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Planning Intervention for Flood Control and Risk Management in Chilmari Upazila of Kurigram District

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Abstract

Water related natural hazards and climate change issues such as flood has become a serious threat to the lives, livelihoods and sustainable development of Bangladesh. Chilmari Upazila of Kurigram district which is one of the most seriously flood affected areas of Bangladesh has been taken as the study area. Bangladesh is already known as a role model for flood risk management around the world. But, the situation of flood management is not the same all around the country. The objectives of this study are to find out the main problems of the flood control and risk management system of Chilmari Upazila, and to develop a planning intervention guideline for its flood control and risk management. The interactive approach of the study involves participation of the stakeholders to develop local solutions to the flood problems. The empirical part of this study is conducted by household questionnaire survey and semi-structured in-depth interviews with questions regarding flood control and risk management. Main findings of the study state that the floods in Chilmari are managed in ad hoc manner. A coordinated and comprehensive management approach along with strong institutional framework is very important for sustainable flood control and risk management at Chilmari.

Introduction

Bangladesh is probably the most flood prone country in the world and some experts are arguing it as the most disaster prone nation in the world (Cutter, 1996; Zaman, 1999). Among natural disasters in Bangladesh, flood is the preeminent one. Every year a large portion of the country becomes flooded. The causes of floods in Bangladesh have been studied by many researchers from different perspectives (Ahmed, 1989; Khalil, 1990). The causes of floods are: Extremely flat topography, where the average height of the land is 25 feet or 8 meters (Huq, 1986); Synchronization of peak flows of the major rivers; Excessive monsoon rainfall in the plains and catchment areas of the Ganges, Brahmaputra and Meghna, the three major river systems; River bed siltation which is reducing river carrying capacity; Back water or tidal effect from the Bay of Bengal during monsoon which is an impediment to recede water from rivers; Deforestation and ecological imbalance; Increasing population pressure which is resulting encroachment and filling up of lakes and canals; Drainage congestion due to unplanned construction of infrastructures; Flood control activities such as flood wall, embankment, artificial levee, dykes; and Probable sea level rise and land subsidence.

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The effects of flood are manifold in Bangladesh since flood water remains long time onto the land. All means of communication viz. roads, railways, highways and even runways become paralyzed due to flooding. It causes widespread damage to crops, stored food grains, domestic animals, homesteads, development infrastructures and human lives. People remain maroon in water without having food and drinking water until relief arrives. The consequences of such recurring floods are really well beyond the capacity of a developing country like Bangladesh to bear. Even though flooding is a regular feature in Bangladesh, however, data on flooding is incomplete, inconsistent and partially misleading (Paul, 1997), because floods are assessed by a number of institutions from different points of view (Chowdhury, 2000). The factors that contribute to these calamitous inundations are varied and complex. Some of these are natural, like heavy monsoon downpour, melting snows in the Himalayas, and geophysical instabilities in the northern regions. But, some of the factors responsible for floods are human work such as deforestation and unplanned development works.

A comprehensive approach for long-term perspectives on economic development with social, ecological and environmental conservatory measures for flood management can be effective to cope with the consequences of floods. It is also important to ensure the involvement of community people, executing agency, concerned ministries, non-government organization and other stakeholders to reduce the gap between flood risk management plan and implementation.

Objectives and Methodology

The objectives of the study are-i) to find out the main problems of the flood control and risk management system of Chilmari Upazila under Kurigram district in Bangladesh; and i) to develop a planning intervention guideline of flood control and risk management for the Upazila.

Both the qualitative and quantitative research methods are followed for the study. The study is conducted in 2014. Relevant data and information on flood control and risk management measures practiced in Bangladesh are collected from both primary and secondary sources. Planning intervention guideline for flood control and risk management has been developed by identifying the gaps and constraints of present flood management system from the face to face interview of the flood affected people. Some recommendations to promote a more interactive, feasible and effective flood control and risk management are drawn based on review of the latest flood management techniques around the world and suggestions from the Upazila people and related other stakeholders. Questionnaire survey of 384 households having 64 households from each of the 6 unions, Focus Group Discussion (FGD) and Key Informant Interview (KII) are conducted. Factors that constrain or facilitate the effective and efficient flood management are considered. SWOT analysis is carried out to identify the potentials and limits of the current flood management based on literature study and in-depth interviews. Flood vulnerability of the six unions of Chilmari Upazila is determined by analyzing the collected data and different kinds of damages to various properties due to the flood of 2014. For determining the level of flood damage, some factors based on the severity of damage to various properties have been given value of importance from 1 to 3. The value 3 represents the most important factor, 1 represents less important and 2

represents important factor. Level of loss has been classified into five categories and given score from 0 to -4. The five categories with scores are: most seriously affected (-4), seriously affected (-3), moderately affected (-2), less affected (-1) and not affected (0).

