JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Hazard of Tropical Cyclone: Impact, Human adjustment and Mitigation in West Bengal

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Abstract:
Cyclones always introduce uncertainty into the essence of human existence. Marginalized people lose their life, property and land through natural hazards. But they do not leave the vulnerable place. They adjust themselves against the natural catastrophe. Mitigation measures are not always sufficient to save people during the cyclone. For the time being people of the coastal areas of West Bengal adopt themselves against cyclone and live permanently.
Key words: Impact of hazard, human adaptation, Mitigation.

I INTRODUCTION

A cyclone is a tropical storm with circular winds and a relatively calm core. It forms over the ocean and gains intensity until it strikes the coast. Different names of cyclone:

1. weak in nature
   - Easterly waves
   - Tropical lows
   - Tropical depression
2. Strong in nature: Cyclone

Causes of formation:
Condition- Warm sea temperature greater than 26 degree Centigrade to a depth of 60 meters that provided enough water vapor through evaporation and high relative humidity in the atmosphere up to 7000 meters altitude, allowing water vapor to condense into droplets and clouds, releasing heat energy which in turn leads to a drop in pressure cyclone formation also depends on the development of massive vertical column clouds and on the earth's rotation.
Tropical cyclone as a hazard: Cyclone when occur suddenly and swiftly and consequently causing harm to the people and their institutions are called hazard.
Different types of cyclone:

storm	Abb.	Wind speed (knots)	Wind speed (kph)
Super cyclone	SC	>120	>221
Very severe cyclonic storm	VSCS	64 to 119	119 to 221
severe cyclonic storm	SCS	48 to 63	88 to 118
cyclonic storm	CS	34 to 47	63 to 87
cyclonic depression	CDP	33 or less	62 or less

II OBJECTIVE OF THE STUDY

The following objectives are set for the present study:
1. To assess the occurrence of cyclone in west Bengal in the past.
2. Impact analysis
3. Analyse the methods of human adjustment.
4. Highlight the hazard reduction measures taken by various Government and non-government agencies.

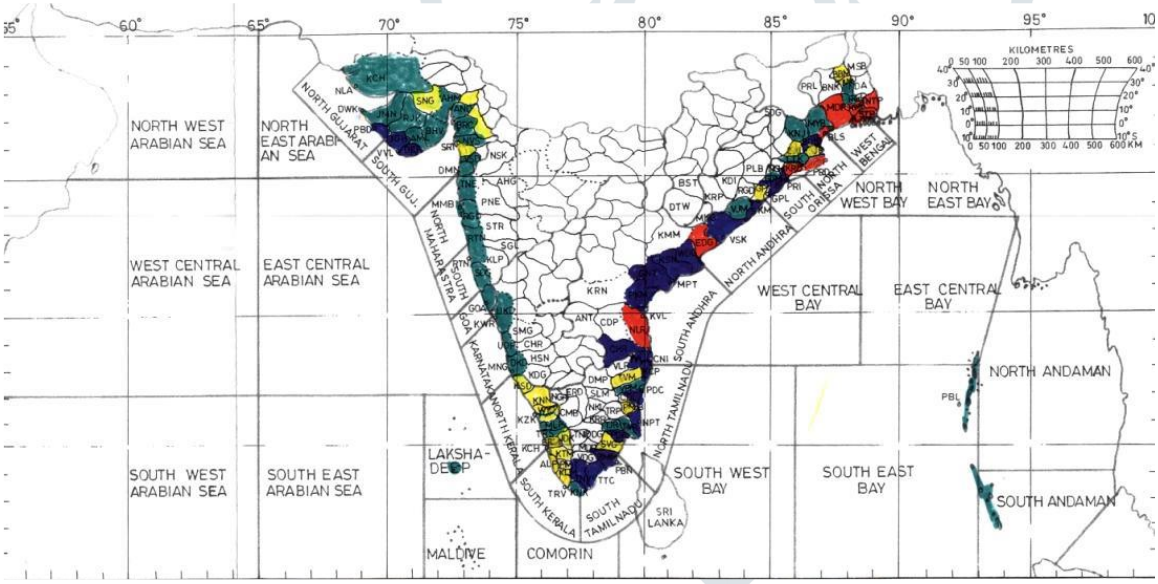
IV DATABASE AND METHODOLOGY

All the data have been collected from Indian Meteorological Department and various district Magistrate office. Methodology includes various steps: First, the frequency of the cyclonic storm and its damages have been tabulated. Second, the impact of cyclone have been analyzed. Third, Human adjustment in the particular area have been discussed. Fourth, Hazard reduction measures have been cited.

V LOCATION OF THE STUDY AREA

The study area include coastal zone of West Bengal i.e. major parts of north and south 24 parganas, parts of Midnapur and Howrah district. The region have 59 blocks, out of which 35 are in two parganas, 15 are in Midnapur district and 9 in Howrah district.

Cyclone hazard prone districts of India



Source: National Disaster Management Authority, Govt. of India

VI DISCUSSION

Coastal areas of West Bengal suffer from cyclonic disturbances each year. Intensity varies from different areas, but devastations occur if wind speed cross 80 km/hours. Description of different devastating cyclone are given below:

Table 1 Devastation of cyclones in west Bengal

Period	Description
17/10/1737_22/10/1737	Furious hurricane storm have been cast away 20,000 ships, barks, sloops, boats, canoes
2-21/3/1833	The event occurred at Sagar Island/24 Paraganas with 3 m high surge and caused 50,000 deaths and about 100,000 cattle perished.

