Perception of fish farmers on flood coping mechanisms in Dewanganj Upazila under Jamalpur district

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Abstract: The study focused on fish farmers' perception on flood coping mechanisms and the relationship between selected characteristics of fish farmers and their perception on flood coping mechanisms. At several villages in four *unions* of Dewanganj *upazila* under Jamalpur district, the data were collected from a sample of 70 fish farmers. Their perception on flood coping mechanisms were measured on five aspects of flood coping mechanisms such as pond management, harvesting and marketing, housing and shelter, means of livelihood and health and sanitation. Pearson's Product Moment Coefficient of Correlation (r) was computed to explore the above mentioned relationships. The findings were as follows: 92.9% of the fish farmers had the moderately favorable perception while 5.7% had the highly favorable perception and the rest 1.4% had the slightly favorable perception on flood coping mechanisms; The correlation test showed that annual family income, extension media contact, cosmopoliteness, training exposure and knowledge on flood coping mechanisms of fish farmers had significant positive relationships with their perception on flood coping mechanisms; but age, educational level, family size and farm size had no relationships with their perception on flood coping mechanisms.
Key words: Fish farmers, flood coping mechanisms, perception, flood prone area.

Introduction

Flood is more or less a recurring phenomenon in Bangladesh. Bangladesh is a land of many rivers, and heavy monsoon rains. Therefore, the country is subjected to inundation by overflow from the riverbanks due to drainage congestion, rainfall run-off and storm-tidal surges. Thirty five percent of the total land surface is flooded during the wet monsoon (Milliman *et al.*, 1989). The annual rainfall in Bangladesh varies from 1,200 mm in the west to over 5,000 mm in the east. The average annual rainfall is approximately 2,300 mm, of which 80% occurs during June to September. Runoff generated by the huge rainfall is carried out to Bangladesh by three major rivers namely the Ganges, the Brahmaputra and the Meghna. In addition to these three major rivers, there are 54 medium and small rivers which enter Bangladesh from India and Myanmar (Chowdhury, 1998).

Available documents revealed that over the last 50 years (1954-2004), Bangladesh has experienced at least 41 floods of different magnitude. Each year flood causes millions of dollars damage in Bangladesh. One fifth to one third of the country is flooded each year during June to October when nearly two thirds of the food grain (mainly rice) is produced. Crops, houses, market etc. go under water and people's sufferings know no bound. There are four categories of floods encountered by Bangladesh: (a) normal monsoon floods, over topping the riverbank of excess water, which submerge the adjoining areas; (b) floods due to on rush of rain water down the hill slopes over land and ultimately causing flooding up in the low lying areas; (c) flash floods in the eastern and northern rivers, with the sharp rise of river water within a matter of days only, followed by the sharp fall; (d) tidal surge because of tidal fluctuation and water level set-up due to cyclones in the coastal area. Of these four categories major river floods are of serious concern.

Flood makes people resourceless and very often in flood time it is seen that hundreds of hungry people are waiting for relief in flood affected areas. Consecutive floods at times (viz. 1987 and 1998 floods) drastically reduced the growth rate of Gross Domestics Product (GDP). The flood in 1998 was the longest lasting in the history of the country causing enormous damages to over two thirds of

the country and continued for more then 75 days. Major losses were incurred in corps, livestock, poultry, fisheries and forestry (ITDG, 2001).

Bangladesh is the world leader in freshwater fish production with 4,016 kg/km^2 of water bodies and a per capita fish production of about 5.5 kg in the inland open-water system of Bangladesh. About 260 species of fresh water and brackish water fish and 475 marine water species (Hussain and Mazid, 2001), 24 species of freshwater prawn and 36 marine shrimp species (DoF, 2005) and 12 exotic cultivable fishes so far been introduced into Bangladesh with the aim of increasing fish production (Mazid *et al.*, 2002).

Fish is not only a food crop but also a cash crop. Fish is the major source of animal protein in the diet of people in Bangladesh contributing 63% of the total animal protein supply (DoF, 2007). It contributes 4.92% of the GDP and 6.0% foreign exchange earning (DoF, 2007). In the year of 2006-2007, the total fish production was 21.53 lakh metric tons (DoF, 2007). Bangladesh earned 3,702 core taka by exporting fish and fishery products in 2006-2007 (DoF, 2007). Approximately 1.4 million people are directly engaged in fishing, 11 million in part-time fishing and another 3 million in aquaculture activities. Thus, the fisheries resources offer excellent opportunities for the increased fish production that will effectively combat malnutrition and generate the additional employment. However, the regular flooding is one of the serious constraints to achieve the required fish production.

