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The Impact of Rainfall on Flood Experienced by Bangladesh In 2008

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ABSTRACT

Bangladesh is a disaster prone country. Flood is one the common phenomena and hydrological disaster that occurred in Bangladesh almost every year. It is located next to India having complex river system .The country is situated on the Ganges Delta and the many tributaries flowing into the Bay of Bengal and thus is prone to different natural hydrological disasters like flooding. The coastal flooding twinned with the bursting of Bangladesh's river banks which is common and severely affects the landscape and Bangladeshi society. Bangladesh in general is subject to floods because much of the country occupies the deltaic floodplains of the Ganges Brahmaputra and Meghna rivers, which is the second largest river system (GBM system) in the world. The major rivers of Bangladesh have profound effects on the land, people and resources along their courses. . In Bangladesh, over the years, channel width is increasing and depth is decreasing because of unfavorable geographic location and discharge control by the countries in the upstream reaches that lead to unexpected erosion-deposition processes along the major rivers. The flood's main cause is the creation of Erranticophrus (top soil wash away reaction) from the inhabitants of the Himalayas irrigating their mountains vertically. Cross-boundary inflow, coincidence of the flood peaks of Ganges, Brahmaputra and Meghna and huge rainfall is the cause to occur this type of flood. Heavy rains also cause flooding; as drainage is impeded by high stages in the main rivers. In this paper, the Impact of rainfall on flood in Bangladesh has been analyzed and studied.

Keywords: Affects, Confluence, Disaster, Hydrological, Phenomena, Tributaries

INTRODUCTION

The word flood is generally synonymous with the river flood. Bangladesh is one of the most disaster prone countries often faced natural calamity and vulnerable to flooding. This vulnerability to flooding occurs due to swelling of surrounding rivers and intensive rainfall that generates runoff, which is beyond the capacity of the existing drainage facilities. Almost every year the country is affected by flood, causing damage to lives, crops, homesteads, roads and other properties. It is a

common phenomenon in Bangladesh. Most of the huge quantity of water flows during monsoon period and its transit causes flood. During the rainy season, the water flow exceeds the holding capacity of rivers and cannels, the river banks and low lying areas inundated and thus occurred flood. It normally occurs during the monsoon season (June to September). The convectional rainfall of the monsoon is added to relief rainfall caused by the Himalayas. Melt-water from the Himalayas is a significant input of flooding. A combination of heavy rainfall within and outside the country and synchronization of peak flows of the major rivers also contribute to flood. In the middle of the country, a broad strip of land is flooded by bank overflow from the main rivers - Jamuna, Ganges, Padma, and Meghna, and their tributaries and distributaries. Flood in Bangladesh is mainly categorized as follows:

- Monsoon flood
- Flash flood
- Tidal flood

In 2008, Bangladesh has experienced a low to moderate flood (Fig-2). The flood-affected areas are mostly in char and low lying river bedded Fig-1 shows the normal river water condition of Bangladesh.Fig 3 shows flood affected area.

Fig-1: Map of water area (Normal)

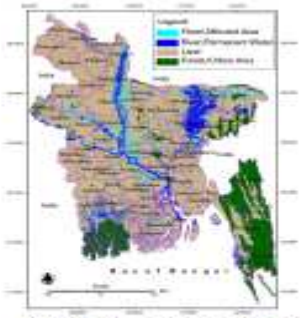


Fig-2: Map of areas flooded in

Fig-3: People at Flood affected area (real picture) 2008

MATERIALS AND METHODS

Objectives

The objective of this study is to analyze the cause of flood ; the impact of rainfall on it ; to find out the affected area etc.

Data used

- Rainfall In-Situ data, the station data (monthly & division wise), collected from Climate division of Bangladesh Meteorological Dept.(BMD) recorded at there 34 stations .
- Satellite data received from Meteorological satellites FY-2D/E, MTSAT-1 (Geo-stationary) at SPARRSO Ground station.

Rainfall data:

- Due to the influence of southwest monsoon, the total rainfall over Bangladesh was recorded
  - monthly
  - division wise

- Light to moderate rainfall has been observed over the country in 2008 (Table 1-4).

