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Assessment of Economic Loss Caused by Flood Damaged Transportation Network

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Abstract

Flood causes direct as well as indirect loss to the economy of a country. The direct losses include damage to the infrastructure, agricultural and industrial products, human being and livestock. The indirect losses include the damage to the economic activities that cannot remain operative due to lack of communication facilities during and immediately after flood. The indirect losses, particularly losses due to damage of transportation facilities may be substantial and warrant special attention. This paper presents an estimate of the indirect loss caused by flood damaged road network. The paper reveals that such indirect loss is much higher than the direct loss. It suggests that some economically important transportation corridors should be constructed in such a way that they remain workable even during flood.

INTRODUCTION

Transportation provides the essential linkages for economic activities of a country. With the increase of specialization of different types of industries in different areas, transportation acts as arteries and veins for the operation of the whole system. Damage to transportation system makes a country lame and hampers economic development severely.

Natural disasters like flood can affect economy of a country in two ways. The first one is the direct effect where it destroys national assets like human

lives, crops, livestock, industries, houses and infrastructures. The other is the indirect effect where the economic activities, which are not destroyed by the disaster, cannot remain operative due to the lack of transportation infrastructure. The monetary value of the first type of damage can be perceived and analyzed relatively easily. For this reason it is usually included in the estimation of the economic losses and in the formulation of rehabilitation policies. On the contrary, it is very difficult to estimate the damages caused by the second type of effect mentioned above. But the economic value of the second type of damage may also be important. This type of loss can be avoided provided the major transportation linkages are protected during the disaster.

Flood is a perennial problem for Bangladesh. If the indirect effect of flood, as mentioned above, proves to be substantial, it may influence future investment policies in transportation significantly. In this case the major transportation linkages should be built in a way that they are not affected by flood. These transportation corridors should interconnect the major industrial areas of the country.

The complete structural measure to prevent flood from occurring is not economically feasible for Bangladesh. By protecting the areas of higher economic potential, e.g., major industrial areas, and by maintaining transportation facilities among these areas and ports, economic losses may be significantly alleviated. This study deals with the economic loss caused by unavailability of transportation facility due to flood-damaged road network. Here the monetary value of this kind of damage is estimated for the devastating flood of 1998.

FLOOD OF 1998 AND ITS EFFECT ON TRANSPORTATION SYSTEM

Flood is a recurring problem in Bangladesh. About 60 percent of the country is flood prone while 25 percent is inundated during monsoon in normal years (Hasan, 1998). The flood of 1998 is one of the most devastating in the living memory. The flood started in early July and remained until late September. Due to the flood, transportation infrastructure in general and highways, railways, bridges and culverts in particular have been severely damaged.

The flood of 1998 has affected most of the road and railway infrastructures of the country. A preliminary assessment of the damages made by the Ministry of Communications and Roads and Highways Department (RHD) is presented in Table 1.

Table 1: Assessment of Damages to Highways and Railways Caused by Flood of 1998

RHD Roads	Length Sub-merged (Km)	Damaged Road (km)		Damaged Bridges & Culverts (No)		No. of Dama-ged Ferry Ghats	Imme. Repair Cost (mil. Taka)	Rehabilitation Cost (mil. Taka)		Total Cost (mil. Taka
		Emban-kment	Pave-ment	Badly	Partial			Short Term	Long Term	
National Highway	1381.2	623.6	599.3	88	232	13	678.4	490.9	918.1	2087.8
Regional Highway	783.9	329.8	329.2	59	126	7	374.3	268.4	502.0	1144.8
Feeder Road	7457.5	3376.1	3315.9	229	470	34	3761.9	2720.5	5087.6	11570.0
Mec.l Equipment	-						30.0	70.0	0	100.0
Total	9622.6	4329.5	4244.4	376	828	54	4845.1	3549.9	6507.7	14902.6
	Railway Tracks and Signaling			Bridges					Total Cost	
Railway	496 km			117					1524.9	

Source: Roads and Highways Department.

A survey conducted by Bangladesh Garments Manufacturers and Exporters Association (BGMEA) reports that about 250 garments factories of the country were submerged during the flood, over 300 thousand workers were affected and failed to attend to work and as the major highways were snapped by flood transportation cost went up five times. The total amount of production loss in country's top foreign exchange earning sector amounted to US$173 million (Quddus, 1998).

