ORISSA (INDIA) SUPER - CYCLONE: IMPACT AND EMERGENCY MANAGEMENT

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DISASTERS IN INDIA

India is highly prone to natural disasters. The hazards like earthquake, cyclones, floods and landslides pose serious problems and cause very high damages to life and property every year. Floods are the most common natural hazard causing severe damages every year. About 40 percent of land area of the country are flood prone accounting for Rs. 9821.26 million losses annually. Entire coastline of India is prone to severe cyclonic storms. Severe cyclones hit the Indian coast every 1-2 years. Earthquakes cause quite high damages to life and property on an average 2-3 years. About 56% of total land area is earthquake prone in the country. Besides, other hazards like landslides and droughts cause serious problems very often. The table no 1 shows the human lives lost due to various disasters in India during 1990-91 to 1997-98.

Table 1 Human lives lost due to various Natural Disasters in India 1990-91 to 1997-98.

Year	Floods	Cyclones/ / Floods	Hailstorm	Earthquakes	Total
1990-91	1320	979	-	-	2299
1991-92	1185	304	-	768	2257
1992-93	1193	497	-	-	1690
1993-94	1690	318	-	7938	9946
1994-95	2038	247	59	-	2344
1995-96	2072	361	31	-	2464
1996-97	2069	1719	40	-	3828
1997-98	1560	216	247	39	2062

Source: Ministry of Agriculture, Government of India

During the last decade (1990-1999), India has faced major natural disasters almost every year. Occurances of the major natural disasters in India

during that period are listed in the following box.
Major Disasters of 1990-1999

Year	Disasters
1990	Cyclone in Andhra Pradesh
1991	Earthquake in Uttar Pradesh
1992	General flooding
1993	Earthquake in Maharashtra
1994	Cyclone in Andhra Pradesh
1995	Floods in Western India
1996	Cyclone in Andhra Pradesh
1997	Earthquake in Madhya Pradesh
1998	Cyclone in Gujarat, Landslide in Uttar Pradesh Severe flooding in eastern parts
1999	Earthquake in Uttar Pradesh, Flooding in eastern parts Super cyclone in Orissa

Cyclone Vulnerability And Disaster Preparedness In Orissa

Indian seas are considered as one of the six highest cyclone prone regions of the world, where cyclonic storms cause widespread damages on regular basis. The East Coast of India is highly prone to damaging cyclones in comparison to the West Coast where about 80% of all the cyclonic formations in the Indian seas hit.

The state of Orissa is prone to three types of natural hazards viz. cyclones, earthquakes and floods. Out of all these, major problem of the state are the cyclonic storms with storm surges inundating vast areas of land along the coastal areas.

The state of Orissa has a coastline of about 450 km. towards the Bay of Bengal. Even though the coastline of Orissa is about 18 percent of the Indian coastline, nearly 35 percent of cyclonic and severe cyclonic storms with core of hurricane winds have crossed along this stretch. Between year 1899 and 1990, the state has experienced 68 cyclonic storms and as many as 26 of these can be classified as severe cyclonic storms. The loss of human lives during some

