SEASONAL BAN OF HILSA FISHING AND ITS IMPACT ON THE LIVELIHOODS OF HILSA FISHERMEN IN A SELECTED AREA OF BARISHAL DISTRICT IN BANGLADESH

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This is to certify that the thesis entitled **"SEASONAL BAN OF HILSA FISHING AND ITS IMPACT ON THE LIVELIHOODS OF HILSA FISHERMEN IN A SELECTED AREA OF BARISHAL DISTRICT IN BANGLADESH"** submitted to the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **"MASTER OF SCIENCE in AGRICULTURAL ECONOMICS"** embodies the result of a piece of bona fide research work carried out by **H. M. ARIN**, Registration No. **11-04345** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.

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ABSTRACT

Hilsa *(Tenualosa ilisha)* is an important fish species in the South and Southeast Asia, especially in Bangladesh. The fish has its unique nature gained international demand for its nutritional value, taste, special aroma and delicacy. It is considered as the national fish of Bangladesh and contributes significantly to the national economy. The Hilsa fish is available almost throughout the year in the major rivers and their tributaries, as well as in the Bay of Bengal. The present study aimed to elucidate the livelihood status of Hilsa fishermen at Barishal district in Bangladesh during August, 2017 to August 2018 through questionnaire survey method. The findings showed that, 58.3% fishermen had Hilsa fishing experience of (0-20) years. Near about 100% fishermen reported that Hilsa population is increasing day by day because of imposing the banning period by the government. The present study revealed that 16.7% had monthly income up to Tk. 10,000, 21.7% had monthly income from Tk. 11,000 – Tk. 15,000, 41.6% had monthly income Tk. 15,000- Tk. 20,000 and above monthly income Tk. 20,000, the percentage of fishermen was 20%. In banning period 40% of the fishermen had income level was zero, 25% had total income upto Tk. 20,000 and 15% had total income Tk. 21,000- Tk. 25,000. To conquer the vulnerable condition of Hilsa fishermen during banning season, govt. has already taken some steps including subsidy (by VGF) to the true fishermen through which govt. allocated 40 kg rice/month for three months for every fishermen. But unfortunately they did not get actually quantity due to the dishonesty of local members and chairman. The socio-economic condition of the fishermen in the adjacent area was not satisfactory. The fishermen were deprived of many amenities. Ban of all kinds of fishing for 2 months has positive impact on production of Hilsa and other fishes. But due to ban of all types of fishing gears fishers livelihood have been affected during this ban period as they do not have any alternate income generating activities. Providing some sorts of management policy as well as providing of some extra providence during the ban season of the fishing which may be done within the provision of the VGF card might be recommended for the better livelihood of the fishermen in greater Barishal region. The problems and constraints, of course are interrelated with one another and hence, need to be removed comprehensively through an integrated program for the better livelihood of the Hilsa fishermen.

ACKNOWLEDGEMENT

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ABBREVIATIONS AND ACRONYMS

BBS	=	Bangladesh Bureau of Statistics
BCR	=	Benefit Cost Ratio
BFRI	=	Bangladesh Fisheries Research Institute
BER	=	Bangladesh Economic Review
DAE	=	Department of Agricultural Extension
DFID	=	Department for International Development
DoF	=	Department of Fisheries
DFO	=	District Fisheries Officer
e. g.	=	exempli gratia (for example)
et al.	=	et alia (L.) and other
etc.	=	et cetera (other and so forth)
FGD	=	Focus Group Discussion
FAO	=	Food and Agricultural Organization
GM	=	Gross Margin
Gm	=	Gram
GC	=	Gross Cost
GDP	=	Gross Domestic Product
GoB	=	Government of Bangladesh
GR	=	Gross Return
HSC	=	Higher Secondary Certificate
Kg	=	Kilogram
Km	=	Kilometer
Ln	=	Natural logarithm
MT	=	Metric Ton
NGO	=	Non-Government Organization
No.	=	Number
NR	=	Net Return
PRA	=	Participatory Rural Appraisal
SSC	=	Secondary School Certificate
SPSS	=	Statistical Package for Social Science

SLA	=	Sustainable Livelihood Approaches
Sq. Km	=	Square Kilometer
SLF	=	Sustainable Livelihood Framework
SWOT	=	Strength, Weakness, Opportunities and Threats
TFC	=	Total Fixed Cost
Tk.	=	Taka (Bangladeshi Currency)
TR	=	Total Return
TVC	=	Total Variable Cost
TV	=	Television
VGF	=	Vulnerable Group Feeding
$	=	U. S. Dollar
%	=	Percentage

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Bangladesh ranks 8th in the world with a population over 164.8 million encompassing an area of 1, 47, 570 sq. km, but in economic consideration it is one of the poorest ones with per capita income (USD, 1466), and low standard of living country compared to other countries. Bangladesh is an agro-based country in South Asia and the country is striving hard to achieve a positive change in the economy which depends particularly on the agricultural sector. Bangladesh is criss-crossed by hundreds of rivers and blessed by rich marine and fresh water resources. A wide portion of land is covered by large rivers such as the Padma, the Jamuna, the Teesta, the Meghna, the Brahmaputra, and the Surma. Rivers are considered as common pool resources (CPR) for the livelihoods of millions of fishers and non-fishers households across the country and includes a number of economic sectors i.e. agriculture, fisheries, industry and commerce (DoF, 2018). There are also thousands of tributaries with a total length of about 24,140 km. These rivers are connected to the Bay of Bengal. Bangladesh is an agro-based country in South Asia and the country is striving hard to achieve a positive change in the economy which depends particularly on the agricultural sector.

Bangladesh is blessed with rich and extensive inland and marine fisheries resources with a wide variety of indigenous and exotic fish fauna. The soil, water and climate of Bangladesh are very favorable for inland fisheries both open and closed water such as *rivers, lakes, Haors, Beels, ponds, Baors, estuaries, coastal belt, seashore* which all together offer tremendous opportunities for fisheries development.

In FY18, Bangladesh earned Taka 4,500 crore by exporting around 69,000 metric tons of fish and fish products. Bangladesh has ranked third in the world in terms of inland fish production in 2018, According to a report by the Food and Agriculture Organization (FAO), 2018. The fisheries sector contributed 3.50 percent to the national GDP in FY19. The country's most important aquatic resource is the Ilish, or the Hilsa shad. Hilsa has the highest contribution in the country's fish production as the single fish species. More than 11% of the country's fish production comes from Hilsa. The country's Ilish fish production has increased by around 150% in last 15 years- thanks to the Government's different conservation initiatives which include a temporal ban on fishing and livelihood support for the fisher-folk (Source-Dhaka Tribune, 24 July, 2018). As a result, Hilsa

production increased from 1,99,032 tons in 2002-03 to 4,96,417 tons in 2016-17. According to the Fisheries Statistical Report of Bangladesh 2016-17, the country's total Hilsa production is 4,96,417 tons- 2,17,469 tons (43.81%) from inland and 2,78,948 tons (56.19%) from marine catches (Source: Dhaka Tribune, 24 July, 2018).

This sector plays a vital role in improving the socio-economic condition, combating malnutrition, earning foreign currency and creating employment opportunities in Bangladesh. Fisheries sector provide food and nutrition as well as job sector. Fish contributes about 60% of the animal protein (DoF, 2018). About 13.16 lakh fishermen are involved in fishing, whereas 8.00 lakh are inland fishermen and 5.16 lakh are marine fishermen.

Tenualosa ilisha (Ilish, Hilsa, Hilsa Herring or Hilsa Shad) is a species of fish in the herring family (Clupeidae) and a popular food fish in South Asia. There are three Hilsa species found in the Bay of Bengal: *Tenualosa ilisha*, Hilsa kelee, and Hilsa toil. The majority of Hilsa fish captured belongs to *Tenualosa ilisha*. Though the Hilsa is generally regarded as an anadromous fish, there is evidence that it is in fact a diadromous fish, which means it migrates both ways between ocean and river. There are two peak seasons of Hilsa migration; the monsoon migration from August to November (which peaks in September-October) and the winter migration (January - February). The Hilsa migrates to the upstream rivers from the Bay of Bengal during May to November for breeding. The juvenile Hilsa (jatka upto 23.0 cm in length) remain for 6 to 7 months in the upstream rivers and estuaries from November to May. After completion of their early life in freshwater and hypo saline brackish water, Hilsa migrate to the sea– the Bay of Bengal. They again migrate back to the   rivers between 2 to 3 years of their lifecycle to spawn. The Hilsa generally migrates in schools, but may also migrate singly or in a small group.

Hilsa is the national fish of Bangladesh having unique taste and nutritional value. Hilsa has the highest contribution in the country's fish production as the single fish species, the fish contributes about 16.4% of the total fish production and about 3.50% of GDP in Bangladesh (DoF, 2018).

Figure 1.1: Snapshot of Hilsa Fish

About 4, 50,000 people are directly involved with the catching for livelihood; around four to five million people are indirectly involved with the trade.

Table 1.1: Yearly Production of Hilsa Fish in Bangladesh

Year	Yearly production of Hilsa (MT.)			
	Inland Water	**Marine Water**	**Total**	**Growth Rate(%)**
2002-03	62944	136088	199032	-9.77
2003-04	71002	184837	255839	28.54
2004-05	77499	198363	275862	7.83
2005-06	78273	198850	277123	0.46
2006-07	82445	196744	279189	0.75
2007-08	89900	200100	290000	3.87
2009-10	114768	198985	313753	4.82
2010-11	114520	225325	339845	8.46
2011-12	114475	232037	346512	1.96
2012-13	98648	252575	351223	1.36
2013-14	127814	257326	385140	9.66
2014-15	135396	251815	387211	0.53
2015-16	139431	255520	394951	1.99

Source: DoF, 2015

In 2014-15 fiscal years, the total Hilsa production was 3.87 lakh MT whereas it increases to more than 4 lakh MT in FY 2015-16). The growth rate was .53 in the fiscal year 2014-15.

Jatka are heavily caught during November and December in estuaries and from January to May in most of the rivers. The rate of jatka catch gradually increases each day due to increasing fishing effort through entry of many new fishers and weak enforcement of fishing regulations. A continuous indiscriminate harvest of jatka may adversely affect the annual total shad catch in the fishery (Amin et al., 2000). If these jatka were not harvested and instead grew to maturity, they would boost total production by an additional 0.2 million MT per year which is double the present annual catch of Hilsa. Therefore, conservation and management of this fish stock in Bangladesh has become very important both to optimize total production and ensure the livelihoods of fishers. It is necessary to reduce the harvest of jatka in order to increase overall Hilsa production.

For ensuring sustainable production of Hilsa, the govt. has adopted a coordinated program to conserve jatka in 2003-04. Each year April and October ban on Jatka catch is being implemented. Due to successful implementation of Jatka conservation program, an incremental production of 4.83 lakh MT of Hilsa is estimated during the last six years since 2003-04 worth an amount of Tk. 12075 crore (DoF, 2015).

1.2 The Meaning of Hilsa Fish Ban

A ban is a formal or informal prohibition of something. Some see this as a negative act (equating it to a form of censorship or discrimination) and others see it as maintaining the "*status quo*". The Hilsa is distributed in all major rivers, including the Meghna, Padma, Jamuna/Brahmaputra, and in some minor coastal rivers such as the Tetulia, Baleshwari, and Andermanik. Around 7,000 square kilometers area of rivers in 27 districts have been earmarked as the breeding ground of the Hilsa, according to a fisheries and livestock ministry's note. The 27 districts are: Chandpur, Laxmipur, Noakhali, Feni, Chittagong, Cox's Bazar, Barisal, Bhola, Patuakhali, Barguna, Pirojpur, Jhalakathi, Bagerhat, Shariatpur, Brahmanbaria, Dhaka, Madaripur, Faridpur, Rajbari, Jamalpur, Narayanganj, Narsingdi, Manikganj, Munshiganj, Khulna, Kushtia and Rajshahi. Apart from rivers of those districts, all the coastal areas and estuaries will be under the purview of the ban. The government imposed the ban from March to April to ensure its safe spawning in Barishal district. If anyone caught fishing during the period from 1ˢᵗ April to April 30 and from 1ˢᵗ October to October 30 would face legal actions.

The main reason for the good catch is the ban on fishing at the height of the Hilsa breeding season, in the last week of October and first week of November. The fact that the Hilsa needed protection did not permeate official consciousness in Bangladesh till 2002, when the annual catch slumped to 199,000 tones. It had been about a million tones till the early 1990s. Apart from the media furor caused by Hilsa-loving citizens, the slump had an effect on nutrition. Till then, the Hilsa was estimated to meet around 10% of fish protein consumption in Bangladesh.

In 2014, the government started with an 11-day ban on fishing in all rivers, estuary and seas. Likewise in 2015, the ban was extended to 15 days. The government has imposed a ban on catching, selling, hoarding and transportation of Hilsa in different rivers for 22 days from October 12, 2016 to protect Hilsa breeding. The banning duration will be extended from 22 days to 1 month from 2018 (DoF, 2015).

Five sites in the rivers of Meghna and Padma, and some inshore marine areas, have been declared as Hilsa sanctuaries under the protection and Conservation of Fish Act, 1950, to achieve desired development of Hilsa. The largest nursery ground of Hilsa can be found in the Meghna river. These breeding grounds form the sanctuaries where fishermen are not allowed to fish between certain periods, and are thus compensated. Every year the highest number of ripe and running Hilsa are caught during 5 days before and 5 days after the full moon of Barapurnima (Full Moon of Durga Puja) in October (Ashwin-Kartik). So, catch of Hilsa has been banned each year in the following major spawning grounds during the highest breeding time (13 Oct – 23 Oct).

Table 1.2: Hilsa Sanctuary Areas in Bangladesh

Sl No.	Hilsa sanctuary areas	Ban period
1	From Shatnol of Chandpur district to Char Alexander of Laxmipur (100 km of lower Meghna estuary)	March to April
2	Madanpur/Char Ilisha to CharPial in Bhola district (90 km area of Shahbajpur river, a tributary of the Meghna)	March to April
3	Bheduria of Bhola district to Char Rustum of Patuakhali district (nearly 100 km area of Tetualia river)	March to April
4	Whole 40 km stretch of Andharmanik river in Kalapara upazila of patuakhali district	November to January
5	Lower Padma River at Shariotpur district, 20 km stretch of the Padma River	March to April

Source: Rahman *et al.* (2011).

The government is going to make an addition to the existing list of five sanctuaries for Ilish (Hilsa) fish – one of the major foreign revenue earning natural resources of Bangladesh. The new proposed sanctuary would be located in three tributaries of the Meghna River, somewhere between Hijla and Mehendiganj in Barisal district.

1.3 Livelihood Concept

1.3.1 Livelihood

"A livelihood is sustainable when it can cope with, and recover from stress and shocks (drought, flood, war, etc.), maintain or enhance its capabilities and assets, while not undermining the natural base".

In other words,

"Livelihood comprises the capabilities, assets (including both material and social) and activities required for a means of living (Chambers and Conway, 1992)".

Livelihoods are 'means of making of living', the various activities and resources that allow people to live.

A livelihood is a combination of the resources used and the activities undertaken by a household for the material provisioning of its member.

"A livelihood, on the other hand, is engagement in a number of activities which, at times, neither require a formal agreement nor are limited to a particular trade. Livelihoods may or may not involve money. Jobs invariably do. Livelihoods are self- directing. Livelihoods are based on income derived from "jobs", but also on incomes derived from assets and entitlements".

1.3.2 Principal of Livelihood

- People-centered
- Responsive and participatory
- Multi-level
- Conducted in partnership with public and private sectors
- Sustainability
- Dynamic
- Holistic
- Building on strengths

Ian Scoones (1998) noted that five key indicators are important for assessing the achievement of sustainable livelihoods.

  i. Creation of working days
  ii. Poverty reduction
  iii. Improvement of well-being and capabilities
  iv. Livelihood adaptation, vulnerability and resilience enhancement and
  v. Surety of natural resource based sustainability.

