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International Journal For Research in  
Applied Science and Engineering Technology



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# **INTERNATIONAL JOURNAL FOR RESEARCH**

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

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**Volume: 7      Issue: XI      Month of publication: November 2019**

**DOI: <http://doi.org/10.22214/ijraset.2019.11122>**

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# The Problem of Annual Occurrences of Floods in Assam, the Role of Administrative Bodies Responsible for Managing Disasters and the Quality of Risk Mitigation and Rehabilitation

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**Abstract:** Assam is a beautiful North Easter State of India, situated south of the eastern Himalayas, along the Brahmaputra and Barak river valleys. The climate here in Assam is cold as the Brahmaputra flows through it and there is rainfall in most of the month. Flooding from the Brahmaputra and other rivers deluges places of Assam every year. Because of the rainfall the water level of the river raise resulting overflowing their banks and engulfing nearby areas. Apart from livestock, houses being washed away by flood water, damage bridges, railway tracks, and roads, which causes communication breakdown in many places. This paper is an attempt to find out the causes and consequences of such frequent occurrences of floods in Assam. Discusses about the role of ASDMA and other bodies responsible for managing flood situations. The paper also discussed about the quality of Risk Mitigation and Rehabilitation after such disaster in Assam. So this paper is an attempt to understand the problem of flood and its management in Assam.

**Keywords:** Assam, Flood, Disaster, Disaster Management, ASDMA, Risk Mitigation, Rehabilitation, Rivers, Brahmaputra, Barak, Early.

## I. INTRODUCTION

India is one of the most flood prone countries of the world because of its unique ecological system which comprises the highly silted river systems, the monsoon, the mountain that erodes, especially those in the Himalayan region. One eighth of the countries geographical area or 4 crore hectors of land is prone to floods, Out of its 35 states 23 is flood prone. Flood occurs in almost all river basins in India. The floods are attributed to heavy rainfall, inadequate capacity of the rivers to carry the high flood discharge, inadequate drainage to carry away the rainwater quickly to streams and rivers. Assam is a beautiful North Easter State of India, situated south of the eastern Himalayas, along the Brahmaputra and Barak river valleys. The climate here is cold as the Brahmaputra flows through it and there is rainfall in most of the month. Assam is temperate, with the tropical monsoon climate (winter min. at 43–46 °F or 6–8 °C and summer max. at 95–100 °F or 35–38 °C) and experiences high humidity and heavy rainfall. The climate here is characterised by heavy monsoon downpours dropping summer temperatures and affecting foggy nights and mornings in winters, frequent during the afternoons. Assam presents a picture of such heterogeneity as is to be rarely met elsewhere in the country<sup>1</sup>. Every year flooding from the Brahmaputra and other rivers deluges places of Assam every year. Because of the rainfall the water level of the river raise resulting overflowing their banks and engulfing nearby areas. Apart from livestock, houses being washed away by flood water, damage bridges, railway tracks, and roads, which causes communication breakdown in many places. This paper is an attempt to find out the causes and consequences of such frequent occurrences of floods in Assam. Discusses about the role of ASDMA and other bodies responsible for managing flood situations. The paper also discussed about the quality of Risk Mitigation and Rehabilitation after such disaster in Assam. So this paper is an attempt to understand the problem of flood and its management in Assam.

## II. MEANING AND CONCEPT OF FLOOD

Flood simply means inundation of extensive land area with water for several days in continuation. Generally floods are considered to be associated with rivers and people conceive flood as the accumulation of huge volume of water coming out of the rivers through overtopping of river banks during peak discharge period. Flood is a natural phenomenon and is a response to rainfall but it becomes hazard and disaster when it causes colossal loss to human lives and property. Floods are also aggravated by human activities and thus flood is both natural and man-made disaster.

Floods are of different types, the following four types are very common India.

- 1) *Rainfall Floods*: Heavy rainfall for long period in continuation is the root cause of river floods. Heavy rainfall in the upper catchment areas of the concern river causes sudden increase in the volume of water downstream.
- 2) *Rainstorm Floods*: Such floods are result of excess heavy rain, associated by depression and cyclonic storms. Cyclonic storms contribute significantly and produce devastating floods.
- 3) *Coastal Floods*: Such floods are caused by severe cyclonic storms over the coastal parts of India.
- 4) *Dam Failure Floods*: such floods are more devastating and are the results of failure or breaching of natural or man-made dams. This type of flood generally is much larger than those originating from snowmelt or rainfall (Costa, 1988)<sup>2</sup>.