Due to regular floods, people of Bangladesh have traditionally developed different kinds of coping mechanisms to avoid or at least to decrease the loss due to floods. However, many people become perplexed what they will do during floods. Many of them are not well known about appropriate coping mechanisms. If they are trained on coping mechanisms their ability of coping with floods will be increased and sufferings during floods will be lessened many times (Ahmed, 2005).

To protect the loss from floods or flash floods, fish farmers take several precautionary measures such as netting around the pond dike, fencing, repairing and raising of pond embankment, fast growing fish species to minimize the production period, harvesting fish before

flood, transferring fish to the flood free pond etc. Due to lack of sufficient information fish farmers frequently fail to adopt these→ preventive measures against floods. Moreover, instead of some information relevant to the abovementioned precautionary measures fish farmers were not able to practice the preventive measures against floods due to lack of necessary perceptions on flood coping mechanisms. As perception is a mental process by which an individual become aware of the world around. It is a response, which in turns furnishes stimuli that elicit and steer further response. Though human perception is seen as an important factor for improving their livelihood, the government and NGOs are not trying to determine fish farmers' perception on flood coping mechanism. Though a number of studies are available on people's flood coping abilities in general (Anam, 1999; Nasreen, 1999; Ahren et al., 2005; Khandker, 2007), no specific study was found on the perception of fish farmers on flood coping mechanisms. Keeping these issues in view, the study was conducted in a flood prone area of Jamalpur district.

Materials and Methods

Dewangonj upazila under Jamalpur district is situated near the river of Jamuna and the river old Brhmaputra crosses this upazila. The area was purposively selected as a suitable area for the study because this upazila comes under regular flood and the people were too much vulnerable to flood damages. Some villages in four unions namely Bahadurabad, Chikajani, Chukaibari and Char Aomkhaoa of Dewanganj upazila were purposively selected for the study. The selection was made on the basis of suggestions made by Upazila Fisheries Officer (UFO), Union parishad members and other relevant officials of Dewangonj upazila. Seventy fish farmers of the selected areas who used to become affected during floods. Due to limited number of fish farmers in the study areas the whole population sampling procedure was taken.

The perception of fish farmers on flood coping mechanisms was measured through getting opinion (by five-points Likert scale) about 20 statements in terms of five aspects for flood coping mechanisms, namely pond management, fish harvesting and marketing, housing and shelter, means of livelihoods, health and sanitation. A respondent was asked to explain how he/she takes necessary actions and measures during, before and after floods concerning the respective aspect. Then, the researcher made a judgment whether his/her overall perception on flood coping mechanisms in those aspects could be ascertained as good or not good. The researcher assigned the basic of answer of the situation by the respondents. The overall score of the respondents' perception on flood coping mechanisms was measured by adding the scores obtained in all five aspects of flood coping mechanisms. So, the overall flood coping mechanisms score can range from 0 (the lowest) to 80 (the highest).

A number of characteristics of the fish farmers were considered for the study such as age, educational level, family size, farm size, annual family income, extension media contact, cosmopoliteness, training exposure, knowledge on flood coping mechanisms. Data were collected through the pre-tested interview schedule by face-to-face interview procedure during the period from 05 September to 15 October, 2009.

Results and Discussion

Characteristics of fish farmers: The study areas were situated in a backward area and its infrastructural and communication facilities were poor. According to Table 1, the highest proportion (55.7%) of fish farmers belonged to the middle age, compared to 41.4% of the young age and 2.9% of the old age.

Table 1. Selected characteristic of fish farmers

Characteristics	Unit of measurement	Expected range	Observed range	Respondents Categories	Respondents % (N=70)	Mean	SD
Age	Year	unknown	24-61	Young (up to 35) Middle (36-50) Old (above 50)	41.4 55.7 2.9	37.23	6.912
Educational level	Year of schooling	unknown	0-12	Illiterate (0) can sign only (0.5) Primary (1-5) Secondary (6-10) Higher secondary (above 10)	7.1 7.1 19.8 53 13	6.71	3.926
Family size	Number	unknown	1-16	Small (below 4) Medium (5-6) Large (above 6)	15.7 31.4 52.9	7.18	2.956
Farm size	Hectare	unknown	0.240-2.540	Small farm (0.2-1.0) Medium (1.0-3.0) Large (above 3.0)	52.9 47.1 0	1.06	0.50
Annual Family income	'000' Tk	unknown	35-619	Low (up to 60) Medium (61-150) Medium high (151-250) High (above 250)	7.1 31.5 31.4 30	209.42	132.54
Extension media contact	Scale score	0-33	1-20	Low (below 11) Medium (11-20)	74.3 25.7	9.10	3.924
Cosmopoliteness	Scale score	0-21	0-13	Low (below 7) Medium (7-13)	95.7 4.3	3.69	2.624
Training exposure	Days	unknown	0-60	Short (below 5) Medium (5-16) Low (above 16)	34.3 45.7 20	10.31	10.655
Knowledge on flood coping mechanisms	Weight score	0-40	7-33	Low (below 13) Medium (14-26) High (above 26)	15.7 65.7 18.6	19.58	6.516