1.3.3 Sustainable Livelihood Framework

A framework is an explicit and simplified representation of reality that groups use to interpret evidence and solve problems to successfully act in a changing world (Fararo 2003). This formalization led to the UK Department for International Development (DFID) Sustainable Livelihood Framework (SLF). It is based on the interactions of six elements necessary for livelihoods, organized in a simple structure to stimulate discussion. Using the framework to design livelihoods helps ensure the important components described below are included:

1. Assets (what people have): The Sustainable Livelihood Framework presents many types of assets, and emphasizes that they interact in different ways. Versions of the Sustainable Livelihood Framework present different asset categories.

2. Strategies (what people do): The Sustainable Livelihood Framework indicates that strategies are determined by assets and by the rules that determine what people can do with their assets.

3. Outcomes (what people get from what they do): In the Sustainable Livelihood Framework, strategies produce outcomes (e.g. nutrition), but those outcomes must be sustained to build assets (e.g. health).

4. Transforming Structures and Processes (the rules that determine who can do what): The Sustainable Livelihood Framework emphasizes the interactions: top- down and bottom-up, cross-sectorial and cross-scale.

5.Vulnerability Context (the risks to people's assets): The Sustainable Livelihood Framework clarifies that risks are linked to rules and affect assets, but that strong assets can resist the risks or can be used to influence the design of rules that enable risks to be managed with more certainty.

6. Influence and Access (the ability to change rules, using assets): This component indicates that rules must be accessible to change, but the ability to influence those rules depends on assets, such as relevant knowledge or political status.

1.4 Status of Hilsa Fishermen

Hilsa fishermen are one of the most vulnerable communities in Bangladesh. They are poor by any standard and over the years economic condition of the fishermen had further deteriorated. From the point of view socio-economic conditions of fishermen usually, it is told that the fishers are the poorest group of the people in the country.

Fishers are engaged throughout the year in the Hilsa fishery in Bangladesh. The people do not possess any land for crop cultivation so the rivers and Hilsa are their only means of survival. Ignoring the intense heat of the sun, the lack of security and safety measures during monsoons and tidal waves, and having little or no food during fishing, these fishers struggle for their livelihood. Some fishers are happy with a catch of just one average-sized fish per day, as it provides them with money needed to feed their family or repay a boat loan. Most of the fishers are so poor that they are unable to upgrade their boats. Most of these fishers are illiterate, and their children cannot attend school because they must help their fisher parents. The fishers who are prevented from catching Jatka under the conservation program come from the poorest segments of the community.

Most of the adult and Jatka Hilsa fishers live below the poverty line, and most work in teams as laborers/fishers. The wealthier people own the boats and nets. During the Jatka season, the fishers are dependent on fishing for their livelihood and do not have any alternative sources of income to support their families. Being an isolated community, fishermen are deprived of many amenities of life mostly in banning season. Unfortunately, there have very minor governmental and other organization (NGOs) initiative to manage and improve Hilsa fisher's condition in this area and there have no clear understanding about the impact of banning period on the livelihoods of the fishermen. For these reasons, the Jatka fishers need alternative sources of income, at least during the ban on juvenile harvest period. Man-made influences, river siltation, closure of migratory routes, over-fishing, use of damaging fishing gears, pollution, hydrological and climatic changes are responsible for the decline of Hilsa fish. However, socio-economic status of Hilsa fishermen is not satisfactory; production of Hilsa in the river also declining day by day.

Considering the above fact, the present study was carried out to compare the relative livelihood pattern between before and during banning period of the Hilsa fishermen.

1.5 Justification of the Study

A good number of studies have been conducted on livelihoods of Hilsa fishermen but very limited number of research have been conducted on banning period on Hilsa fish. The present study aims at comparing the relative livelihood pattern of Hilsa fishermen before and during the banning period in some selected areas of Barishal district. It is expecting to bring into focus the important information regarding impact of seasonal banning on Hilsa fishermen's livelihoods. This study will be helpful in identifying the factors affecting the Hilsa fishermen income before and during banning period. This study will provide appropriate suggestion and policy recommendations which will help the development agencies and policy makers of the country for improving the livelihood pattern of the fishermen.

1.6 Objectives of the Study

The specific objectives of the studies are as follows:

1. To examine the socio-economic status of Hilsa fishermen.

2. To identify the factors affecting Hilsa fishermen's income before and during banning period.

3. To identify the problems faced by the Hilsa fishermen and

4. To suggest policy guidelines.

CHAPTER 2
REVIEW OF LITERATURE

Review of literature in any research is essential because it provides opportunities for reviewing the stocks of knowledge and information for the research which give a guideline in designing the future research problems.

Although a good number of studies have been done on the livelihood status of fishermen but it is limited throughout the world in comparison with other research work. A few studies on Hilsa fishermen livelihoods status had been done in Bangladesh. However, some existing information has been compiled here:

Alam (2006) determined the socio-economic conditions of fish farmers in some selected areas of Mithapuqur Upazila in Rangpur district. He found the average pond size was 0.15 ha, about 32% were seasonal and remaining 68% were perennial. The Study revealed that 80% of the farmers having single ownership and 20% having multiple ownership of their pond. The stocking density was found to be 17,262 fry/ha/year and annual yield was 2,609kg/ha/year. The average production cost was Tk. 65,236/ha/year. The net profit was Tk. 52,596/ha/year and cost benefit ratio was 1.81.

Mome (2007) categorized three major types of Hilsa fishers: the boat owner, head mazhi (skipper) and the crew. Usually the boat owners own the boats and the nets and offer their boats and nets for fishing to the head mazhi. The usual shares of the above categories of the fishers are that the boat owner gets 50-70% of the total catch, the head mazhi gets 2-3% of share, assistant head mazhi and the boat driver get 1.5% of share and the crew of labors fishers, deducting the cost of fishing get only 1% share for the fishing operation. The annual expenditure for livelihood (except capital cost) of the artisanal Hilsa fishers was found to average Tk. 76,045 and for consumption it was an average of tk. 38,300. So the overall socio-economic conditions of the Hilsa fisher-folk in both the upper and lower regions are very poor. If the production or CPUE decline, the socio-economic conditions of the Hilsa fisher folk will worsen further.

Ali *et al.* (2008) assessed the livelihood status of the fish farmers in Hamirkutsha and Kamarbari Unions of Bagmara Upazila under Rajshahi district. Most of the fishers belonged to the age category of 31 to 40 years and average education level of 9.86 years of schooling, represented by 94% Muslims and 6% Hindus. About 54% of the farmers have tin shed house while 26, 14 and 6% of the farmers have half-building, building and katcha house, respectively. Average annual incomes of majority of fish farmers were above Tk. 75,000 per annum and 62% of the farmers

used semi-pucca sanitary, 28% used pucca sanitary while only 10% used katcha sanitary. About 62% of the farmers had electricity facilities while 16 38% did not have and 88% of the farmers used own tube-well, while 12% of the farmers used neighbor's tube-well. Forty six percent of the farmers received health service from village doctor or kobiraj, 18% have access to upazila health complex, 14% went to district hospital, 20% consulted with MBBS doctor and 2% of the farmers do not take any treatment due to lack of money.

Ali *et al.* **(2009)** conducted a study on assessment of the livelihood status of the fish farmers in some selected areas of Bagmara upazila under Rajshahi district. Average pond size was 0.13 ha with single (64%) and multiple ownerships (36%). Most of the fishers were belonged to the category of 31 to 40 years and average education level of 9.86 years of schooling, represented by 94% Muslims and 6% Hindus. Average annual incomes of majority of fish farmers were above Tk. 75000 per annum. Lack of scientific knowledge, multiple ownerships and lake of capital for fish culture were the major constraints.

Hossain *et al.* **(2009)** undertook a study to determine the socio-economic condition of fishermen in seasonal floodplain beels in Rajshahi District, Bangladesh. There are 2.8 million hectares seasonal floodplain beels. It was found that most of the fishermen were at the age group 31-40 years, larger family size (5.6-5.8) belong to landless fishermen. 46.6% landless fishermen on both the sites were illiterate with no person above secondary level. Among landowners rate of illiteracy were lower and13-20% were educated above secondary level. Housing condition of landless fishermen is mostly Katcha (60- 67%) and of landowners mostly semi-pucca (60-73%). The average annual household income of the landowners" fishermen ranges from Tk. 77396 to Tk. 96888 whereas average annual household income of the landless fishermen ranges from Tk. 36407 to Tk. 37990 which is much below the poverty line. Average fish consumptions for all types of farmers are 1.38 kg/capita/month.

Swapan (2010) studied to assess the impacts of banning period on the socio-economic conditions of the Hilsa fishing community of Monpura Island in Bhola district, Bangladesh, during February to July, 2010. He found the majority (74%) of the fishermen used *Katcha* sanitary latrine and during banning season fisher's tendency of going to village doctor and *kabiraj* increased from 38% to 50% and 12% to 32%, respectively, for health care due to low income.

Minar *et al.* **(2012)** studied the livelihood status of fishing community of the Kirtonkhola river adjacent to the Barisal town. Most of the fishermen belonged to the age groups of 31 to 40 years

(56.00%), represented by 88% Muslims. Fishing community's family size is usually consisted of 5-6 members and medium family is the predominant (70%) among the fishermen but in a joint family (84.00%). About 12% of the fishermen only could write name while 80%, 8% and 0% of the fishermen were illiterate, primary and secondary level of education holders respectively. Over 80% of the fishermen primary occupation was fishing, 10% was engaged in agriculture and daily labor activities respectively. About 70% of the fishermen received health service from village doctors, 24% from upazila health complex and remaining 6% got health service from MBBS doctors. Around 14% fishermen used their own tube-well, 62% used shared tube-well and remaining 24% used neighbors tube-well for drinking water purpose. About 74% of the fishermen used katcha sanitary while 10% used semi-pucca sanitary, and 16% of the fishers had no sanitary facilities.

Rahman *et al.* **(2012)** conducted livelihood status and the potential of alternative income generating activities of fishers'' community of Nijhum Dwip under Hatiya upazila of Noakhali district in Bangladesh. In the study area the average homestead area of the fishers was 8.75 decimal. Among the fishers'', 66.66% were illiterate while 16.66% had a primary education and another 16.66% can sign only. In sanitation, 95% households used katcha latrine. In the community, 41.67% were nuclear family and 58.33% were joint family. The highest number (46%) of the fishers'' annual income ranged between Tk. 50,000 and Tk. 75,000. In case of social status, 80% were ordinary persons and only 5% were local leaders. Major constraints and alternative income generating activities (AIGAs) of the fishers'' livelihood were identified.

Kabir *et al.* **(2012)** investigated livelihood status of fishermen of the Old Brahmaputra river, Bangladesh. Most of the fishermen belonged to the age groups of 31 to 40 years (50.00%), represented by 95% Muslim. Over 70% of the fishermen primary occupation was fishing, 20% was engaged in agriculture and 10% in daily labor activities. About 2% of the fishermen only could write name, while 88%, 10% and 0% of the fishermen were illiterate, primary and secondary level of education respectively. About 60% of the fishermen received health service from village doctors, 30% from upazila health complex and remaining 10% got health service from MBBS doctors. About 60% of the fishermen used katcha while 10% used semipaka and 30% of the fishers had no sanitary toilet facilities. Around 40% fishermen used their own tube-well, 50% used shared tube-well and remaining 10% used neighbors tube-well for drinking water purpose.

Khatun *et al.* (2013) reported the socio-economic status of fish farmers of the Charbata union Noakhali district, Bangladesh. Fish farmers belonged to the age groups of 36 to 50 years (46%), represented by 82% Muslim. About 6% and 36% of fish farmers were involved in fish farming as their primary and secondary occupation, respectively. About 18% had no education while 16%, 42%, 14% and 10% had primary, secondary, higher secondary and bachelor level of education respectively. About 34% fish farmers average annual income were Tk. 75,000 to Tk.1,00,000. About 74% the of fish farmers received health service from village doctors and remaining 22% and 4% got health service from upazila health complex and MBBS doctors respectively. The provision of training facilities was insufficient as only 14% of the fish farmers received formal training on fish farming. About 94% of the fish farmers reported, their socio-economic conditions were improved through fish farming.

Islam *et al.* (2013) assessed the livelihood of fishermen in Monirampur Upazila of Jessore district Bangladesh. The mean age and fishing experience of fishermen were 35.22 ± 9.67 and 17.9 ± 7.12 years, respectively. The mean monthly income of the household was BDT 9470±4806.89. Only 2% fishermen were landless. Primary occupation for majority fishermen (90%) was fishing. About 4% fishermen had training on fishing/fish culture; 46% fishermen involved in NGOs for loan and savings; 52% fishermen cultivated paddy during boro (summer) season whereas only 18% cultivated paddy during Aman (rainy) season.

Pravakar *et al.* (2013) assessed the status of fish farming and livelihood of fish farmer in the Shahrasti Upazila of Chandpur district, Bangladesh. The study revealed that average pond size was 0.24 ha with 85% of the farmers having ponds of single ownership. Indian major carps and exotic carps were mainly cultured where 10% ponds were seasonal and 90% perennial. Most of the fish farmers belonged to the age groups of 41 to 60 years (44%), represented by 75% Muslims. About 10% had no education while 16%, 48%, 16% and 10% had primary, secondary, higher secondary and bachelor level of education respectively. About 20% of fish farmers were involved in fish farming as their primary occupation while 45%, 25% and 10% were involved in business, agriculture and service respectively. The provision of training facilities 20 was insufficient as only 34% of the fish farmers received formal training on fish farming. About 94% of the fish farmers reported their socio-economic conditions were improved through fish farming. Fish disease, non-availability of fish fry, pouching, insufficient water in dry season, poor technical knowledge, lack of quality feed and lack of money for fish farming was identified as the major constraints.

Paul *et al.* (2013) studied the livelihood status of fishing community in Turag river area, Bangladesh. Most of the fishermen were belonging to the age groups of 35-40 years old (30%) in Birulia and 40-45 years old (56%) in Boroibari, majority featured by Hindus. All of the fishermen in Birulia received loan from various microcredit NGO namely ASA, GRAMEEN, ADESH and in Boroibari all of the respondent fishermen were the beneficiaries of various management program like IPAC. About 63% fishermen in Birulia and 35% fishermen in Boroibari had a moderate annual income (Tk. 30000-Tk. 60000). About 33% fishermen in Birulia and 65% fishermen in Boroibari had a high annual income (above 60000 Tk.).

Patwary (2014) assessed the livelihood status of Hilsa fishermen in Haimchar upazila under Chandpur district. The Study revealed that 44% fishermen had Hilsa fishing experience of 5-10 years. The rest 30%, 16%, and 10% fishermen had experience of 11-20 years, 21-30 years, and above 30 years of fishing, respectively. From the study, it was found that about 78% fishermen caught Hilsa ranging 500gm -1000 gm as opposed to 22% fishermen caught Hilsa above 1000 gm, it was also found that Muslims constituted 86% of the fishermen community as opposed to 14% Hindus. River erosion is the main barrier for the fishing community and they also have to face flood and other natural calamities. Reduction in fish catch, use of low technique fishing gears, inadequate processing and marketing infrastructure etc. were the barriers of increasing income from fishing and fishing labor as well.

Faruque *et al.* (2014) conducted a study to assess the socio-economic Status of the Hilsa (*Tenualosa ilisha*) fishermen of Padma river, Bangladesh. The study revealed that most of the fishers were belonged to the age category of 31 to 40 years represented by 56.52- 75.00% professional, 20.83-43.48% occasional and 0.00-7.69% subsistence fishermen. About 67.54% of the Hilsa fishermen of Charghat upazila were only could sign their name while 16.62%, 14.05% and 1.57% were illiterate, primary and secondary level of education respectively. In Godagari about 17.79% of fishermen had no education. Catching of Hilsa fish in Padma River was dominated by Muslim fishermen except Horisonkorpur (majorities were Hindus). It was ranged from 45.83 to 78.57% and on an average 57.14 to 78.26 % of the fishermen had four to six family members followed by 21.74 to 33.33% had one to three family members and 4.17 to 14.29% had seven to nine family members. Average annual incomes of most of them were ranged from taka Tk. 30,000 to TK. 39,999 (85.13%) and 1.79% had above taka 50,000. About 68.14% fishermen households were dependent on village doctor and 24.05% and 7.81% received health service from

the Upazila health complex and Kabiraj respectively. Most of the fishemen's housing conditions were Katcha and 90% fishermen household under Godagari upazila used the river water for drinking and other purposes. The main problems were identified as extortion by local extortionist; other problems such as inadequate credit facilities, lack of appropriate preservation facilities and frequent conflict between professional and non-professional fishermen and between Muslims and Hindus fishermen were prominent.

