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Economics of banning Hilsa fishing and its impact on the fishermen's income in Chandpur Sadar Upazila of Bangladesh

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ABSTRACT

Hilsa fish population had been declining due to the fishing of the juvenile fish and fishing during the breeding seasons. So, restrictions have been imposed on the fishing of jatka during certain times and on all kinds of Hilsa fishing during certain times of the year. However, the Hilsa fishermen are poor and these restrictions may adversely affect their income. This study aimed to understand the impact of seasonal banning of Hilsa fishing on the fishermen's income in Chandpur Sadar Upazila. The study was based on a field survey where primary data were collected from 40 fishermen and secondary data were collected from different reports, published and unpublished documents, journal articles, etc. Changes in income of fishermen were observed through benefit-cost analysis of fish farming. Factors affecting changes in income because of the ban were analyzed through regression analysis. The present study revealed that the BCR of Hilsa fishing before banning season was 1.20. The total cost of Hilsa fishing per day was Tk. 2972. The gross return per day was Tk. 3591 in peak season. The net return of Hilsa fishing per day was Tk. 618. The study also revealed that per day income of Hilsa fishermen during banning period was about Tk. 182. The regression analysis found that subsidy, alternative job, other types of fish catch, fishing hour, and experience of Hilsa fishermen, all of these factors had a negative impact on the difference in income before and during the ban while, the quantity of Hilsa fish caught had a positive impact. The study also found that the Hilsa fishermen were facing various financial, technical, marketing and social problems. The study concluded that steps should be taken to provide alternate income support to the Hilsa fishermen, especially during ban and lean period.

Keywords: Hilsa fishermen, fishing ban, fishing income, economic impact, Bangladesh

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1 Introduction

Bangladesh is blessed with rich and extensive inland and marine fisheries resources with a wide range of indigenous and exotic fish species. In Bangladesh a total of 11,63,606 metric tons of fish was obtained from inland open water bodies, 23,33,352 metric tons were produced through inland culture and 6,37,476 metric tons were obtained from marine sources in 2016-17 (DoF, 2017). The market value of 68,305 metric tons of fish and fishery products exported is Tk. 4287.64 crore (DoF, 2017). Fisheries sector contributed 3.61% to national GDP and 24.41% to the agricultural GDP in 2016-17 (DoF, 2017). There are many fish species in Bangladesh but Hilsa which is locally known as Ilish is the national fish of Bangladesh having unique taste and nutritional value. *Tenualosa ilisha* is a species of fish belonging to the herring family (Clupeidae) and a popular food in Bangladesh and parts of India. There are three Hilsa species found in the Bay of Bengal: *Tenualosa ilisha*, *Hilsa kelee*, and *Hilsa toil*. Most of the captured Hilsa fish are to *Tenualosa ilisha*. Hilsa is the highest contributor to the country's fish production as the single fish species as it provides about 12% of the total fish production and about 1% of GDP in Bangladesh (Sarker et al., 2019; DoF, 2015). About 4,50,000 people are directly involved with the catching for livelihood and around four to five million people are indirectly involved with the trade (Haldar and Ali, 2014).

Hilsa is a diadromous fish, which means they migrate 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 (locally known as 'jatka' which is up to 23 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 hyposaline 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.

It has been reported that about 75% of Hilsa catch in the world is from Bangladeshi waters (Miah, 2015). In 2014-15 fiscal years, the total Hilsa production was 3.87 lakh MT whereas it increased to more than 4 lakh MT in FY 2015-16 (DoF, 2017). The jatka or the Hilsa fish are heavily caught during November and December in estuaries and from January to May in most of the rivers. Indiscriminate harvest of jatka adversely affects the annual total shad catch in the fishery (Sarker et al., 2019; Haldar and Ali, 2014; 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 (Dewhurst-Richman et al., 2016). Since 2003-04 the government has been undertaking programmes to conserve jatka for ensuring sustainable production of Hilsa. Each year from November 1st to May 31st ban on jatka catch is being implemented (Sarker et al., 2019). Due to the successful implementation of jatka conservation programme, an incremental production of 4.83 lakh MT of Hilsa is estimated during the last six years since 2003-04 which is worth Tk. 12,075 crore (DoF, 2013).