Only 7.1% of fish farmers were found illiterate, compared to 66 % of the secondary and above education. The majority (52.9%) of fish farmers had a large sized family with the average family size being 7.18 persons, compared to the national average of 4.9 (BBS, 2008). The majority (52.9%) of fish farmers were small farmers while 47.1% for the medium farmer. The average farm size of fish farmers was 1.062 hectares, which was slightly larger than the national average (0.81 ha). Less than half (31.5%) of fish farmers earned the medium annual family income, while 31.4% had medium high annual family income, 30% high annual family income and only 7.1% low annual family income.

Table 2. Distribution of fish farmers according to their overall perception scores (N =70)

Level of perception	Respondents (%)	Mean	SD
Slightly favorable (below 50)	1.4		
Moderately favorable (50-70)	92.9	63.4	5.647
Highly favorable (above70)	5.7		

Meanwhile, a significant proportion (74.3%) of fish farmers had low extension media contact while 25.7% medium extension media contact.

Table 3. Extent of perception of fish farmers towards flood coping mechanisms

Sl. No.	Statements	Mean
Pond management		
1.	Pond drying, liming and fertilization is more productive before fry release (+)	3.61 (0.519)
2.	Disease may have not any relevancy with the loss of fish production after flood (-)	3.13 (0.635)
3.	Fencing/netting is necessary practice to protect fish from escaping during flood (+)	3.40 (0.522)
4.	There is no relationship of fish production with or without exit of gases in the bottom layer of the pond after decrease the severity of flood (-)	3.04 (0.824)
Harvesting and marketing		
5.	Seasonal interference of middleman due to flood hampered achieving real market price of fish (+)	2.87 (0.867)
6.	There is no necessity to harvest and marketing of table size fish before flood occur (-)	3.13 (0.588)
7.	It is important to have harvesting equipments to catch of fish just after the flood occurrence (+)	3.17 (0.564)
8.	Buying of fish fry from the fingerling dealer just before flood is very useful (-)	3.31 (0.627)
Housing and shelter		
9.	There should be precaution about flood to protect house and homestead from flood (+)	3.30 (0.598)
10.	Protection of removable assets by transferring safety place to minimize the flood damage is not necessary (-)	2.93 (0.709)
11.	Necessary action should be taken when house moderately inundated by flood (+)	3.19 (0.546)
12.	There is no necessity to take any action when house is severely flooded you need to take shelter another suitable place (-)	3.19 (0.666)
Means of livelihood		
13.	Security of non-food essentials (e.g. clothing, shelter) is an important aspect of the fish farmer during flood occur (+)	3.04 (0.669)
14.	There is no possibility to earn huge money by selling of fish just before flood occur (-)	2.93 (0.644)
15.	It is important to ensure the security of fuel for cooking and other necessary commodities during flood (+)	3.17 (0.636)
16.	Saving money would not be very helpful for improving the livelihood of fish farmer during the time of flood (-)	3.13 (0.815)
Health and sanitation		
17.	Ensure pure drinking water and water for cooking can prevent water born disease (e.g. diarrhea) during flood (+)	3.21 (0.587)
18.	Use of toilet here and there may not create any health problem in the locality after flood (-)	3.31 (0.526)
19.	Restriction on taking bath and using water would be play a significant role in health and sanitation for the fish farmers during flood (+)	3.04 (0.550)
20.	It is not necessary to clean the household area immediately after drainage of flood water (-)	3.29 (0.764)

Notes: 1. Means were calculated on the basis of scores measured by a five-point Likert scale; and 2. The number in the parenthesis indicates Standard Deviation.

The majority of fish farmers (95.7%) had low cosmopoliteness as compared to 4.3% medium cosmopoliteness. The highest proportion (45.7%) of fish farmers had medium duration of training and 34.3% short training while 20% long training. It is said that training can enhance the level of knowledge and improve skills on various aspects of aquaculture technologies (Islam, 2004). As a result, more than half (65.7%) of fish farmers had medium knowledge, 15.7% low knowledge and 18.6% high knowledge on flood coping mechanisms. In general, the level of their knowledge was satisfactory.