Sarker *et al.* **(2016)** assessed the livelihood status of Hilsa (*Tenualosa ilisha*) fishermen of Greater Noakhali regions of Bangladesh. During Hilsa fishing, Pangas (*Pangasius pangasius*), Koral (*Lates calcarifer*) and Poa (*Johnius coitor*) were also found to capture as by catch using Chandi jal (set gill net). 85% fishermen were observed to use mechanized (5-40 HP; Horse Power) boats in the study areas. Hilsa fishing was noticed mostly during October-November while such activities was almost absent during February-May (off period) which made fishermen to start migrating temporarily to the nearest urban areas for their livelihood. Although the Government of Bangladesh formulates an act to have fishing license yet 20% of the fishermen were found having valid fishing license in the study areas. Average daily net income of the fishermen during fishing period was TK. 600 whereas their real field daily income through fishing supposed to be Tk. 1695 if they are supported by nets, boats, fuels etc., which means almost 64% of their daily income is taken by the aratdars. The above review reveals a good number of studies have been conducted on livelihoods of Hilsa fishermen but very limited numbers of research have been conducted on banning period on Hilsa fish. The present study aims to compare the relative livelihood pattern of Hilsa fishermen before and during the banning period in Bakerganj Upazila of Barishal district. It is expected to bring into focus the important information regarding impact of seasonal banning on Hilsa fishermen's livelihoods.

CHAPTER 3
MATERIALS AND METHODS

Methodology refers to the way in which a research is accomplished. The materials and methods section is the most important aspect of a scientific research because it provides the information by which the validity of a study is ultimately judged. The credibility of the result of a research depends on the appropriate methodology used in the research. Proper methodology is the prerequisite of a good research. The researcher gave a careful consideration in following a scientific and logical methodology for carrying out of this research. The design of any study is predominantly determined by the nature, aims and objectives. Improper methodology often creates erroneous result. There are various methods of collecting data to be used in research. The present study was based on primary and secondary data. For the present study, survey method was used to collect primary data. The word "Survey" refers to a method of study in which an overall picture of a given universe is obtained by systematic collection of all available data on the subject.

A survey is a data collection method used to gather information about individuals. Survey method was selected for data collection as this method allows collecting a large amount of data in a relatively short period of time, the method is less expensive and can be created quickly and administered easily.

A survey usually involves the collection of original data from a selected sample within the area studied (Yang, 1965). In this method "Survey method" was employed mainly due to in following two reasons:

    a. Study enables quick investigations of large number of cases; and

    b. Least cost involved than other methods and the results have wider applicability.

There are three methods by which Survey data can be gathered (Dillon and Hardaker 1993). These are-

- Direct Observation;
- Interviewing respondents;
- Records kept by the respondents.

Since the fishermen of Bangladesh do not usually maintain records, the second method was followed to achieve the objectives of this study. The survey method has advantages over the methods. However survey method is not free from drawbacks. The drawback of this method is to rely on the memory of the respondents.

To overcome this problem, repeated visits can be made to collect data in the study area and in the case of any omission or contradiction the fishermen should be revisited to obtain the missing and/or correct information.

The present study was based on a field survey where primary data were collected from individual fishermen including selection of the study site, selection of the samples and sampling technique, preparation of the survey schedule, period of data collection, collection of data, editing and tabulation of data, analysis interpretation and presentation of data.

The design of the present study involves some necessary steps which are presented in the following figure:

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┌──────────────────────────────────────────────────┐
│            Selection of the study area             │
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┌──────────────────────────────────────────────────┐
│             Target group: Fishermen               │
└──────────────────────────────────────────────────┘
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┌──────────────────────────────────────────────────┐
│    Selection of the Sample and Sampling Technique  │
└──────────────────────────────────────────────────┘
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┌──────────────────────────────────────────────────┐
│             Period of Data collection              │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│            Preparation of Questionnaire            │
└──────────────────────────────────────────────────┘
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┌──────────────────────────────────────────────────┐
│             Methods of data collection             │
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Primary Sources
- Key informant's survey
- Questionnaire survey
- PRA and FGD

Secondary data
- Crosscheck interviews
- Project reports and documents
- Journals and Maps

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┌──────────────────────────────────────────────────┐
│             Entry and processing of Data           │
└──────────────────────────────────────────────────┘
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┌──────────────────────────────────────────────────┐
│                  Data Analysis                     │
└──────────────────────────────────────────────────┘
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┌──────────────────────────────────────────────────┐
│                  Thesis writing                    │
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Figure 3.1: An Overview of the Steps Followed for the Study

3.1 Selection of the Study Area

Selection of the study area is an important factor for socio-economic study of target population. The study area and sample units were selected keeping in mind the objectives of the study. Study area should be selected carefully and tactfully so that they serve to fulfill the specific research objectives. A study usually requires selection of an area for collecting data in accordance with the objectives set for the study. The area in which a study is to be made depends on several factors like availability of data, the particular purpose of the study, access to the area and possible cooperation from the fishermen.

For easy accessibility, time and resource constraints, Bakerganj upazila of Barishal district was selected purposively for data collection. It may be noted that Barishal is well recognized for Hilsa fish. It would be time consuming to conduct the study to all over the Barishal district. For this reason Bakerganj upazila was selected for conducting the study.

Figure 3.2: Map of Bakerganj upazila in Barishal

Apart from this the reasons for selecting the upazila was as follows:

1. Suitability of the areas to fulfill the objectives of the study area.
2. Concentration of different types of fishermen and
3. Good communication system to the selected area.

3.2 Target Group: Fishermen

In the study area a good number of fishermen were known to be engaged in fish catching in Bakerganj. Fishing is the main activity for most of these people. There are 10836 enlisted fishers (personal communication, Upazila Fisheries Officer of Bakerganj Upazila) engaged in Hilsa fishing.

3.3 Selection of the Sample and Sampling Technique

The main purpose of sampling is to select a small group which will represent a reasonably true picture of the population. Two factors need to be considered before selecting a sample. First one relates to the sample size which should be large enough to allow for adequate degrees of freedom in the statistical analysis. On the other hand, administration of field research, processing and analysis of data should be manageable within the limitations imposed by physical, human and financial resources (Mannan, 2001). The size of the sample depends on a number of factors like variability in local conditions, the degree of precision required, the types of tabulation desired, the funds, the personnel and the time available for research. A sample of representative farms is, therefore, chosen in such a way that the information meets the purpose of the study. Survey method was followed to collect data while simple random sampling technique was used to select the Hilsa fishermen. The list of Hilsa Fishermen was prepared through a preliminary short survey with the help of Department of Fisheries (DoF) and Department of Agricultural Extension (DAE) personnel, after which they were selected by using random number table. Pertinent data for this study were collected from purposively selected 60 (Sixty) Hilsa fishermen comprising of younger, middle aged and elderly experienced fishers. To achieve the objectives of the study, a comprehensive interview schedule of was used to collect data.

3.4 Period of Data Collection

The researcher herself collected necessary data through personal interviews with the selected fishermen. Data were collected for 6 months from October 2018 to March, 2019. These months were selected because banning started on firstly October and then March. The research objectives

were to compare the livelihood pattern of Hilsa fishermen before and during the banning period and that's why these months were selected.

3.5 Preparation of Questionnaire

Preparation of the questionnaire is of crucial importance in any socio-economic study. The main consideration in this respect is to obtain reliable data from the respondents for the preparation of a suitable survey schedule. In conformity with the objective of the study a draft Survey schedule was prepared in such a way that reliable data could be collected from the fishermen. Then the draft schedule was tested and attention was paid for inclusion of new information which was not included in the draft schedule. Thus the draft schedule was improved, rearranged and modified in the light of the actual and practical experience gained during the pre-test. After making necessary adjustment a final survey schedule was developed in logical sequence so that the fisherman could answer chronologically. The final schedule included the following information:

- Identification of sample fishermen;
- Income and expenditure of fisherman;
- Farm size of the fishermen;
- Family size, composition and occupation of the sample fishermen;
- Cost and return in banning period;
- Food intake for fishermen before and during the banning period;
- Other relevant aspects of livelihood, impacts of banning period, alternative livelihood;
- Problems and constraints in Hilsa fishing;
- Suggestion with respect to the problems faced by the fishermen.

3.6 Methods of Data Collection

Collection of accurate and reliable data and other necessary information from the field is not an easy task. It must be done properly since the success of the study depends on the reliability of the data. The study is based on both primary and secondary sources of data. Primary data was collected through the survey schedule. Secondary data and information were collected from various governmental and non- governmental organizations.

For the study a combination of interview schedule, participatory rural appraisal (PRA), focus group discussion (FGD), and cross-check interviews with key informants were used for

fishermen. The sources and methods used to collect data for the research are outlined below:

3.6.1 Primary Data

The researcher collected the relevant data from the fishermen through face to face interview. Before conducting actual interviews, the whole academic purpose of the present study was clearly explained to the respondents. All possible efforts were made by the researcher to ensure the collection of reasonably accurate information from the field. When the fishermen were not so much busy with their activities, then the selected fishermen were interviewed using semi-structured questionnaire. During the interview, each respondent was given a brief introduction about the nature and purpose of the study. The questions were asked systematically in a very simple manner with explanations whenever it was felt necessary and the replies were recorded on the schedules. After completion of each interview, the questionnaires were checked and verified to be sure that answers to each question was properly recorded. If any data appeared to be inconsistent, the fishermen were again interviewed for relevant answers. In order to minimize errors, data were collected in local units. Later they were converted into standard units.

3.6.2 Secondary Data

In addition to field level primary data, secondary data and information having relevancy with this study were also collected and discussed for this research from different handouts, reports, published and unpublished documents of the Government of Bangladesh and its different organizations and agencies such as Statistical Yearbook of Bangladesh, Bangladesh Economic Review, various journals, newspaper, notifications etc.

3.6.3 Questionnaire Reviews

For Questionnaire interviews, purposive sampling method was followed for 60 fishermen in the study area. Fishermen were interviewed at the river sites, on the boat and at home. Each interview required about half an hour and the information was recorded.

3.6.4 Focus Group Discussion

For the present study, participatory rural appraisal (PRA) tool such as, focus group discussion (FGD) was conducted with the fishermen. FGD was used to get an overview of particular issues such as, livelihood, alternate livelihood, impact of banning season, subsidy from government etc. FGD sessions were held with fishermen at river side, at tea stall, under the trees where there was spontaneous gathering.

3.6.5 Cross-Check Interviews

After data collection through questionnaire interviews and FGD, it was necessary to check the information for justification of collected data. Cross - check interviews were conducted with key person such as, upazila Fisheries Officer (UFO), District fisheries officer, AFO, and relevant NGO workers for the confirmation of relevant information.

3.7 Entry and Processing of Data

The data and information collected through interviews, discussions and communications were scrutinized, classified, edited and coded. The responses of the respondents that were recorded in the questionnaire were transferred into a master sheet for entering the data in the computer. Data entry was then done by the researcher. After completing the pre-tabulation task, actual tabulation work was started. A list of tables was prepared and finally tabulated data were analyzed on the basis of the objectives of the study. Different computer software packages like Microsoft Excel and Statistical Package for Social Science (SPSS) were used for analyzing the data. The final results of the analysis were summarized and presented in tabular forms with their meaningful interpretations.

3.8 Data Analysis

Data analysis is an important step for any research work. Analytical techniques enable researcher to examine complex relationships between variables. Data were analyzed with a combination of tabular and functional analysis. Various descriptive statistical measures (i.e., sum, average, percentages, ratios, etc.) were employed to achieve the objectives.

3.8.1 Socio-economic Characteristics of Hilsa Fishermen

Socio-economic data were presented mostly in the tabular form. This form is simple in calculation, widely used and easy to understand. Some statistical measures like average, percentage and ratios were calculated to examine the socio-economic characteristics of sample farmers.

3.8.2 Statistical Techniques

Data were analyzed in accordance with the specified design to accomplish the objectives of the study. In the present study, the following analytical technique were used:

3.8.2.1 Cost and Return Analysis

In the present study, cost and return analysis considered both variable cost and fixed cost. To achieve the objectives of the study simple tabular analysis was used to determine the net return

of the fishermen. Following equations were used:

Gross Return

Gross return was calculated simply by multiplying the total volume of output by its per unit of price in the harvesting period (Dillon and Hardaker 1993). The following equation (Afroza, 2012) was used to calculate gross return (GR):

$$GR = Pb. \, Qb$$

Where, GR = Gross return from product

Pb = Price of Product

Qb = Quantity of product

Gross Margin

Calculation of gross margin was done to have an estimate of the difference between total return and variable cost. The argument for using gross margin analysis is that the fishermen are more interested to know their return over variable cost. The following equation (Afroza, 2012) was used to assess the gross margin:

$$GM = TR - VC$$

Where, GM = Gross margin

TR = Total Return

VC = Variable Cost

Net Return

Net return was calculated by deducting all cost (variable and fixed) from gross return. To determine the net return of the Hilsa fishermen, the following equation (Afroza, 2012) was used in the present study:

$$\Pi = PF. \, QF - (TC)$$

Where, π = Net return/ Profit of Hilsa fishermen

PF = Per kg. Price of Hilsa fish

QF = Quantity (kg.) of Hilsa

TC = Total Cost

3.8.2.2 Multiple Linear Regression Model

Multiple linear regression model was chosen to estimate the effects of variables on income of fishermen. The double log linear regression model proved to be a superior alternative on theoretical and economic grounds. The multiple regression model was selected for the study.

The specification of the multiple linear regression model was as follows:

$$Y = aX_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6} u_i$$

By taking log in both sides the multiple linear regression model, it was transformed into the following logarithmic form, because it could not be solved by ordinary least square (OLS) method.

$$lnY = lna + b_1lnX_1 + b_2lnX_2 + b_3lnX_3 + b_4lnX_4 + b_5lnX_5 + b_6lnX_6 + u_i$$

Where,

Y = Income difference between before and during banning (Tk);

ln a = Intercept of the function;

X_1 = Subsidy (Tk);

X_2 = Alternative job (Tk);

X_3 = Quantity of Hilsa fish (No.);

X_4 = Other types of fish catch; (No.);

X_5 = Fishing hour;

X_6 = Experience of Hilsa fishermen (yr.)

3.8.3 SWOT Analysis

SWOT analysis (alternatively SWOT MATRIX) is an acronym for strength, weakness, opportunities, and threats is a structured planning method and evaluate those four elements of an organization, project or business venture. A SWOT analysis can be carried out for a company, product, place, industry, or person. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favorable and unfavorable to achieve that objective.

Identification of SWOT is important because they can inform later steps in planning to achieve the objective. First, decision-makers should consider whether the objective is attainable, given the SWOT. If the objective is not attainable, they must select a different objective and repeat the process.

A SWOT analysis is usually in the form of a 2x2 matrix or a grid with four sections. The top two sections list the strengths and weaknesses and the lower two sections list the opportunities and threats.

Figure 3.3: SWOT Analysis

Users of SWOT analysis must ask and answer questions that generate meaningful information for each category (strengths, weaknesses, opportunities, and threats) to make the analysis useful and find their competitive advantage.

SWOT analysis aims to identify the key internal and external factors seen as important to achieving an objective. SWOT analysis groups key pieces of information into two main categories:

1. Internal factors
2. External factors

3.8.3.1 Internal Factors

- Strengths include an organization's internal capabilities, skills and distinct competencies that enable it to achieve goals.
- Weaknesses are all those factors that inhibit an organization and affect its overall performance.

