

A Study On Nature Of Disasters And Disaster Management In Odisha, India

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Abstract: Hazard is best viewed as a naturally occurring or human induced process or event with the potential to create loss i.e. a general source of danger. Whereas risk is the actual exposure of something of human value to a hazard and is often regarded as the combination of probability and loss. On the other hand when a large number of people exposed to hazard are killed, injured or damaged in some way the event is termed as disaster. So disaster may be seen as the realization of hazard. Every year, huge amount of resources are mobilized for rescue, relief and rehabilitation works following natural disaster occurrences. Millions of people are affected every year and the economic losses caused by natural disasters amount to a major share of the Gross National Product (GNP). Natural disasters are huge economic burdens on developing economies such as India. In India, a closer analysis of what transforms a hazard into a human and economic disaster reveals that its vulnerability to the catastrophic effects of natural hazards. The principal causes of vulnerability include rapid and uncontrolled urbanization, persistence of widespread urban and rural poverty, degradation of the environment resulting from the mismanagement of natural resources, inefficient public policies, and lagging (and misguided) investments in infrastructure. Humans have managed disasters and an overview of our past experiences shows that management of disasters is not a new concept. For example, in ancient India, droughts were effectively managed through conventional water conservation methods, which are still in use in certain parts of the country - like Rajasthan. Local communities have devised indigenous safety mechanisms and drought-oriented farming methods in many parts of the country. In the post-independent India, a journey through the five-year plans points to the fact that the understanding of disasters was to mitigate droughts and floods; schemes such as the Drought Prone Area Program (DPAP), Desert Development Program (DDP), National Watershed Development Project for Rain fed Areas (NWDPR) and Integrated Water Development Project (IWDP) are examples of this conventional paradigm (Planning Commission, 2002). The present study is mainly contributed the glimpse of various disasters and its management procedure with referenced to the state of Odisha.

Keywords: Disaster management, hazard, risk, vulnerability, management.

I. INTRODUCTION

Like many other countries of the world, India is plagued by various kinds of natural disasters every year, such as floods, drought, earthquakes, cyclones and landslides etc. Every year, huge amount of resources are mobilized for rescue, relief and rehabilitation works following natural disaster occurrences. Millions of people are affected every year and the economic losses caused by natural disasters

amount to a major share of the Gross National Product (GNP). Natural Disasters are huge economic burdens on developing economies such as India. In present Odisha state is taken into consideration for study as this state is home of multiple hazards.

II. THE STUDY AREA

Odisha lies between 17°49' N and 22°34' N latitudes and 81°28' E and 87°29' E longitudes along the Bay of Bengal. It has an area of 155, 707 sq. kms, and a coastline of 482 kms. (including islands).

Odisha is vulnerable to multiple disasters. Due to its sub-tropical location, the state is prone to tropical cyclones, storm surges and tsunamis. The rivers in these areas with heavy load of silt have very little carrying capacity, resulting in frequent floods. Though a large part of the state comes under Earthquake Risk Zone-II (Low Damage Risk Zone), the Brahmani Mahanadi graben and their deltaic areas come under Earthquake Risk Zone-III (Moderate Damage Risk Zone) covering 43 out of the 103 urban local bodies of the state. Besides these natural hazards, human-induced disasters such as accidents, stampede, fire, etc, vector borne disasters such as epidemics, animal diseases and pest attacks and industrial / chemical disasters add to human suffering.

OBJECTIVES

- The objectives of the study are mentioned here.
- ✓ First and foremost objective is to study various kinds of disasters in details in Orissa.
- ✓ Secondly to study the disaster management procedure of Orissa along with risk assessment and vulnerability reduction.

III. METHODOLOGY

First of all lots of literature surveys are done based on the study area. Various types of hazards of Odisha along with their frequency of occurrence, vulnerability, affected areas are studied in details. Disaster related maps are taken from OSDMA (ODISHA STATE DISASTER MANAGEMENT AUTHORITY). Here ranking method is applied for identifying the level of vulnerability of the affected districts. Finally disaster management procedure are discussed to reduce the risk and for combating with a hazard.

