Natural Disaster Management in India

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DISASTER IS defined as 'Catastrophic situation in which the normal pattern of life or ecosystem has been disrupted and extra-ordinary emergency interventions are required to save and preserve lives and or the environment' (Ministry of Home Affairs, 2011). The Disaster Management Act has included man-made disasters also and defines disaster as 'a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man made causes or by accident or negligence which result in substantial loss of life or human sufferings or damage to, and destruction of, property or damage to, or degradation of environment and is of such a nature or magnitude as to be beyond the coping capacity of the community of an affected area'.

The Indian scenario

The Indian subcontinent is highly vulnerable to cyclones, droughts, earthquakes and floods. Avalanches, forest fire and landslides occur frequently in the Himalayan region of northern India. Among the 35 total states/ Union Territories in the country, 25 are disaster prone. On an average, about 50 million people in the country are affected by one or the other disaster every year, besides loss of property worth several million (Table 1).

In the 1970s and the 80s, droughts and famines were the biggest killers in India, the situation stands altered today. It is probably a combination of factors like better resources management and food security measures that has greatly reduced the deaths caused by droughts and famines. Floods, high winds and earthquakes dominate (98 percent) the reported injuries, with ever increasing numbers in the last ten years. The period from 2001 to 2011 has been associated with a large number of earthquakes in Asia that have a relatively high injury to death ratio. Floods, droughts, cyclones, earthquakes, landslides and avalanches are some of the major natural disasters that repeatedly and increasingly affect India (Table-2).

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The natural disasters directly impact economies, agriculture, food security, water, sanitation, the environment and health each year. Therefore it is one of the single largest concerns for most of the developing nations. Different natural hazards because varying levels of physical damage to infrastructure and agriculture with implications for their indirect and secondary impacts. Drought causes heavy Crop and Livestock losses over wide areas of land but typically leave infrastructure and productive capacity largely unaffected. Floods and Cyclones cause extensive whereas damage to both infrastructure and agriculture, depending on their timing relative to the agricultural cycle. While earthquakes have little impact on standing crops excluding localized losses but can cause wide spread devastation of infrastructure and other productive capacity over relatively large areas.

The precise cost of the disaster in terms of loss of lives, property, loss of development opportunities, etc. cannot be clearly assessed, counted or scaled. The costs of disaster are clearly inequitable, falling heavily only on the few. Disasters result not only in loss of shelter but also create hardships, lack of food availability, temporary loss of livelihood and disrupt socio-economic activities. Some of the losses may be redeemable and compensated for through disaster relief and insurance. However, apart from economic dimension, such disturbances have their psychological and social dimensions as well, which need to be studied, and documented besides developing appropriate mitigation strategies.

India's Vulnerability

India is a country highly vulnerable to natural disasters.

Table-1: People affected, lives lost and economic damage due to Disasters in India during 1980 to 2010.

Year	Type of Disasters	People affected	Life lost	Economic damage (USD x 1,000)
1980	Flood	30,000,023		
1982	Drought	100,000,000		
	Flood	33,500,000		
1984	Epidemic		3290	
1987	Drought	300,000,000		
1988	Epidemic		3000	
1990	Storm			2,200,000
1993	Flood	128,000,000		7,000,000
	Earthquake		9,748	
1994	Flood		2001	
1995	Flood	32,704,000		
1996	Storm			1,500,300
1998	Storm		2871	
	Extreme Temp		2541	
	Flood		1811	
1999	Storm		9,843	2,500,000
2000	Drought	50,000,000		
2001	Earthquake		20,005	2,263,000
2002	Drought	300,000,000		
	Flood	42,000,000		
2004	Flood	33,000,000		2,500,000
	Earthquake		16,389	
2005	Flood			3,330,000
	Flood			2,300,000
2006	Flood			3,390,000
2009	Flood			2,150,000

Source: "EM-DAT: The OFDA/CRED International Disaster Database

Table-2: Year-wise damage caused due to floods, cyclonic storms, landslides, etc. during last ten years in India

Year	Live Lost human (in No.)	Cattle Lost (in No.)	Houses damaged (in No.)	Cropped areas affected (in Lakh hectares)
2001-02	834	21,269	3,46,878	18.72
2002-03	898	3,729	4,62,700	21.00
2003-04	1,992	25,393	6,82,209	31.98
2004-05	1,995	12,389	16,03,300	32.53
2005-06	2,698	1,10,997	21,20,012	35.52
2006-07	2,402	4,55,619	19,34,680	70.87
2007-08	3,764	1,19,218	35,27,041	85.13
2008-09	3,405	53,833	16,46,905	35.56
2009-10	1,677	1,28,452	13,59,726	47.13
2010-11	2,310	48,778	13,38,619	46.25

Source: Ministry of Home Affairs (MHA)

Enormous population pressures and urbanization have forced people to live on marginal lands or in cities where they are at greater risk to disasters and the damage they can cause. Whether a flood, a regional drought or a devastating earthquake, millions of Indians are effected each time a disaster occurs. In addition to large-scale displacement and the loss of life, these events result in the loss of property and agricultural crops worth millions of dollars annually. These catastrophes typically result in the substantial loss of hard won development gains.

