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CONCEPT OF FLOOD SHELTER AND ITS PLANNING TO COPE WITH FLOOD

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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. Floods are the cause of most natural disasters affecting society. Sheehan and Hewitt (1969) reported that floods accounted for about 30 percent of all natural disasters and 40 percent of the fatalities. Recently the occurrence of devastating flood has increased which may be caused by human interference with the nature.

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 process which produce floods, he has attempted to adjust to the hazard by means of flood alleviation projects. Through the application of sophisticated 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 to protect 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 may 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 is similar to cyclone shelters (BUET-BIDS, 1992). In this study, the advantages, disadvantages and scope of a flood shelter are examined. The paper also explains a GIS based planning approach for locating flood shelters.

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 middle of 1998, Bangladesh experienced the most devastating and prolonged flood in the history which caused serious disruption on 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).

Table 1 : 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

The prime reason of flood in Bangladesh is heavy rainfall in the upstream of the rivers going through the country. Three major rivers of the world discharge into the sea through Bangladesh. Heavy rainfall over the catchment 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.

In the monsoon of 1998, due to excessive and intermittent rainfall in the country and 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 started to become alarmingly 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 in 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 in the second week of September and about 75,000 sq.km area of 52 districts were affected during that time. The flooded condition existed from early July to the last week of September, for more than three months at different places in different magnitudes. 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 well include 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 during periods other than 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 can not be protected by structural measures due to practical reason seem to be a plausible solution.

To investigate the feasibility of flood shelter, Zatrapur and Mogol Basa union of Kurigram district has been selected as study area. These areas are struck by flood every year. The geography of the area such that any measures, such as building embankments, is neither economically nor 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.

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 daily laborers (Figure 1). In the study area about 74 percent of the houses are katcha house and the rest are tin shed houses (Figure 2). During the flood of 1998 about 27 percent of the houses were washed away, 18 percent were fully damaged and 55 percent were partially damaged (Figure 3).

Figure 4 shows that about 87 percent of the people had to leave their houses during the flood of 1998 among whom 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 (Figure 5). Most of the people took their livestock with them, as it was their only asset (Figure 6).

Most of the users of flood shelters had no other alternatives than to go to flood shelters. 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 (Figure 7).

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.

Planning of Flood Shelter Using GIS

Geographic Information System (GIS) can be a very effective tool for locating and designing flood shelters. Using GIS framework the demand for space in flood shelter can easily be determined considering the population within the scope of the flood shelter. It can also assist in locating the appropriate place for locating the flood shelter considering the geography of the area. User interface of GIS model is shown Figure 8.

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 can not be eliminated for all the areas. For the areas of frequent flooding evasive measures to reduce the sufferings of the people seem to be more 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, and thereby enabling the people to engage in activities sooner and bringing economic benefit. The shelters can also