Table 1: Factors of calculating flood vulnerability in Chilmari Upazila

Factors	Importance
Agricultural damage	3
Damage to houses	3
Damage to business property	2
Loss of work	3
Duration of flood water stay	2
Hamper to education	1

Table 2: Scores for different levels of damage by flood

Level of Loss	Score	Level of Loss	Score
Most seriously affected	-4	Less affected	-1
Seriously affected	-3	Not affected	0
Moderately affected	-2		

From the score of level of loss and importance of factor, total score of damaged level due to flood for each union has been calculated, where the most negative value represented the worst condition of any union.

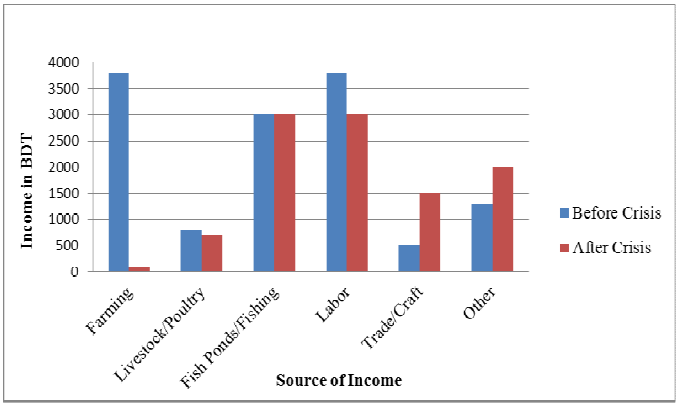
Total score of damaged level = Score of Importance * Scores of level of loss

Analysis and Findings

Floods in Chilmari with Different Impacts

Chilmari suffers almost every year from two types of floods: monsoon floods and flash floods. The floods cause a great damage in the upazila. Recent flood of 2014 also had a great impact on living of the people. Almost all the unions of the Upazila went under water and people lost their living as most of them are farmer. Agricultural loss, loss to business properties and loss of work of the day laborers caused a great decrease in the average monthly income of the households. Average household monthly income before and after the crisis of flood 2014 is shown in Figure 1.

Household income from the farming or agriculture dropped almost at zero from BDT 3,800/= earned before the flood. Income from fishery was found almost same before and after the flood. Trades and non-farm activities with income were found to increase after the flood.



Source: Field survey 2014.

Fig. 1: Change in source of income before and after the crisis of flood 2014

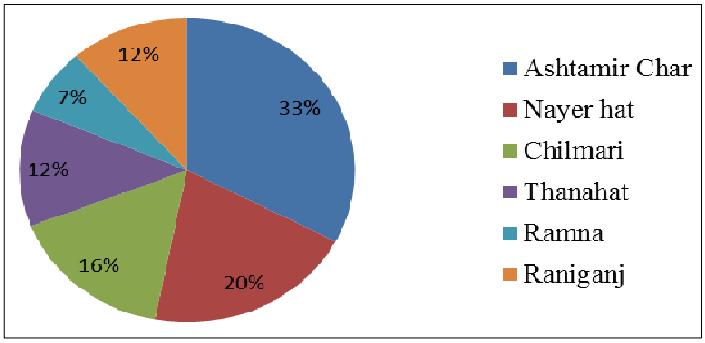
Table 3 shows that about 64% households of Chilmari Upazila were affected by agricultural damage. Maximum i.e. 24% households were affected in Ashtamir Char union and the minimum i.e. 9% households in Ramna union. Consequently, financial loss due to agricultural damages was also found highest i.e. BDT 5,200/= in Ashtamir Char and lowest i.e. BDT 3,400/= in Ramna union.

Table 3: Households affected by agricultural damage with financial loss during the flood 2014

Unions	Survey households	Affected households	Percentage	Average income of households (Tk.)	Average loss (Tk.)
Ashtamir Char	64	58	23.67	5000	5200
Nayerhat	64	50	20.41	5200	4800
Chilmari	64	43	17.55	5500	4300
Thanahat	64	38	15.51	5200	4200
Ramna	64	23	9.39	5000	3400
Raniganj	64	33	13.47	5200	3700
Total	384	245	63.80	5183	4266

Source: Field Survey, 2014.