ASSESSMENT OF SECONDARY DAMAGES CAUSED BY FLOOD

Due to the flood of 1998 about 68 percent of areas of Bangladesh had been inundated (Annual Flood Report, 1998). Although most of the inundated areas were rural agricultural lands, many urban areas were also flooded. But among the industrial areas of the country only 25 percent had gone under water. The flood did not directly affect many industries in Dhaka, Khulna, Chittagong and Bogura. But a lot of industries in these areas could not be kept operative due to the fact that either the raw materials or the finished products could not be transported to and from these industries. This was particularly true for the garments industries, one of the most important industries of the country. During flood it was reported that some major garments industries of the country used airplanes to transport their goods to the Chittagong port. Although this increased the production cost quite significantly, the manufacturers opted for it because of lack of any other alternative. The flood in 1998 continued for more than three months. Had the air transport alternative not been used, all the produced goods would have been

wasted and the future opportunities would have been lost. Many small industries were bankrupt due to this reason.

This study is aimed at assessing the monetary value of the secondary type of damage. The analysis for all kinds of industries would have involved large amount of time and resources. As an initial step in this regard, the present study is concentrated on the garments industry considering its importance. For the purpose of the assessment, a survey was conducted among garments manufacturers after the flood of 1998. The main objective of the questionnaire survey was to quantify the significance of unavailability of transportation facilities, due to damage of transportation system caused by flood. It was designed to extract information about the characteristics of the damages caused by flood and their relative importance. A total of 39 randomly selected garments industries around Dhaka were surveyed. The questionnaire included questions on the types of damages caused by flood, the level of production before and during flood and the losses attributed to various factors, including those due to unavailability of transportation.

In the analysis it was observed that about 97 percent of the garments industries were affected by flood (see Fig. 1). Among these industries, only ten percent were submerged and discontinued production. These industries remained closed during the flood. About 87 percent of the garments industries were partially affected by the flood. Although these industries remained operative during flood, their production had to be reduced. Productions were hampered by three major factors as shown in Fig. 2. In 68 percent of cases, transportation of either raw materials or finished products and in 27 percent of cases, transportation of the workers was hampered. So, it is evident that for the partially operative garments industries unavailability of transportation facilities were the major issue and prime cause of losses. The duration for which the industries remained affected by flood varied from 20 to 60 days with an average of 30 days as shown in Fig. 3.

For all the industries that remained partially operative, the production capabilities reduced by about 55 percent on an average, as shown in Fig. 4. For the 39 garments industries surveyed in the study, the total loss amounted to about Taka 75 million. As shown in Fig. 5a, transportation related issues were directly responsible for 26 percent of the loss, which amounts to Taka 19.5 million. About 49 percent of the losses were attributed to reduced production, 15 percent were attributed to additional transportation cost and 11 percent were attributed to the fact that produced goods could not be sent to the market or ports. The rest (i.e., 25 percent) of the total loss were attributed to the fact that the flood caused the garments manufacturers to fail in satisfying the commitments and engaging in new contracts. If this kind of loss is excluded, damage caused by inadequate transportation facilities will increase to 34 percent (Fig. 5b).