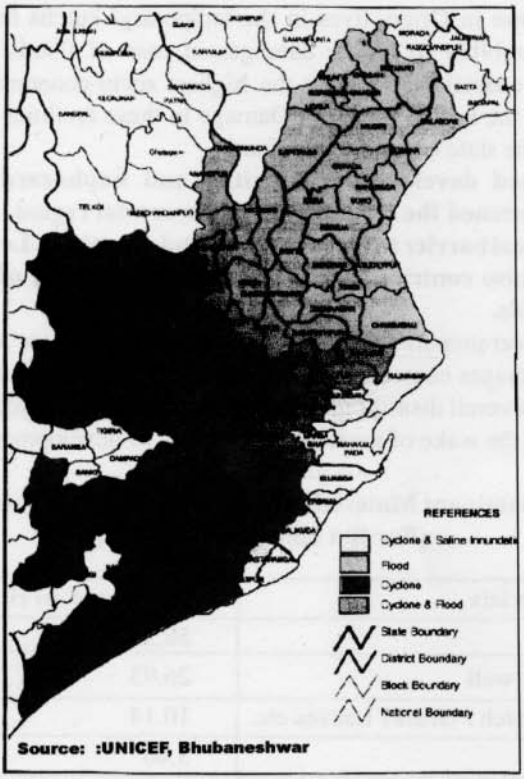

Figure 1 : Map of the areas affected by the super-cyclone in Orissa

noteworthy cyclones occurring along the Orissa coast are Balasore (1831) – 22,000, False Point (1855) -5,000 and Paradeep (1971) -10,000.

The high magnitude of damages due to past and present disasters in the state clearly shows the seriousness of the problem. The coastal plains here are comprised of deltas of rivers like Mahanadi and its tributaries. The presence of good alluvial soil and irrigation sources made this region highly fertile, leading to the very high population concentrations. Even though the region has faced cyclones in the past, the population concentrations has been the highest in the region within the State and thus making this region highly vulnerable to hazards like floods and cyclones.

The state of Orissa is the poorest among all the India states where more than half of the population live below poverty line. Orissa also has the least household income and per capita income in the country. About eighty percent

of the population in Orissa lives in the temporary/ kutcha houses (table2), increase vulnerability to higher damages in case of floods and cyclones. However, the coastal plains have the highest socio-economic indicator in comparison of the rest of the state. Damage to these facilities due to natural disasters hits the state economy very hard.

Ill-planned development activities and haphazard agricultural practices threatened the forest cover in the coastal region, which used to act as the natural barrier to the high winds and sea surges. Low forest cover of the region also contributes to increased vulnerability of the region to natural hazards.

The disaster preparedness level in Orissa was quite low as evident from the level of damages caused due to the recent disasters in the state. Being the poor state, the overall disaster management, a state level subject in India, gets low priority in the wake of more pressing needs of development.

Table 2: Predominant Materials Used for House Construction in Orissa (For flat and slopping roofs)

Walling Materials	Percentage of Houses
Mud Walls	58.35
Burned Brick wall	26.93
Bamboo / Thatch / Grass / Leaves etc.	10.14
Wood	3.46
Stone	3.21
Unburned brick	2.96
Total	**99.05**

Source: Vulnerability Atlas of India

Indian Meteorological Department (IMD) had installed the 35 Disaster (cyclone) Warning Systems (DWS) all along the entire coast of the state. Through DWS rapid and direct dissemination of cyclone warnings are made using INSAT satellite to designate addresses at isolated places in local languages. The DWS sets have been installed in smaller administrative units like Block and Police Stations besides District and State headquarters.

Besides, non-government efforts were initiated by NGOs to built permanent cyclone shelters in coastal districts of Orissa. The Red Cross Society of India in collaboration with International partners constructed 23 cyclone shelters

during last few years. The Red Cross Society also trained local volunteers for evacuating people to these cyclone shelters during emergencies.

Disasters in Orissa

Orissa was totally ruined by successive disasters like cyclones and floods in the second half of last year i.e. 1999 affecting very severely 14 out of 23 districts of the State. The State first experienced severe floods in August 1999, which affected seven districts. The floods were followed by the severe cyclone of October 17-18, 1999 with a wind speed of 200 km/h. This cyclone caused damages in the four districts. Within a span of just eleven days, the state was hit by another cyclone of catastrophic nature on October 29-30,1999. The cyclone with a wind speed of 270-300 km/h and a tidal wave upto 7-10 m height swept away the Orissa coast spreading over a stretch of about 250 kms. Torrential rains, ranging from 44 – 95 cm over a period of four days after the super cyclone, caused unprecedented floods in the large areas of coastal plains. In all 12 districts were affected badly. Two districts of the neighboring State of West Bengal were also affected by the cyclone. Table 3 depicts the damages due to the recent disasters in Orissa.

Figure 2 : The houses built by thatch etc. were washed away by the high winds and sea surges. There are no traces left of those houses after the cyclone.