IV. DISCUSSION

Almost every year Odisha is affected by various kinds of hazards such as earthquake, flood, tsunami, landslide, heat wave, lightning etc, which are discussed here.



Figure 1: Multihazard maps of Odisha

A. CYCLONE IN ODISHA

Cyclones are atmospheric and marine in origin and create coastal hazards. Cyclones bring multiple problems associated with high wind speed, intense rainfalls and sea surges. Orissa is being situated in the coastal region very frequently affected by the cyclones. Some of the severe cyclones of this State are discussed here. The 1999 Odisha cyclone, also known as Cyclone 05B, and Paradip cyclone, was the strongest tropical cyclone ever recorded in the North Indian Ocean. It was a tropical depression formed over the Malay Peninsula on October 25. It moved to the northwest and became a tropical storm on October 26. It continued to strengthen into a cyclone on October 27. On October 28, it became a severe cyclone with a peak of 160 mph (260 km/h) winds. It hit India the next day as a 155 mph (250 km/h) cyclone. It caused the deaths of about 10,000 people, and heavy to extreme damage in its path of destruction. Cyclone Jal, East Coast, had caused severe damage to the states of Odisha. Odisha has faced two of the most violent cyclonic storms in the span of only two years. In October 2013, the coastal districts of Odisha were kept on high alert. The Dussera vacations were cancelled and people were asked to take refuge in disaster shelters. Cyclone Phailin gushed through land, creeks and lakes into the eastern state. The district of Ganjam alone had faced damage of Rs 3,000 crore. Around 1,154,725 people were evacuated to shelter homes. The total damage cost around the state accumulated to 42.4 billion rupees. In 2014 extremely severe cyclone Hudhud caused damage to both the states on an industrial scale. Most districts in Odisha were kept on high alert and many areas in the state remained devoid of electricity due to disruption in power supply. Last year's one of the severe cyclone damage the state on an industrial scale. The storm had first hit is likely to get heavy rain in the next 48 hours under the impact of cyclonic storm 'Komen' formed over the Bay of Bengal. This cyclone worsen the existing flood situation in north Odissa that has affected more. This cyclone caused "heavy to very heavy" rainfall in north Odisha according to the India Meteorological Department (IMD).

B. FLOODS IN ODISHA

The 482 km long of coastline of Odisha exposes the state to flood. Heavy rainfall during monsoon causes floods in the rivers. The flat coastal belts with poor drainage, high degree of siltation of the rivers, soil erosion, breaching of the embankments and spilling of floodwaters over them are also responsible for flooding. In Odisha, rivers such as the Mahanadi, Subarnarekha, Brahmani, Baitarani, Rushikulya etc and their many tributaries and branches flowing through the state expose vast areas to floods. The entire coastal belt is prone to storm surges. The storms that produce tidal surges are usually accompanied by heavy rain fall making the coastal belt vulnerable to both floods and storm surges. People die, livestock perish, houses are washed away, paddy and other crops are lost and roads and bridges are damaged. The floods of 1980, 1982, 2001 and 2003 in the State were particularly severe; property worth crores of rupees was destroyed in the floods.

C. VULNERABILITY OF ORISSA TO TSUNAMI

The State of Odisha falls in the peninsular shield region of India. Studies show that the margins of the shield are generally seismogenic where earthquakes are likely to occur. The earthquakes experienced occasionally along the eastern margins of the Deccan shield are attributed to uplifting of earth's crust in those areas. This uplifting is however, considered to be slower than its counterpart in the Western margin. The resultant strain is thus being accumulated which manifests itself occasionally into earthquakes. Recent studies have also given an indication that the Mahanadi river valley is faulted and could be a potential earthquake source. Besides this, the Sumatra fault zone and tectonic plate setting along the Andaman & Nicobar Islands and Burma Micro plate boundaries remaining in the eastern part of the Bay of Bengal pose potential threats of tsunami for the coast of Orissa. As the technology stands today though earthquake prone areas are identified yet earthquakes still remain unpredictable. As per the assessment made, 266 villages of different districts are vulnerable to Tsunami.

