

Flood and Its Management

- Disaster is a natural or human, caused phenomenon, which causes serious disruption of the functioning of a community or a society causing widespread human, material, economic and environmental losses which elicited the ability of the affected community, society to cope using its resources.
- Floods are a common feature in the Bangladesh that occur every year in many parts of the country.
- Floods are natural phenomena and it is water related disaster

What is Flood? 14-15(5) 13-14(2)

- If an area goes under water and even remains so for some time then it is called inundation
- When this inundation causes damage to property and like disrupts communication and bring harmful effects then it is called flood.
- This is a major problem in Bangladesh
- A flood occurs when the Geomorphic Equilibrium in the river system is disturbed because of intrinsic or extrinsic factors or when a system crosses the geomorphic threshold.
 - (a) Flooding in a river due to aggradation of river bed (intrinsic)
 - (b) Flooding in a river due to heavy rainfall (extrinsic)
- Floods in major cities especially during rainy season are proving too disastrous not only to the environment but also have serious implications for human life and property.

Types of Floods:

- ❖ Flash floods
- ❖ River floods
- ❖ Coastal Floods
- ❖ Urban Flood

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❖ According to their duration flood can be divided into different categories:

- ❖ **Slow-Onset Floods:** Slow Onset Floods usually last for a relatively longer period, it may last for one or more weeks, or even months.
- ❖ **Rapid-Onset Floods:** Rapid-Onset Floods last for a relatively shorter period, they usually last for one or two days only.
- ❖ **Flash Floods:** Flash Floods may occur within minutes or a few hours after heavy rainfall, tropical storm, failure of dams or levees or releases of ice dams. And it causes the greatest damages to society.

Flash Flood:

- Flash floods happen in a short time, they have a great volume of water, and are local floods.
- The runoff of intense rain results in high flood waves.
- Flash floods result in failure of dams and more.
- It usually happens in desert areas and mountain regions.
- They are a threat in steep land, high runoff rates, thunderstorms, and narrow streams.

River Flood:

- River floods are caused by melting of snow and precipitation over large areas.
- They take place in rivers.
- Floods in large rivers take hours to days.
- The ground conditions effects the runoff.

Coastal Flood:

- Coastal floods are caused by tides, storms, tropical cyclones, or tsunamis.
- These floods happen in the ocean and affects the general public and maritime interests along the coastline.
- These are caused by heavy surf, tidal piling, and storm surges,

- Other factors are tidal cycles, behaviors of the storm, river or stream runoff, no offshore reefs or other barriers, and high winds.

Urban Flood:

- Urban floods are when the land is turned from fields or woods into roads and parking lots. Since this happens it can't absorb the rainfall.
- During the urban floods all the streets become rivers and basements become full of water, they are death traps.
- Ice Jam is floating ice that adds up at a man-made or natural area and stops the flow of water. This causes the area to flood.

Causes of Floods:

- Silting in the river bed
- Inadequate capacity within the banks
- River bank erosion
- Flow obstruction and change in the river course
- Common floods in the main and tributary rivers
- Poor natural drainage
- Cyclones
- Retardation of flow and back water effect
- Heavy rainfall

natural Factors:

- Due to bank erosion
- Earthquake loosening the soil
- High runoff or rise in the water level
- Silting of river bed due to bank erosion
- High discharge of water due to rain shifting river courses
- Landslides
- Falling of the trees
- Flash flood due to high discharge in the main river
- Obstruction of the natural drainage

➤ High precipitation

➤ High runoff

Man-made Factors:

➤ Due to dams, embankments and bunds construction

➤ Decrease in bank height

➤ Decrease in vegetative cover due to deforestation

➤ Construction activities in the river bed

➤ Breaking of bunds constructed on the tributary river for irrigation purposes

➤ Rapid urbanization which causes pressure on the drainage system

➤ Inadequate drainage capacity and urbanization in the low lying areas

Main causes of floods may be summarized as follows:

- excessive rainfall leading to run-off in excess of safe channel conveyance capacity;
- deterioration of drainage channel by natural siltation, shoal formation, or obstructions;
- drainage congestions due to faulty or unplanned development activities and encroachment on flood plains;
- effect of construction of embankments, causing increases in flooding elsewhere;
- deforestation in upper catchment areas;
- flat topography of the country which slows drainage rate;
- rise in sea level due to monsoon wind;
- coincidence of peak flow of major rivers causing congestion at confluences;
- failure of water retaining structures, dams etc.;
- tidal surges and sea waves; and
- Global climate change.

Effects of flood:

- Damage crops in the field and disrupt normal agricultural cycle
- Cause death to live stock.
- Render thousands homeless
- Pose serious threats to nutrition
- Causes various diseases.
- disrupts communication etc
- Human Loss
- Property Loss
- Affects the Major Roads
- Disruption of Air / Train / Bus services
- Spread of Water-borne Communicable Diseases
- Communication Breakdown
- Electricity Supply Cut off
- Economic and Social Disruption
- Increase in Air / Water Pollution

Major floods occurred in Bangladesh:

- Bangladesh is a country with many rivers. Flooding in this area is common and necessary so it could fertilize from deposits of fresh alluvium.
- Fresh alluvium is soil that is deposited by moving water.
- In the fall of 1974 flooding was extended over one half of the country and stayed this way for over a month.
- At least 1,200 people had died in the floods and 27,500 died from diseases and starvation. 425,000 houses were destroyed and destroyed agriculture.
- The cost of damages were 325.9 million in U.S.
- 36 million were affected by this huge flood.

Area affected by Floods 1953-1998. (Total Area of Bangladesh is 144,000km²).

