

Natural Hazards and Coastal Zones: The Case of Puri-Konark Region

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1. Introduction

The term natural hazard refers to all atmospheric, hydrological, geologic and wildlife phenomena, that because of their location, severity and frequency have the potential to affect humans, their structures or their activities adversely. We can define a hazard as an extreme event as any manifestation in a geophysical system (lithosphere, hydrosphere, biosphere or atmosphere) which differs substantially or significantly from the mean. If human socio-economic and physiological systems do not have the capacity sufficiently to reflect absorb or buffer the impact, then disaster may occur. The average cost of natural hazards over the past 25 years stands at a over US\$87 billion a year. The disturbing fact is that even in a region like

South Asia, where poverty, deprivation and death due to disasters are a common enough features of life, India remains the worst affected country.

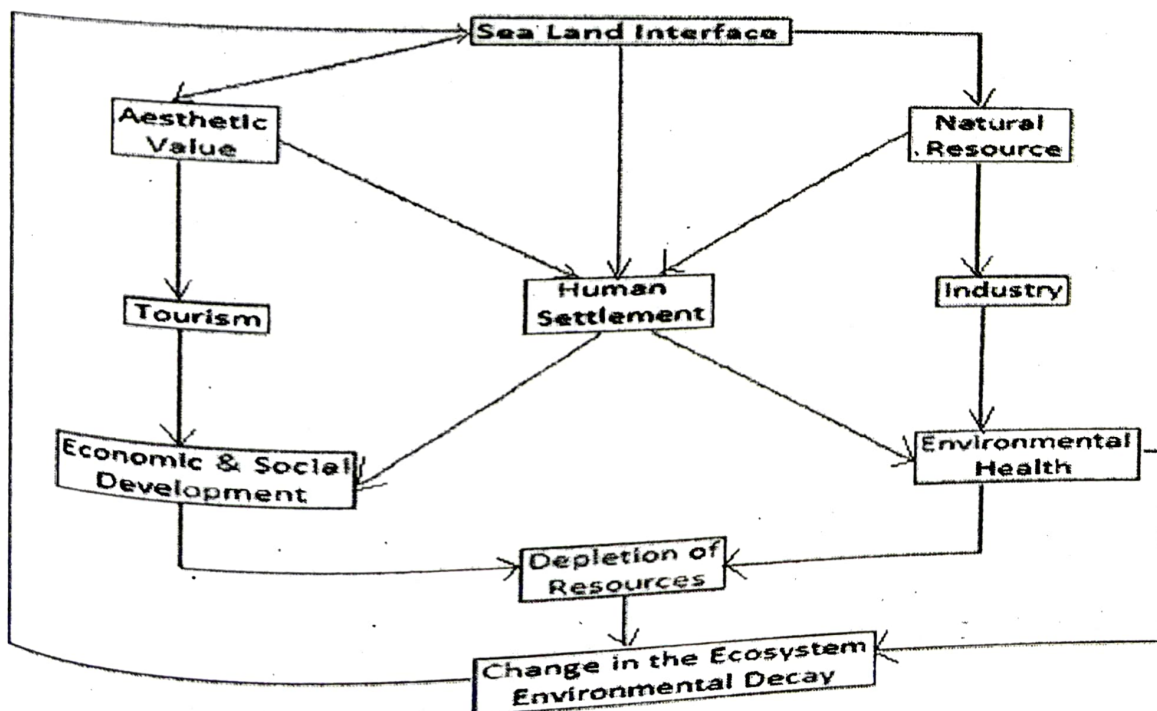
2. Objectives, Methodology & Database:

The objective of the paper is to study the type and frequency of different natural hazards affecting the area. Furthermore discusses the different measures taken by Govt. and other agencies to face the situation. Both primary and secondary sources of data have been consulted and used for the study.

3. Significant of the Study:

The present region under study has a mix of economic activities like agriculture and tourism. The

Fig- 1
Sea-Land Interface



study region encompasses. Puri famous as “Shanikha Khefra” one of the four “Dhamas” of Hindus. On the other end is “Konark” or the “Arka Khetra”, the site of an architectural and sculptural wonder in the form of the famous Sun Temple. Apart from these heritage sites, the silhouetted figures of canoes and catamarans disappearing into the deep sea, enthralls the visitor in the golden lands on Puri beach. Since fine immemorial

one can always find on lookers enthralled by the fascinating rhythm of sea. And hence, tourism has been the most important economic activity of the area off late. Apart from the above the region support a fragile ecosystem lying at the sea land interface and hence on extremely sensitive environment set up. Recurrent onslaught of natural hazards destroys the habitat and threaten the existence of micro-ecological systems of the area.

