

Concept of Flood Shelter to Cope with Flood

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Abstract

Shelter means protection during period of crisis. The people of Bangladesh, a country prone to natural disasters, are familiar with the 'Cyclone Shelter'. But the concept of flood shelter is relatively new. Traditionally, embankments are most commonly used as shelters during floods. Considering the geography of the country and the amount of floodwater that passes through it during the monsoon period, it may easily be seen that building embankments are not feasible in many areas of the country. In those areas flood shelter may be a very effective tool for coping with flood. In some of the areas of the country the local people have already established flood shelters. This paper investigates the advantages, disadvantages and problems of the flood shelter and proposes measures to improve their usefulness.

INTRODUCTION

Human being exists in this world in an adapted ecological relationship with the surrounding environment and has to live with a variety of natural hazards, which threaten life and property. River flood is the most common type of global hazard, encompassing a wide range of events from largely unpredictable and localized flash flood to anticipated widespread floods. Sheehan and Hewitt (1969) reported that floods accounted for about 30 percent of all natural disasters and 40 percent of the fatalities.

A flood may be defined as a discharge, which exceeds the channel capacity of a river and then proceeds to inundate adjacent flood plain. Flood hazard is a function of both geophysical attributes and human activities. Since man is still

unable to control the basic atmospheric processes that produce floods, he has attempted to cope with the hazard by taking alleviation measures. Through the application of high technology and massive investment of capital, the flood threat to human life has decreased appreciably in most of the developed countries.

Flood is a perennial problem for Bangladesh. Almost every year flood causes enormous damage to the people and economy of the country. To reduce the problem, a lot of investment has been made to build embankments for protecting important areas. The current records of damages by flood demonstrate that these measures could not bring about the desired results. Considering the geography of the country and amount floodwater in monsoon period, it may be concluded that only the structural measures to cope with flood will not be very successful. Together with structural measures such as building embankments and structures, other evasive measures may also prove to be highly effective. Evasive measures may include flood shelters, which are similar to cyclone shelters (BUET-BIDS, 1992). In this study, the advantages, disadvantages and scope of a flood shelter have been examined. For this purpose two flood shelters in Kurigram district have been selected. During the devastating flood of 1998 these shelters were used by the people of the locality. On the contrary, many people in the vicinity of the shelters had chosen houses of their relatives, located far away, as shelters. This study also investigates the reasons behind their choice.

FLOODS IN BANGLADESH AND THE FLOOD OF 1998

Flood is a recurring problem in this flat and riverine country. Some parts of India and Bangladesh experience flood almost every year with considerable damage. Flood statistics for Bangladesh are available since 1954 which is summarized in Table 1. The floods of 1954, 1955, 1974, 1987, 1988 all caused enormous damage to properties and considerable loss of life. During the middle of 1998, Bangladesh experienced the most devastating and prolonged flood in its history, which caused enormous damage to the economy of the country. The extent of damage caused by the flood is estimated to be around 3.0 billion US dollars (Annual Flood Report, 1998).

The prime reason of flood in Bangladesh is heavy rainfall in the upstream of the rivers flowing through the country. Three major rivers of the world flow through Bangladesh before discharging into the ocean. Heavy rainfall over the catchments of these rivers could produce an average runoff of about 1,009,000 million cubic meters. If the whole water were stored, the country would have been flooded to a depth of 8 to 10 meters.

Table 1: Year-wise Major Flood Incidences in Bangladesh

Year	Flood Affected Areas		Year	Flood Affected Areas		Year	Flood Affected Areas	
	Sq. km	%		Sq. km	%		Sq. km	%
1954	36800	25	1969	41400	28	1987	57300	39
1955	50500	34	1970	42400	29	1988	89970	61
1962	37200	25	1971	36300	25	1995	32000	22
1963	43100	29	1974	52600	36	1996	35800	24
1968	37200	25	1980	3300	22	1998	100250	68

During the monsoon of 1998, due to excessive and intermittent rainfall in the country and in the upper catchment areas from July to September, all the rivers of the country experienced significant increase in flow far above the danger level. The flood situation turned worse from the middle of July and by this time the low-lying areas of the country had already gone under water. At that time, about 45,000 sq. km of 37 districts of the country were affected by flood. Although flood situation started improving in early August, the flow of the two main rivers of the country- Padma and Brahmaputra-Jamuna increased significantly during the middle of August. This was caused by heavy rainfall in the upper catchment areas. By the end of August flood situation became worse and about 60,000 sq.km area of 42 districts were affected. During the early September the flow of the major rivers increased abruptly, worsening the condition. The flood situation became worst during the second week of September and about 75,000 sq.km area of 52 districts were affected during that time. The flooded condition existed for about three months, from early July to the last week of September, in different magnitudes at different places. Thus flood of 1998 became the most prolonged flood in the history of the country. The total flood inundated area was about 1,00,250 sq.km (68 percent of the total area of the country) affecting 53 districts (Annual Flood Report, 1998).