3.8.3.2 External Factors

- Opportunities are external factors that organizations can take advantage of to improve performance and gain competitive advantage.
- Threats are all those external factors that can potentially restrain an organization and inhibit its growth or profitability

In the present study, SWOT analysis was used to assess the alternative livelihood options considering the important fact seasonal ban of Hilsa fishing in Bakerganj upazila under Barishal district.

CHAPTER 4

SOCIO-ECONOMIC CHARACTERISTICS OF THE SAMPLED FISHERMEN

The purpose of this chapter is to identify some socio-economic characteristics of Hilsa fishermen. A person differs from one another in many aspects. Behavior of an individual is largely determined by his characteristics. There are numerous interrelated and constituent attributes that characterize an individual and profoundly influence development of his/her behavior and personality. So finally it can be said that socio-economic characteristics mainly illustrates the wide range of interrelated social attributes of the fishermen which largely influence their economic activities, living condition and decision making process. Basic characteristics of the fishermen are as follows:

4.1 Experience of Hilsa Fishing

Hilsa fishermen are engaged in catching fish in Tulatoli, Karkhana, Bishkhali, Goma River throughout the year. They are dependent on fishing as a source of income and nutrition. They are engaged in fishing from generation to generation. The experience of the Hilsa fishermen was examined by classifying the fishermen experienced into three categories. These categories are (0-21) years as low experience, (21-40) as medium experience, and (40- Above) as high experience.

Table 4.1: Experience of Hilsa Fishermen in the Study Area

Experience in fishing	No. of fishermen(n=60)	% of total fishermen
Low (0-20)	35	58.3
Medium (21-40)	18	30
High (40 to Above)	7	11.7
Total	60	100

Among the respondents of the studied area, 58.3% fishermen had hilsa fishing experience of 0-20 years (Low experience). The rest 30% and 11.7% had experience of 21-40 years and above 40 years of fishing respectively (Table 4.1).

Fishing gear locally known as current jal, kona jal, gulti jal, suta jal and chandi jal with mesh size of around 3 inches were used for Hilsa fishing. For catching Hilsa, it was revealed from the study that about 40.50% fishermen use current jal, whereas 18.50%, 11.50% and 29.50% fishermen use kona jal, gulti jal and suta jal respectively (Figure 4.1).

11.50%

18.50%

40.50%

29.50%

- Current Jal
- Suta Jal
- Kona Jal
- Gulti Jal
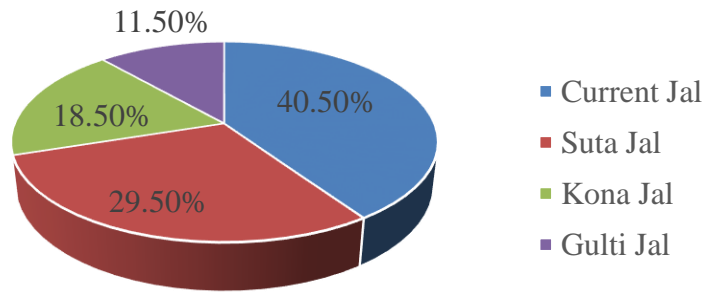
Figure 4.1: Fishing Gear Used by the Respondent in the Study Area

4.2 Human Capital

Human capital is a collection of traits – all the knowledge, talents, skills, abilities, experience, intelligence, training, judgment, and wisdom possessed individually and collectively by individuals in a population. These resources are the total capacity of the people that represents a form of wealth which can be directed to accomplish the goals of the nation or state or a portion thereof.

4.2.1 Age Distribution

Age plays an important role for better fishing practices. It was found that the maximum age of the respondent was 73 and minimum age was found 23 in the study area. Knowledge on the age structure of fishermen is very important in estimating the productive potential of human resources.

Table 4.2: Age Distribution of the Respondent in the Study Area

Age (Year)	No. of fishermen (n=60)	Percentage (%)
0-18 (Young)	7	11.7
19-35 (Middle)	25	41.7
36-55 (More than Middle)	18	30.0
Above 56 (Old)	10	16.6
Total	60	100.0

Different categories of age groups: young (0-18 years), middle aged (19-35 years), more than middle aged (36-55) and old (above to 56) were considered to examine the age distribution.

Among the 60 fishermen, 11.7% belonged to young aged group, 41.7%, 30%, 16.6%, belonged to the categories middle aged, more than middle aged and old aged respectively.

4.2.2 Family Status

In rural Bangladesh, families are classified into two types:

    I) Nuclear family – married couples with children, and

    II) Joint family – group of people related by blood and/or by law.

Table 4.3: Family Status of the Fishermen in the Study Area

Types of family	No. of fishermen (n=60)	Percentage (%)
Nuclear family	33	55.0
Joint family	27	45.0
Total	60	100.0

In the fishermen community of the study area it was found that, about 45% fishermen family were jointed and 55% family were nuclear (Table 4.3).

4.2.3 Family Size

A family has been defined as the total number of person living together and taking meals from the same kitchen under the administration of a single head of the family. The composition of a family includes father, mother, husband, wife, brother and sister etc. Family size was defined as the number of persons, either working or not, belonging to the same family.

The family size and its composition were related to occupation, income and were likely to have an important influence on fishing practice.
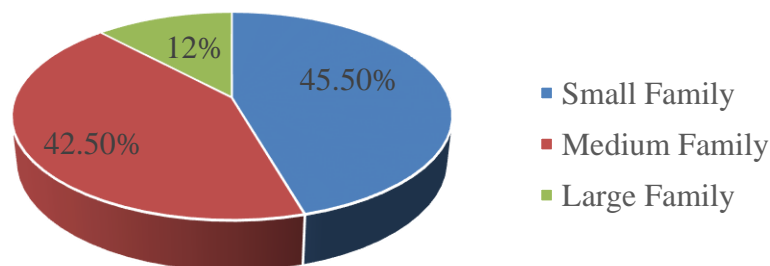
Figure 4.2: Distribution of Fishermen According to Family Size

The family sizes of the fishermen were divided into three classes as small, medium and large. The present findings revealed that, fishermen's families composed of 1 to 5 members (45.50%), marked as small family, medium family (42.50%) consisted of 6 to 8 members and large family (members above 8) accounted for 12% of the surveyed respondents (Figure 4.2).

4.2.4 Educational Status

Education plays a vital role in adopting improved fishing technology, because educated fishermen can easily understand relevant technical information for improved fishing and can take economic decision. There is a significant impact of education on the society. In the present study four categories were used to determine the level of education. These categories were illiterate, capable to sign only, primary (up to 5 class), and secondary (6 to 10 class).

Out of 60 interviewed fishermen, 2.5% were illiterate, a huge portion of them could sign only (44%), 35% had education up to primary school, and 18.5% had secondary level of education. It could be said that majority of the fishermen were able to sign only (Figure 4.3).
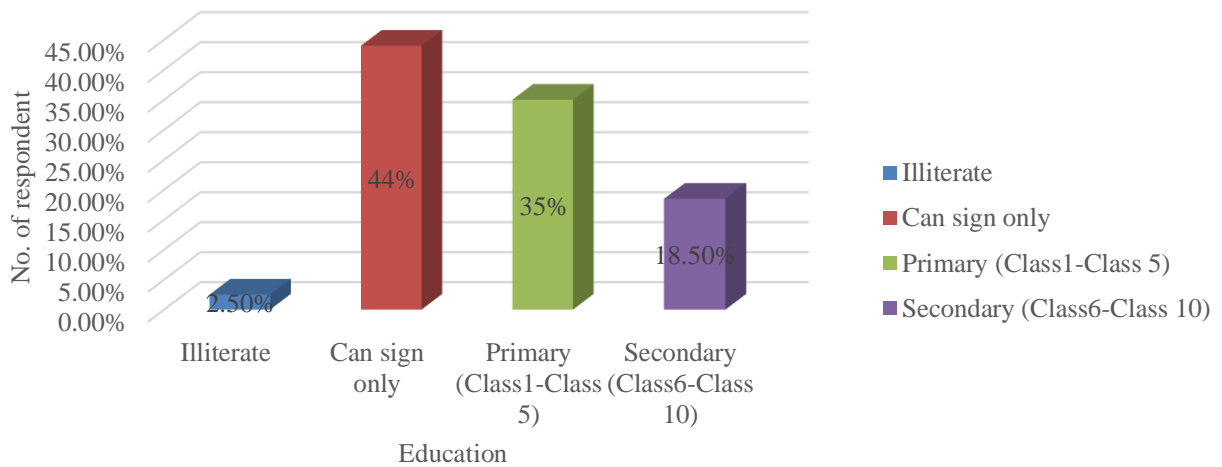
Figure 4.3: Educational Status of the Fishermen in the Study Area

4.2.5 Religious Status

Religion plays a very important role in the socio-cultural activities of people of a given area, and can act as a notable constraint or modifies in social changes. From the present study, it was found that Muslims constituted 70.5% of the fishermen community as opposed to 29.5% Hindus. There was no Buddhists or Christians (Figure 4.4).
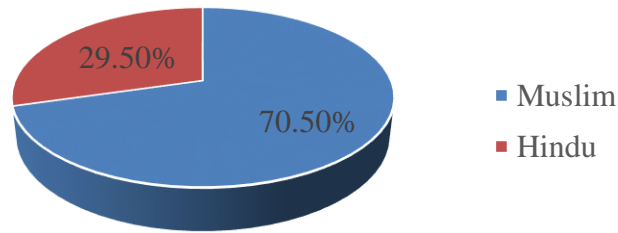
Figure 4.4: Religious Status of the Hilsa Fishermen in the Study Area

4.3 Physical Capital

Transport, shelter, road, market, electricity, drinking water supply, health and sanitary facilities are the physical capital of the people involved in fishing activities. Poor physical capital affected people to practice their livelihood strategies.

4.3.1 House Dwelling Unit Ownership

House dwelling unit ownership of the Hilsa fishermen was two types as owned, rented. The study indicated that 96.5% houses were owned, and only 3.5% were rented (Figure 4.5).
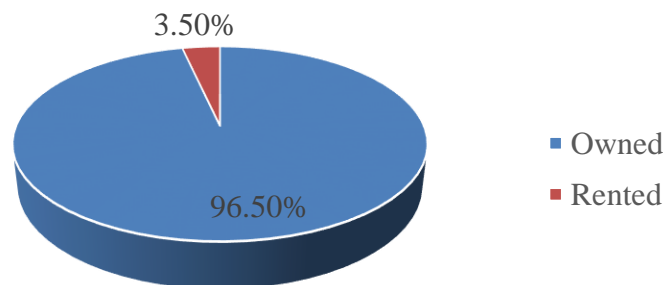
Figure 4.5: House Dwelling Unit Ownership of the Fishermen in the Study Area

4.3.2 Housing Condition

Housing is a major element of people's material living standards. It is essential to meet basic needs, such as for shelter from weather conditions, and to offer a sense of personal security, privacy and personal space. Good housing conditions are also essential for people's health and affect childhood development.

The nature of house indicates the social status of the people. The study attempts were made to find out the condition of living house of the people. In the study area houses of hilsa fishermen were of five main types such as

i.   Kacha

ii.   Tin Shed

iii.   Half Building

iv.   Bamboo made

v.   Wood made

From the study, it was found that 17.5% households of the fishermen were katcha, 60% , 11.5%, 8.5%, 2.5% households were tin shed, half building, bamboo made and wood made respectively (Figure 4.6).
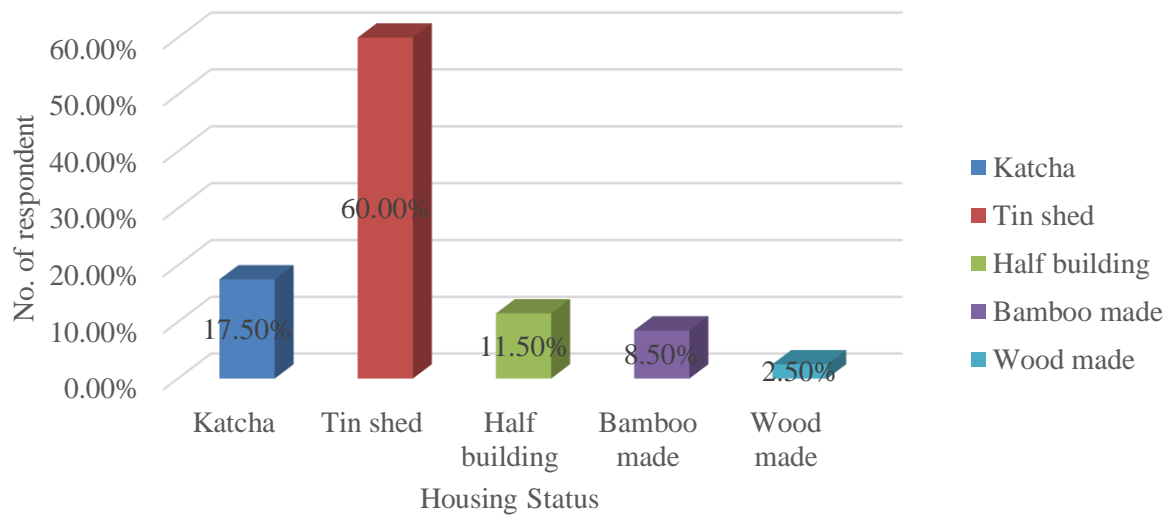
Figure 4.6: Housing Condition of the Fishermen in the Study Area

4.3.3 Drinking Water Facilities

The provision of clean and safe drinking water is considered to be the most valued elements in the society. The study showed that 93% and 7% fishermen household used water from tubewell and pond respectively.
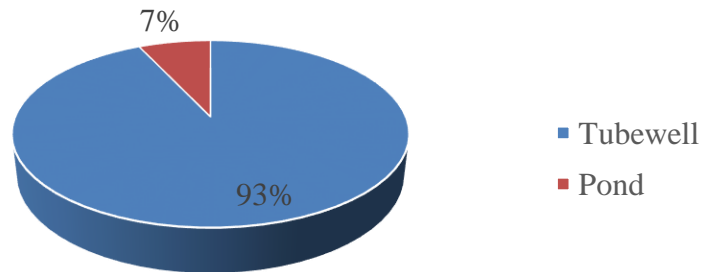
Figure 4.7: Sources of Drinking Water
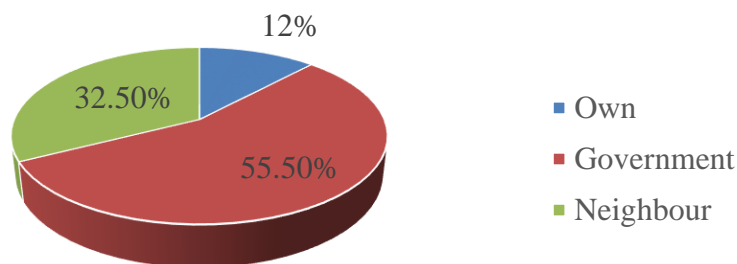
Figure 4.8: Drinking Water Facilities Enjoyed by the Fishermen in the Study Area

Among them 12% fishermen used their own tubewell, 55.5%% fishermen used government tubewell and remaining 32.5% used neighbor's tubewell.

4.3.4 Sanitary Facilities

Sanitation is the means of promoting hygiene through the prevention of human contact with hazards of wastes especially feces, by proper treatment and disposal of the waste, often mixed into wastewater. These hazards may be physical, microbiological, biological or chemical agents of disease. It was observed that sanitary conditions of the fishermen were not satisfactory though they had access to various types of toilets. Three types of toilets were found to be used by the fishermen viz. i) Katcha toilet – made of bamboo with leaf shelter and inadequate drainage disposal, ii) Semi-pucca toilet – made of tin or wood with inadequate drainage disposal, and iii) Pucca toilet – made of brick with good drainage disposal. In the study area, it was found that 50% toilets were katcha while 30% were semi-pucca and 20% were pucca (Table 4.4).