Table – 1

Coastal Issues Related to Natural Hazards

Sl. Nos.	Systems	Issues
1.	Coastal Areas	Change in Morphology, increased wave attack storm surges, Shoreline retreat, dune erosion, increased risk of inundation, land losses, resettlement and population of risk.
2.	Rivers and Estuaries	Increased flood risk, back water effect salt water intrusion, river levels, rising embankments, river bed elevation harbors, water ways.
3.	Costal Aquifer System	Salt water intrusion, seepage, qualitative and quantitative, recharge area and volume increase in fresh ground water resources.
4.	Water Management	Water Supply (Industrial and Domestic) agriculture, crop damage, horticulture, irrigation, drainage problems, flushing shipping, ecosystems (Marshes, wet lands, mangroves and lagoons) fisheries, recreation, beach tourism and infrastructure.

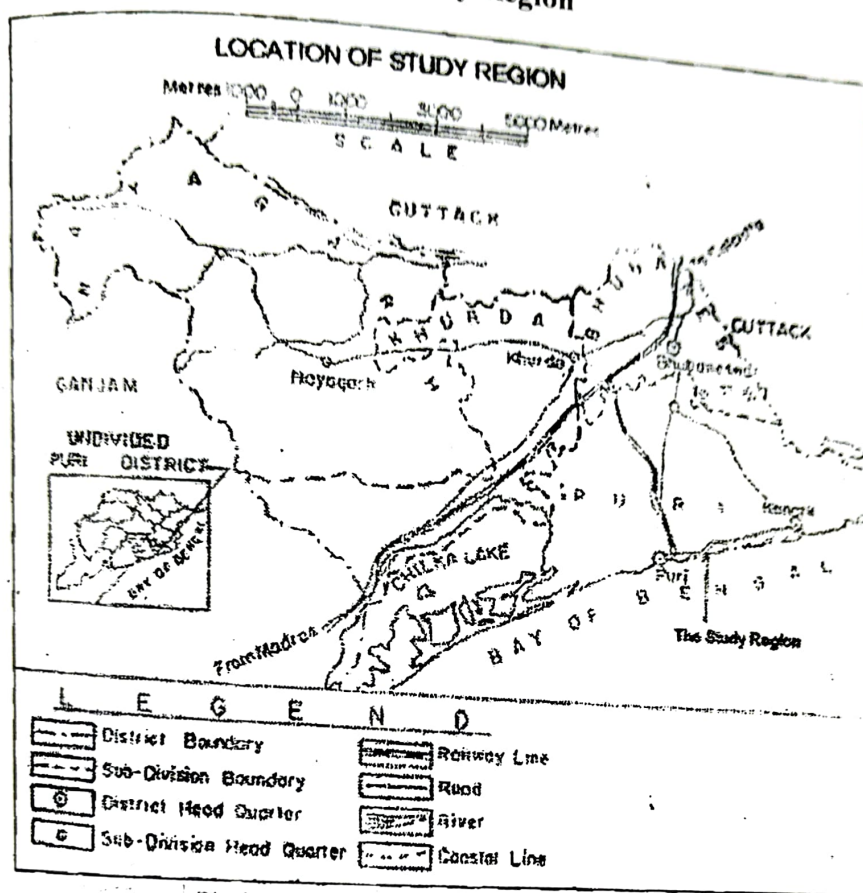
Source: Encyclopaedia of Disaster Management, P.C,Sinha, Vol-7, Anmal Publication, New Delhi

4. Study Area:

The Puri-Konark coastal region stretches, from 19°47'55"N to 19° 53' N latitude and 85° 49'55" E to 86° 06' E longitude for a length of 42 kms and width of 6 kms. It has an area of 239.79 sq. kms. If has an area of 239.79 sq. kms. It is a zone of increasing importance in

view of its high productivity, roch and conductive human ecosystem consisting of major urban centers and above all, varied landscape of tourist interest. The presence of the sea-land interface enhances the aesthetic value and the natural resources potential of the area. Major part of its area is within the coastal regulation zone Fig-2 shows the location of the area.

