

# Vulnerable embankment and climatic hazard and its impact on local community in Indian Sundarban region: “A case study of Sagar block of South 24 Parganas”.

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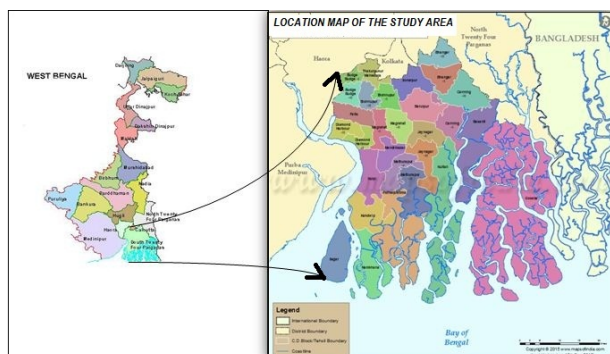
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**Abstract :** *The present paper is an attempt to analyse the vulnerable embankment and climatic hazard, and its impact on local community. The total area of Indian Sundarban is about 9360 Sq.km comprising of 102 islands. The entire Sundarban region is the part of Active delta. Sagar is one of the most important community development block of South 24 Parganas District. From primary observation the vulnerability of embankments extremely severe in 5 GPs out of 9 GPs in Sagar Block. Embankments raised along the river bed are the most vital public defence. During the months of April to October the tidal waves assume giant proportions and causes breach in the mud dykes. As a result the local communities are suffering a lot. Climate change and its resultant sea-level rise can significantly increase the vulnerability of coastal embankment of Sagar block of South 24 Parganas District.*

**Key words:** *Vulnerable embankment, climatic hazard, extreme events, tropical cyclone, risk assessment, flood hazard, local community*

## [I] INTRODUCTION

A hazard is an unexpected threat to humans and their property. The atmospheric hazards are related to weather and climatic extreme events. Hazards are the processes whereas disasters are the results. Tropical cyclones become more disastrous natural hazards because of their high wind speed of 180 to 400 kilometres per hour, high tidal surges, high rainfall intensity and their persistence for several days. The present study is regarding the vulnerable embankment and climatic hazard, and its impact on local community of the Sagar block of south 24 parganas.



**Study Area :** The Sagar CD block of Kakdwip subdivision is geographically located at the southernmost

trip of West Bengal, covering an area of 282.11 square kilometer, surrounded by Kakdwip and Namkhana Block. The block consists of 9 Gram Panchayets, 1 Panchayet Samity and 42 inhabited villages and is located at the lower deltaic plain with 4m height above the MSL. Rudranagar is the headquarter of this block.

## [II] OBJECTIVE OF THE STUDY :

The present study has been under taken with the specific objectives which as following:

- To examine the vulnerable embankment of Sagar block of South 24 Parganas District.
- To assess climatic influence on vulnerable embankment.
- Risk and vulnerability analysis of the block.
- To retrieve out relationship between vulnerable embankment and climatic hazard.

## [III] METHODOLOGY :

This study is based on primary as well as secondary data. Map and census data collected from the census office Govt. of West Bengal. Literature review done by searching internet and from many reports of the Govt. of West Bengal. District disaster Management plan – 2015 collected from the internet

## [IV] RESULTLS AND DISCUSSIONS :

[A] Vulnerable embankment : In a reverine block, where most of the GPs are surrounded by rivers, khals and creeks, embankment play a very important role in order to protect the inhabitants. Funnel shaped bays and inlets puse a very favourable situation for the tidal bore to come and devastate vast areas of land. Interlinkage of the rivers makes it easy for the flood water to reach further interior of the lands. Large stretches of embankments are broken almost every year either due to fierce tidal bores or due to bank erosion.

The following tables gives an enumeration of the GPs which are endangered due to tidal bore and bank erosion.

### GPs wise length of damaged embankment

Sl. No	Location of Damage	River / Khal	Length	Tentative cost of restoration
			(in M)	(Rs. in Lacs)
01.	Ghoramara Island	Hooghly	1100	15.00

02.	Mouza Beguakhali	Bay of Bengal	1200	12.00
03.	Mouza Shibpur and Dhablat	Bay of Bengal	1400	35.00
04.	Mouza Chemaguri	Satbanki	150	4.00
05.	Mouza Muriganga	Muriganga	750	7.00

**Source :** District Disaster Management Plan – 2015; South 24 Parganas.

**Types of embankment :** In the study area four main types of embankment can be seen along the different river side. These are



- Earthen embankment
- Earthen embankment with bamboo fence
- Earthen embankment with bamboo fence and sand fill sag along the embankment.
- Boulder pitching or concrete pitching embankment.

**Causes of embankment breaching:**

- The area is crisscrossed by numerous tidal rivers and its tributaries and distributaries.
- Weak technological structure of embankment
- Embankment breaching is also linked with the proper drainage.

**IMPACTS ON LOCAL COMMUNITY :** It has both direct and indirect impacts on local community. Most of the river and sea side mouzas are lost in last few decades of Sagar block. Bamankhali, Begnakhali, Dhablat and Bishakhalakshmipur and Ghoramara large areas went into the sea. Settlements are also lost and thousand of people turn into environmental refugee from Ghoramara island of Sagar block.