India is a nation with varied climatologically and hypsographic conditions. Therefore 68 percent of the land is drought prone, 60 percent is prone to earthquake, 12 percent to Floods, 8 percent to Cyclones. This count to almost 85 percent of the land area in India is vulnerable to natural hazards while 22 States have been marked as hazards prone states. The main natural disasters in India includes floods, earthquakes, droughts, and cyclones while the minor natural hazards in India are landslides, avalanches, hailstorms, forest fires and bushfires. In India most of the states experience more than one type of disaster

Types of Disasters

Due to the increasing frequency of natural and man-made disasters and their severe impact on the individuals, society, economy, natural resources and environment, Government of India constituted a High Powered Committee (HPC) on Disaster Management in August 1999 to prepare comprehensive plans for National, State and District levels. The HPC has rightly stressed on the need for a comprehensive and holistic approach towards dealing with all kinds of disasters. From a compartmentalized response oriented approach, a coordinated, holistic and participatory approach has been recommended. HPC identified thirty one disasters in the country. These disasters have been categorized into following five sub-groups depending on generic (origin) considerations and various departments/ ministries dealing with various aspects:

1. **Water and Climate Related Disasters**

Floods and Drainage Management, Cyclones, Tornadoes and Hurricanes, Hailstorm, Cloud Burst, Heat Wave and Cold Wave, Snow Avalanches, Droughts, Sea Erosion and Thunder and Lightning.

2. **Geologically related disasters**

Landslides and Mudflows, Earthquakes, Dam Failures/ Dam Bursts and Mine Fires

3. **Chemical , Industrial & Nuclear related disasters**

Chemical and industrial and nuclear disasters have been included.

4. **Accident related disasters**

Forest Fires, Urban Fires, Mines Flooding Oil Spill, Major Building Collapse, Serial Bomb Blasts, Festival related disasters, Electrical disasters and Fires, Air, Road and Rail Accidents, Boat Capsizing and Village Fire have been included in this sub-group by HPC.

5. **Biologically related disasters**

Epidemics, Pest Attacks, Cattle epidemics and Food poisoning.

Natural disasters are natural phenomenon and occur without any intention while man-made disasters are events which, either intentionally or by accident cause severe threats to public health and well-being. Because their occurrence is unpredictable, man-made disasters pose an especially challenging threat that must be dealt with through vigilance, and proper preparedness and response.

Natural disasters

Floods

Floods in the Indo-Gangatic Brahmaputra plains are an annual feature. Seventy five percent of rainfall is concentrated over four months of monsoon (June - September) and as a result almost all the rivers carry heavy discharge during this period. Brahmaputra and the Gangetic Basin are the most flood prone areas. The other flood prone areas are the north-west region of west due to over flowing rivers such as the Narmada and Tapti, Central India and the Deccan region with major eastward flowing rivers like Mahanadi, Krishna and Cavery. The average area affected by floods annually is about 8 million hectares while the total area in India liable to floods is 40 million hectares in which Uttar Pradesh has 21.9 percent, Bihar (12.71 percent), Assam (9.4 percent), West Bengal (7.91 percent), Orissa (4.18 percent) and other states have 43.9 percent flood prone area.

An analysis of data of different states for the period of 1953-2009 reveals that average annual damage to crops, houses and public utilities in the country was around Rs. 1649.77 crore and maximum reported 8864.54 crore was in the year of 2000. On an average, an area of about 7 million hectares (17.50 mha maximum in 1978) was flooded, of which, on average crop area affected was of the order of 3.302 million hectares (10.15 mha in 1988). The floods claimed on an average 1464 human life and 86288 heads of cattle dead every year.

Droughts

We have a largely monsoon dependant irrigation network. An erratic pattern, both low (less than 750 mm) and medium (750 - 1125 mm) makes 68 percent of the total sown area vulnerable to periodic droughts. Severe and rare droughts occur in arid and semi-arid zones once in almost every 8-9 years. Drought is a perennial feature in some states of India. 16 percent of the country's total area is drought prone and approximately 50 million people are annually affected by droughts. In fact, persistent drought with less than average rainfall over a long period of time gives rise to serious environmental problems.

Cyclones

India has a long coastline of approximately 8,000 km. There are two distinct cyclone seasons: pre-monsoon (May-June) and post-monsoon (October-November). The impact of these cyclones is confined to the coastal districts, the maximum destruction being within 100 km from the centre of the cyclones and on either side of the storm track. Most casualties are caused due to coastal inundation by tidal waves, storm surges and torrential rains. The occurrence of tropical cyclone is almost a common natural phenomenon. The Indian Ocean is one of the six major cyclones–prone regions of the world. In India, cyclones from Indian Ocean usually occur between April and May, and also between October and December. The eastern coastline is more prone to cyclones than the western coast. About 80 percent of total cyclones generated in the region hit the eastern coast. Out of approximately six cyclones formed every year, two to three may be severe.