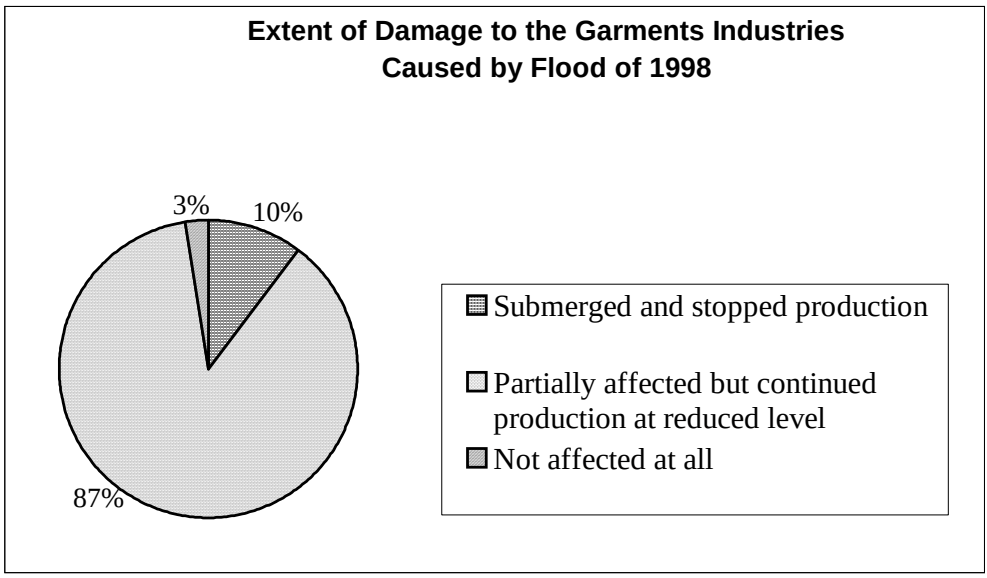

Figure 1: Extent of Damages to Garments Industries Caused by the Flood

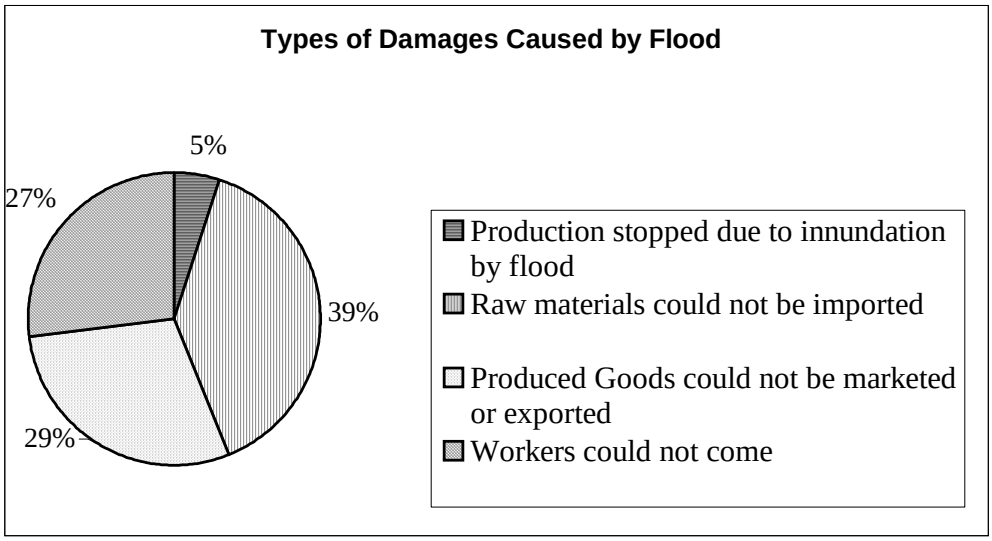

Figure 2: Types of Damages Caused by the 1998 Flood

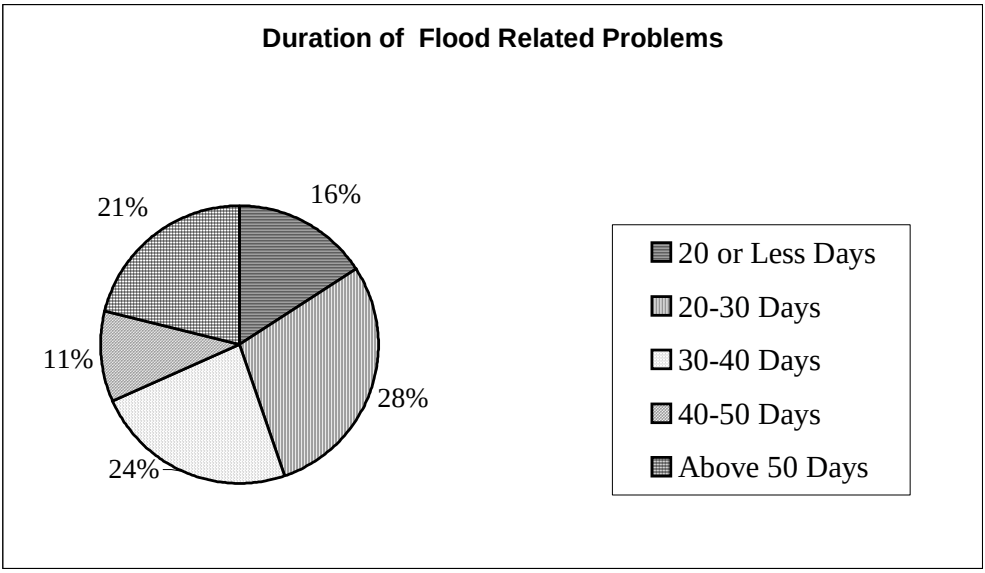

Figure 3: Duration of the Flood-related Problems

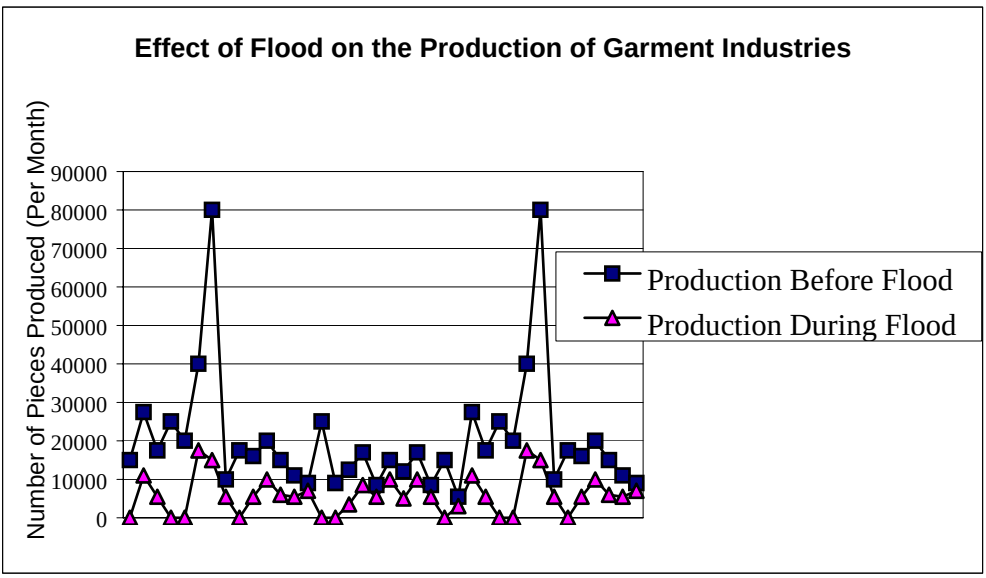

Figure 4: Effect of the 1998 Flood on the Production of Garments Industries

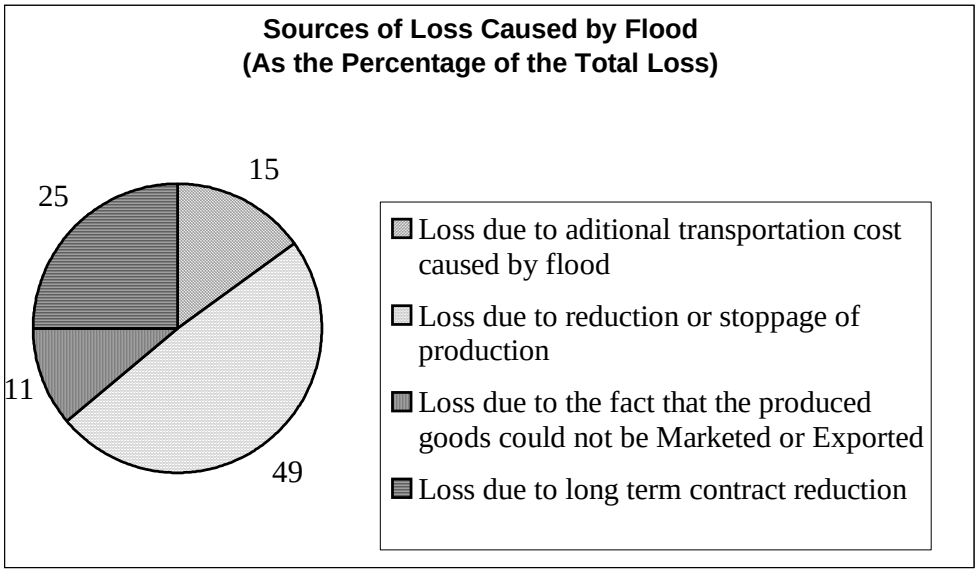

Figure 5a: Proportions of Losses Attributed to Different Factors

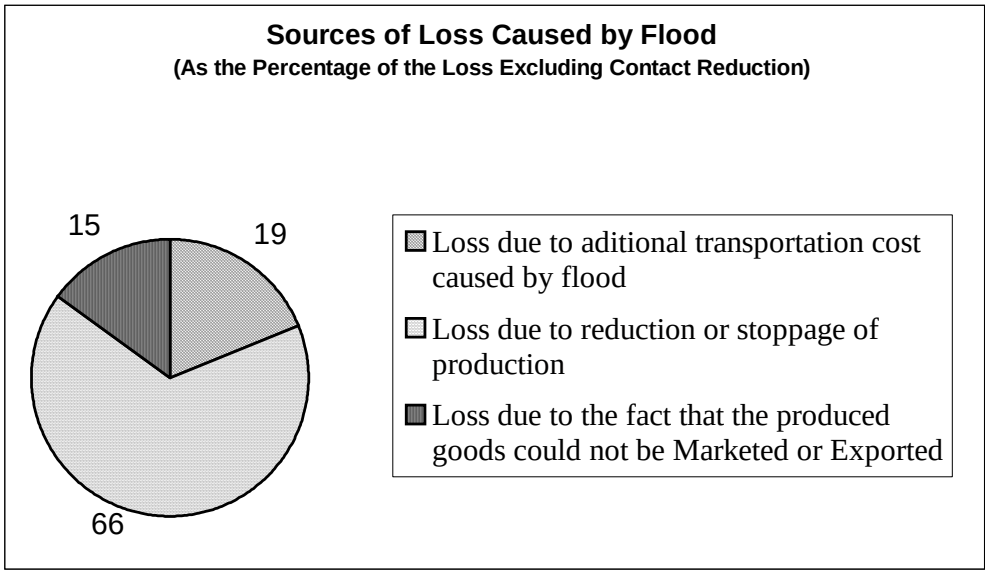

Figure 5b: Proportions of Losses Attributed to Different Factors

As mentioned earlier, unavailability of transportation for the materials was the principal reason for reduced production. So, a portion of the losses attributed to reduced production can be indirectly related with transportation. In a nutshell it can be concluded that inadequate transportation is responsible for about 67 percent (half of 66 percent