CONCEPT OF FLOOD SHELTER

The implementation of any flood alleviation scheme has four basic aims – (i) to reduce flooding, (ii) to reduce damage, (iii) to save lives, and (iv) to save property. A particular scheme may cover all four of these e.g., building embankments to protect vulnerable areas. On the other hand, small-scale projects such as flood shelters may help in saving lives and properties. These shelters can be used to manage relief and rehabilitation activities in an organized way. The

shelters can also be used as schools and community centers when there is no flood.

Clearly, floodplain evacuation is neither socially desirable nor economically viable, particularly in densely populated and large areas. But providing shelter in the most vulnerable areas, which cannot be protected by structural measures due to practical reason, seems to be a plausible solution.

The study area selected in this research is an area that is struck by flood every year. The geography of the area is such that any measures, such as building embankments, is not economically or technically feasible. Considering the fact, the local people, administration and NGOs have taken steps to build shelters for the affected people. These shelters are used as school, community center, medical center and offices of charity organizations during periods other than flood. During flood these shelters store emergency medicine and relief materials other than providing shelter. In the present study, the advantages and disadvantages of these flood shelters are investigated so that it can be improved further and implemented in other areas of the country.

THE STUDY AREA

The study area is a part of Kurigram district which is one of the worst victims of the flood of 1998. The research is aimed at evaluating the necessity and acceptability of flood shelters in this area.

The prolonged and devastating flood of 1998 caused serious damages in the whole Kurigram district and the area under study is one of the worst victims of this flood. In this area, flood is caused by heavy rainfall and overflow of the excess water of the rivers Dharla and Dudkumar which have their sources in India.

In 1998, floodwater remained in the study area for about 90 days. This flood affected about 40 thousand people of the study area. In this area, floodwater rose up to 10 to 15 feet above the ground level. The floodwater went up to the top of the houses. People took shelter on high roads, embankments, and in the houses of the relatives. Thousands of them rushed to the cities. Ripe crops in the fields were submerged and cattle, poultry and household belongings were washed away. Lack of pure drinking water and lack of hygienic latrine facilities caused various diseases and many lives were lost. An assessment of the damages caused by the flood 1998 in the study area is presented in Table 2.

Table 2: Assessment of the Damages Caused by Flood of 1998 in the Study Area

Area (Upazila)	Kurigram	Nageswari
No. of Union	3	1
No. of villages	10	1
Affected family	7366	1000
Affected people	31283	5000
Damaged houses (full)	168	100
Damaged houses (partial)	516	200
Damaged crops (hectare)	546	79
Affected damaged embankment (km)	10	1
Damaged bridge (No)	120	2
Damaged educational institutes (Nos)	2	2

(Source : Zibika, A local NGO)

FLOOD SHELTERS IN THE STUDY AREA

There are two flood shelters in the study area. One is at Zatrapur and the other is at Mogal Basa in Kurigram District. Their present conditions are described in the following sections.

Zatrapur Flood Shelter

This flood shelter is located in the village Ghanoshampur under Zatrapur Union of Kurigram Upazilla beside the Kurigram-Zatrapur Road. The district police station is 8 km to the east and Zatrapur market is half a kilometer to the south of it. It is 700 m away from the Brahmaputra/Dharla river. The Zatrapur flood shelter was constructed for the purpose of giving temporary shelter to the people of Panch Ghasi, Zatrapur and Ghogadah unions, who are the victims of the flood caused by the overflow of the Buamaputra/Dharla river. The Zatrapur flood shelter was built by LGRD and Co-operative Ministry during 1975-76 fiscal year. The coverage area of this flood shelter is 2.5 acres. There are four sheds each 220ft by 20ft, two katcha kitchens, ten latrines and two tube-wells in the shelter area. RCC pillar and wooden trusses have been used as framing elements, G.I. sheet has been used in the roof and the houses have been enclosed by bamboo. The construction cost was 6,50,000 Taka and 1500 kg of wheat. Later, in 1978-79, ten inch-brick walls were constructed up to plinth level and five-inch brick walls were constructed as partition walls. During the devastating flood of 1998, more than 2000 people with their domestic animals took refuge in this flood shelter.