Most of the people of Chilmari Upazila are poor and lower middle income class. So, damage to their residential house has a great impact to their livelihood. They can hardly afford to rebuild the house or repair it. Most of the houses are kutcha or semi pucca. As a result the velocity of flood water and long duration of flood water stay can easily damage the houses. Many houses on the mainland and Chars were inundated with flood water and shelter items (blankets, clothes, cooking pots and utensils etc.) were widely lost.



Source: Field survey 2014.

Fig. 2: Households affected by damage to houses and residential properties during the flood 2014

Households affected by damage to houses and residential properties in each union of the Upazila is shown in Figure 2. It is found that most of the houses have been affected by the recent flood in Ashtamir Char union. In Chilmari Upazila about 29% households have been affected by damages to their houses and residential properties. Among the total affected households, 33% households have been affected in Ashtamir Char, 20% in Nayerhat, 16% in Chilmari, 12% in Thanahat, 12% in Raniganj and 7% households in Ramna union respectively.

The people lost their agriculture related works as the agricultural land went under water. The people who have no land of their own and have to work on others' land have suffered a lot. Table 4 shows the number of people lost their works due to the flood of 2014.

Table 4: Lost of works with duration of workless by households during the flood 2014

Unions	Survey households	Households lost works	Percentage	Days of workless
Ashtamir Char	64	18	23.68	60
Nayerhat	64	15	19.74	50
Chilmari	64	13	17.11	45
Thanahat	64	11	14.47	44
Ramna	64	9	11.84	30
Raniganj	64	10	13.16	45
Total/Average	384	76	19.79	46

Source: Field Survey, 2014

Average 20% households of all the unions of Chilmari Upazila remained workless on an average of 46 days during the flood. Maximum i.e. 24% households of Ashtamir Char union lost their works for the maximum number of days, which is 60 days.

Both flooding and water logging cause serious damage to infrastructure like roads, railways, formal and informal housing and institutions. The flood has also disrupted communication, slow down economic activities by affecting small business, hat bazars and other business properties.

Table 5: Number of schools affected by the flood 2014

Unions	Number of schools affected	Disruption of study duration in days
Ashtamir Char	3	30
Nayerhat	2	20
Chilmari	2	15
Thanahat	2	15
Ramna	1	10
Raniganj	1	10
Total/Average	11	17

Source: Field Survey, 2014.

Char community people reported that during flood the teachers are unwilling to travel over to the islands to teach the children and in that effect there had no primary education. Char children who are lodged with extended family are able to attend the secondary schools located on mainland. Most of the children do not attend the schools and a very few take the daily trip by boat. Table 5 shows that the flood of 2014 affected 11 schools in six unions. Maximum disruption of study duration i.e. 30 days is found in Ashtamir Char union. Average days of disruption of study in each union of the upazila are found 17 days.

During the flood, there had been serious scarcity of pure drinking water as most of the tube wells went under water. Low lying Char islands and the mainland riverbank areas lost tube wells and latrines. This decline in numbers has decreased the use of water and sanitation facilities that caused some dissatisfaction and arguments within communities. Communities had to share latrines during the day, but at night women and children in particular did not make 10 minutes walk to use the latrines. Water borne diseases like diarrhea, cholera, dysentery etc. are found to spread over the affected area. About 90% households reported that their general health condition was worse during the flood. About 50% households mentioned stomach problems and diarrheal diseases. Households of 18% stated mosquito borne diseases as worse.

Flood Vulnerability Comparison among the Unions of Chilmari Upazila

Overall score of flood damage for six unions of the upazila has been calculated individually after analyzing all the collected data. Overall score of flood damage in 2014 for the six unions has been presented in Table 6.

Table 6: Flood vulnerability as per different damage scores of six unions of Chilmari Upazila

Unions	Total score of different damage and loss						Overall score	Remarks
	Agriculture	Houses	Non-agri properties	Works	Education	Water stay		
Ashtamir Char	-12	-12	-8	-12	-8	-8	-60	Most vulnerable
Nayerhat	-9	-9	-8	-9	-6	-6	-47	Moderately vulnerable
Chilmari	-9	-9	-6	-6	-6	-4	-40	Vulnerable
Thanahat	-9	-6	-6	-6	-4	-2	-33	Less vulnerable
Ramna	-3	-3	-4	-3	-4	-2	-19	Least vulnerable
Raniganj	-6	-6	-6	-6	-4	-2	-30	Less vulnerable

Table 6 reveals that overall flood damage score in Ashtamir Char is "-60", which is the highest negative value among all the unions. So, Ashtamir Char is the most flood vulnerable union in the Upazila. The least damage score i.e. "-19" is found in Ramna union. It indicates that Ramna union is the least flood vulnerable union in the Upazila. Figure 1 shows the comparison of flood vulnerability of six unions of Chilmari Upazila where the vulnerability scale is represented by the intensity of color.