**[B] CLIMATIC HAZARD :** The atmospheric hazards are related to weather and climatic extreme events. The extreme water and climatic events may be divided into two groups viz. [a] abnormal and infrequent events and [b] the events which prevail for prolonged period of time. Tropical cyclones and flood are the common climatic hazard in Sagar block of South 24 Parganas.

**[1] TROPICAL CYCLONES :** Bay of Bengal is one of the six major regions of the world which are responsible for the origin of tropical cyclones. The study area of Sagar block of south 24 parganas district lies in the coastal region of the bay. So, it is highly affected by the tropical cyclones originating in the bay of Bengal. Here tropical cyclones become more disastrous natural hazard, because of their high wind speed, high tidal surges, high rainfall intensity, very low atmospheric pressures causing unusual rise in sea level, and their persistence for several days.

Following table gives an idea regarding the cyclone episodes of Sagar Block.

**History of Disaster and probability of Disaster Episodes in the Block.**

Type of Hazard	Year of Occurrence	Area affected	Impact of Life	Live Stock	Remark
CYCLONE	2006	Sagar	Severe	Affected to a great extent	Possibilities of damaging dwelling houses particularly in coastal area.
	2009	Sagar	Severe	Affected to a great extent	Possibilities of damaging dwelling houses particularly in coastal area.

**Source :** District Disaster Management Plan – 2015, South 24 Pgs.

**Impacts of Local Community :**

Sagar Block, located at Southernmost tip of the South 24 Parganas district, is entirely rural in origin and is characterized with ill developed infrastructural facilities. Here majority of the population still lives on primary occupation like agriculture, collecting and fishing.

The following table gives an idea regarding the risk assessment of Sagar block.

**Risk Assessment**

Type of Hazard	Time of Occurrence	Potential Impact	Vulnerable area
Cyclone	April, May, Oct, Nov.	(i) Damage of houses (fully / partly) (ii) Washing out of embankments (iii) Damage of seasonal crops (iv) Uprooting of big trees (v) Impact on livelihood (vi) Causes death or injury to human	Sagar Block (Severe)

**[2] FLOOD HAZARDS :** Flood simply means inundation of extensive land area with water for several days in continuation. The block, as already mentioned earlier, is heavily transected by large number of rivers and khal's. Thus there is presence of estuaries and creeks which are funnel shaped. This typical physical characteristic of the blok favours the occurrence of tidal bore during high tides. So, high tides and high intensity of rainfall crate flood in the Sagar block of South 24 parganas.

The following table gives an idea regarding the flood episodes in this block.

**History of disaster and probability of disaster episodes in the block.**

Type of hazard	Year of occurrence	Area affected	Impact of life	Live stock	Remark
Flood	1978	Sagar	Severe	Affected to a great extent	Possibilities of damaging dwelling houses particularly in coastal area.
	1986	..	..	..	..
	2009	..	..	..	..

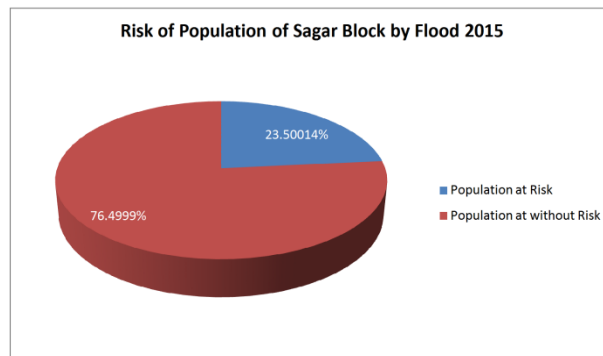
**Source :** District Disaster Management Plan – 2015, South 24 parganas. .

**Impacts of local community :** As a result of flood common people extensively go towards danger in the Sagar block. Heavy rainfall caused havoc damage to agricultural crops, roads and houses in all the GPs of Sagar block. The worst affected GPs were Dhablat, Ganga Sagar, Daspara Sumatinagar II, Muriganga – I and Ghoramara. Here the following table shows the flood prone places of Sagar Block.

**Block level flood prone places.**

Name of the Block	Name of GP	Population at Risk	Total Population 2011 (census)
Sagar	Dhablut	18061	212037
	Gangasagar	6681	
	Daspara Sumatinagar – II	8145	
	Muriganga – I	11706	
	Ghoramara	5236	
	<b>Total</b>	<b>49829</b>	

**Source :** District Disaster Management Plan – 2015, South 24 Parganas and Census of India.



**[V] CONCLUSION**

Embankment is the life line of the Sundarbans people. After field observation and secondary data analysis, many incidents can be seen. The villages which located near the river site are very vulnerable along the Hooghly, Satbanki and Muriganga.

Vulnerable embankment also hampered the livelihood support system of the local community. Climatic hazard also effect on their life style and socio-economic condition. So, coastal zone management, block disaster management plan and local people awareness and proper planning from the very grass root level can save the entire region, specially the local people and the environment.

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