According to the people of the area there is no doubt about the necessity of flood shelter of adequate capacity along with sufficient facilities. But the flood shelter of Zatrapur in a poor state due to lack of maintenance and supervision. Besides it is not clear who is responsible for its maintenance and as a result its properties and materials are being stolen. There are no health and utility facilities in the shelter. It is necessary to take proper measures to maintain and rehabilitate the flood shelter so that it could be used by the people in this area in the event of a future flood.

Zibika Flood Shelter

This flood shelter is located in the village Char Shetaizar under Mogol Basa Union of Kurigram Upazilla beside the Dharla river. The district police station is 6 km to the south-east of it. This flood shelter was constructed for the purpose of giving temporary shelter to the people of the village of Char Shetaizar during the flood caused by the overflow of water of the Dharla river. It was built by Zibika, a local NGO in April, 1996. The area of this flood shelter is about 1.5 acres and it has two permanent sheds of size 30ft by 15ft. There are provisions to build temporary sheds, if needed. There exist a public toilet, a bathroom and a separate toilet for the women. The elevation of the shelter is about 8ft above the ground level. There is a pond in front of the shelter. The design capacity of the flood shelter is 100 families with a total of 300 people. The construction cost of this shelter was Tk. 540,000/-. The sheds are made of RC pillar and G.I. sheet supported by wooden truss. The walls of the sheds are also made of G.I. sheet. Photographs of the shelter are shown in Fig. 1. As the flood shelter is maintained and supervised by Zibika, its present condition is good. People who took shelter here during the 1998 flood were quite happy with the facilities provided to them. In this shelter, there are arrangements for keeping domestic animals. There is also provision for individual cooking. Special care is taken to provide hygienic condition. People are able to get pure water and the bathroom/toilet facilities are very good. These are supervised on a regular basis. Two sheds are used as a primary school and a clinic during the non-flood seasons. About 212 families took shelter in it during the 1998 flood. A medical team worked in the shelter during that time and provided health treatment to 110 male, 210 female and 105 children. But the supply of food was insufficient. In the future, this shelter should be expanded and its elevation should be increased.



Figure 2: Photograph of Zibika Flood Shelter

Usage of the Flood Shelter and People’s Opinion

This section presents the results of a survey to grasp people’s perception about the flood shelter. For this purpose a survey was conducted after the flood of 1998. From the survey it is evident that the people who live in katcha houses are the main users of the shelters. Among the users, about 75 percent are farmers and laborers (Fig. 2). In the study area, about 74 percent of the houses are katcha and the rest are tin shed (Fig. 3). During the flood of 1998 about 27 percent of the houses were washed away, 18% were completely damaged and 55 percent were partially damaged (Fig. 4).