D. EARTHQUAKE ZONES OF ODISHA

A large portion of Orissa comes under earthquake risk zone-II (Low damage risk zone). The Mahanadi and Brahmani graven, Mahanadi delta and parts of Balasore and Mayurbhanj district come under earthquake risk zone -III (moderate damage risk zone). 43 urban centres (Census) come under earthquake risk zone-III with a population of nearly 27 lakh. Out of 9 class-I towns, 5 namely Bhubaneswar, Cuttack, Puri, Sambalpur & Balasore are located in zone-III. Besides, important industrial centres like Angul, Talcher and Paradeep also come within the same zone. India Meteorological Department (IMD) had identified six locations for setting up seismological observatories in Orissa namely Rayagada, Jharsuguda, Malaygiri, Berhampur, Sonapur and Nuapada.

E. LANDSLIDES IN ODISHA

Outward and downward movement of mass, consisting of rock and soils, due to natural or man-made causes is termed as landslide. High intensity rainfall and earthquake triggers most of the landslides in Odisha. The landslides and related phenomena such as mudflows, earth flows, rock falls, debris flows are natural events that would occur without human activity, however human use and interest has led to increase in the intensity of these events. Mayurbhanj is most landslide prone district of Odisha.

F. HEAT WAVE

Heat wave can be defined as a condition of atmospheric temperature that leads to physiological stress, which sometimes can claim human life. There will be no harm to the human body if the environmental temperature remains at 37° C. Whenever the environmental temperature increases above 37° C., the human body starts gaining heat from the atmosphere. In the case of humidity being high along with high temperature, a person can suffer from heat stress

disorders even with the temperature at 37° or 38° C. Jharsukda, Talcher, Angul, Sundargarh, Dhenkenel, Sambalpur, Balangir, Mayurbhanj, Kandhamal, Keonjhar are mostly affected by heat wave.

G. ORISSA LIGHTNING

Lightning of thunder stroke is a natural phenomenon and prevention of its occurrence is beyond human control. A good number of people, nearly 300 persons succumb to death due to lightning in the State every year. Since this is not included in the list of natural disasters under Calamity Relief Fund (CRF) appropriate assistance i.e. ex-gratia cannot be given to the poor people for their death as in case of death due to other calamities like flood, fire, cyclone and earthquake etc. This issue has been repeatedly raised before the Government of India and Finance Commissions for consideration i.e. inclusion of "lightning" in the list of natural disasters so that relief can be administered to the poor people out of CRF. However, in due consideration of the gravity of the situation, the State Government have enhanced the ex-gratia to the next of kin of the deceased in the case of death due to lightning from Rs.10,000/- to Rs.50,000/- w.e.f. 01.06.2007. During the visit of Hon'ble members of 13th Finance Commission, Government of India in February, 2009 the State Government put forth the demand to include the "lightning" in the list of natural calamity under CRF.

ANALYSIS

After studying various types of hazards different affected districts are identified for the different hazards.

Sl No	Types of Hazards	Effected districts in Odisha
1	Cyclone	Ganjam, Gajapati, Khurda, Nayagar, Puri, Cuttack, Jagatsingpur, Dhenkanal, Jajpur, Kendrapara, Bhadrak, Mayurbhanj, Keonjhar.
2	Flood	Ganjam, Puri, Jagatsingpur, Cuttack, Kendrapara, Jajpur, Bhadrak, Baleswar.
3	Tsunami	Ganjam, Puri, Jagatsingpur, Kendrapara, Bhadrak, Baleswar
4	Earthquake	Sundergarh, Jharsuguda, Bargarh, Sambalpur, Deogarh, Angul, Dhenkanal, Jajpur, Cuttack. Khurda, Puri, Jagatsingpur, Kendrapara, Bhadrak, Mayurbhanj & Balasore.
5	Land slide	Mayurbhanj.
6	Heat wave	Jharsukda, Talcher, Angul, Sundargarh, Dhenkenel, Sambalpur, Balangir, Mayurbhanj, Kandhamal, Keonjhar
7	Lightning	Mayurbhanj, Dhenkenel, Khordha, Puri, Ganjam, Sundargarh
8	Industrial hazard, fire related hazards	Sundargarh, Jagatsingpur, Ganjam, Cuttack, Angul-Talcher, Balasore, Jharsuguda-Belpahar

	and others	and Rayagada
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Table 1: The table for various hazard affected districts in Orissa

In table No 1 names of vulnerable districts in relation to various types of disaster are enlisted. And these vulnerable districts of Odisha are ranked accordingly based on the numbers of hazards hit them and by which they are severely affected. For example one district which is susceptible to flood can also be affected by other kinds of hazards like cyclone, earthquake etc.