Moreover, since 2014, the government imposed a 11-day ban on fishing in all rivers, estuary and seas (Dewhurst-Richman et al., 2016). Also, 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 9 to 30 in 2019 to protect Hilsa breeding (Dhaka Tribune 2019). The banning duration will be extended from 22 days to 1 month from 2018 (DoF, 2015). As a part of this ban, five sites on the Meghna and Padma rivers, and some inshore marine areas, have been declared as Hilsa sanctuaries (Table 1) under the protection and Conservation of Fish Act, 1950, to achieve desired development of Hilsa. The largest nursery ground of Hilsa can be found on 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) (Islam et al., 2016a). So, catch of Hilsa of any size has been banned each year in the following major spawning grounds during the highest breeding time (13 Oct – 23 Oct).

However, Hilsa fishermen are poor and one of the most vulnerable communities in Bangladesh, whose economic condition has not improved over the years (Mozumder et al., 2018; Islam et al., 2016b; Minar et al., 2012). Alam and Bashar (1995) assessed the average annual per capital income of the fishermen families to be Tk. 2,442 i.e., about 70% lower than the per capital income of the country as a whole. These people do not possess any crop land for so Hilsa fishing from the river is their only means of survival. Most of the fishermen are so poor that they are unable to upgrade their boats. Most of these fishermen are illiterate, and their children cannot attend school because they must help their fisher parents. The fishermen who are prevented from catching fish under the conservation programme come from the poorest segments of the community. Unfortunately, there have very little governmental and other organizational (NGOs) initiative to manage and improve the condition of Hilsa fishermen in this area and there have been no clear understanding about the impact of banning period on the livelihoods of the fishermen.

While there are many studies on the income status of Hilsa fishermen in Bangladesh, but very limited numbers of research have been conducted on banning period on Hilsa fish. A research by Ali et al. (1970) studied the impacts of banning period on the socio-economic condition of Hilsa fishermen in Shakhchor union of Lakshmipur Sadar Upazila, Bangladesh. The annual income of Hilsa fishermen varied from Tk. 15,000 to Tk. 150,000 and in banning season fishermen's monthly average income decreased to Tk. 21,600 from Tk. 50,400. In this area the proportion of fishermen involved in labor activities during banning season stood at 48% and the proportion of fishermen taking loan during banning season compared with non-banning period stood at more than 21%. Although 60% fishermen reported getting subsidy (through VGF card) from the government during banning period but it was stated to be not sufficient to maintain their livelihood.

Considering the above fact, the present study was carried out to compare the relative income before and during banning period of the Hilsa fishermen. The present study aims to analyze the impact of Hilsa fishing on fishermen's income before and during the banning period in Chandpur Sadar Upazila of Chandpur district. It is expected to bring into focus the important information regarding impact of seasonal banning on Hilsa fishermen's income in the study area. The objectives of the present study are: toexamine the socioeconomic characteristics of Hilsa fishermen; to determine the impact of Hilsa fishing ban on the fishermen's income; to identify the constraints and problems faced by the Hilsa fishermen; and to suggest policy guidelines.

2 Materials and Methods

The present study conducted a field survey where primary data were collected from individual fishermen and secondary data were collected from different reports, published and unpublished documents, journal articles, etc. For easy accessibility, time and resource constraints, Chandpur Sadar Upazila of Chandpur District was selected purposively for data collection. Chandpur is one of the Districts of Bangladesh located in the East-Central part of Bangladesh. The Chandpur Sadar Upazila is located between 23°7′ and 23°20′ N latitude and 90°34′ and 90°48′ E longitudes, and has an area of 308.78 square kilometers. It is bordered by Matlab Dakshin and Matlab Uttar Upazila on the north, Haimchar and Faridganj Upazilas on the south, Hajiganj on the west. It may be noted that Chandpur is well recognized for Hilsa fish. Then Chandpur Sadar Upazila was selected for conducting the study. Subsequently, three villages namely, West Sreeramdi, Jafrabad, and Baharia of Chandpur Sadar Upazila were selected. There are 16,836 enlisted fishermen (personal communication, Upazila Fisheries Officer of Chandpur Sadar Upazila) engaged in Hilsa fishing in 14 unions of Chandpur sadar (Ashikati, Baghadi, Balia, Bishnupur, Chandra, Hanar Char, Ibrahimpur, Kalyanpur, Maishadi, Rajrajeshwar, Rampur, Sakhua, Shah Mahmudpur, Tarpur Chandi). Data were collected from 40 (forty) Hilsa fishermen (due to budget and time constraint) comprising of younger, middle aged and elderly experienced fishermen. The fishermen were purposively chosen based on the objectives of the study. To achieve the objectives of the study a structured questionnaire was used to collect data.