attributed to production loss plus 34 percent mentioned above) of the total losses caused by flood. The production loss caused mentioned above) of the total losses caused by flood. The production loss caused by the flood of 1998 amounted to US$ 173 million (Taka 865 crore) in the garments sector. So the amount of loss that can be attributed to transportation is Taka 878 crore (865*0.67/0.66). Had transportation facilities been maintained, this large sum of money could have been saved from garments sector alone. The enormity of the aggregate indirect loss caused by damaged transportation facility during flood can be imagined from this figure.

CONCLUSIONS

Flood is a perennial problem for Bangladesh. The people of this country must live with flood. The major objective of the study is to investigate the significance of transportation in the economic loss caused by flood related damages. In the study, it was observed that the 1998 flood did not directly affect most of the garments industries. Rather the industries suffered from inadequate transportation facilities caused by damaged transportation infrastructure due to flood. Factors related to the transportation of either raw materials or workers were responsible for loss of production in 95 percent of cases. Transportation was directly responsible for 26 percent and indirectly responsible for 67 percent of the secondary type of monetary losses caused by flood. Such losses may be avoided by building some major transportation corridors to withstand most severe flood so that connections among the industrial zones, sources of raw materials and ports can be maintained during that time. Attempts should be made to keep the industries of the country operative even during flood. This study dealt only with garments industries of the country. It should be extended to include other products and to reformulate national policies in this regard.

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