Table 4.4: Sanitary Facilities of the Respondent in the Study Area

Type of toilet	No. of fishermen (n=60)	Percentage (%)
Katcha	30	50.0
Semi pucca	18	30.0
pucca	12	20.0
Total	60	100.0

4.3.5 Health Facilities

A health facility is, in general, any location where healthcare is provided. The number and quality of health facilities in a country or region is one common measure of that area's prosperity and quality of life.

In the study area health facilities of the Hilsa fishermen were poor. Generally fishermen took health suggestions from unskilled, non-professional kabiraj/village doctor. Health service status was categorized into four groups: kabiraj, village doctor, upazila health complex and MBBS doctor. It was found that 15% fishermen went to village kabiraj, 45% to village doctors, 28.3% got health service from upazila health complex and remaining 11.7% from MBBS doctors (Table 4.5).

Table 4.5: Health Facilities of Sampled Fishermen in the Study Area

Types of physician visited	No. of fishermen (n=60)	Percentage (%)
Kobiraj	9	15
Village doctor	27	45
Upazila health complex	17	28.3
MBBS Doctors	7	11.7
Total	60	100.0

4.4 Natural Capital

Natural resources that can be exploited to support livelihoods are called natural capital. Natural capital is the quality and quantity of natural resources that are available to people and above all, the access and control people have over these natural resources; includes aquatic resources, land, water, forest, air quality and biodiversity. Bakerganj is situated at the lower Kirtonkhola River and this place is blessed with very resourceful water bodies of Kirtonkhola, full of fish resources, major catches are Hilsa, lotia, icha, baila, poa etc. This soil is very fertile and suitable for cultivation of pulses, vegetables, and paddy. People living besides the river, not only depend on fish but also on a combination of natural resources for pursuing their livelihoods. Fresh water is used for human consumption, for preserving fish and for production of ice. Access to land can be important, especially if fishing is a seasonal activity, because agricultural activities can be the supplement of the household food requirements. Some canals and ditches of the villages are also the sources of livelihood support for the poor people.

4.5 Social Capital

Social capital is a form of economic and cultural capital in which social networks are central, transactions are marked by reciprocity, trust and cooperation and market agents produce goods and services not mainly for themselves, but for a common goal.

The term generally refers to (a) resources, and the value of these resources, tangible (public spaces, private property) and intangible ("actors", "human capital", people), (b) the relationships among these resources, and (c) the impact that these relationships have on the resources involved in each relationship, and on larger groups.

It is generally seen as a form of capital that produces public goods for a common good. Social livelihood resources of the fishermen comprise access to input supplies and marketing outlets, access to health care service, access to extension service, access to social and development activities etc. The present study showed the poor existence of social organizations of the fishermen. Lack of social capital has affected livelihoods of poor people in fishermen communities. Mobility and contact to various input and output markets, healthcare service, social and development activities, educational institution, extension service etc. indicate one's access to these services, which enhanced the capacity of the person. For a sustainable livelihood, one must have access to these institutions for enhancement of knowledge and skill related to primary and secondary occupation and coping ability to natural and social adverse conditions. The study area had good facility for input supplies, local and distant markets for marketing of products within a fair distance and the fishermen had good access to these facilities. The highest frequency of contact was observed in access to local village market for all categories of fishermen.

4.6 Financial Capital

Financial capital represents the financial resources that people use to attain their livelihood objectives. Financial capital of fishermen denotes income, occupation, credit, savings etc. The fishing sector has the potential to generate considerable amounts of financial capital relative to resources of associated groups. The present study showed that fishermen were often disadvantaged due to the poor financial resources. There is no access to safe and secure cyclone shelters in the vicinity of the village. Flood and storm also affected them destructively. River erosion is one of the major problems and most of the fishermen lost their household assets.

4.6.1 Occupational Status

4.6.1.1 Primary Occupation

Actual physical possession or use of a dwelling or piece of land. Occupation exists only where it is recognized as such and where the occupant has a sufficient measure of control that prevents interference from strangers. In the present study, it is found that all the respondents' primary occupation is fishing.

4.6.1.2 Secondary Occupation

Primary occupation could not afford full time employment and the income derived therefore might be insufficient to supply adequate means of livelihood.
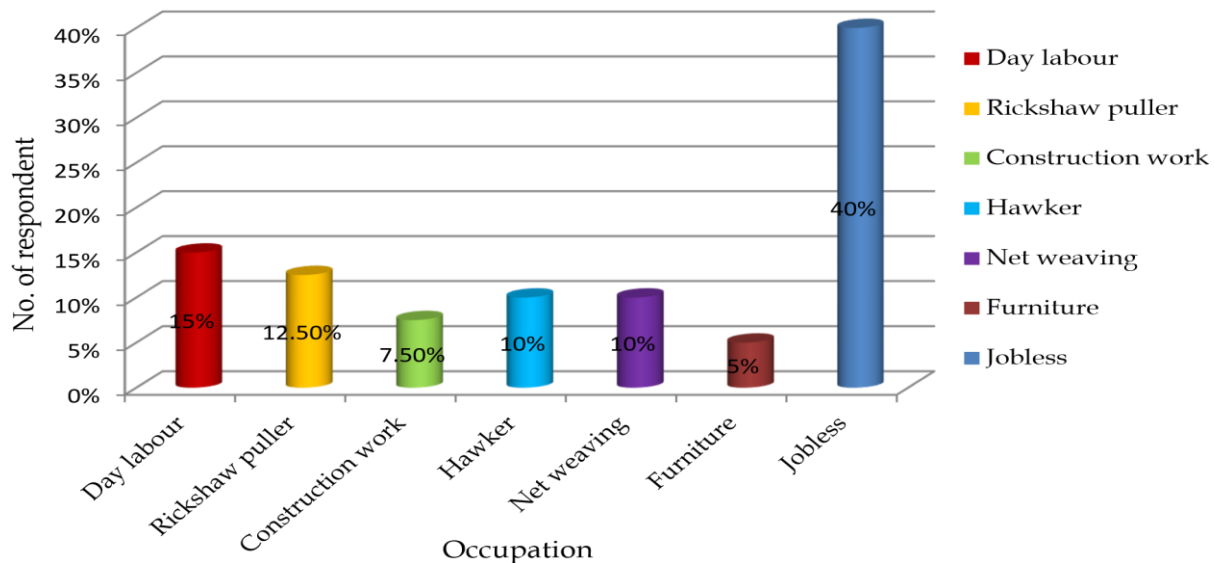
Figure 4.9: Secondary Occupation of Fishermen in the Study Area

In the study area 15% fishermen stated that their secondary occupations were day labor while 12.50%, 7.5%, 10%, 10%, 5%, were rickshaw puller, construction worker, hawker and furniture worker respectively and 40% had no secondary occupation (Figure 4.9).

4.6.2 Credit Access

The national and local NGO like CARITAS, BRAC provide credit as well as aratdar to the organized poor members for purchase fishing equipment's and to continue their livelihood. No fishermen received loan from the government bank.

After repayment only 7.5% became self-sufficient who did not need financial help but 35% borrow money from their neighbors, 7.5% from relatives, and 50% from NGOs.
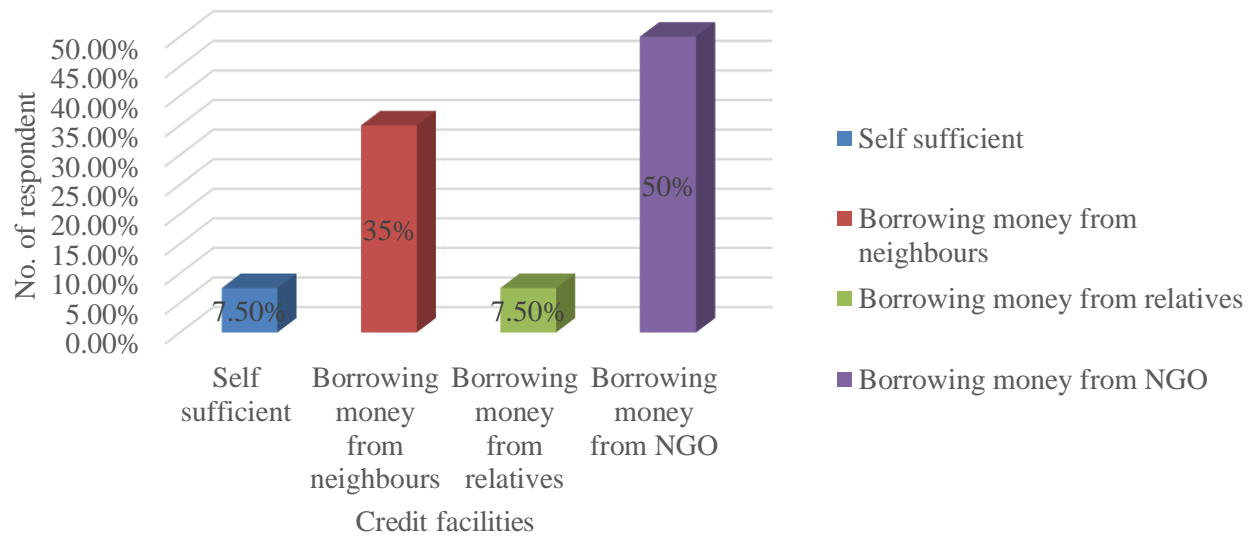
Figure 4.10: Source of Credit Facilities in the Study Area

Low wage rate in fishing and fishing related activities limited the earnings of these fishermen households. Reduction in fish catch, use of low technique fishing gears, inadequate processing and marketing infrastructure etc. are the barriers of increasing income from fishing and fishing labor as well.

4.6.3 Income of fishermen (Before Banning)

Level of income of an individual family determines socio-economic status in a society. Annual income of fishermen comes from main occupation as well as secondary occupation. There are various sources of income such as fishing, construction working, net weaving, rickshaw pulling etc.

The selected fishermen were grouped into four categories based on the level of their monthly income. The 1st category described the fishermen having monthly income up to Tk. 10,000. The 2nd, 3rd, and 4th categories had income levels of Tk. 11,000 - Tk. 15,000; Tk. 16,000 - Tk.20,000; and above Tk. 20,000 respectively (table 4.6).

Table 4.6: Fishing Income/Month (Tk.) of the Fishermen in the Study Area

Fishing income/month (Tk.)	Number of fishermen (n=60)	Percentage (%)
Up to 10,000	10	16.7
11,000-15,000	13	21.7
16,000-20,000	25	41.6
Above 20,000	12	20
Total	60	100.0
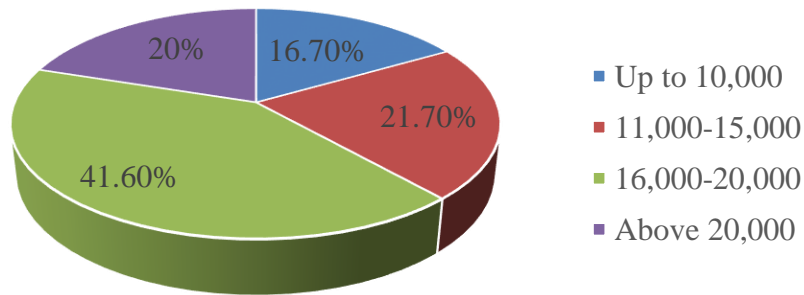
Figure 4.11: Fishing Income/Month (Tk.) of the Fishermen in the Study Area

It denoted that Tk. 16,000 - Tk. 20,000 category had the highest number (41.6%) of fishermen while up to Tk. 10,000 category had the lowest number (16.7%) of fishers.

4.6.4 Income of fishermen (During Banning Period)

The selected fishermen were classified into six categories based on the level of their total income in banning period other than fishing. The 1st category included the fishermen having no income in banning period. The 2nd, 3rd, 4th, and 5th categories had income level of Tk. Up to 20,000; Tk. 21,000 - Tk. 25,000; Tk. 26,000 - Tk. 30,000; and above Tk. 30,000 respectively (figure 4.12)

It reveals that income group of no income category have the highest number (50%) of fishermen, whereas above Tk. 30,000 category have the lowest number (5%) of fishers.

Figure 4.12: Income of Fishermen During Banning Period (65 days) in the Study Area

4.7 Concluding Remarks

The socio-economic attributes of Hilsa fishermen has been analyzed.The finding of analysis clearly indicates that socio-economic demographic characteristics differ from each other in respect of family size, literacy, occupation, etc. Highest percentage (44%) of education level of fishermen was sign only. Most of the fishermen were within the age group of 19 to 35 years (41.7%). Among fishermen 70.5% were Muslim and highest number of fishermen's housing condition (60%) was tin shed. About 41.6% fishermen's per month income was Tk. 21,000-25,000 before banning period and about 40% fishermen become jobless during banning period.

CHAPTER 5

PROFITABILITY OF HILSA FISH CATCH

The main purpose is to assess the cost, return and therefore the profitability of Hilsa catching which measures the income of the Hilsa fishermen. In calculating profit or loss, the cost benefit items need clarification. To determine the profitability of Hilsa catch, however necessary to compute all the cost which were deducted from the value of output. The term cost refers to outlay funds for fishing services. Cost items were classified into two major groups e.g. fixed cost and variable cost and these together equaled total cost. Computation of total cost is necessary for working out net returns.

5.1 Cost Items of Hilsa Fishing

For analytical advantages, the cost items of Hilsa fishing were classified under the following heads:

- Cost of boat;
- Cost of net;
- Cost of fuel;
- Cost of food;
- Commission of aratdars ;
- Labor cost; and
- Miscellaneous cost etc.

The method of calculation of individual cost items are discussed below:

5.1.1 Cost of Boat

Cost of boat includes depreciation cost and maintenance and repairing cost of boat. Depreciation cost is a way charging on original investment or capital expenditure against revenue over the economic life of the investment. In the present study, depreciation cost of boat was calculated by straight line method which is given below:

Annual depreciation= (Purchase value-Salvage value)/Expected life

Maintenance cost and repairing cost involved regular and preventive care to reduce deterioration of boat that extends its economic life. These two items were grouped together because in practice it is difficult to separate them. In all methods of Hilsa fishing, boat serves for the longer period and thereby annual cost of boat shared a small amount of total cost. The present study revealed that the cost boat was 0 .69% of the total cost.

5.1.2 Cost of Gear

Various types of gear are used for Hilsa fishing. Gill net is the principal and common types of gear which is used for Hilsa catch. Usually two types of gillnet are used, they are drift gill net and set gill net. The drift gill nets are locally called gulti jal, chandi jal and current jal. Seine nets are of various dimensions are used to catch juvenile Hilsa (jatka) and Hilsa. Cost of gear was an important cost item in all methods of Hilsa fishing. This cost includes depreciation of net and maintenance and repairing cost of net. This cost was calculated by the previous method. In the present study, it was found that the cost of net is 14.90% of the total cost.

5.1.3 Cost of Fuel

Fuel may be defined as any substance burned as a source of heat or power, such as coal or petrol. From the present study, it was found that the average fuel cost was Tk. 1050.25 and the cost covered 34.95% of the total cost in Hilsa fishing.

5.1.4 Cost of Food

In all cases food costs were the major cost item of Hilsa fishing. The item includes the cost of food betel leaf, cigarette, biddi, etc. which were used or consumed during the period of fishing in Kirtonkhola river.

The average per day food cost was 342.07 Tk. It was revealed from the study that the cost of food was 11.38 % of the total cost in Hilsa fishing.

5.1.5 Aratdar's commission

Many Hilsa fish aratdar were seen in the studied area. Fishermen usually sell their fish to the aratdars. About 5% commissions were collected on fishermen's fish sale by the aratdars. There was no single rate in collecting commission by the aratdars. Because aratdars had set higher commission rate provided with some credit to the fishermen. The study revealed that the aratdar's commission was 6.45% of the total cost in Hilsa fishing.

5.1.6 Labor cost

Human labor is the most important input in Hilsa fishing. There were two types of labor was used in the time of Hilsa fishing such as family labor and hired labor. In the present study, it was found that most of the labor is hired labor. The hired labor were usually paid in cash and in some cases paid in kind. . It was found from the study that the average wage rate was Tk. 950/day. The present study reveals that the labor cost is 31.61% of the total cost.