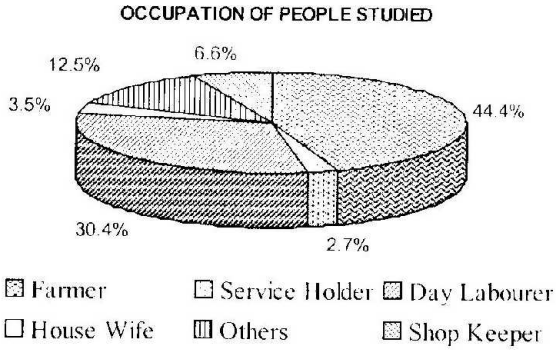


Figure 1 : Schematic Representation of Occupation of the People Surveyed

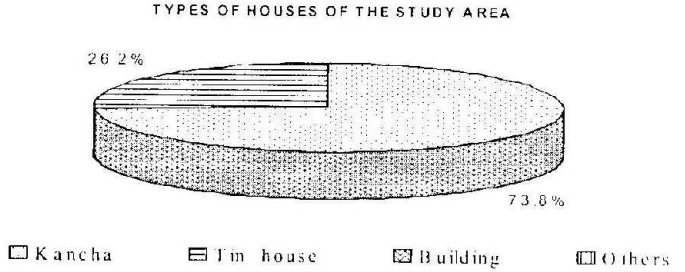


Figure 2 : Types of Houses in the Study Area

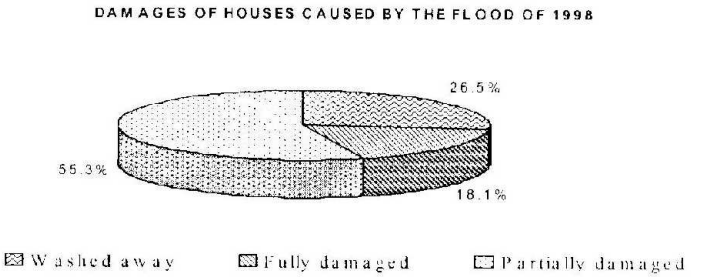


Figure 3 : Damages Caused by the Flood of 1998

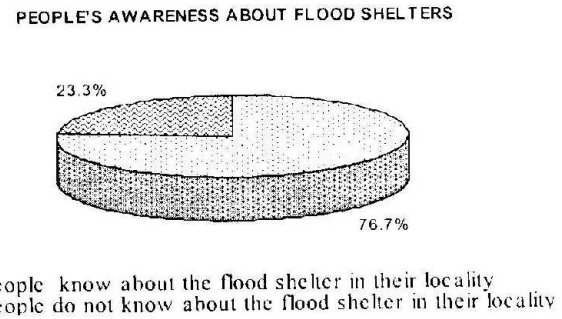


Figure 4 : People's Awareness about Flood Shelter

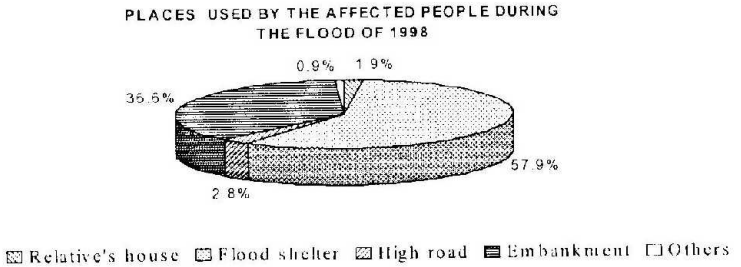


Figure 5 : Places used as Shelters by the People during the Flood of 1998

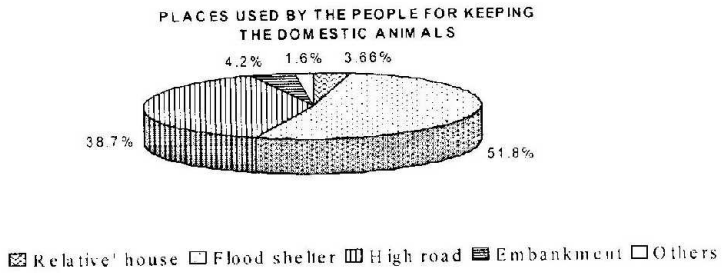
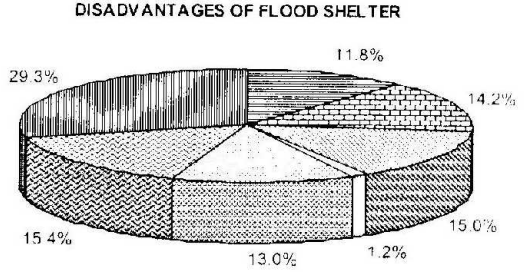


Figure 6 : Places used by the People to keep Livestock during the Flood of 1998



Lack of Privacy of Women
Too low capacity
Insufficient food supply
Difficulty in cooking
Dirty surrounding
Others
The Shelter is Vulnerable to Flood

Figure 7 : Disadvantages of Flood Shelters as Suggested by the People

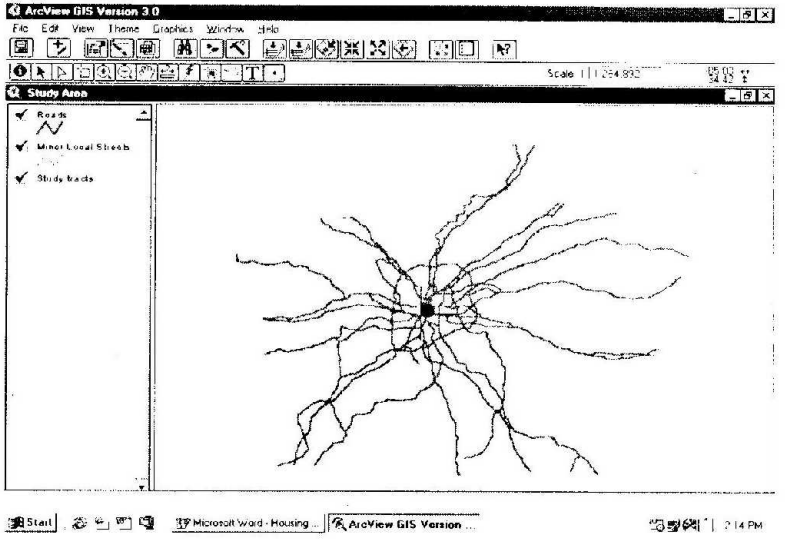


Figure 8 : GIS Model for Finding the Location of Flood Shelter

be used as the nucleus of relief and rehabilitation activities in a broader perspective. During the period 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 by the flood of 1998. This area was selected because there were flood shelters constructed by the local people and administration about 20 years ago. 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 improved toilet facility and separate arrangement for the women.

The study dealt with the socio-economic aspects of flood shelters. 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.

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