3/10/1854	The surge went up to 12 m and water level increased at Kolkata and its vicinity. About 50,000 deaths reported
2-05/10/1864	Caused flooding up to 13 km on either side of the Hooghly River with 80,000 deaths reported
05-01/11/1867	Reported to have damaged Port Canning, and caused 13 m high surge at Hatia and Bhola Islands
13-16/10/1874	About 3049 deaths reported
21-26/9/1887	No estimation of associated deaths
18-29/9/1916	Extensive damage reported; however, no estimation of deaths
14-16/10/1942	About 5 m high surge reported at Midnapur (64 km upstream in Hooghly River). Overall 15,000 deaths reported
29/5/1956-01/6/1956	Caused flooding in Midnapur District, and also damage to agriculture due to saline water intrusion
13-26/8/1974	Cyclonic storm over land with maximum wind speed of 139 kmph caused floods in several districts. Seven deaths reported
11/9/1976	About 2.5 m high surge along with 1.4 m tide caused 40 deaths
27/9/1971-1/10/1971	Sixty people died and thousands of houses collapsed
24-28/9/1981	Caused loss of five launches in the Bay and damage to many houses in Midnapur District
9-14/10/1984	Caused damage in Midnapur district
23-27/5/1989	Sixty-one persons died and thousands of cattle perished
12/11/2002	Caused 78 deaths along with the destruction of agricultural crops and property
2009 Aila	1,50,000 people affected ,45 died in West Bengal. Villages were inundated by the river water hugely damaging crops, vegetables, pond fish, animals like Goats, Cows and other domestic ones. Tube well are of no use due to saline water contamination. Damage of food grains crops, vegetables causing severe crisis of food grains.

Source: Dartmouth flood observatory global archive

a) Impact of Super cyclone *Amphan:* The landfall of Amphan occurred on 20th May, 2020 at 2.30pm at Bakkhali of South 24 Parganas District, West Bengal. Being the epicenter of this cyclone, West Bengal affected mostly. 86 people were died. Storm surge of 5mt height inundated large coastal districts. Embankment, bridges over different rivers totally swept away. Wind speed in coastal areas were nearly 150-160 km/hour. Megacity Kolkata faces severe damages caused by electric shortage, uprooted trees and collapsed houses. Besides west Bengal severe wind and rain also damage coastal districts of Orissa, Bangaldesh, Srilanka and Bhutan.

b) Types of Impact of Cyclone: Negative Impact

Cyclone may strike on two types of environment: i) Non-populated and ii) Populated areas. Non-populated areas include islands, forest core areas, and coastal areas. In these non-populated areas major changes that occur due to cyclone are as follows:

a) Bio-diversity become changes
b) Destruction of environmental niche of different living being takes place
c) Destruction of various species of trees takes place
d) Death and habitat loss of animal occurred.
e) f) Salinity in water and land increase.

In the populated areas impact of cyclone may be divided into two:
1) Physical 2) Socio-Economic

Physical impact are as follows:
a) Due to erosion-accretion-the total land area becomes squeezed, i.e net loss of land area.
b) Soil and water becomes more saline.
c) Earthen embankment easily breached.

d) The land use of the total area totally changed.
e) Fresh water becomes contaminated.
f) Destruction of forests takes place.
g) Havoc death toll of life takes place.

Socio-economic Impact:
Economic Impact are as follows:
a) Loss of agricultural products
b) Loss of household articles.
c) Loss of consumable goods.
c) Lost in communication.
d) Decline in forest products.

Social Impact:
a) Social welfare scheme cease temporarily.
b) Social crime increase in remote atreas.

Adverse effects on human being:
i) Somatoticism-It is related with physical ill health.
ii) Psycoticsm- It is related with mental ill health.
iii) Socioticism- It changes in personal values and religious practices.

c) Beneficial Effects of Tropical Cyclones: Beneficial effects are few. Dry areas gets rainfall from cyclones. 2. It also help to maintain global heat balance by moving warm, moist tropical air to the mid-latitudes and Polar Regions.3. It stir up of the waters in estuaries which have beneficial role in fish breeding.4. Social bonding in society strengthen after cyclone due to unfamiliar circumstances.

d) Human adjustment with tropical cyclone:
The marginalized people in coastal areas do not leave their home though they are more vulnerable. People adjust themselves with the adverse environment and ultimately they adopt themselves. The adjustment procedure of vulnerable people are as follows:
Raising the height of the plinth, Plantation of big trees around home, harvest crops and gather from field, awareness generation through government campaigning, setting domestic animals free from sheds to allow them to survive surge water, take shelter in safety places. There are various instructions and help from government level which people follow to protect lives during and after devastations.

e) Measures taken for hazard reduction:

Several measures have been taken in West Bengal to reduce the loss of devastations. These are as follows:
a) Preparation of map of the areas prone to cyclone.
b) Construction and maintenance of embankments
c) Rehabilitation of affected people.
d) Infrastructural development in the coastal areas to ensure sustainable development.
e) Awareness generation for saving life, property and domestic animals.

VII CONCLUSIONS

Cyclone is the cause of death toll and loss of property in the coastal areas of west Bengal, but it has a long-term effect on human behavior. Many people leave the place for ever, many people compelled to leave as mitigation measures. People have to adjust themselves into different environment and social structure. Those who do not leave have to adjust with destruction and newer surroundings after cyclone. Sometimes poor, marginalized people becomes victim of dirty politics to get relief and rehabilitation facilities from government agencies.

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