Table 3 : Damage in the Recent Disaster in Orissa

Items	Units	Super Cyclone (Oct. 29-30, 99)	Severe Cyclone (Oct. 17-18, 99)	Flood (August,99)
Population Affected	Millions	13	3.30	1.80
Human Lives lost	App. No.	10,000	200	14
Livestock Causalities	Million	0.45	0.011	NA
Houses Damaged	Million	1.6	0.36	0.012
Agricultural Land Affected	M.Hac.	1.9	0.3	0.17

Source: Ministry of Agriculture , Government of India Reports

Figure 3 : Performance of houses of mud, thatch and bamboo is quite poor during the cyclone. These houses were damaged very severely during the recent cyclone.

Impact of Super Cyclone

The super cyclone of October 28-29, 1999 had exposed the people and landscape to the impact of three types of hazards- high-speed winds, storm surge and heavy torrential rains. A combination of these hazards resulted in the different types of impact i.e. physical destruction, saline water inundation and flooding respectively. The damage caused by this cyclone can be grouped into the following four categories:

1. Loss of human lives, settlements and dwellings
2. Loss of livelihood- agriculture, livestock, horticulture and plantation

crops, implements of the village artisans like weavers and fishermen etc.

3. Loss of infrastructure – telecommunication, power, health and education, public institutions, and surface communication like roads and railways.
4. Loss to environment - ecological impact.

This cyclone is considered as the most severe cyclone faced by India. The cyclone rendered millions of people homeless. Majority of affected people were staying in the rural areas in mud and thatched hut type of dwelling units. In all about 23796 houses washed away, 733866 houses fully collapsed and 904021 houses partially collapsed.

Figure 4 : The traditional modes of communication like radio, television, etc. were hugely damaged due to this cyclone. The transmission tower of the Cuttack radio station fell down on November 29, 2000 disrupting the broadcast of the warning messages

The cyclonic storm remained stationary for about four hours over the twin cities of Bhubaneshwar, the capital city, and Cuttack, the oldest city of the state, causing huge devastation and paralyzing the normal life in both the cities. The major casualty was to the telecommunications, power supply, water supply and surface communication sectors. The high magnitude of damages particularly to communication sector made the state administrative machinery ineffective for first few days after the storm. The salient features of the damage caused due to

the super cyclone in Orissa are:

- 1.35 million hectares of paddy crop, 0.28 million hectare of non-paddy crops and 0.18-hectare horticulture crops were damaged.
- About 3425 high school and 14901 upper primary school buildings had been damaged. Most of the students in the cyclone-affected area lost their books, stationary items and school uniforms.
- In all about 90 million trees have been uprooted or damaged. About 95,750 hectare of forest area has been affected. The entire affected belt is daunted of its green cover.
- 2139 km of Public Works Department roads (including National and State Highways) were damaged, including a 90 m wide breach on the National Highway No. 5 connecting Calcutta- Bhubaneshwar- Chennai.
- 12000 km of rural roads with 1474 cross drainage works had been severely damaged.
- Severe floods due to heavy rainfall had caused 2005 number of breaches in the flood embankments and 8647 breaches in canal embankments. About 5636 lift irrigation points in the affected area had been severely affected.

Figure 5 : Cyclone shelters built by the Indian Red Cross Society helped in saving thousands of human lives. These shelters were used very effectively as the relief centers.

Post Cyclone Response

In the immediate aftermath of the cyclone, the essential infrastructure had complete by collapsed making it impossible to start the rescue and relief works. There were a number of constraints like large stretches of land were inundated by water, roads were submerged or washed away, roads were blocked by uprooted trees and complete collapse of the telecommunications system. Considering the various constraints and the magnitude of devastation, the Chief Minister of Orissa requested Central Government and Defense Forces for assistance. He also requested people, NGOs and various aid agencies to provide humanitarian aid to the affected people of the State.

Figure 6 : People affected by the cyclone started construction of their houses again. Mud, thatch and bamboo constitute the primary building materials in the cyclone-affected areas.