Fig- 2
The Study Region



5 Natural Hazard & the Coastal Zone:

The major Natural hazards affecting the area are drought, flood and cyclone. The following table shows the total no of reported hazards in the Puri-Konark coastal zone from 1980-2008.

Table - 2
Total No.of Reported Hazards in the Puri-Konark Coastal Belt (1980-2008)

Natural Hazard	Period		
	1980-90	1990-2008	Total
Drought	05	05	10
Flood	04	07	11
Cyclone	02	01	03
Total	11	13	24

Source: District Emergency Office, Puri

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5.1. Drought:

“Drought is a condition of moisture deficient to have on adverse effect on vegetation, animals and man over a sizeable area”. Drought is a protracted period of dryness due to lack of rain.... An absolute drought is a period of at least 15 consecutive days to none of which is credited 0.01 inches of rain or more. A partial drought is a period of at least 29 consecutive days, the daily rainfall of which does not exceed 0.01 inches. A dry spell is a period of at least 15 consecutive days to none of which is credited 0.04 inches or more of rain (meteorological Glossary. Air Ministry, 3rd ed. London, 1944, P.68) Drought is also a “Creeping Hazard”. This is because droughts, develop slowly, often over a period of months and also have a prolonged existence often over a period of years for major events. The disciplinary perspective on drought divides it into Meteorological, Agricultural, Hydrological, Socio-Economic drought.

5.1.1. Magnitude of Hazards

For the calculation of magnitude of drought and flood we have adopted the following procedure. At the first step percentage deviation of rainfall deficiency has been calculated. The percentage deviation of rainfall deficiency for 1980 to 2000, a period of 20 years has been calculated by using the following formula.

$$\text{Deviation} = \text{Actual Rainfall} - \text{Normal Rainfall}$$

$$\text{Rainfall Percentage Deviation} = \frac{\text{Deviation}}{\text{Normal Rainfall}} \times 100$$

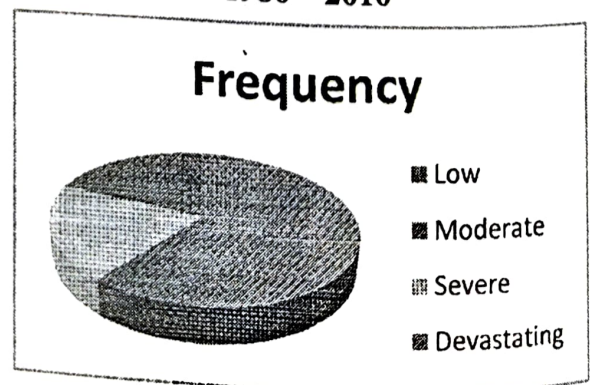
According to extent of deviation they are classified into four categories of Low, Medium, Severe and Devastating. If we analyze the above table in the period of last 30 years. i.e. 1980 to 2010, 15 years have experienced drought. Out of which 03 are devastating

03 severe, 04 moderate and 05 low. To summarize in a period of 20 years the area has experienced 06 severe droughts. Drought experiences here is mainly meteorological and agricultural. The meteorological indication are incidence of rainfall, amount, spatial and temporal distribution and variation with respect to normal. The agricultural indication are decrease in crop average, reduction in yield and impact as crop vigor or crop stress.

Table – 3
Magnitude and frequency of Droughts
1980 - 2010

Magnitude	Frequency
Low	05
Moderate	04
Severe	03
Devastating	03
Total	15

Figure – 3
Magnitude and frequency of Droughts
1980 - 2010



5.2. Flood

Floods are basically associated with erratic rainfall, more so if there is heavy down pour due to cyclones of clouds or cloud bursts over a small period of time.