Table-1: Rainfall data for the month of June ,2008

Division	Mean rainfall(mm)	Normal rainfall (mm)	Deviation(%)
Dhaka	405	355	14
Chittagong	612	589	4
Sylhet	432	634	-32
Rajshahi	362	347	4
Khulna	223	298	-25
Barisal	354	483	-27

Table-2: Rainfall data for the month of July ,2008

Division	Mean rainfall(mm)	Normal rainfall (mm)	Deviation(%)
Dhaka	448	379	18.2
Chittagong	969	720	34.6
Sylhet	463	579	-20.2
Rajshahi	350	385	-09.2
Khulna	409	341	20.1
Barisal	755	519	45.5

Table-3: Rainfall data for the month of August, 2008

Division	Mean rainfall(mm)	Normal rainfall (mm)	Deviation(%)
Dhaka	263	310	-15
Chittagong	612	556	10
Sylhet	591	456	30
Rajshahi	344	322	7
Khulna	195	341	-35
Barisal	332	519	-23

Table-4: Rainfall data for the month of September, 2008

Division	Mean rainfall(mm)	Normal rainfall (mm)	Deviation (%)
Dhaka	185	289	-36
Chittagong	311	317	-02
Sylhet	203	407	-50
Rajshahi	176	352	-50
Khulna	350	276	-27
Barisal	316	316	00

Method:

Data analysis

Rainfall In-Situ data (field observation) were calculated to find out the mean total rainfall and deviations for different months of monsoon season (June –Sept.) and have been analyzed (Table 5-6)

The mean and normal rainfall of monsoon period have been plotted (Fig-4&5)
Satellite imageries (space based data) were enhanced and analyzed to study the impact of rainfall on flood that occurred in 2008.

Rainfall analysis:

According to the rainfall data, the country has experienced 16% less amount of rainfall in 2008 than the normal on the average. It was also observed that the mean total rainfall in the monsoon period of 2008 over all divisions was less than the normal one except Chittagong.

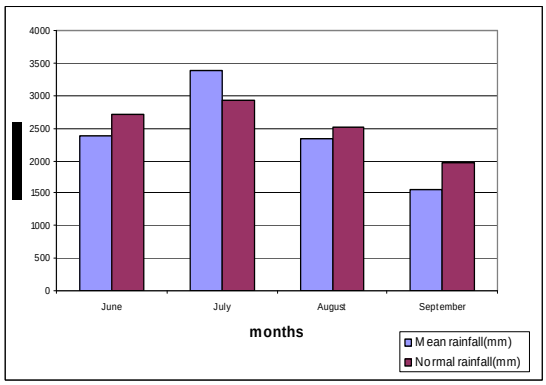
Background-Analysis

Table-5: Month-wise Rainfall over Bangladesh during the monsoon period of 2008

Months	Mean rainfall(mm)	Normal rainfall (mm)	Deviation (%)
June	2388	2706	-62
July	3394	2923	89
August	2337	2504	-26
September	1541	1957	-111

Table-6: Division-wise Rainfall over Bangladesh during the monsoon period of 2008

Division	Mean rainfall(mm)	Normal rainfall (mm)	Deviation (%)
Dhaka	1301	1313	-18.8
Chittagong	2504	2182	46.6
Sylhet	1689	2075	-72.2
Rajshahi	1232	1406	- 48
Khulna	1177	1256	-12.9
Barisal	1757	1837	-04.5



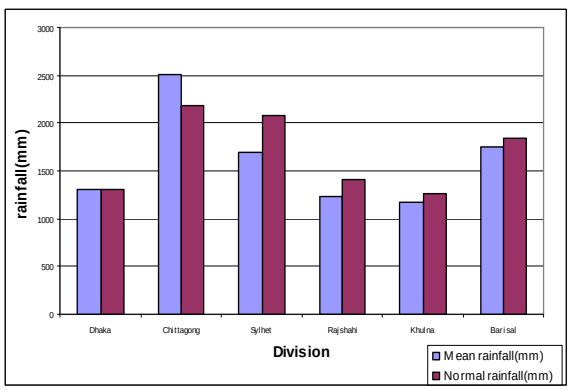
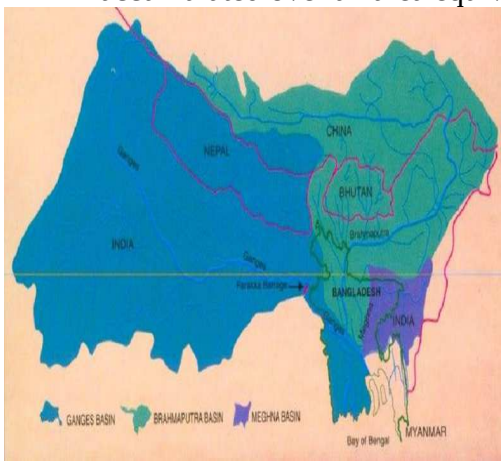


Fig-4: Division-wise Mean and Normal rainfall Fig-5: Monthly Mean and Normal rainfall

- Bangladesh has an area of about 147,570 sq km laying in the delta of the greatest rivers the Ganges, the Brahmaputra and a complex river network of 230 rivers.