Keeping in view the disastrous effects of the cyclone, the Government of India considered it as the calamity of Rare Severity and treated it as a calamity to be handled at the National level. All the Central Government Ministries / Departments like Defense, Health and Railways etc. played a very effective role in the post-cyclone phase. A High Powered Task Force (HPTF) was constituted under the Chairmanship of Defense Minister and comprising of Secretaries of various ministries and departments of Government of India. The HPTF was constituted to

- Prepare a comprehensive rehabilitation and reconstruction plan for the cyclone affected areas of Orissa.
- Recommend the mode of implementation of the plan including its funding and
- Recommend the steps that need to be taken in other areas of the country which are prone to such calamities.

Figure 7 : Saline sea water inundated the agricultural fields causing huge losses to the standing crops like Paddy etc.

Two neighbouring states of Andhra Pradesh and West Bengal provided immediate help to the states of Orissa. These two States were the first responders to this calamity. Other states as well provided essential relief material to the affected people of the State. All the twelve affected districts were adopted by different State Governments for the rehabilitation and reconstruction work. For the first time various Public Sector Undertakings (PSUs) also provided helping hands to the state of Orissa in relief, rehabilitation and reconstruction of disaster affected areas.

Andhra Pradesh is considered as one of the well-prepared states of India from disaster management point of view. The State Government of Andhra Pradesh sent a team of senior officers to identify the needs and requirement of Orissa immediately after the cyclone. Very timely help provided by the Government of Andhra Pradesh resulted in establishing the telecommunications network,

clearing roads and establishing power supply in the affected areas. The National Institute of Amateur Radio at Hyderabad was able to establish the network of HAM Radios at the critical locations within the capital city and affected district headquarters within first few days after the disaster.

Figure 8 : A great loss to the green cover of the area took place due to this cyclone. There are no trees left over the long stretches along the roadsides in the cyclone affected areas.

Coordination of Relief Efforts

Despite the very severe damages, to infrastructure etc. the State Administration started the massive relief operations. Various aid agencies, NGOs etc. also put very encouraging support to the State Government in the relief distribution. Immediately after the cyclone a massive inflow of relief supplies, volunteers, NGOs etc. took place to assist the state Govt. in relief operations. The entire relief operation at state level was undertaken through a Special Relief Commissioner and the District Collectors. State Chief Minister was monitoring the relief efforts on daily basis. The major tasks assigned / undertook by the State Relief Administration were:

- Relief collection and distribution. Army helped in the distribution of the relief material
- Coordination of relief and restoration works where NGOs were also involved.

- Restoration of vital installations and
- Damage assessment in various affected districts in terms of human lives lost, cattle head lost, buildings, Government property and agriculture.

Figure 9 : A view of the control room at the block level. The materials collected from the district headquarters were supplied through blocks to the affected people in the villages.

To coordinate the huge amount of relief material rushing into the state capital, separate control rooms were established at different locations at Bhubaneshwar. These control room work round the clock. The functions of various control rooms are listed in table 4.

Role of NGOs and other Aid Agencies

The UN had started a massive relief and rehabilitation programme in the state. A coordinated effort, to provide relief materials and aid to cyclone victims, had been put into operation by UN organisations. Various organisations like UNDP, UNICEF, UNFPA, FPO, WFP, ILO, WHO etc. were very actively involved in the post-cyclone management. A team from OCHA and UN each had arrived in India to make an on-the-spot assessment of immediate relief requirements and to identify areas of UN assistance for relief and rehabilitation. The UNICEF office in Bhubaneshwar was upgraded as UN house for better coordination and management of activities. The entire UN machinery worked in close coordination with Govt. of Orissa. The various UN agencies and other international NGOs met

every day to identify the gaps and to avoid the duplication of efforts.

Besides international aid and UN agencies a number of NGOs and Voluntary Organizations (VOs) came forward to help the affected population. About 46 international, 31 national and 78 local NGOs provided assistance to the cyclone victims. Major activities taken up by the NGO sector were to dispose off the dead bodies and animal carcasses, running of free kitchens, drinking water supply and disinfection of water bodies.