### III. CAUSES OF SEVERE FLOODS IN ASSAM

Floods are the result of both natural and anthropogenic factors but the main cause of its occurrence is its unique topography and climate. Other causes may include prolonged high intensity rainfall, meandering courses of the rivers, inadequate carrying capacity of the rivers of high flood discharge, landslides blocking river upstream, typhoons, cyclones etc. High concentration of rain over small areas, steady rain for long periods, the torrential rain during hurricanes and other combination of meteorological condition may cause severe floods of sufficient magnitude to have disastrous effects<sup>3</sup>.

Several factors are responsible for the frequent occurrence of floods in Assam. Of the two major river systems – the Brahmaputra and Barak, the Brahmaputra system is more highly responsible for causing devastation.

Dr. D.C. Goswami (1985)<sup>4</sup>, explained the cause of floods in the valley as, “Floods in Assam are caused by a combination of several natural and anthropogenic factors. The unique geographical setting of the region, highly potent monsoon rainfall regime, easily erodible geographical formations in the upper catchments, active seismicity, accelerated rates of basin erosion, rapid channel aggradations, massive deforestation, intense land use pressure, explosive population growth especially in the flood plain belt and ad hoc type temporary measures of flood control are some of the dominant factors that cause and or intensity of floods in Assam”.

There are a number of geographical and other factors which are responsible for the occurrences of floods in Assam.

- A. The extremely dynamic monsoon regime vis-a-vis the unique physio-graphic setting of basin is the single most important cause for frequent occurrence of flood in this region.
- B. Devastating landslides and heavy monsoonal rains coupled with steep slopes, easy erodible of rocks and high seismicity constitute the major natural causes of flood in Assam.
- C. Whenever there is rainfall in the surrounding hills and mountains Water rushes down to limited plains from extensive catchment areas and resulting flooding the plains.
- D. The gradient of the plain is extremely low. The Brahmaputra grades very gently towards its downstream. The average gradient of the plain is only 14 cm/km. This fact clearly indicates the possibility of flood and erosion hazards in the Brahmaputra plain.
- E. Assam and its surrounding regions are made of relatively soft tertiary rocks. They further soften due to the heavy monsoon rains. The rivers and streams carry the sediments and deposit them on its bed, thus choking the channel. The water therefore overflows the channel causing floods.
- F. Geological and seismic factors combined with hydro-meteorological factors also worsen the flood situation of Assam (Bora 2001)<sup>5</sup>. The earthquake of 1897 and 1950 of 8.7 and 8.6 magnitudes in the Richter scale respectively, caused remarkable changes in the fluvial regime of the state, particularly in the Brahmaputra valley by sudden rising of the river beds.
- G. Besides the natural factors, the human induced factors such as deforestation and unwise tree felling in the hilly catchments of the Brahmaputra and Barak are highly responsible for devastating floods in the state.

### IV. CONSEQUENCES OF FREQUENT FLOODS IN ASSAM

Frequent floods have been responsible for many problems in the state.

First one is the flooding and soil erosion converting the fertile cultivable land unsuitable for crop production due to excess deposition of coarse sand on the surface to a variable depth. This is the most severe environmental degradation triggered by floods, which in turn is intimidating the sustainable agricultural production. Second, obstruction of technological transformation causing yield levels of food grains, rice and other crops to be very low. It is not only low, but also is experiencing a very changing nature of growth over the successive periods. Third, departure of funds to flood control measures certainly restrict investment in agricultural infrastructures. These are the matters of serious concern. These problems have been hindering not only the agricultural growth, but also the overall economic growth of the state<sup>6</sup>.



Recurrent floods caused by heavy rainfall almost throughout the State, aggravated by the denudation of the forests as a result of jhum cultivation, is a major problem of the State. Flood causes plant growth, which directly or indirectly impacts the food and shelter of both human and animal<sup>7</sup>. Direct losses due to floods run to several crores of rupees annually and lead to indifference of the cultivators over large tracts towards improvement of agriculture.

The numerous rivulets and streams gushing forth after heavy rains render construction of roads and railways very costly and subject to traffic dislocations during the monsoons; but, as they dry up during the winter, are unable to provide alternative dependable and cheap water- ways navigable throughout the year. The river Brahmaputra is, of course, navigable by large country boats throughout its length, of which again about 500 kilometres are negotiable by inland steam boats.