Drainage channels which adjust themselves for normal conditions, when unable to carry excess water from torrential showers, spill them over their banks leading to floods. The danger of such floods heightens with a fall in the capacity of a drainage system to flush out water heightens with a fall in the capacity of a drainage system to flush out water due to adverse human interference. In almost every part of India, with every acre of long lying claimed for human use, such interference has been cumulatively growing for centuries. A flood can be defined as the height or stage of water above some given point, such as the banks of a

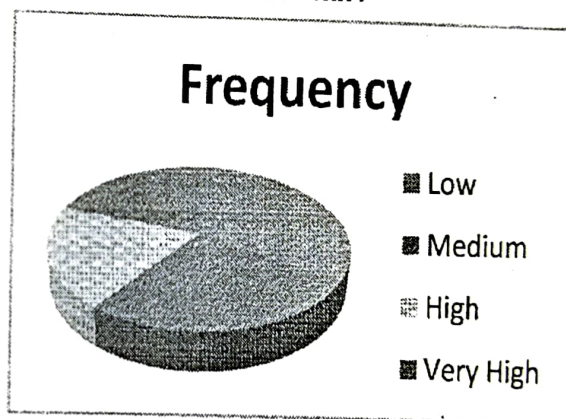
river. The flood hazard consists of the threat of life or property posed by rising or spilling water.

The most devastating floods were in 1955, 1956. If we analyze the period between 1980 and 2010, the region has experienced flooding in the year 1980, 82, 85, 90, 91, 94, 95, 97, 98, 99, 2000, 2006, 2008 and 2010. Flooding in the area is not related only to rainfall rather release of water from Hirokud reservoir also plays a very important role. Because in some years if there is heavy rainfall in the upper reaches of Mahanadi, the this area suffers from flooding. The following table analyzes the magnitude and frequently of floods between 1980 and 2008, based on amount of rainfall received.

Table – 4
Magnitude and frequency of Floods
1980 - 2002

Magnitude	Frequency
Low	05
Medium	04
High	03
Very High	03
Total	15

Figure – 4
Magnitude and frequency of Floods
1980 - 2002



The years for disastrous floods coincide with the years of 1986, 1990, 1995 and 1999. The incidences of floods have increased after 1990s.

Table – 5
Intensity of Cyclones in the Bay of Bengal

Intensity/km/hr	Name of State	Year/Month
161	West Bengal	October, 1942
163	Orissa	October, 1971
160	West Bengal	September, 1976
150	Andhra Pradesh	November, 1977
140	Tamil Nadu	November, 1978
150	Andhra Pradesh	November, 1979
180	Orissa	June, 1982
167	Tamil Nadu	December, 1993
260	Orissa	October, 1999

Source: Climate Change, Deforestation and Orissa Super Cyclone, V.J.Shiva, & A Emani, Research Foundation for Science Technology & Ecology, New Delhi, 2000.

5.2. Cyclone

Cyclone is any large system of winds that rotates about a centre of low atmosphere/odisha receives most of its rainfall from cyclones. The term "Cyclone" is derived from the Greek word "Kukloma" meaning the coil of a snake and was coined by Herry Fiddington, Chairman of Marine Court of Calcutta in 1848. He was the first person to attempt a systematic and scientific study of tropical storms in the Indian seas.

If we analyze the following table it can be found that 3 of the all time intense cyclones have devastated Odisha, the last two being in the recent past. The month wise distribution of the cyclonic disturbances reveals that their distribution is confined between May to December. There are three peak months for severe storms in a year. i.e. May, July and September.

Out of the 298 cyclonic storms of the Bay of Bengal, 101 storms have originated adjacent to Orissa coast in 108 years, i.e. one out of three storms of the Bay of Bengal affects the Orissa coast. During 1977 to 1987 there were 28 severe cyclonic storms. The pre-monsoon month of May and post-monsoon months of October and November are the most probable months of occurrence of the severe storms. Summarizing the above discussions one thing is clear that the region has been ravaged by droughts, floods and cyclones in the considered time period. In some years the area has experienced both flood and drought which sounds quite illogical. In some years there is excess rainfall in the initial months of monsoon causing flooding. In the subsequent months there is no rainfall with high sun which leads to rapid evaporation. Hence, the region suffers both flood and drought. Similarly cyclonic rainfall leads to flash floods and the region is ravaged by both wind storms as well as flooding. In this way drought, flood and cyclone are regular feature here sometimes overlapping with each other, thereby affecting the natural as well as cultural environment adversely.

6. Mitigation

In order to strengths its disaster management capacity, the Government of Orissa launched a 'comprehensive disaster preparedness and mitigation program' with the Orissa **State Disaster Mitigation Authority (OSDMA)** set up as the nodal agency to co-ordinate the whole process. The OSDMA is responsible for coordinating

disaster preparedness and mitigation activated with both Government & Non-Government agencies at different levels. If also co-ordinates post-disaster reconstruction and recovery activities as required by the State Government. Disaster Management infialives taken offer the Super Cyclone can be broadly categorized as follows.