Primary data were collected through personal interviews with the selected fishermen through face to face interviews with the help of a questionnaire. Data were collected for 6 months from October 2016 to March, 2017. These months were selected because banning started on firstly October and then March. The research objectives were to compare the income level of Hilsa fishermen before and during the banning period and that's why these months were selected. During the interview, each respondent was given a brief introduction about the nature and purpose of the study.

The 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 (GoB), the Department of Fisheries (DoF), various journals, newspaper, etc. Moreover, 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.

The data and information collected through interviews, discussions and communications were scrutinized, classified, edited and coded. A list of tables was prepared and finally tabulated data were analyzed on the basis of the objectives of the study. 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. 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.

Benefit cost analysis was performed to achieve the objectives of the study. This part included gross returns, which was calculated simply by multiplying the total volume of output by the corresponding price per unit; gross margin, which was calculated to have an estimate of the difference between total return and variable cost, and net return, which was calculated by deducting all cost (variable and fixed) from gross return. The cost items of Hilsa fishing were classified

Table 1. Hilsa sanctuary areas in Bangladesh

Sl.	Hilsa sanctuary areas	Ban period
1	From Shatnol of Chandpur district to Char Alexander of Laxmipur (100 km of lower Meghna estuary)	Mar to Apr
2	Madanpur/Char Ilisha to Char Pial in Bhola district (90 km area of Shahbajpur river, a tributary of the Meghna)	Mar to Apr
3	Bheduria of Bhola district to Char Rustum of Patuakhali district (nearly 100 km area of Tetualia river)	Mar to Apr
4	Whole 40 km stretch of Andharmanik river in Kalapara upazila of patuakhali district	Nov to Jan
5	Lower Padma River at Shariotpur district, 20 km stretch of the Padma River	Mar to Apr

Source: Rahman et al. (2011)

under the following heads: cost of boat; cost of net; cost of fuel; cost of food; commission of aratdars; labor cost; miscellaneous cost; etc. The depreciation cost of boat was calculated by straight line method which is given below:

$$AD = \frac{(V_P - V_C)}{L_E} \quad (1)$$

AD = annual depreciation, V_P and V_S are purchase and salvage value, respectively, and L_E = expected life. Cost of boat includes depreciation cost and maintenance and repairing cost of boat.

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. 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 gill net 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 (jatka) and adult Hilsa. This cost includes depreciation of net and maintenance and repairing cost of net. This cost was calculated by the previous method. Fuel cost was incurred through operation of the boats. In all cases food costs were the major cost item of Hilsa fishing. The items include the cost of food pan, cigarette, biri, etc. which were used or consumed during the period of fishing in Meghna river. 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. 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.

Finally, the benefit cost ratio (BCR) was calculated by dividing gross return by gross cost, i.e., gross return/gross cost. Functional analysis was used to reveal the quantitative relationship between the dependent variables and a set of explanatory variables. To determine the effect of the explanatory variables, multiple linear regression function was estimated for its convenience. Many factors might affect the 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 model was specified for measuring the contribution of variable factors. The functional relationship between income difference between before and during banning and factors affecting this change in income can be depicted as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6) \quad (2)$$

where, Y = Income difference between before and during banning, X_1 = subsidy, X_2 = alternative job, X_3 = quantity of hilsa fish, X_4 = other types of fish catch, X_5 = fishing hour,and X_6 = experience of hilsa fishermen.

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

$$Y = \sum_{i=1}^{6} (b_i X_i) + ui \quad (3)$$

where, ui is the error term.

Table 2. Per day cost and returns of Hilsa fishermen before banning season

	Items	Unit	Quantity	Price unit^{-1} (Tk.)	Value (Tk.)
A.	Gross Return	kg	11.5375	311.25	3591.05
	Variable cost				
	Labor cost	Tk.	–	–	935
	Cost of fuel and oil	Tk.	–	–	1053.75
	Food expenses	Tk.	–	–	336.09
	Aratdars commission	Tk.	–	–	179.13
B.	Total variable cost	Tk.	–	–	2503.97
	Fixed cost				
	Depreciation cost of boat	Tk.	–	–	20.83
	Depreciation cost of net	Tk.	–	–	448
C.	Total fixed cost	Tk.	–	–	468.83
D.	Gross cost (B+C)	Tk.	–	–	2972.8
E.	Gross margin (A−B)	Tk.	–	–	1087.08
F.	Net return (A−D)	Tk.	–	–	618.24
G.	Benefit cost ratio (A/D)				1.2

Source: Field Study, 2017

3 Results and Discussion

3.1 Benefit cost analysis

The findings of the cost and return for Hilsa fishermen are presented in Table 2. The key findings are discussed below.