5.2 Gross Cost

Gross cost was calculated by adding all cost incurred for variable inputs and fixed inputs. The average total cost of Hilsa fishing was Tk. 3005.06 (Table 5.1).

5.3 Gross Return

Gross return was calculated by multiplying the total amount of product with their farm gate prices. The average gross return of Hilsa fishermen per day was Tk. 3878.13 in peak season (Table 5.1).

5.4 Gross Margin

It is known that gross margin is the difference between total return and total variable cost. Gross margin of the Hilsa was obtained by deducting total variable cost from the total return. i.e.

Gross margin = Gross return- Total variable cost.

Gross margin can be increased if the total returns increased or variable cost decreased. In the study area, the average gross margin of Hilsa fish was estimated at Tk. 1341.9 (Table 5.1).

5.5 Net Return

Net return is a useful tool to evaluate the profitability of Hilsa fishing. It was calculated by deducting total cost from the total return i.e.

Net return= Total return – Total cost.

In the study area, it was found that the average net return of Hilsa fishing per day was estimated at Tk. 873.07 (Table 5.1)

Table 5.1: Per Day Cost and Returns of Hilsa Fishing Before Banning Season

Items	Unit	Quantity	Price Per Unit (Tk.)	Value (Tk.)
Gross Return				
Product (Fish)	kg	12.50	310.25	3878.13
Total	-	-	-	3878.13
Variable Cost				
Labor Cost	Tk.	-	-	950
Cost of Fuel and Oil	Tk.	-	-	1050.25
Food Expenses	Tk.	-	-	342.07
Aratdars Commission	Tk.	-	-	193.91
Total Variable Cost	Tk.	-	-	2536.23
Fixed Cost				
Depreciation Cost of Boat	Tk.	-	-	20.82
Depreciation Cost of Net	Tk.	-	-	448.00
Total Fixed Cost	Tk.	-		468.83
Total Cost (TFC+TVC)	Tk.	-	-	3005.06
Gross Margin (GR-TVC)	Tk.	-	-	1341.9
Net Return (GR-GC)	Tk.	-	-	873.07
Benefit Cost Ratio (BCR=GR/TC)				1.29

5.6 Benefit Cost Ratio

Benefit cost ratio (BCR) was calculated by dividing gross return by gross cost, i.e., gross return / gross cost. It is a measure to see the efficiency of resource use. The BCR of Hilsa fishing before banning season is 1.29 implying that tk. 1.29 would be earned by investing tk. 1 for Hilsa fishing.

CHAPTER 6
FACTORS AFFECTING HILSA FISHERMEN'S INCOME BEFORE AND DURING BANNING PERIOD

6.1 Functional Analysis

Functional analysis was used to reveal the quantitative relationship between dependent variables and set of explanatory variables. To determine the effect of the explanatory variables, multiple regression function were estimated initially. The multiple regression function as better in terms of expected signs and magnitudes of the coefficients R^2 and F-values. So, the parameter estimates obtained from log linear model were selected for interpretation. Many factors might affect income of Hilsa fishermen but it is quite difficult to include all variables in a model analysis because of the multicolinearity or other logical aspects. So, important variables were included to keep the model as simple as possible. The multiple regression function was specified for measuring the contribution of variable factors which were specified earlier in chapter 3.

6.2 Interpretation of the Results

The results of the functional analysis are illustrated in terms of the estimated coefficient and related statistics (Table. 6.1). The important features are noted below:

Constant or Intercept Term

The value of intercept represents the composite impact of all other influencing variables that are excluded from the model.

Subsidy (X_1)

The estimated value of coefficient of subsidy was -6401.48 which was significant at 1 percent probability level. Thus there was a negative relationship between subsidy and difference between before and during banning period income of Hilsa fishermen. It indicates that 1 percent increase in subsidy to Hilsa fishermen, on an average, keeping other factors constant, led to 6401.48 percent decreases in difference of income between before and during banning period (Table 6.1).

Alternative Job (X_2)

The estimated value of coefficient of alternative job was -5881.27 which was significant at 5 percent probability level. Thus there was a negative relationship between alternative job and difference between before and during banning period income of Hilsa fishermen. It indicates that 1 percent increase in alternative job of Hilsa fishermen, on an average, keeping other factors

constant, led to 5881.27 percent decreases in difference of income between before and during banning period (Table 6.1).

Quantity of Hilsa Fish (X_3)

The estimated value of coefficient of quantity of Hilsa fish was 766.43 which was significant at 5 percent probability level. Thus there was a positive relationship between quantity of Hilsa fish and income difference between before and during banning period of Hilsa fishermen. It indicates that 1 percent increase in the quantity of Hilsa fish, on an average, keeping other factors constant, led to 766.43 percent increases in difference of income between before and during banning period (Table 6.1).

Other Types of Fish Catch (X_4)

The estimated value of coefficient of other types of fish catch was -543.04 which was significant at 10 percent probability level. Thus there was a negative relationship between other types of catch and difference of income between before and during banning period of Hilsa fishermen. It indicates that 1 percent increase in other types of fish catch, on an average, keeping other factors constant, led to 543.04 percent decrease in difference of income between before and during banning period (Table 6.1).

Fishing Hour (X_5)

The estimated value of coefficient of fishing hour was -977.59 which was significant at 5 percent probability level. Thus there was a negative relationship between fishing hour of Hilsa fish and difference of income between before and during banning period of Hilsa fishermen. It indicates that 1 percent increase in fishing hour of Hilsa fish catch, on an average, keeping other factors constant, led to 977.59 percent decrease in difference of income between before and during banning period.

Table 6.1: Estimated Values of Coefficients and Related Statistics of Multiple Regression Function for Income Difference Between Before and During Banning Period

Explanatory Variables	Estimated coefficients	Standard error	P value
Intercept	31589.13	28571.15	
Subsidy	-6401. 48***	2268.17	0.003
Alternative job	-5881. 27**	2634.26	0.015
Other Types of fish catch	-543. 04*	237.11	0.06
Quantity of Hilsa fish	766. 43**	360.06	0.019
Experience of Hilsa fishermen	-1. 80*	1.09	0.05
Fishing hour	-977.59**	474.20	0.022
R^2	0.63		
F- value	32.10		

Note: *** = Significant at 1% probability level;
       ** = Significant at 5% probability level;
        * = Significant at 10% probability level.

Experience of Hilsa Fishermen (X_6)

The estimated value of coefficient of experience of Hilsa fishermen was -1.80 which was significant at 10 percent probability level. Thus there was a negative relationship between experience of Hilsa fishermen and difference of income between before and during banning period of Hilsa fishermen. It indicates that 1 percent increase in experience of Hilsa fish catch on an average, keeping other factors constant, led to 1.80 percent decrease in difference of income between before and during banning period (Table 6.1).

F-value

F-value was estimated for overall significance of the estimated model. The F values of the model was 32.1 which was significant at 10 percent probability level implying that all the included

explanatory variables included in the model were important for explaining the variation in income difference between before and during banning period (Table 6.1).

Value of R^2

The estimated value of goodness of fit, R^2 of the model was 0.63. R^2 value of 0.63 indicated that about 63 percent of the total variation in income difference between before and during banning period has been explained by the variables included in the model Remaining 37 percent of the total variation in income difference was unexplained due to other factors those have not been included here in the model (Table 6.1).

6.3 Concluding Remarks

It can be concluded that Hilsa fishing was profitable in the study area. The benefit cost ratio of Hilsa fishing was 1.29 confirms that Hilsa fishing was profitable. From the Table 6.1, it is seen that all the variables included in the regression model were important to explain the variation in the net return of Hilsa fishing.

CHAPTER 7

IMPACT OF BANNING PERIOD OF HILSA FISHING ON FISHERMEN'S LIVELIHOOD

The aim of this chapter is to present the impact of banning season of Hilsa fish catching on the livelihood of fishermen. A livelihood is the set of capabilities, assets, and activities that furnish the means for people to meet their basic needs and support their wellbeing. The building of livelihoods reflects and seeks to fulfill both material and experiential needs. Livelihoods are not simply a localized phenomenon, but connected by environmental, economic, political and cultural processes to wider national, regional and global arenas. In this guideline 'livelihood' does not just mean the activities that people carry out to earn a living. It means all the different elements that contribute to or affect their ability to ensure a living for themselves and their household. This includes:

i.   The assets that the household owns or is able to gain access to-human, natural, social, financial and physical capital;

ii.   The activities that allow the household to use those assets to satisfy basic needs;

iii. The different factors that the household itself may be able to control directly, like the seasons, natural disasters or economic trends that affect its vulnerability;

iv.   Policies, institutions and processes that may help them or make it more difficult for them, to achieve an adequate livelihood.

The concept of 'Sustainable Livelihoods' constitute the basis of different 'Sustainable Livelihood Approaches' (SLA) and has been adapted by different development agencies such as the UK Department for International Development (DFID). The DFID has developed a 'Sustainable Livelihood Framework' (SLF) which is one of the most widely used livelihoods frameworks in development practice.

The sustainable livelihood framework includes the asset pentagon, which is compassed of five types of capital, namely human capital, social capital, natural capital, physical capital and financial capital. A sustainable livelihood is the outcome of the entire and intra relationship between the components of these capitals. The livelihood framework identifies five core assets or capital upon which livelihoods are built. Increasing access which can take the form of ownership or the right to use to these assets is a primary concern for some international NGOs for poverty elimination. Other

ways may be developed, depending on local circumstances, what is important here is that these are all controlled by them.

The asset pentagon can provide a useful starting point for household livelihood analysis, as it encourage investigators to take into account all the different kinds of assets and resources that are likely to play a role in household livelihoods. In the past, development workers often tended to focus very much on the physical capital, the financial capital and the human capital. But very often people's access to natural capital and the key role of the social capital of households has not been properly taken into account. Using this pentagon as a guide can help investigators to get a more complete picture of the household and its livelihood assets.

7.1 Livelihood Assets

As the livelihoods approach is concerned first and foremost with people, it seeks to gain an accurate and realistic understanding of people's strengths (here called "assets" or "capitals"). It is crucial to analyze how people endeavor to convert these strengths into positive livelihood outcomes.

The approach is founded on a belief that people require a range of assets to achieve positive livelihood outcomes. Therefore the SLF identifies five types of assets or capitals upon which livelihoods are built, namely human capital, social capital, natural capital, physical capital and financial capital.

7.1.1 Human Capital

Development of human capital is one of the pre-requirements for successful attainment of other types of assets. It represents the skills, knowledge and ability of fishermen and good health that together enable people to earn skills, knowledge and ability of labor and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objective. In the present study, five components under human capital were considered. Table 7.1 shows the changing nature of different components of human capital in the study area.

Table 7.1: Changes in Human Capital During Banning Period (All are in percentage of respondent's number)

Items	Hilsa fishermen		
	Increase	**Decrease**	**Constant**
Access to Information	58.3 (35)	18.3 (11)	23.4 (14)
Education	00 (00)	58.3 (35)	41.7 (25)
Health and sanitation	00 (00)	100 (60)	00 (0)
Training	50 (30)	6.7 (4)	43.3 (26)
Technology	73.3 (44)	8.3 (5)	18.4 (11)
Knowledge	00 (00)	86.7 (52)	13.3 (8)
Fishing net improved	15 (9)	50 (30)	35 (21)

Note: Figure In the Parenthesis Indicates Respondent's Number.

In the present study, the fishermen reported that their access to information increased 58.3 percent, 18.3 percent and 23.4 percent were decreased and constant respectively due to banning on Hilsa catch. In case of education, the fishermen reported that education was decreased 58.3 percent due to banning period.

In case of knowledge/efficiency and technology, 86.7% and 73.3% were increased because of the implementation of banning period.

So, it can say that the human capital of the fishermen was decreased significantly due to banning period.

7.1.2 Social Capital

Social capital refers to formal and informal social relationship, including their degree of trust, reliability and adaptability. The way in which people work together, both within the household and in wider community, is of key importance of household livelihoods. In many communities, different households will be linked together by ties of social obligation, reciprocal exchange, trust

and mutual support, all of which can play a critical role particularly in times of crisis. These can be thought of as social capital, which forms part of a household's livelihood capabilities.

Table 7.2: Changes in Social Capital During Banning Period (All are in percentage of respondent's number)

Items	Hilsa fishermen		
	Increase	**Decrease**	**Constant**
Self-managerial capability	10 (6)	66.7 (40)	23.3 (14)
Involvement of social group	30 (18)	70 (42)	00 (00)
Political involvement	10 (6)	63.3 (38)	26.7 (16)
Social prestige	5 (3)	80 (48)	15 (9)
Decision making Ability	00 (00)	78.3 (47)	21.7 (13)

Note: Figure in the Parenthesis Indicates Respondents Number.

In the present study five components under social capital is considered. Table 7.2 shows the changing nature of different components of social capital in the study area. Table 7.2 reveals that the self-managerial capability of the Hilsa fishermen decreased 66.7 percent. In case of involvement of social group, the percentage was also decreased (70%). In all the cases, of political involvement, social prestige and decision making ability, the percentage was decreased 63.3, 80, and 15 percent respectively. So it can easily say that the social capital of the Hilsa fishermen was decreased radically in the banning period.

7.1.3 Physical Capital

Physical capital refers to the household goods, tools and equipment and physical infrastructure of the households. Some of the physical capitals such as radio, mobile phone, tube well, sanitation, furniture, equipment, etc. were included in this study. Table 7.3 shows the status of changes in physical capital of the sample households.

Table 7.3: Changes in Physical Capital During Banning Period (All are in percentage of respondent's number)

Items	Hilsa fishermen		
	Increase	**Decrease**	**Constant**
Radio	00 (00)	56.7 (34)	43.3 (26)
Mobile phone	56.7 (34)	00 (00)	43.3 (26)
Sanitation	8.3 (5)	5 (3)	86.7 (52)
Tubewell	00 (00)	8.3 (5)	91.7 (55)
Furniture	10 (6)	63.3 (38)	26.7 (16)
Equipment	3.4 (2)	58.3 (35)	38.3 (23)

Note: Figure in the Parenthesis Indicates Respondent's Number.

Table 7.3 reveals that The number of having radio of the Hilsa fishermen decreased and the number of having mobile phone of the Hilsa fishermen increased in the banning period and the percentages were 56.7 and 56.7 percent.

In case of sanitation and tube well, the situation were constant. It was found from the study that Hilsa fishermen furniture and equipment were also decreased because of banning period. Because in that period they had a small number of sources of income that's why they sold the physical capital.

So finally it can say that there were no significant improvement because of banning period rather there occurred dis-improvement in the study area due to the banning period.

7.1.4 Natural Capital

Natural capital consists of natural resources, including their flows and services. Here information about cultivable land, open water sources and forests, as the natural capital of sampled fishermen. Table 7.4 shows that the cultivable land, open water sources, and forest of the hilsa fishermen were in a constant position. That means there was no significant changes prevailed due to banning period. So it can clearly say that significant improvement did not occur in the livelihoods of Hilsa fishermen due to impose the banning period by the government.

Table 7.4: Changes in Natural Capital During Banning Period (All are in percentage of respondent's number)

Items	Hilsa Fishermen		
	Increase	Decrease	Constant
Cultivable land	00 (00)	00 (00)	100 (60)
Open water sources	00 (00)	00 (00)	100 (60)
Forest	00 (00)	00 (00)	100 (60)

Note: Figure in the Parenthesis Indicate Respondents Number.

7.1.5 Financial Capital

Financial capital includes financial resource such as savings, cash in hand, bonds, debenture, etc. Here information about income in major financial resources of the sampled fishermen.

In the banning period, most of the fishermen were jobless. They did not find any kind of absolute job in the banning period which can generate income.

Table 7.5 shows that the situation of the hilsa fishermen in the banning period was deplorable. I was found from the study that the fishermen cash in hand, cash in bank were decreased in the banning period.