- The estimated quantity of water which flow through these rivers is about 1500 billion cubic meters which can from a pool of a depth of about 10.25 meters stagnant water if water accumulated over an area equivalent to that of Bangladesh.



- The river of Bangladesh drains the run-off from a catchments area(Fig-6) of about 1.7 million sq km of which only 7.5% is within the country.

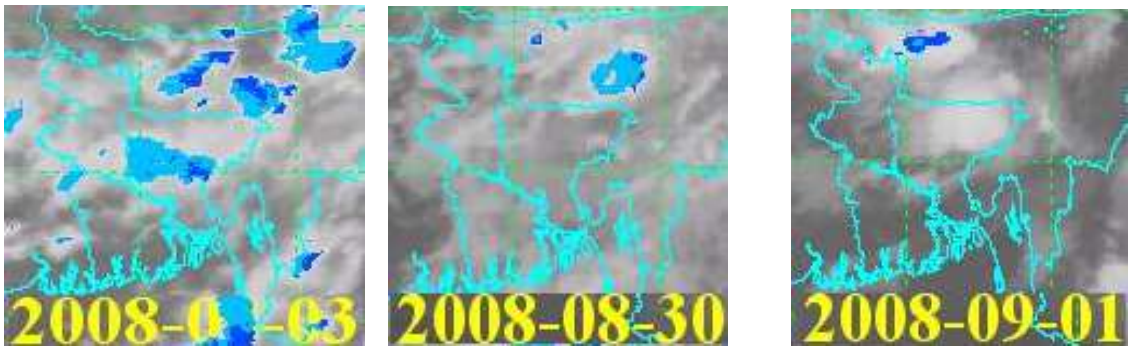
- Most of the huge quantity of water flows during monsoon period and during its transit causes flood.

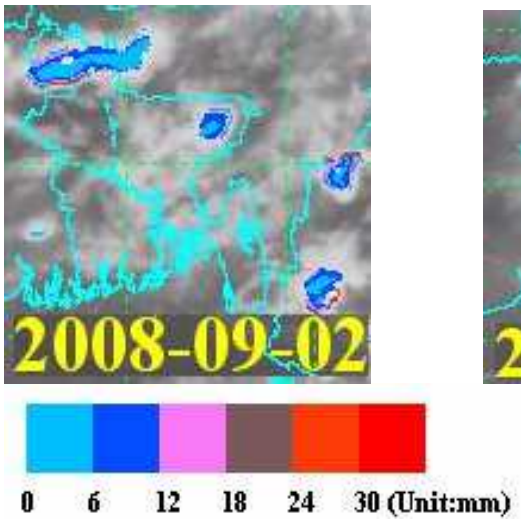
Fig-6: Catchments area of Bangladesh

Satellite data analysis

We have no rainfall field In-situ data for catchments area. To fulfill that purpose we made our observation using meteorological satellite data (cloud pictures). The formation of clouds were observed from the FY-2C Satellite data of monsoon period and was analyzed to asses the rainfall over that area (Fig-6).

Analysis of FY-2C Satellite data (cloud pictures)





Final Analysis:

It is seen from the analysis that, the total rainfall over Bangladesh in the year 2008 is below the normal rainfall on the average but experienced a moderate flood because -

- Water holding capacity of the rivers are decreasing day by day due to the rising up of river beds. So the river banks overflowed due to such moderate rainfall too.
- There were moderate to heavy rainfall in the upper catchments area during the monsoon period which caused upstream water flow towards Bangladesh.

CONCLUSION

It can now be concluded on the average that a low to moderate flood have occurred in 2008 in Bangladesh , mainly due to the water flow from upper catchments area as well as the light to moderate rainfall inside the country, overflowed by the river beds those are rising up day by day. It may be happened due to unauthorized and uncontrolled filling of low lying areas and khals , may be due to reduced gradient of rivers, encroached of natural open drainage system, may be due to the construction of buildings & roads thereby violating the law, due to the destroyed subsequent development of the infrastructure which hampered the planned flood control activities. Bangladesh is vulnerable to intense flooding in near future due to such problems and unpredictable rainfall over the recent years as its drainage and water holding capability are decreasing alarmingly with wetlands occupied by land grabbers which need immediate attention of the concerned authorities.

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