Years for which flood affected area exceeded 50,000 km² are shows in boldface).

Table :

Year	Area affected by floods (km ²)		
	Elahi	Shahjahan	Islam
1953		27,000	
1954		37,000	36,920
1955		40,000	50,000
1956		36,000	35,620
1962		37,000	37,440
1963		35,000	43,180
1964		10,000	
1966		33,000	
1968		37,000	37,300
1969		41,000	
1970		42,000	42,640
1971		36,000	36,475
1972		21,000	
1973		29,000	
1974	90,650	52,000	52,720
1975		17,000	
1976		28,000	
1980	64,750	35,000	
1981		12,000	
1982		23,000	
1983		11,000	
1984	64,750	48,000	28,314
1985		22,000	
1986		18,000	
1987	88,000	60,000	57,491
1988	98,000	98,000	77,700
1988			48,000

Damages from a flood event depend on the following factors:

- location (urban and rural areas need to be treated separately);
- depth (growth stage of crops is to be considered);
- duration (paddy can tolerate submergence for few days);
- timing (crop calendar is important here); and

- extent of flooding.

Planning for disaster management:

- Pre-disaster mitigation: This includes measures to reduce the impact of or prevent a flood event. Examples range from structural measures to public education.
- Pre-disaster preparedness: At this stage a response plan for the flood is developed in advance; a warning system for flood is installed and the people responsible for preparedness are trained; the institutional mechanism for implementation is specified.
- Response to disaster: This includes activities which are undertaken during and immediately after flood, such as emergency aid, evacuation to pre-designated shelters, flood fighting; and assistance and taking measures for minimizing secondary damage and recovery operations.
- Post-flood recovery: At this stage support is provided for a return to vital life-support system to minimum operation levels, which is continued until the community returns to normal life.

These stages are however inter-related.

Options for flood damage mitigation:

Measures that can be adopted for flood damage mitigation can be classified into two categories~

- direct or structural measures and
- Indirect or non-structural measures

Structural measures for flood control

Structural measures can be divided into six categories:

- storage reservoir or detention basins for impounding of excess runoff;
- retarding basin to lower the level of flooding downstream:

- levees and flood walls to confine flood waters within areas immediately adjacent to the rivers or sea:
- improvement of channel capacity by channel improvement and removing obstructions to flow;
- floodway or flood diversion through by-passes aimed at diversion of excess flows causing flood; and
- watershed management.

Non-structural Methods:

Broadly, there are seven types of non-structural measures~

- flood forecasting and warnings;
- flood-fighting;
- flood-proofing;
- rescheduling of reservoir operations;
- evacuation and post flood recovery programs;
- flood insurance; and
- flood plain zoning.

Conclusion:

- Flooding is a natural phenomenon, which can not be prevented .
- Complete flood control is not in the interests of most Bangladeshi farmers.
- The flood control measures and policies should be direct to mitigation of flood damage rather than flood prevention.
- To minimize flood losses, the following steps may be taken.
 - i) increasing the forecast lead time by strengthening the flood and warning system through the installation of effective equipment for collection of hydrological and meteorological data and through adequate training for related personnel:
 - ii) setting up an efficient system for the dissemination of flood warning;

- iii) encouraging the introduction of zoning laws, especially in urban areas and areas covered by newly-built water-control structures;
- iv) education of the public about flood hazards, especially through the development of flood-risk maps;
- v) the inclusion of disaster relief and preventive health measures in development programs;
- vi) the maintenance of an effective infrastructure for emergency relief operations;
- vii) where reservoirs have been constructed its operational pattern may be properly designed and monitored so that artificial flood is not created at downstream locations;
- viii) where embankments/polders have been constructed, its maintenance is essential to have it effective during flood events. Involvement of local people in planning, design, construction and maintenance of new embankments must be ensured.

The main reasons for the failure of any flood management policy are:

- lack of adequate funds for undertaking mitigation, warning recovery and preparedness program ; thus ad-hoc measures are taken only when flood arrives,
- Often difficult to implement long term program and sustain them as the pressure fades away after occurrence of a disaster;
- Flood problems are technically complex and prediction of next occurrence of a major event is difficult; and
- Inter-government and inter-organizational management problem that undermines concerned and integrated to a flood event.

List of possible impacts on water resources system of Bangladesh:

1. Reduction of water in the Brahmaputra River would affect the followings:

- Change in morphology (Bank erosion and Deposition)
- Water holding capacity of the Beels in the NW region
- Ground water storage
- Recharge of wetlands and ground water
- Inflow to the Padma and lower Meghna
- Tidal propagation in the lower Meghna, Meghna and Padma
- LLP irrigation
- Navigation
- Open fisheries
- Forestry
- Industry

2. Reduction of flow of the Teesta and Other rivers in the NW regions

- Agriculture in the NW region (Teesta Barrage: Present 111,000 ha, Phase II 408,000 ha)

3. Increased salinity intrusion in the lower Meghna:

- Agriculture in the SE and SC regions
- Haors in the NE region
- Forestry
- Fresh water fisheries

4. Draining of wetlands:

- Fish, bird and wildlife habitats
- Aquatic plants
- Biodiversity

5. Water scarcity would effect the following major irrigation projects:

- Teesta barrage project in NW region
- Chandpur and Meghna-Dhonagoda project in the SE region

- Bholra and Barisal projects in the SC region
- GK project in SW region (already affected by the Farrakka diversion)

6. Risk of catastrophic flood

- Flooding due to water release during high rainfall
- Flooding due to failure of dam

7. Intensification of adverse impacts in the long term by climate change