Scale of vulnerability	Rank	Name of districts in Odisha
1.Very high	5	Puri, Ganjam, Jagathsingpur, Mayurbhanj
2.High	4	Cuttak, Kendrapara, Dankhel, Bhadrak, Sundargarh
3.Moderate	3	Jaipur, Jharsukda
4.Moderate to less	2	Angul, Sambalpur, Talcher, Keonjhar, Baleswar, Khurdha.
5.Less	1	Gajapati, Baraghar, Deoghar, Kandhamal

Table 2: The table for the ranking of the hazard prone districts based on scale of vulnerability

This list of districts is highlighting the most vulnerable districts of Orissa, which really needed management.

V. DISASTER MANAGEMENT

Disaster management is essentially a dynamic process. It involves many organizations, which must work together to prevent, mitigate, prepare for, respond to and recover from the effects of disaster. Disaster management would therefore include immediate response, recovery, prevention, mitigation, preparedness and the cycle goes on. Before the disaster management Risk Assessment is very much essential. According to Ketes and Kasperson (1983) risk assessment comprises three distinct steps: a).An Identification of hazards likely to results in disaster, i.e. what hazardous events may occur). An estimation of risks of such events, i.e. what is the probability of each event).An evaluation of the social consequences of the derived risk, i.e. what is the loss created by each event? When analysis is undertaken, risk (R) is taken as some product of probability (p) and loss (L): $[R=p \times L]$. After risk assessment risk management is also an important step. It mainly includes pre – disaster planning, preparedness, response, recovery and reconstruction. After that reduction and adjustment of vulnerability is very much essential and it includes modifying loss burden, modifying hazard events and modifying human vulnerability.

Has undergone a paradigm shift from relief, restoration and rehabilitation to planning, preparedness and prevention, It includes several processes and some steps are very much needed to be highlighted like The focus of any disaster management plan now incorporates the following:

- ✓ Prioritizing the problem of locations and focusing on the worst hit areas and population is the essence of disaster management, (Community Based Disaster Preparedness).
- ✓ Use of GIS-based scientific tools helped in identifying the problem locations in advance,
- ✓ Panchayati Raj Institutions (PRIs) played key role in relief and rescue operation, suspension of schools for use of school buildings as temporary shelters.
- ✓ Risk analysis to identify the kinds of risks faced by people. Prevention and mitigation to address the structural sources of vulnerability.
- ✓ Strengthening of Emergency Operation Centres (EOC),Multi-hazard resistant Emergency Operations Centre (EOC) buildings have been constructed to focus of the Disaster Management Policy,
- ✓ Management and vulnerability reduction by strengthening the physical infrastructure as well as bio-physical, psychological, social and economic status of the people and to make the people increasingly disaster resilient as well and use people's indigenous knowledge,
- ✓ Whenever possible, establish an Institute dedicated to conducting research, development and training on disaster management related activities make Disaster Management a part of the educational system and curricula
- ✓ Emphasize participation of women in all stages of Disaster Management and recognize their special problems in disaster situation and finally recognize the higher vulnerability of children, elders, physically and mentally challenged, during and after emergencies and design interventions accordingly.
- ✓ Emergency preparedness and response to enhance a country's readiness to cope quickly and effectively with an emergency.

VI. CONCLUSION

Odisha is vulnerable to variety of hazards. Almost every year some districts of Odisha is devastated by any kinds of hazard. It is not possible to stop hazard but the vulnerability can be reduced through various management procedure. Emphasis should be given on the pre – disaster management techniques than the post – disaster management related activities for checking the hazard which may turned into disaster.

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