Perception of fish farmers on flood coping mechanisms: The overall perception scores of fish farmers ranged from 44 to 76 with the average score of 63.4 and the standard deviation of 5.64. The distribution of the fish farmers according to their overall perception scores is shown in Table 2. Most of fish farmers (92.9%) had moderately favorable perception on flood coping mechanisms. However, 1.4% had slightly favorable perception and 5.7% had highly favorable perception on flood coping mechanisms.

The concrete perception (namely 20 statements) on flood coping mechanisms is shown in Table 3. Except No.5, 10 and 14 statements, of which the means were comparatively low (less than 3 with a high variance), the overall perceptions were favorable.

Relationship between selected characteristics of fish farmers and their perception on flood coping mechanisms: Relationships between selected characteristics of fish farmers and their perception on flood coping ability were ascertained by Pearson's Product Moment Coefficient of Correlation (r) (Table 4). Annual family income, extension media contact, cosmopoliteness, training exposure and knowledge on flood coping mechanisms were significantly (positive) correlated with their perception on flood coping mechanisms. However, age, educational level and farm size did not show the significant relationship with their perception on flood coping mechanisms.

Table 4. Relationships between the selected characteristics of the fish farmers and their perception on flood coping mechanisms (N=70)

Selected Characteristics	Correlation coefficient (r)
Age	0.026
Educational level	0.200
Family size	-0.066
Farm size	0.082
Annual family income	0.284*
Extension media contact	0.359**
Cosmopoliteness	0.309**
Training Exposure	0.354**
Knowledge on flood coping mechanisms	0.262*

**: significant at 1% level of probability (2 tailed test), *: significant at 5% level of probability (2 tailed test)

Conclusion

Findings of the study reveal that majority (92.9%) of the fish farmers in the study area had moderately favorable

perception, while 5.7% of them had highly favorable perception towards flood coping mechanisms. This led to the conclusion that if majority of the fish farmers in a flood prone area do not have favourable perception on flood coping mechanisms their livelihoods will not be free from vulnerability. Moreover, annual family income, extension media contact, cosmopoliteness, training exposure, and knowledge on flood coping mechanisms of the fish farmers had significant positive relationships with their perception towards flood coping mechanisms. On the other hand, age, educational level, family size, and farm size of the fish farmers had no relationships with their perception towards flood coping mechanisms. Therefore, while undertaking any safety net programmes and livelihood improvement programmes for the fish farmers in the flood prone areas, these factors should be appropriately addressed by the concerned agencies.

References

Ahern, M., R.P. Kovats, Wilkinson, R. Few and F. Matthies. 2005. *Global Health impacts of floods: Epidemiologic evidence. Epidemiologic Reviews*, 23:771-777.

Ahmed, N. 2005. *Slip Trip Tumble: Determining Landlessness in Rural Bangladesh*. Dhaka: The University Press Ltd.

Anam, S. 1999. Women Coping with Floods. In: I. Ahmed (ed). *Living with Floods: An Exercise in Alternatives*. Dhaka: The University Press Limited.

BBS. 2008. *Statistical Yearbook of Bangladesh*. Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

Chowdhury, J.U. 1998. Some Hydraulic Aspects of Floods in Bangladesh and their Implications in Planning, In: M.M.Ali, M.M. Hoque, R. Rahman and S. Rashid (eds). *Bangladesh Floods Views from Home and Abroad*. Dhaka : The University Press Limited.

DoF. 2005. Fish fortnight publication, Department of Fisheries,

DoF. 2007. Fish fortnight publication, 2007. Published by the Edwards, P., 2000. Aquaculture, Poverty Impacts and Livelihoods. Natural Research Perspective, ODI. No. 56. Fisheries Research.

Hussain, M.G. and M.A. Mazid. 2001. Genetic improvement and conservation of carp species in Bangladesh. Bangladesh Fisheries Research institute.

Islam, M. S. 2004. Farmers' Ability to Cope with Flood in a Selected Area of Jamalpur District. M.S. (Ag. Ext. Edu.). *Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

ITDG. 2001. *Annual Report 2001*. Intermediate Technology Development Group-Bangladesh, Dhaka.

Mazid, M.A., M.S. Hossain, A. Razzaque and S. Rahman. 2002. Fishing methods in the flood plains and measure to control. BFRI publication no. 13. *Bangladesh J. flood plain aqu.*

Milliman, J.D., J.M. Broadus and G. Frank. 1989. *Environmental and Economic Impact of Rising Sea Level and Subsiding Deltas: The Nile and Bengal Examples*, 1:11-12.

Nasreen, M. 1999. Coping with Flood: Structural Measures or Survival Strategies? In I. Ahmed (ed). *Living with Floods*. Dhaka: The University Press Limited.