For the first time in the country, a number of NGOs came forward to work together for affective and efficient post cyclone management. NGOs in Orissa had established Orissa Disaster Mitigation Mission (ODMM) of interested VOs. The ODMM was created as a collective effort to respond immediately to the post disaster requirements of the people. The ODMM had been represented at the grassroot level by 52 nodal points, which were managed by about 35 Voluntary Groups with 533 volunteers. The ODMM carried out the works under four major heads i.e. shelter, food, health and carcass disposal.

Table 4 : Various Control Rooms and Their Functions

Control Rooms	Functions
Revenue Dept. Control Room	Overall coordination of relief, restoration and rescue operations. Issuing the daily situation report
Central Relief Coordination Centre	• *Food Control Room:* Relief consolidation and diversion of food items to District headquarters. • *Drugs / Medicine Control Room:* Consolidation, reloading and diversion of medicines.
Health Control Room	Coordination of drug supply and health measures.
Shelter Materials Control Room	Consolidation and dispatch of shelter materials and garments
Oil and Petroleum Control Room	Coordination of supply of petroleum products.
NGOs Coordination Cell	Coordination of overall NGOs activities. Separate control room to coordinate with CARE, UNICEF, WFP, and other international agencies.
Textile Control Room	Procurement, storing and dispatch of blankets and clothing.
Railway Yard Control Room	Clearance of incoming relief materials through railways.
Airport Control Room	Clearance of incoming relief materials through air routes.

Lessons from Orissa Cyclone

1. Community preparedness may result in a very positive public response to warning and other preparedness measures like evacuation. In case of Orissa Super Cyclone, the India Meteorology Department issued very timely warning of impending cyclone (first warning was issued on October 26, 1999). Despite timely warning people didn't move out of the vulnerable areas. Mass awareness programmes for the public and special training sessions for the administrative machinery to handle such type of situation must be initiated.

2. Communication system is the major causality in case of a cyclone. All means of communication like telecommunications, surface communication, radio and television transmission, etc. got affected due to this cyclone. The fallen trees on the roads blocked the roads and other communication means like telephones went out of order. Cyclone preparedness is the only key to overcome these difficulties. Teams should be ready to clean the fallen trees and unconventional means of communication like Ham radio, satellite phone etc. must be installed at pre- cyclone stage itself.

3. The majority of losses due to the cyclone are to the built environment. The rural houses in coastal Orissa are non-engineered buildings. These buildings are built up with temporary materials like thatch, bamboo and mud. This type of construction is highly prone to damages in the cyclonic storms. The only way to minimize the damage is through constructing the houses with permanent building materials according to the building codes.

4. Another way is to safeguard the people against the cyclones by evacuating them to the specially designed and constructed cyclone shelters. At present, there are twenty-three cyclone shelters in the coastal districts of Orissa. These shelters save thousands of lives in this cyclone. There is a need to construct more such shelters.

5. Land use planning in coastal areas is very important and effective means of loss reduction. The human settlements and industries should not come very near to the coastline. The coastal belt upto 2-5 km. from the sea must be reserved for plantation. Low-density settlements without heavy industries may be permitted at a distance of more than 5 km. from the sea. Due to various pressures, the people have reached very near to the coastline in Orissa for settlement development and economic activities. This trend must be checked to avoid the mega disaster like this one. Mixed vegetation should be planted to act as the wind barriers to the settlements must be developed in the coastal areas.

6. The physical infrastructure, which is the backbone for any post cyclone rescue and relief operations, is highly vulnerable to severe damages in case of cyclones. Telecommunications, power, roads, water supply etc. were disrupted for a long period of time. Schools, health centers and other community buildings were damaged in very large numbers. These entire facilities take very long time in rebuilding in comparison to individual dwelling units. All these facilities must be designed and constructed as per the codes/ guidelines already available for the purpose.

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