1. Upgrading emergency response mechanism.
2. Strengthening Community level Preparedness.
3. Capacity building of key personnel in the field emergency management.
4. Unking Reconstruction/Recovery with risk reduction and Mitigation.
5. Creating necessary infrastructure for disaster management
6. Strengthening coordination and collaboration amongst various actors.
7. Policy Making and Planning.
8. Awareness Raising and Public Education and
9. Inter agency coordination, collaboration and partnership.

Mitigation is the cornerstone of emergency management which is the key to successful disaster management. The strategy promotes a community based approach to reducing vulnerability hazards.

- Altering the hazards (seeding clouds during a drought)
- Averting the hazard (Building dams to control flood waters)
- Avoiding the hazard (Moving Parts of communities out of flood plains)
- Adopting to the hazards (Constructing cyclone shelters)

People's understanding of the issues and their ability to mobilize professional skill are essential components of any risk reduction strategy. Enabling communities by investing in human resources and building individual capabilities across the generations will have longer lasting value than any other specific investment in technological systems to reduce risks.

7. Conclusion

Extreme natural events illuminate one aspect of the complex process by which people interact with biological and physical systems. Every parameter of the biosphere subject to seasonal, annual or secular fluctuation constitutes a hazard to man to the extent that his adjustments to the frequency, magnitude, or timing of its extremes are based on imperfect knowledge. By definition, no natural hazard exists apart from human adjustments to it. If always involves human initiatives and choice. Orissa lies on the eastern coast of India which is constantly ravaged by natural hazards. Disaster management is a very complex and sensitive matter to be left to the whims of politicians and Government officials. Active participants of NGOs and people's participation along with awareness generation are the basic requirements for disaster management in the true sense of the term.

References:

1. Alexander, D (1999), *Natural Disasters*, UCL Press, London.
2. Climatological Data Of Orissa, 1972-2008, Unpublished data from Bureau of Economics and Statistics, Govt. of Orissa, Bhubaneswar.
3. Parasuraman, S. Unnikrishnan, P.U. (1999) (ed.): *India Disasters Report towards a Policy initiative*, Oxford University Press, New Delhi.
4. Shiva, V.D., Emani, A. (2000) *Climate Change, Deforestation and the Orissa Super Cyclone*, Research Foundation for Science Technology and ecology, New Delhi.
5. Sinha, P.C. (1988), *Encyclopedia of Disaster Management Vol. I, II, IV, VII*, Ananda Publication Pvt. Ltd. New Delhi.
6. *Disaster Reduction Initiatives in Orissa, The story after Cyclone 1999* (2003), Orissa State Disaster Mitigation Authority Bhubaneswar.

THE CLASH OF CIVILIZATIONS

"The West is attempting and will continue to attempt to sustain its preeminent position and defend its interests by defining those interests as the interests of the "World Community." That phrase has become the euphemistic collective noun (replacing "the Free World") to give global legitimacy to actions reflecting the interests of the United States and other Western Powers. The West is, for instance, attempting to integrate the economies of non-western societies into a global economic system which it dominates. Though the IMF and other international economic institutions, the West promotes its economic interests and imposes on other nations the economic policies it thinks appropriate. In any poll of non-Western peoples, however, the IMF undoubtedly would win the support of finance ministers and a few others but get an overwhelmingly unfavorable rating from almost everyone else, who would agree with Georgia Arbatov's description of IMF officials as "neo-Bolsheviks who love expropriating other people's money, imposing undemocratic and alien rules of economic and political conduct and stifling economic freedom."

"Non-Westerners also do not hesitate to point to gaps between Western principle and Western action. Hypocrisy. Double standards, and "but nots" are the price of universalistic pretensions. Democracy is promoted but not if it brings Islamic fundamentalists to power nonproliferation is preached for Iran and Iraq but not for Israel; free trade is the elixir of economic growth but not for agriculture, human rights are an issue with China but not with Saudi Arabia; aggression against Oil-owning Kuwaitis is massively repulsed but not against non-oil-owning Bosnians. non-oil-owning Kuwait's is massively repulsed but not against non-oil-owning Bosnians. Double standards in practice are the unavailable price of Universal standards of principle."

(Samuel P. Huntington, "The Clash of Civilizations and the remarking of world order", P.184, 1996)