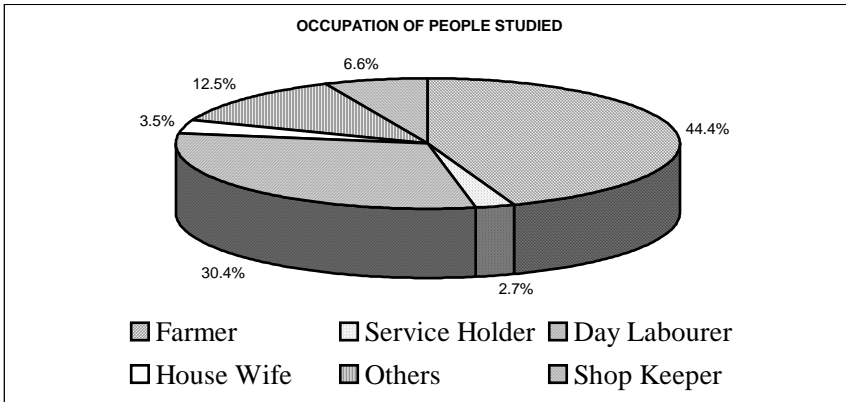


Figure 2: Occupation of People Survey in the Study Area

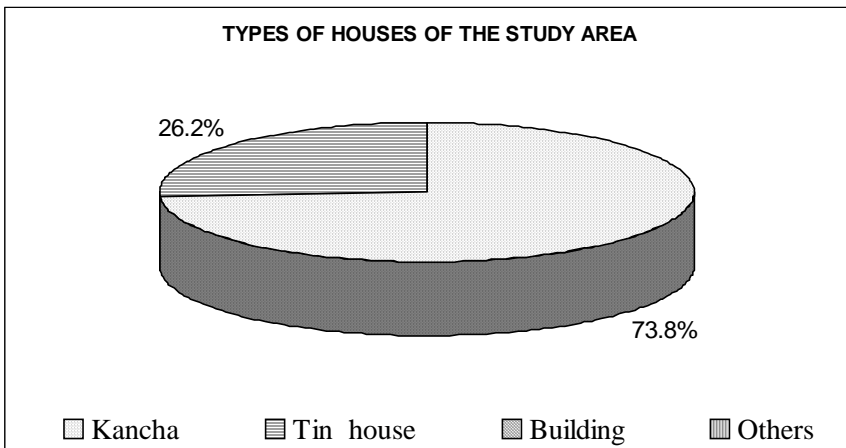


Figure 3: Types of Houses in the Study Area

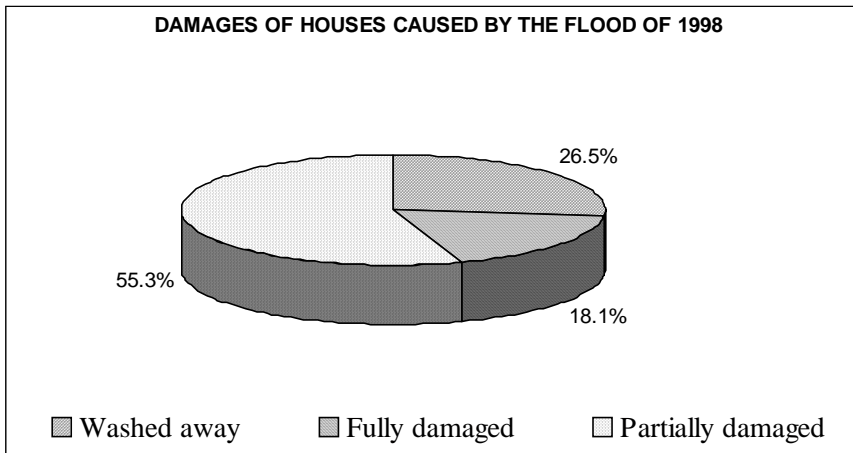


Figure 4: Damages Caused by Flood in the Study Area

Figure 5 shows that about 87 percent of the people had to leave their houses during the flood of 1998, among them 76 percent knew about the existence of the flood shelter in the locality beforehand. Of the people who left their houses during the flood, 58 percent went to flood shelter and 39 percent took shelter on high roads and embankments (Fig. 6). Most of the people took their livestock with them, as it was their only asset (Fig. 7).