Table 7.5: Changes in Financial Capital During Banning Period (All are in percentage of respondent's number)

Items	Hilsa fishermen		
	Increased	Decreased	Constant
Cash in hand	00 (00)	100 (60)	00 (00)
Cash in bank	00 (00)	100 (60)	00 (00)
Jewelry	00 (00)	80 (48)	20 (12)

Note: Figure in the Parenthesis Indicates Respondent's Number.

So finally, it can be clarified that there was no financial improvement in the livelihoods of Hilsa fishermen in the banning period.

7.1.6 Overall Degression of the Fishermen During Banning Period

Table 7.6 shows the comparative degression of livelihood assets for all sampled fishermen.

Table 7.6: Overall Degression of the Fishermen During Banning Period

Livelihood assets	Hilsa fishermen (%)
Human capital	54.28
Social capital	75
Physical capital	40.41
Natural capital	0
Financial capital	92.5
Overall degression	52.43

7.2 Impact of Banning Period on Loan

Most of the Hilsa fishermen lived on hand to mouth. During banning period as their income source was about to cease they were bound to borrow money from neighbors, relatives or NGOs at a very high interest rate with some conditions. Amount of loan ranged between Tk. 2000-Tk. 50000. Most of them had to sell their own boat and net for paying loan and gradually become poor to poorer.

7.3 Subsidy by the Government

In the study, it revealed that, 37.50% fishermen got VGF card from government and 62.50% fishermen had no VGF card. By the VGF card they got rice 10-15 kg 3 times in a year.
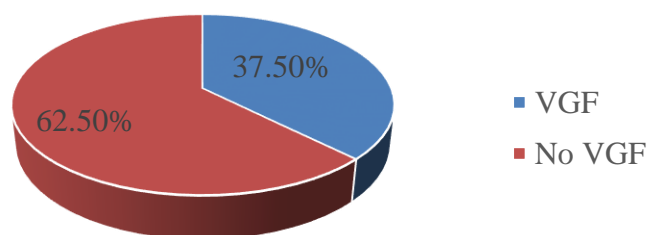

Figure 7.1: Subsidy Got From the Government

7.4 Improvement Status by VGF in Banning Period

The study suggests that 20% of the respondent fishermen improved their livelihood status through VGF service where 80% fishermen have not yet improved their status due to inadequate rice, net making materials given by the government.
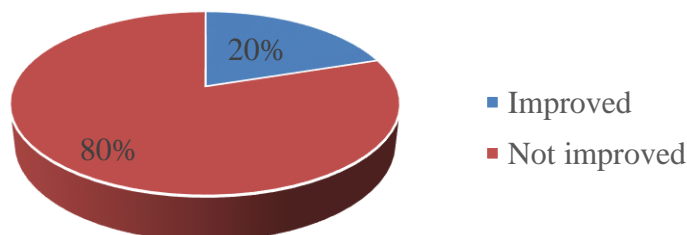
Figure 7.2: Improvement Status Due to VGF

7.5 Changes of Income of Hilsa Fishermen

Income is one of the major indicator of measuring livelihood changes. The following table shows the changes of income before and during the banning period of Hilsa fishermen.

Table 7.7: Average Monthly Income of Hilsa Fishermen Before and During Banning Period

Category	Income (Tk)	n	Std. Deviation	t
Before Banning	23541.28	60	8155.34	
During Banning	7457.45	60	4935.18	10.78
Changes in before banning to during banning period income	16083.83*	60	1204.88	

Note: * = significant at 1% probability level

The estimated mean value of per month income of Hilsa fishermen's before banning was Tk. 23541.28 and during banning period was. Tk. 7457.45 (Table 7.7). The mean difference of per month income of Hilsa fishermen between before and during banning period was Tk. 16083.83 which was significant at 1 percent probability level (Table 7.7).

So finally it can be said that the income of Hilsa fishermen during banning period decreased so badly and their livelihood pattern changes immensely.

7.6 SWOT Analysis of Banning Period

Table 7.8: SWOT analysis of banning period of Hilsa fish

Strength	Weakness
➢ Hilsa fish is currently not evaporated. ➢ Hilsa is able to spawn in a huge number. ➢ The amount of Hilsa increased. ➢ Foreign currency increased. ➢ Income level increased of Hilsa fishermen after a certain period of time.	➢ Hilsa fishermen become poor to poorer because of not any scope of alternative income generating activities. ➢ Income level decreased because of banning period. ➢ Fishermen are not able to have enough food. ➢ Malnutrition occurs. ➢ Barriers in education.
Opportunities	**Threats**
➢ The amount of fish increased in a large number. ➢ Recruitment of a new stock of Hilsa fish. ➢ Country able to export a huge number of Hilsa fish.	➢ Fishermen are not able to maintain their livelihood as a result they involved in the illegal activities. ➢ Fishermen sometimes catch the Hilsa fish in banning period. So the brood Hilsa fish was not able to spawning. ➢ Loss of aquatic resource.

CHAPTER 8

PROBLEMS FACED BY THE HILSA FISHERMEN

It is designed to identify the major constraints confronted by the Hilsa fishermen in the study area. The respondents were asked to give their opinion regarding the problems and constraints of Hilsa fishing. A multiple number of problems and constraints were faced by the fishermen for Hilsa fishing. They are economically not very capable of investing the required amount for Hilsa fishing because of shortage of financial capital.

Fishermen generally complain of getting insufficient support from governmental agencies. It is also complained that fishermen do not get required technical and financial support from the government. Therefore, major problems and constraints faced by Hilsa fishermen have been identified. For the sake of analytical convenience, the problem and constraints were classified into the following general groups:

i)   Financial Problems

ii)   Technical Problems

iii)   Marketing Problems

iv)   Social Problems

8.1 Financial Problems Faced by the Fishermen

Fishermen are facing various financial problems and constraints in Hilsa fishing. Some of the major financial problems and constraints, which the fishermen emphasized upon, are discussed below:

8.1.1 Lack of Financial Capital

Most of the fishermen in the study area reported that they face scarcity of operating capital before and during banning period. They are not capable of catching Hilsa fish in the large scale due to lack of operating capital. They often have to borrow money from different institutional and non-institutional sources. From the Table 7.1, it can be said that 12.5% fishermen were facing lack of operating capital.

8.1.2 Lack of Bank Credit

In the study area enough bank credit is unavailable for the Hilsa fishermen. Getting bank loan is a very complex process. Most of the time fishermen were lost their interest on the bank credit. Most of small farmers reported that they were lake of bank credit (Table 7.1).

8.1.3 High Interest Rate of NGOs credit

In the study areas, most of them borrow their operating capital from different NGOs. Among the sampled fishermen, 60% complained that the interest rate is very high and it is the major problem for them.

8.1.4 High interest rate of non-institutional credit

Non-institutional such as mohazon, businessman, aratdars, money lenders, friends, relatives, neighbors etc. are important sources of credit in the study area. Most of the time the interest charged by the lender of non-institutional credit is very high. Among the sampled fishermen, 21.6% percent complained that interest rate of non-institutional credit is high (Table 8.1).

Table 8.1: Different Problems and Constraints Faced by the Hilsa fishermen

Problems	No. of fishermen (n=60)	Percentage (%)
Financial capital	6	10
Lack of bank credit	4	6.7
High interest rate of credit of NGOs	37	61.7
High interest rate of non- institutional credit	13	21.6
Total	60	100.0

8.2 Technical Problems Faced by the Fishermen

The technical problem includes the problems related to fishing technique. In the study area there were many technical problems faced by the farmers. These are discussed below:

8.2.1 Lack of scientific knowledge about fishing

Fishermen who are catching Hilsa fish they were lack of scientific knowledge about fishing technique because they have no training about Hilsa fishing. Among small farmers 64% percent reported that they were lack behind of proper production technique (Figure 8.1).
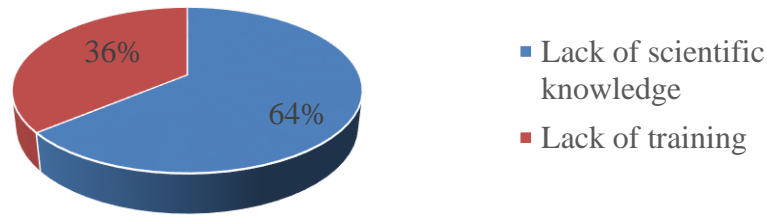
Figure 8.1: Technical Problems Faced by Hilsa Fishermen

8.2.2 Training

The Hilsa fishermen complained that there were not enough kinds of training facilities about Hilsa fishing. They reported that if training prevailed there in the banning period by the government then fishermen may be gained the capability of Hilsa fishing in the peak season and ultimately they could able to improve their livelihood status. It was revealed from the study that 35% of the fishermen faces training problem.

8.3 Marketing Problems Faced by Hilsa Fishermen

Fishermen faced the following problems during the marketing of Hilsa fish.

8.3.1 Low price

In the beginning of peak season fishermen get the high price of Hilsa fish. But in late season fishermen get very low price of fish. About 28.00 percent fishermen reported that they have faced with the problem (Figure 8.2).

8.3.2 Frequent price fluctuation

The supply of Hilsa fish in the market increases or decreases frequently within short period of time. For this reason, the prices of Hilsa fish fluctuate frequently in the market. Sometimes intermediaries are dominant in the market. They unfairly decrease the price of Hilsa. Small fishermen have the less bargaining power in the market. They are often exploited by the intermediaries. About 55% Hilsa fishermen reported that the price of Hilsa fish is frequently fluctuate (Figure 8.2).
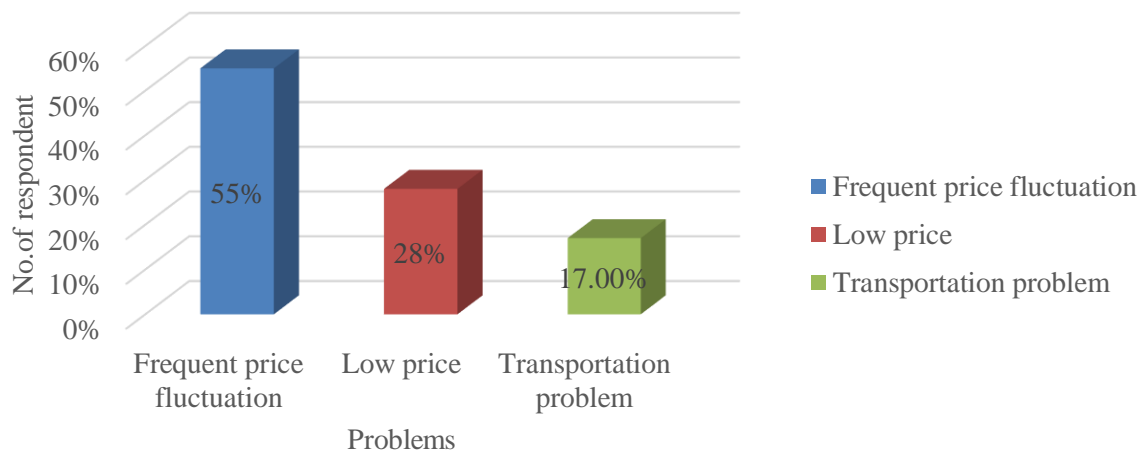
Figure 8.2: Marketing Problems Faced by Hilsa Fishermen

8.3.3 Transportation Problem

Transportation problem is one of the marketing problems faced by the fishermen in the study area. Fishermen generally carried their fish with van, nosimon and korimon. About 17.50 percent of all sampled fishermen faced transportation problem (Figure 8.2).

8.4 Social Problems Faced by Hilsa Fishermen

Fishermen in the study area faced some social problems during Hilsa fishing. Major problems of them are as follows:

8.4.1 Loss of production due to piracy problem

During the Hilsa fishing time, sometimes piracy problems occurred there. In the study area, a few numbers of fishermen reported that their products were stolen by the pirates. About 28.3 percent Hilsa fishermen were reported this problem (Table 8.2).

Table 8.2: Piracy Problem in the Study Area

Opinion	Number of fishermen (n=60)	% of total fishermen
Yes	17	28.3
No	43	71.7
Total	60	100.0

8.5 Other Problems

8.5.1 Natural Disaster Problem

On the other hand natural disaster is one of the major problems faced by the Hilsa fishermen. About 42.50% of the Hilsa fishermen reported that they faced the storm problem when they catch fish. They also faced flood, cyclone, and river erosion 25%, 2.50% and 30% respectively.

Figure 8.3: Natural Disaster Faced by the Hilsa Fishermen in the Study Area.
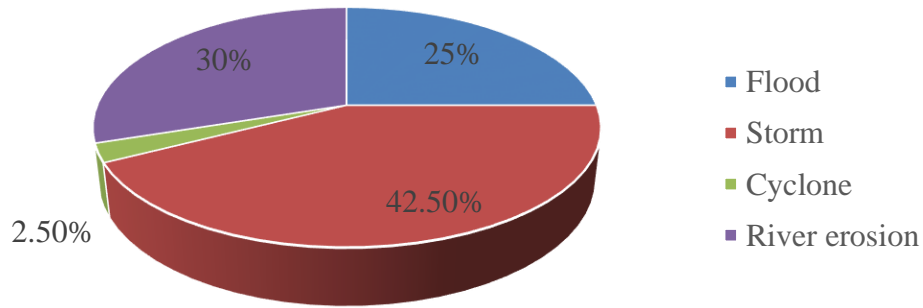
8.5.2 Fishing Elements Constraint

Fishing elements are the major constraints for Hilsa fishermen. About 45% fishermen reported that (boat + net) was their main problem.
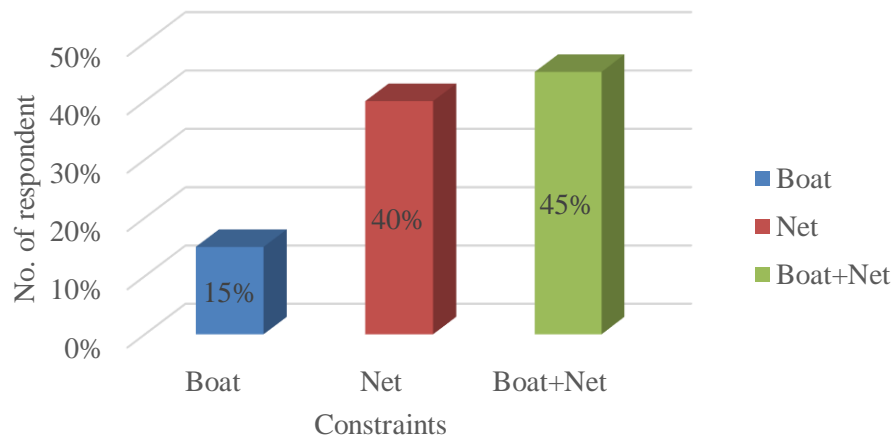

Figure 8.4: Fishing Elements Constraints Faced by the Fishermen in the Study Area

Study revealed that 40% and 15% were the boat and net problems faced by the fishermen in the studied area.

8.6 Probable Solutions of the Identified Problems Suggested By the Fishermen

The fishermen in the rural Bangladesh have been facing a lot of problems during fishing. Hilsa fishermen are not an exception. They also faced a lot of constraints at the time of catching Hilsa fish. After identification of different problems and constrains some probable solutions were suggested by the fishermen in the study area. They are described below:

1) To ensure easy provision of loans from the financial institutions;
2) Government should take necessary steps to train the fishermen about the scientific production technique;
3) To improve marketing facility;
4) To fix fish price in the market;
5) To execute the government rule;
6) Government should take necessary steps to stop the piracy problem;
7) Adequate marketing facilities such as roads and communication should be improved by the government without any further delay so that they can have fair prices for their products;
8) Government should take necessary steps to remove the syndicate problem in the market;
9) Formation of cooperative market for ensuring fair price of Hilsa fish and increasing bargaining power of fishermen is very important suggested by the farmers in the study area;
10) Government should take initiatives to make sure that the effective supervision by the Department of fisheries (DoF) in time when needed.
11) To provide social, moral and scientific education.