Gross cost The average total cost of Hilsa fishing was Tk. 2,972 per day.

Gross return The average gross return of Hilsa fishermen per day was Tk. 3591 in peak season (when highest amount of Hilsa fish is caught).

Gross margin In the study area, the average gross margin of Hilsa fish was estimated at Tk. 1087.

Net return In the study area, it was found that the average net return of Hilsa fishing per day was estimated at Tk. 618.

Benefit-cost ratio The present study revealed that the BCR of Hilsa fishing before banning season is 1.20.

Income during banning period The FGD during this study revealed that per day income of Hilsa fishermen during banning period was Tk. 181.88. The average monthly income during banning period was estimated Tk. 5456.25. It can be concluded that Hilsa fishing was profitable in the study area. Net return of per day Hilsa fishing before banning period was estimated Tk. 618.244 which was quite a good figure. The benefit cost ratio of Hilsa fishing was 1.20, meaning that for investing 1.0 Tk., fishermen were earning 1.2 Tk.

3.2 Factors affecting the income

The results of the functional analysis are illustrated in terms of the estimated coefficient and related statistics (Table 3). The F-value was estimated for overall significance of the estimated model. The F values of the model was 3.22 which was significant at 10 percent level of significance implying that all the included explanatory variables included in the model were jointly significant for explaining the variation in income difference between before and during banning period (Table 3). The estimated value of goodness of fit, R^2 of the model was 0.526. This indicated that about 52 percent of the total variation in income difference between before and during banning period has been explained by the variables included in the model.

3.2.1 Impact of subsidy

The estimated value of coefficient of subsidy was −6402.68 which was significant at 1 percent level of significance. Thus, there was a negative relationship between subsidy and change in income before and during banning period for Hilsa fishermen. This is because the subsidy ultimately provides an alternative source of income during the ban period. It indicates that 1 unit increase in benefit from subsidy to Hilsa fishermen, on an average, led to 6402.68 Tk. decrease in difference of income between before and during banning period (Table 3).

3.2.2 Impact of alternative job

The estimated value of coefficient of alternative job was −5881.98 which was significant at 5 percent level

of significance. Thus there was a negative relationship between alternative job and difference between before and during banning period income of Hilsa fishermen. The alternative jobs included working as day laborers, rickshaw pullers in the nearest town, etc. It indicates that 1 unit increase in income from alternative job of Hilsa fishermen, on an average, led to 5881.98 Tk. decrease in difference of income between before and during banning period (Table 3).

3.2.3 Impact of quantity of hilsa fish

The estimated value of coefficient of quantity of Hilsa fish was 767.22 which was significant at 5 percent level of significance. 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 unit increase in Hilsa fish quantity of fishermen, on an average, led to 767.22 Tk. increase in difference of income between before and during banning period (Table 3).

3.2.4 Impact of other types of fish catch

The estimated value of coefficient of other types of fish catch was −543.44 which was significant at 10 percent level of significance. 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, led to 543.44 Tk. decrease in difference of income between before and during banning period (Table 3).

3.2.5 Impact of fishing hour

The estimated value of coefficient of fishing hour was −977.89 which was significant at 5 percent level of significance. 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 unit increase in fishing hour of Hilsa fish catch on an average, led to 977.89 Tk. decrease in difference of income between before and during banning period.

3.2.6 Impact of experience of hilsa fishermen

The estimated value of coefficient of experience of Hilsa fishermen was −1.90 which was significant at 10 percent level of significance. 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 unit increase in experience of Hilsa fish catch on an average, led to 1.90 Tk. decrease in difference of income between before and during banning period (Table 4).

3.3 Problems faced by the fishermen

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. A study by Azad et al. (2017) identified different problems in the Hilsa fish value chain which included lack of modern and hygienic landing center; lack of handling and preservation facilities; illiteracy, ignorance, lack of awareness of the fishermen etc. The major problems and constraints faced by Hilsa fishermen reported in this study are discussed here.

3.3.1 Financial problems

All the fishermen in the study area reported that they face different types of financial constraints 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 4it can be said that 12.5% fishermen were facing lack of operating capital. In the study area, enough bank credit is unavailable for the Hilsa fishermen. Getting a loan from a commercial bank is a very complex process. About 10% of small farmers reported that lack of bank credit was their major problem (Table 4). Many fishermen borrow their operating capital from different NGOs. Among the sampled fishermen, 60% complained that the interest rate was very high and it was a major problem for them. Non-institutional such as mohazon, businessman, aratdars, money lenders, friends, relatives, neighbors etc. are important sources of credit in the study area. Among the sampled fishermen, 17.5% percent complained that interest rate of non-institutional credit was high (Table 4).