## V. ROLE OF ADMINISTRATIVE BODIES

The state governments are engaged in flood management works since the independence of the country. The schemes for flood control and protection are to be planned, funded and executed by the state governments. Since 1954 various flood controls measures were taken up by the state government but the measures have not been proved successful to the desired level. Still the state government has been taking various steps in order to meet the exigencies arising out of flood. Most of the steps were of emergency nature and short term like opening of relief camps, provision of gratuitous relief to the affected families, construction of embankments, construction of drainage channels and sluices, anti-erosion works, protection works, restoration of road communication, providing flood warning information etc. (P. Goyari, 2005)<sup>8</sup>.

Various committees, commissions and Boards were also set up to chalk out plans to control flood recurrences at the state<sup>9</sup>.

- A. Bhagbati committee on embankment and drainage in Assam (1957) recommended carrying out regular sample surveys of the economic condition of the people from the different parts of the state annually to assess the impact of the embankment and drainage projects. It also recommended for the preparation of a comprehensive plan for flood control and provision of adequate number of sluices in the future embankments.
- B. Pagladiya Inquiry committee-Assam (1967) recommended for raising and strengthening of existing embankments, adequate waterways for road and bridges.
- C. Ministers committee on flood control (1972) recommended special assistance to the state Assam for flood.
- D. Rashtriya Bar Ayog-GOI (1976) finalised proposals regarding Dehing and Subansiri Dam projects in the Brahmaputra valley and Tipaimuk on the Barak.
- E. Brahmaputra Board (1982) recommended to prepare master plan for planning and implementation of measures for the management of floods and bank erosion in the Brahmaputra valley.

## VI. RISK MITIGATION AND REHABILITATION

Flood in any area effects large number of people and their livelihood. An integrated disaster management approach is essential to minimise the loss of lives, loss or damage of property. Structural measures such as Dams, Levees, Channel alteration and other protective works are usually designed to provide protection against some specific level of flooding. But sometime lack of long, continuous and reliable hydrological records is a major constraint in estimating the minimum standard of protection. Thus it is essential to improve, modernise and expand the existing network, rainfall and stream gauging stations and develop a comprehensive database.

## VII. CONCLUSIONS

Assam falls under a meteorological zone that receives excess monsoon rains. Brahmaputra carries a lot of water and sediments - another natural reason for floods. Destruction of wetlands and encroachment of plains have worsened the situation. Assam's population is just over 3 crore, Floods lead to loss in human lives and the economy takes a big hit. According to Central Water Commission data (1953-2016) on average 26 lakh people are affected every year in Assam; 47 lose lives, 10,961 cattle die, Rs 7 crore worth of houses destroyed and the total damage comes up to Rs 128 crore every year. The zone's topography is also complicated. The steep slopes force the rivers to gush down to the plains. Frequent earthquakes and resultant landslides push soil and debris into the rivers. This sedimentation raises river beds.

According to the Brahmaputra Board, a central body under the Ministry of Jal Shakti tasked to monitor and control floods, the region receives rainfall "ranging from 248 cm to 635...Rainfall of more than 40 mm in an hour is frequent and around 70 mm per hour is also not uncommon". There have been occasions when 500 mm of rainfall has been recorded in a day. The valley through

which the Brahmaputra flows is narrow. While the river occupies 6-10 km, there are forest covers on either side. The remaining area is inhabited and farming is conducted in the low-lying areas. Overflowing rivers and flowing rapidly down the valley tend to spill over when it reaches the narrow strips. According to a paper published in the International Journal for Scientific Research and Development, "Brahmaputra water contains more sediments raising river by 3 metres in some places and reducing the water carrying capacity of the river."

There are man-made causes that have worsened the flood situation. Encroachment is a big issue. The population density of Brahmaputra valley was 9-29 people per sq km in 1940-41; this shot up to 200 people per sq km now, according Brahmaputra Board, the systematic destruction of wetlands and water bodies that act as natural run-offs have aggravated the flood problem in Assam. Though embankments provide protection, most of them have not been maintained leading to breaches. There are reports that around the Assam-Bhutan border, villagers form WhatsApp groups to warn people of rising water levels. If such people-people arrangements can work out then there is no reason why more institutionalised systems, based on technology, cannot be put in place. The early warning systems should be institutionalised based on scientific approach. Wetlands and local water bodies should be revived so that the natural drainage system can act as a basin for excess water to flow. This would entail clearing human encroachments in the Brahmaputra flood plains. Embankments should be regularly checked for breaches and systems put in place for maintenance; a first step would be to break the babu-contractor nexus that finds floods an easy way to sponge money from the system.

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