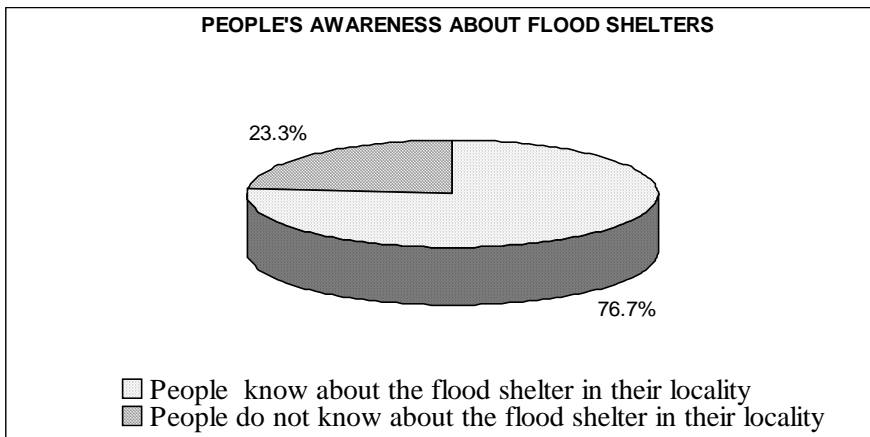


Figure 5: People's Awareness about Flood Shelter in the Study Area

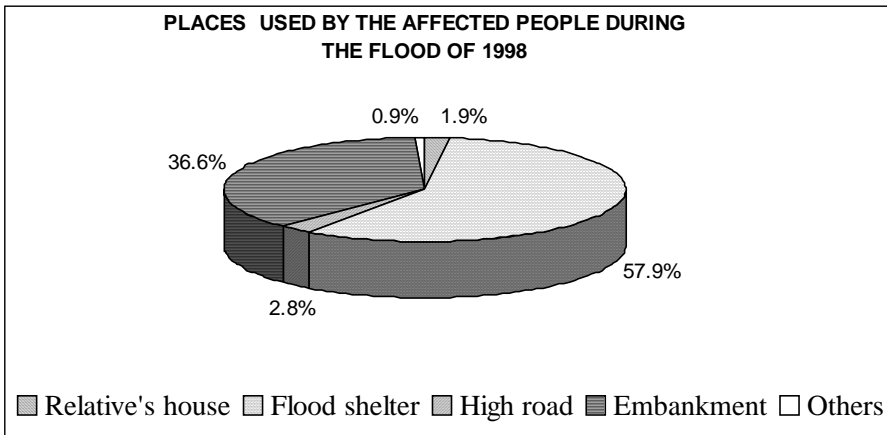


Figure 6: Places Used as Shelter by People during the 1998 Flood

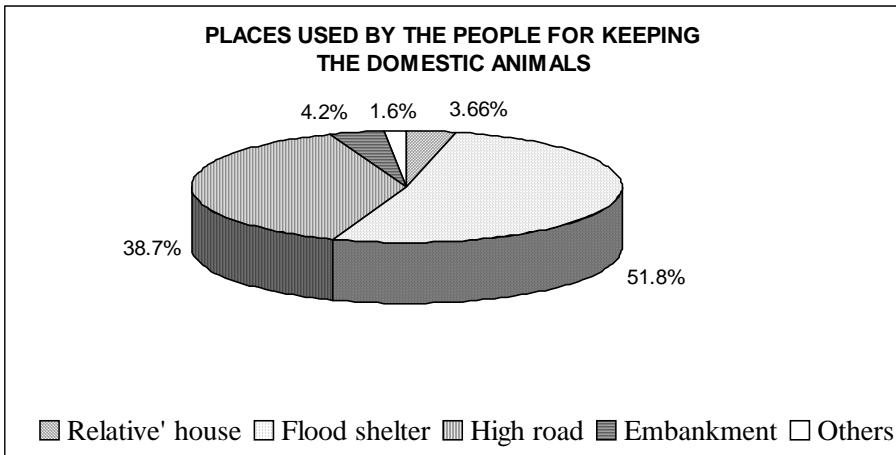


Figure 7: Places Used by People to Keep Livestock during the 1998 Flood

Most of the users of flood shelters had no other alternatives for taking shelter as shown in Fig. 8. Although many of the users did not mention any specific problem, only few of them were satisfied with food supply and toilet facilities. A substantial portion of the people demanded separate arrangement for the women (Fig. 9). Although there were some complaints, almost all the people mentioned that the shelters were of great help to them, which assisted them to survive during the flood and to get rehabilitated afterwards.