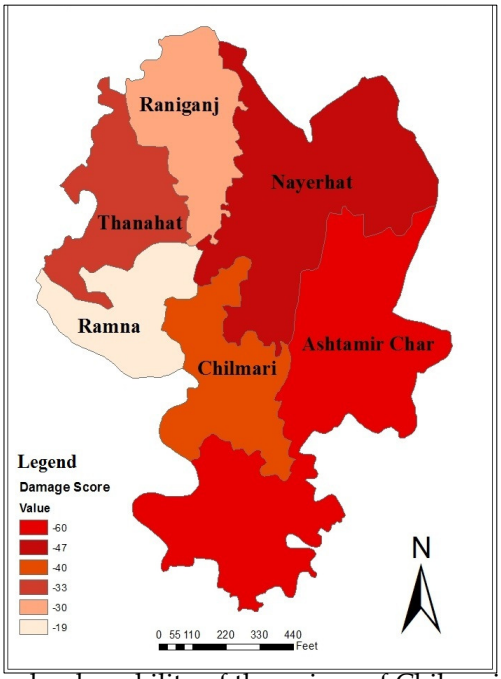


Fig. 1: Flood vulnerability of the unions of Chilmari upazila

Problems of Flood Control and Risk Management System in Chilmari

There are some problems of flood control and risk management system in Chilmari Upazila. The problems are analyzed below:

Lack of Institutional-Organizational Coordination and Cooperation

Different ministries with local government bodies like Zila Parishad, Upazila Parishad and Union Parishad are involved in flood control and risk management of Chilmari Upazila. There exists hardly any coordination and cooperation among these organizations. The rigid institutional framework has hindered the effort of coordination as well as information sharing which often leads to undesirable conflicts among the organizations.

Lack of Fund of the Organizations for Controlling Flood and Flood Risk Management

Being a developing country, fund constraint is a common phenomenon for Bangladesh. Because of lack of fund, flood control projects take longer time than the actual estimation. Flood protection embankment has been failed because of sub standard quality work due to lack of fund. In general, the maintenance division of any development work occupies a small percentage of national budgets. The Ministry of Finance and Planning Commission make financial arrangement mainly for the implementation of construction related investment projects not for their repair and maintenance. Proper maintenance and operation of the flood control structures is hindered due to shortage of fund.

Lack of Participatory Approach in Planning of Flood Control and Management

Rigid and inefficient bureaucratic practice and lack of people participation resist the formation of alternative body to manage floods at local level. There exists a guideline for Participatory Water Resource Management prepared by Water Resources Planning Organization (WARPO). But, it is not in practice. There is limited and in most cases no people participation in planning, policy and decision making phases. Flood control and management is mostly driven by top-down planning and decision making without participation of the affected people.

Lack of Integration between the Structural and Non-structural Measures of Flood Management

An integrated approach to flood management means the best mix of structural and non-structural measures. Though flood in Chilmari is managed by both the structural and non-structural measures, integration between them is not remarkable. Structural flood control measures that are physical in nature are mostly emphasized than the non-structural measures.

Inefficient Flood Warning System

Char unions are the most flood vulnerable unions in the upazila. But, the field survey found that people of three Char unions received no warning about the flood of 2014 while other three unions of the upazila received flood warning. In the Char union, people inspected their agricultural seeds just before a few days of the flood. If they received warning in due time, a huge amount of agricultural losses could be reduced.

Mismanagement in Relief Distribution

In relief distribution, both the GOs (Government Organizations) and NGOs are involved. But, there exists little or no coordination among the organizations. Main reason behind this problem is the corruption of public sector. Union Parishads generally distribute relief to the flood affected people. Many respondents have reported that they did not receive any kind of relief whereas some people of the same union have received relief twice or thrice. List of affected people for relief distribution is manipulated by the names of relatives and supporters of the elected representatives i.e. Chairmen and Members of the Union Parishads. In some cases people who have not been totally affected by the flood, receive relief from Union Parishad. Thus, many of the actually flood affected people are deprived of the government flood reliefs. Relief distribution by the NGOs is better than the public sector. But, total distribution is not always completed by the NGOs. The lists of affected people prepared by the NGOs are also manipulated by the Union Parishads. There is a tendency among some people outside the Char areas to build makeshift houses in the Char areas only for receiving reliefs from various organizations during the disaster.