3.3.2 Technical problems

Fishermen who were catching Hilsa fish lacked scientific knowledge about fishing technique because they have no training about Hilsa fishing. Among small farmers 65% reported that they lacked knowledge of proper harvesting technique (Table 4). The Hilsa fishermen complained that there were not enough training facilities about Hilsa fishing. They reported that if training were provided during the banning period by the government, then fishermen can improve the capability of Hilsa fishing in the peak season and ultimately they could able to improve their income. The study revealed that 35% of the fishermen did not get necessary training.

Table 3. 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	*t*–value
Intercept	31590.27	28570.11	1.10
Subsidy	−6402.67***	2270.25	−2.82
Alternative job	−5881.97**	2635.95	−2.23
Quantity of Hilsa fish	767.21**	360.35	2.12
Other Types of fish catch	−543.43*	2370.10	−2.29
Fishing hour	−977.88**	475.20	−2.058
Experience of Hilsa fishermen	−1.90*	109.00	−2.22
R^2	0.52		
F–value	3.22*		

Source: Author's estimation, 2017;
***, **, * denote Ssignificant at 1%, 5%, and 10% probability levels, respectively.

Table 4. Different problems and constraints faced by the Hilsa fishermen

Problems faced by the fishermen	% of total fishermen[†]
Financial problem	
Lack of capital	12.5
Lack of bank credit	10
High interest rate of credit of NGOs	60
High interest rate of non-institutional credit	17.5
Technical problems	
Lack of scientific knowledge	65
Lack of training	35
Marketing problem	
Frequent price fluctuations	55
Low price	28
Transportation problem	17
Problems related to natural disaster	
Flood	25
Storm	42.5
Cyclone	2.5
River erosion	30
Fishing elements constraints	
Boat	15
Net	40
Boat + Net	45

[†] N = 40; Source: Field Study, 2017

3.3.3 Marketing problems

In the beginning of peak season (around October) fishermen get the high price of Hilsa fish. But in late season (around November) fishermen get very low price of fish. About 28% small farmers reported that they have faced with the problem (Table 4). The supply of Hilsa fish in the market increases or decreases frequently within a 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% small farmers reported that the price of Hilsa fish is frequently fluctuate (Table 4). 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% of all sampled farmers faced transportation problem (Table 4).

3.3.4 Social problems

During the Hilsa fishing time, sometimes piracy problems occurred there. In the study area, about 30 percent of fishermen reported that their products were forcefully taken by the pirates (data not shown).

3.3.5 Other problems

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. Fishing gears are a major constraint for many Hilsa fishermen. About 45% fishermen reported that boat and net were their main problem. The study also revealed that 40% and 15% of the fishermen faced either boat or net problems (Table 4).

3.4 Solutions suggested by the fishermen

After identification of different problems and constrains some probable solutions were suggested by the fishermen in the study area. They are described as follows:

1. Government should take necessary steps to train the fishermen about the scientific production technique;
2. To improve marketing facility;
3. To fix fish price in the market;
4. To execute the government rule;
5. Government should take necessary steps to stop the piracy problem;
6. 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;
7. Government should take necessary steps to remove the syndicate problem in the market;
8. 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;
9. Government should take initiatives to make sure that the effective supervision by the Department of fisheries (DoF) in time when needed.
10. To provide social, moral and scientific education.

4 Conclusions

The present study revealed that about 31.5% Hilsa fishermen catch Hilsa in the banning period. Government support to the affected fishermen during ban period is quite insufficient and is not properly distributed. The Hilsa fishermen in the study area reported that they did not get actual amount by the VGF card. Urgent steps should be taken to provide alternate livelihood support to the Hilsa fishermen especially during ban and lean period. Necessary steps should be taken to develop the awareness among the fishermen by government and NGOs. The Government should take some vital initiatives 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.

Recommendation

The following recommendations are made based on the findings of the study to improve the socio-economic conditions of the Hilsa fishermen and thereby improve their welfare.

1. Institutional credit should be provided to the deserving fishermen on easy terms basis.
2. The fishermen do not have any alternate job opportunities during lean and ban periods. Therefore, arrangement for alternate income generating activities should be made for the fishermen during lean and ban fishing periods and also providing control over fishing.

3. Concerned department of the government should provide the necessary infrastructural, financial and technical assistance for the improvement of the income of this fishing community.

Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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