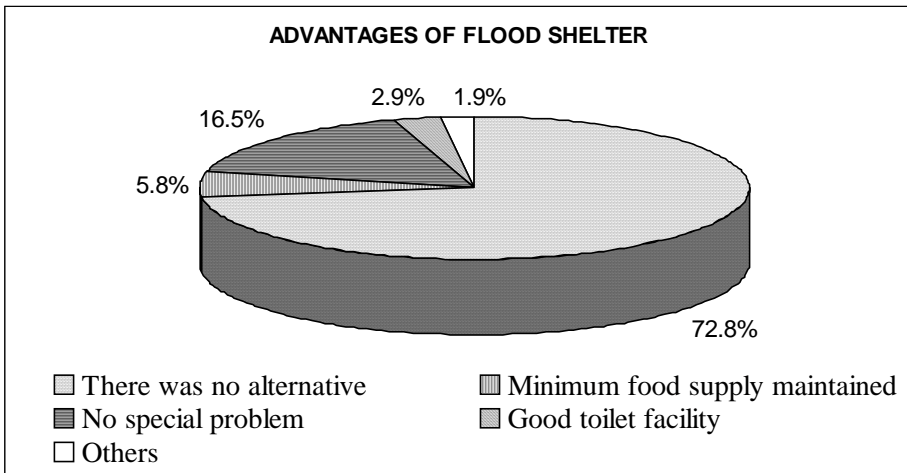


Figure 8: Advantages of Flood Shelters as Suggested by the People

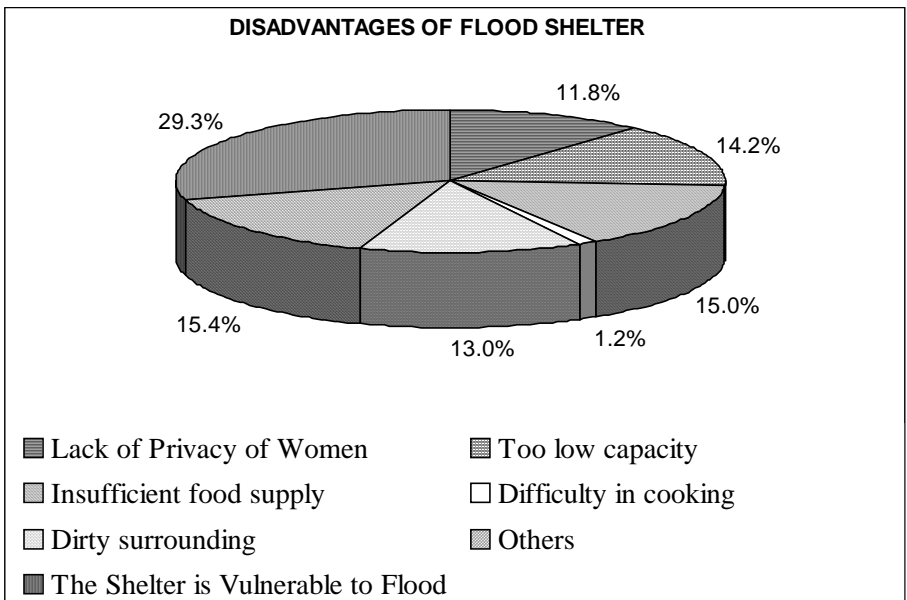


Figure 9: Disadvantages of Flood Shelters as Suggested by the People

CONCLUSIONS

Flood is a perennial problem for Bangladesh and the people of the country must live with flood. Although by building embankments the menace of flood can be reduced to some extent, it cannot be eliminated for all the areas. For the areas of frequent flooding evasive measures to reduce the sufferings of the people seem to be effective. Flood shelter is a form of evasive action. These shelters may provide the victims of flood with place to survive during flood and get rehabilitated afterwards. The shelters can also be used as the nucleus of relief and rehabilitation activities in a broader perspective. During periods other than flood, the shelters may be used as schools, community centers, health centers etc. To investigate the effectiveness of flood shelters, a survey was conducted in Kurigram district, one of the worst hit areas of the country during the flood of 1998. This area was selected because flood shelters, constructed by the local people and administration, existed here for more than 20 years. Most of the people mentioned that the shelters were of great help to them. The people provided some suggestions to improve the condition and usability of the shelters, which include improvement of toilet facility and separate arrangement for the women. From the results of the study it is evident that the shelters can play a significant role in the survival and rehabilitation of the flood affected people. The study can further be extended to incorporate technical specifications regarding the design and construction guidelines on ground elevation, structure type and layout of the flood shelters.

REFERENCES

- Annual Flood Report (1998), Flood Forecasting & Warning Centre, Processing and Flood Forecasting Circle, Bangladesh Water Development Board.
- Sheehan, L. and Hewitt, K. (1969), A Pilot Survey of Global Natural Disaster of the Past Twenty Years. Natural Hazard Research Working Paper No. 11, Department of Geography, University of Toronto.
- Smith, K. and Tobin, G. (1979), Human Adjustment to the Flood Hazard. Longman Group Ltd., UK.
- BUET-BIDS (1992), Progress Report-II, Multipurpose Cyclone Shelter Programme, World Bank/UNDP/GOB Project.