8.7 Concluding Remarks

The above discussions clearly indicate that fishermen are facing a number of problems in Hilsa fishing. Therefore, it may be concluded that Hilsa fish production could possibly be increased to a large extent if the above mentioned problems and constraints could be solved. Then it could help fishermen to increase their income as well as their living standard.

CHAPTER 9
SUMMARY AND CONCLUSION

9.1 Summary

Hilsa fishery possesses the single largest fishery because of its abundance in the open water which explores large local markets extended to Dhaka and other district towns as well as international markets. Unfortunately, there are very few Government and non-government organizations (NGOs) involve in managing and improving Hilsa fishery in this area. Reliable information about Hilsa production, number of fishers involved, types of gear used, etc. in the study area is available. At present Government banned Jatka fishing during March-April and all types of fishing is strictly prohibited in Hilsa sanctuaries during 1 October to 31 October and March-April, from catching Hilsa fish to increase the production (DoF, 2018). The government has imposed a ban on catching, selling, hoarding and transportation of Hilsa in different rivers for 31 days from October 1 to protect Hilsa breeding. Again to let allow the gravid fish to release eggs, all types of fishing is prohibited during 14 October to 24 October. No doubt this strategy resulted in increasing production of this national fish in the recent years. Unfortunately increasing production does not improves the economic condition of the Hilsa fishers and they suffers the most during the full banning season (March – April) because fishers have little access for alternative livelihoods in this coastal area.

The study emphasized on the relative livelihood pattern of Hilsa fishermen before and during the banning period in this region. Generally, fishermen come from the most marginal segment of Bangladeshi's population (Zafar and Ahsan, 2006). The most noticed segment of the population of this area especially land less people and their children were engaged in Hilsa fishing and trading for their livelihoods. Their levels of income vary from time to time depending on the peak season and lean season as well as fishing and banned period. The poverty ranking done through the study denoted that the Hilsa fishermen were the poorest and vulnerable group among the other communities.

A number of fishermen are catching Hilsa fish in a few areas of the country. Under these circumstances appropriate answering to some research question is necessary for popularization of Hilsa fishing in Bangladesh. These question include information about which group of people are currently related to Hilsa fishing and why; is Hilsa fishing economically profitable; if profitable then what its impact on livelihood improvement of the Hilsa fishermen; what are the problems and

constraints those hampers popularization of Hilsa fishing; how these problems and constraints can be remover for popularization of Hilsa fishing in Bakerganj upazila. with this view in mind the overall objective of the study was to compare the livelihood pattern of Hilsa fishermen before and during banning period Along with, the study will also determine the profitability, problems and constraints of Hilsa fishing with possible solutions. To achieve the overall objective the following specific objectives are set for:

1. To examine the socio-economic characteristics of Hilsa fishermen;
2. Factors affecting Hilsa fishermen income before and during banning period;
3. To compare the relative livelihood pattern of the fishermen before and during the banning period;
4. To identify the constraints and problems faced by the Hilsa fishermen;
5. To suggest policy guidelines.

Recently the production of Hilsa fish is rapidly increasing in Bangladesh. To attain the objectives, Bakerganj upazila of Barishal district was purposively selected for conducting this research work. Survey method was applied to collect the data. Data were collected during period of 1st October 2018 to 31 March 2019. Using purposive sampling technique a representative sample of 40 respondents were selected for the research.

Collection of accurate and reliable data and other necessary information from the field is not an easy task. Data were collected by the researcher herself. Before conducting actual interviews, the whole academic purpose of the present study was clearly explained to the respondents. An intensive survey was made on all the selected fishermen for collecting relevant data relating to inputs and outputs involved in Hilsa fish production and were collected by making time to time visit in the study areas during this period. Questions were asked systematically and explanation was made whenever felt necessary. Data were collected both at fishermen's house and in the river. In studying socio-economic characteristics, age structure, educational status, family status, family size, religious status, occupational status, housing condition, sanitary facilities, health facilities, and per income of fishermen before banning and during banning period were considered.

Hilsa fishermen are dependent on fishing as a source of income and nutrition. They are engaged in fishing from generation to generation. The findings showed that, 58.3% fishermen had Hilsa fishing experience of (0-20) years. The rest 30%, and 11.7% fishermen had experience of (21-40)

years, and others have above 40 years of fishing, respectively. Present analysis showed that professional fishermen constituted 72.5% and seasonal fishermen were 27.5%.

Fishing gear locally known as current jal, kona jal, gulti jal and suta jal were used for Hilsa fishing. Near about 100% fishermen reported that Hilsa population is increasing day by day because of imposing the banning period by the government.

Human capital represents the skills, education, experience, ability to labor and good health that together enable people to pursue their livelihood strategies. The knowledge about age structure of fishermen is important for estimating the potentiality of working of human resources in a community. From the present study, 41.7% belonged to age group of 19-35 years, 11.7% to 0-18 years, 30% to 36-55 years and 16.6% to above 56 years of age. It may be noted here that a large number of the fishermen from 19-35 years were head of their family.

In the fishermen community of the study area, it was found that about 45% fishermen family were jointed and 55% families were nuclear. The present findings revealed that, fishermen's families composed of 2 to 5 members (45.5%), marked as small family, medium family (42.5%) consisted of 6 to 8 members and large family (members above 8) accounted for 12% of the studied respondents.

There is a significant impact of education on the society. In the present study, five categories were used to determine the level of education. Out of 60 interviewed fishermen, 2.5% were illiterate, a huge portion of them could sign only (44%), 35% had education up to primary school, and 18.5% had secondary level of education, whereas no one completed the SSC level. Another important factor was that there is little educational institution in the areas of fishing villages. The study represented that most of the fishermen families are unable to maintain the educational expenses of their school going children during banning period or lean season due to low or zero income.

Transport, shelter, road, market, electricity, drinking water supply, health and sanitary facilities are the physical capital of the people involved in fishing activities. Poor physical capital affected people to pursue their livelihood strategies. House dwelling unit ownership of the Hilsa fishermen in the present study indicated that 96.5% houses were owned, and only 3.5% were rented in. The nature of house indicates the social status of the people. From the study, it was found that 60% households of the fishermen were tin shed, 17.50% households were katcha, 11.50% half building, 8.50% households were bamboo, and 2.50% households were wood.

Health facilities of the fish farmer were poor and it was found that 15% fishermen went to village kabiraj, 45% to village doctors, 28.3% fishermen got health service from Upazila health complex and remaining 11.7% from MBBS doctors district. Almost all fishers were disadvantaged in social capital such as trust, groups, networks, access to institution etc. The present study showed the poor existence of social organizations of the fishermen.

The present study revealed that only 7.5% became self-sufficient who did not need financial help but 35% borrowed money from their neighbors, 7.50% from relatives, and 50% from NGO"s for their fishing business. Low wage rate in fishing and fishing related activities limited the earnings of these fishermen households. Reduction in fish catch, use of low technique fishing gears, inadequate processing and marketing infrastructure, debt trap of dadon etc. are the barriers of increasing income from fishing and fishing labor as well.

Level of income of an individual family determines socio-economic status in a society. The income profile is the main indicator of national development. In most cases the fishermen in Bangladesh is below poverty level (Hossain, 2007). Annual income of fishermen comes from main occupation as well as secondary occupation. The present study revealed that 16.7% had monthly income up to Tk. 10,000, 21.7% had monthly income from Tk. 11,000 – Tk. 15,000, 41.6% had monthly income Tk. 16,000- Tk. 20,000, and above monthly income Tk. 20,000, the percentage of fishermen was 20%. During banning period, monthly income of the Hilsa fishermen decreased to Tk. 5756.25 from Tk. 17182.99 and sometimes income goes to nearly zero due to lack of alternative employment opportunity. The present study revealed that in banning period 40% of the fishermen had income level was zero, 25% had total income up to Tk.15,000 and 15%% had total income Tk. 16,000- Tk. 20,000.

Although production and price of Hilsa increased in the recent years but income level of the fishermen does not increased satisfactorily, this is mainly because of involvement of a large number of middlemen in fish marketing channel. Involvement of middlemen makes the fish a costly food item whereas true fishermen usually get little or no benefit from that.

Government banned Jatka fishing during April and October. During banning season, fishermen look for alternative income generate opportunities and involved in various occupations as day labor, boat and net making, agricultural works. Fishermen were found to work hard to manage their food all the year round. During the fishing banned period, the poor fishermen household suffered food storage and try to consume less expensive foods items, they mostly depended on

vegetables. Fishermen also suffered from various problems such as, inadequate credit facility, lack of marketing facilities, lack of knowledge of fishing, lack of appropriate gears etc.

To conquer the vulnerable condition of Hilsa fishermen during banning season, govt. has already taken some steps including subsidy (by VGF) to the true fishermen through which govt. allocated 40 kg rice/month for three months for every fishermen. But unfortunately they did not get actually quantity due to the dishonesty of local members and chairman. Fishermen claimed that they only got 10 kg rice/month and sometimes they got no rice.

Livelihood outcome factors are food security, nutrition, health, income, education, housing facilities, environment, safety etc. the people of the fishermen community were food insecure for 4-5 months in every year. Reason for the food insecurity was the banning and off season of fish catches. Educational status of the fishermen in the study area was not good and most of the people were illiterate and can sign only. But the primary education percentage of the children of fishermen was increasing gradually. River erosion is the main barrier for the fishing community and they also have to face flood and other natural calamities. So they were vulnerable to these situations. The health condition was not good. Most of the people went to the village doctor for their treatment of disease. Nutritional level of these people was poor because they did not know about the nutritional value though they took fish almost every day. Social relations among the local people were very good and there was no conflict between them. If conflict arouse they manage the conflict themselves. Fishermen had to face piracy problems in case of offshore fishing. Illegal fishing also occur in this region in banning season not all the fishermen have done this, only a few of them involve. The regular monitoring by coast guards on the area could solve the problem. So, the fishing communities in the Bakerganj Upazila need immediate attention and solution for betterment of their livelihood.

9.2 Conclusion

The contribution of fishery in the economy of Bangladesh and livelihood of her people is very important for creating job opportunities for unemployed people, earning foreign exchange, alleviating poverty and improving nutritional status of the people of Bangladesh.

The study was focused on the impacts of banning period on the livelihoods of Hilsa fishermen of Bakerganj upazila under Barishal district. In this area, most of the people live under the poverty level, some of which involved in Hilsa fishing for their livelihoods. However, the number of Hilsa fishers is increased due to lack of variable alternatives and Hilsa market demand of this fish.

The socio-economic condition of the fishermen in the adjacent area was not satisfactory. The fishermen were deprived of many amenities. Population pressure, low income, lack of alternative employment opportunities, and extortion by the local extortionist, loan problem, piracy problem etc. were the common socio-economic constraints of the fishermen in the study area. Fishers were found to be mostly poor, landless and neglected in the society and are exploited by the rich people/Mohajan/Aratdar in different ways. Many fishers do not have fishing equipment (boat and net) and as such they undertake fishing in Mohajan's boat as laborers or on catch share basis fishermen also faced various problems such as education, health facilities, food consumption, during banning season. . Due to lack of awareness as well as the poor income of the fishermen families, they had to lead sub-human life. Almost all fishermen mentioned lack of capital and lack of variable alternatives during banning period as their main problems. Actually fishermen of Bangladesh are socially disadvantaged and unable to fulfilling their basic needs (FAO, 2004) and they also live below the poverty line and struggle to survive with health, nutrition and sanitation a day to day problem (Rahman, 1994).

Ban of all kinds of fishing for 2 months has positive impact on production of Hilsa and other fishes. But due to ban of all types of fishing gears fishers livelihood have been affected during this ban period as they do not have any alternate income generating activities.

The present study revealed that about 31.5% Hilsa fishermen catch Hilsa in the banning period. This occurred because there was no any kind of alternative livelihood or income generating activities for the Hilsa fishermen. That's why they were forced to do this in order to maintain their livelihood.

There are about 16836 fishers (personal communication with Upazila fisheries officer Bakerganj Upazila) engaged in Hilsa fishing to maintain their livelihoods in Bakerganj upazila. Government support to the affected fishers during ban period is quite insufficient and is not properly distributed. The Hilsa fishermen in the study area reported that they did not get absolute amount by the VGF card. They claimed that about 40 kg of rice came from govt. but they did not get it because of the fancywork by the local member and chairman. Urgent steps should be taken to provide alternate livelihood support to the Hilsa fishers especially during ban and lean period.

A project named "Jatka Project" that came to an end in 2014. Before 2014, about 2-5% Hilsa fishermen got the alternative livelihood opportunity such as, cattle rearing, sewing machine, net

weaving etc. in every upazila under Barishal district. But after 2014, those activities were not seen afterwards.

As fishermen play an important role in catching Hilsa fish under severe stressful conditions, so we should do something for them to improve the socio-economic conditions and nutritional status. Necessary steps should be taken to develop the awareness among the fishermen by Govt. and NGOs. Therefore, a positive strategy must be taken to build sustainable Hilsa fishery and build up necessary links in the sustainable livelihoods frame-work at the community and national level. Demand, availability, conservation means etc. indicated that it is a sector of massive prospect bearing urgent initiative to uplift the livelihood of this marginal segment of population by searching alternative livelihoods, most importantly during ban and lean periods.

The Government should take some important steps by providing some sorts of management policy as well as providing of some extra providence during the ban season of the fishing which may be done within the provision of the VGF card. Some form of NGOs activity will be helpful for the providing soft loan which may be used for procurement of fishing gears and nets by the fishermen.

9.3 Recommendations

Based on the findings of the study, the following recommendations can be made to improve the socio-economic conditions of the Hilsa fishermen and thereby improve their welfare.

1. It is crucial to protect the fishermen from pirates by strengthening forest guards and police force with coast guard involvement to give the maximum benefit to fishers and legal resource extraction.

2. Some rules should be formed and implemented with regard to the use of gears, so that fishermen cannot catch fingerlings, brood fish indiscriminately.

3. Institutional credit system should be extended to the deserving fishermen on soft term basis.

4. The fishermen should be encouraged to sell their fish to the market directly without involvement of the intermediaries.

5. The fishermen do not have any alternate job opportunities during lean and ban periods of fishing. Therefore, arrangement for alternate income generating activities should be made for the fishers during lean and ban fishing periods and also providing control over fishing.

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APPENDICES

Table A-1: Species-wise Annual Fish Production From 2011-12 to 2017-18.

[Unit: Metric Ton]

SI No.	Species Group	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
1	Major Carp	777005	731662	728695	755074	750880	811588	846397
2	Other Carp	60356	54130	80138	80997	80647	100730	111373
3	Exotic Carp	299494	402490	389642	363737	357933	409801	454078
4	Pangas (Cat Fish)	-	-	371068	406818	504674	510097	453383
5	Other Cat Fish	288887	360722	81536	64537	65130	66646	68850
6	Snake Head	89351	53305	60282	69305	70106	72991	73358
7	Live Fish	95063	102651	115185	133512	136113	127120	144007
8	Tilapia	-	-	298062	347801	377346	370017	381215
9	Other Inland Fish	763668	835457	524488	542711	568446	598923	646350
10	Hilsa	346512	351223	385140	387211	394951	496417	517198
11	Shrimp/Prawn	252523	228769	223788	230244	234188	246774	247304
12	Crab	-	-	-	-	13160	14421	11787
13	Sardine	20187	29636	27590	32835	44386	48704	41486
14	Bombay Duck	62817	71745	51673	53950	58545	69230	75085
15	Indian Salmon	3030	2445	1960	1020	895	775	487
16	Pomfret	39537	29693	23355	11437	10593	10686	11899
17	Jew Fish	37929	30600	36170	31826	31894	33768	35427
18	Sea Cat Fish	19700	8594	9719	9476	8695	8424	9455
19	Shark/Skate/Ray	3865	5017	5648	5093	4622	4495	3974
20	Other Marine Fish	101858	112115	133976	156661	165120	132827	143527
	Total	3261782	3410254	3548115	3684245	3878324	4134434	4276641

Source: DoF 2018