Table 7: Households of the unions of Chilmari received relief during the flood 2014

Unions	Total damage score	Vulnerability status	Households received relief
Ashtamir Char	-60	Most vulnerable	30%
Nayerhat	-47	Moderately vulnerable	50%
Chilmari	-40	Vulnerable	55%
Thanahat	-33	Less vulnerable	50%
Ramna	-19	Least vulnerable	65%
Raniganj	-30	Less vulnerable	50%

Source: Field Survey, 2014

The study finds that Ashtamir Char, the most flood vulnerable union is provided with the least amount of relief. Table 7 shows that maximum i.e. 65% households of the least vulnerable union Ramna received relief and minimum i.e. 30% households of the most vulnerable Union Ashtamir Char received relief during the flood.

SWOT Analysis for Flood Control and Risk Management at Chilmari

Internal strength and weakness consider a number of factors related to the capacity of the organizations involved in flood control and management, their interrelationships and management efficiency. The external opportunities and threats consider the outside factors that have an impact on functioning of the organizations and their system.

Table 8: SWOT analysis of the organizations for flood control and risk management at Chilmari

Strength	Weakness
▪ Existence of Water Resources Planning Organization (WARPO) and (National Water Management Plan) NWMP ▪ Drainage Plan in Chilmari ▪ Structural and Non-Structural Measures taken in the area ▪ Water Modeling & Flood Mapping through the country ▪ Skilled Water Managers in the country.	▪ Lack of political good will & commitment ▪ Top-down decision making process ▪ Corruption ▪ Lack of transparency and accountability ▪ Weak institutional arrangement ▪ Lack of institutional cooperation & integration ▪ Less accessibility to information ▪ Lack of land use planning ▪ Lack of integration between land and water resource management ▪ Lack of legal framework ▪ Weak enforcement of law ▪ Fund constraints ▪ Weak monitoring and lack of infrastructural maintenance.
Opportunities	**Threats**
▪Increasing public awareness ▪ Policy advocacy of the civil society ▪ Growing number of water professionals	▪ Political unrest ▪ Land development through land filling ▪ Illegal encroachment of river, canals etc. ▪ Climate change ▪ Deforestation

Source: Literature review and field survey, 2014.

Recommendations

Following recommendations are recommended for the effective flood control and risk management of Chilmari Upazila:

- Steps can be taken to ensure strong institutional framework and coordination among WARPO and BWDB; Zila, Upazila and Union Parishads; departments of the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC); Ministry of Disaster and Relief; and other concerned ministries; and NGOs for their active involvement in the flood control and risk management of Chilmari Upazila.
- The beneficial aspects and negative socio-economic impacts of flood should be taken into consideration during the preparation of flood management plans and policies. Options of rainwater harvesting in the form of flood retention ponds can be adopted in Chilmari upazila to supplement the water supply, replenish the ground water table, increase soil moisture level and above all to mitigate the flooding.
- Long term and short term planning should be done with prioritization of implementation of the measures for integrated flood control and reducing flood vulnerability.
- Principles of good governance i.e. transparency, accountability, equity, delegation of power, decentralization of decision making through participation, optimal mix of bottom-up and top-down approaches etc. should be practiced by the organizations involved in planning and implementation of flood control and risk management initiatives of Chilmari.
- Future relief responses in Chilmari should consider effective coordination among all concerned organizations to ensure equitable distribution of relief and rehabilitation

supports. Steps can be taken to invest in supplier negotiations, training and registration of households in digital system.

- Steps can be taken to reactivate both the Union and Upazila Disaster Management Committees to perform their responsibilities for the better disaster management of Chilmari.
- Flash flood modeling, hazard mapping, land use guidelines and building codes for the Chilmari can be developed and implemented with the strong involvement of local stakeholders.
- Like many other developing countries, flood insurance should be practiced in Chilmari and other flood prone areas of Bangladesh.

Conclusions

Water resources planning and management issues in Bangladesh are mainly related to the construction of embankments on both banks of the river and establishment of sluice gates cum drainage facilities for the flood control and increased agriculture production. Though Bangladesh is already known as a role model for flood risk management around the world, its success is not the same all around the country. The flood control and risk management approach followed for Chilmari Upazila is fragmented rather than integrated and holistic. Integration between the structural and non-structural flood control measures is not remarkable. Structural flood control measures that are physical in nature are mostly emphasized than the non-structural measures. Ashtamir Char, the most flood vulnerable union is provided with the least amount of relief during the flood 2014. The beneficial aspects and negative socio-economic impacts of flood should be taken into consideration during the preparation of flood management plans and policies. Flash flood modeling, hazard mapping, land use guidelines and building codes for Chilmari as well as for the whole country can be developed and implemented with strong involvement of all concerned stakeholders.

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