Earthquakes

The Himalayan mountain ranges are considered to be the world's youngest fold mountain ranges. The subterranean Himalayas are geologically very active. In a span of 53 years four earthquakes exceeding magnitude 8 have occurred in this region. The peninsular part of India comprises stable continental crust. Although these regions were considered seismically least active, earthquakes, which occurred in Latur in Maharashtra on September 30, 1993 of magnitude 6.4 on the Richter scale and Gujarat 2001 of magnitude 6.9 on the Richter scale caused substantial loss of lives and damage to infrastructure. India has a large part of its land area liable to wide range of probable maximum seismic intensities where shallow earthquake of magnitudes of 5.0 or more on Richter Scale have been known to occur in the historical past or recorded in the last about 100 years. The Himalayas frontal that are flanked by the Arakan Yoma fold belt in the east and the Chaman fault in the west constitute one of the most seismically active regions in the world.

Landslides

The Himalayas, the Northeast hill ranges and the Western Ghats experience considerable landslide activity of varying intensities. River erosions, seismic movements and heavy rainfalls cause considerable landslide activity. Heavy monsoon rainfall often in association with cyclonic disturbances results in considerable landslide activity on the slopes of the Western Ghats. The Himalayan, the north-east hill and the Western Ghats experience considerable land-slides activities of varying intensities. The rock and debris carried by the rivers like Kosi originating in the Himalayas cause enormous landslide in the valleys. The seismic activity in the Himalayan region also results in considerable landslide movement. The Government of India is collaborating with a wide range of Indian academic institutions on hill research.

Landslides Zonation Mapping is a modern method to identify landslide prone areas and has been in use in India since 1980s.

Avalanches

Avalanches constitute a major hazard in the higher elevations of Himalayas. Parts of the Himalayas receive snowfall round the year and adventure sports are in abundance in such locations. Severe snow avalanches occur in States like Jammu & Kashmir, Himachal Pradesh and Uttrakhand. Losses of life and property have been reported due to avalanches.

Manmade Disasters

The fast pace of growth and expansion in the name of development without comprehensive understanding or preparedness has brought forth a range of issues that seek urgent attention at all levels. In the absence of such measures growing numbers in our population are at a risk of prospective hazards such as air accidents, boat capsizing, building collapse, electric fires, festival related disasters, forest fires, mine flooding, oil spills, rail accidents, road accidents, serial bomb blasts, and fires. The safeguards within existing systems are limited and the risks involved high. Nuclear, Chemical and Biological threats are apparent in the present scenario. Deliberate international terrorism or accidental secondary fallout can be fatal. Creation of specific infrastructure is imperative to avoid a catastrophe in the future. However, rapid and effective response needs intensive research and laboratory support.

Forest Fires

Forests face many hazards but the most common hazard is fire. Forests fires are as old as the forests themselves. They pose a threat not only to the forest wealth but also to the entire regime of fauna and flora seriously disturbing the bio-diversity and the ecology and environment of a region. Forest fires are usually seasonal. They usually start in the dry season and can be prevented by adequate precautions. State Governments are aware of the severe damage caused by fires not only trees but also to forests and ecology of the area. Successive Five Year Plans have provided funds for forest fire fighting.

National Disaster Management System in India

Indeed, concurrent to these occurrences, the government at various levels too, has responded by taking appropriate measures for prevention and mitigation of the effects of disasters. While long term preventive and preparedness measures have been taken up, the unprecedented nature of the disasters has called in for a nationwide response mechanism wherein there is a pre-set assignment of roles and functions to various institutions at central, state and the district level.

The Administrative Response

In the federal set-up of India, the responsibility to formulate the Governments response to a natural calamity is essentially that of the concerned State government. However, the Central Government, with its resources, physical and financial does provide the needed help and assistance to buttress relief efforts in the wake of major natural disasters. The dimensions of the response at the level of Central Government are determined in accordance with the existing policy of financing the relief expenditure and keeping in view the factors like:

(i) the gravity of a natural calamity,

(ii) the scale of the relief operation necessary, and

(iii) the requirements of Central assistance for augmenting the financial resources at the disposal of the State Government.

The Division of Disaster Management of Ministry of Home Affairs, Government of India is the nodal ministry for all matters concerning disasters at the Centre except the drought. The Drought Management is looked after by the Ministry of Agriculture, Government of India. The National Contingency Action Plan (NCAP) facilitates launching of relief and rescue operations without delay. The CAP identifies initiatives required to be taken by various Central Ministries, and Public Departments like in the wake of natural calamities, sets down the procedures and determines the focal points in the administrative machinery.

As pointed out earlier, the central government only supplements the efforts of the State Government. State Governments are autonomous in organizing relief operations in the event of natural disaster and in the long-term preparedness/ rehabilitation measures. The States have Relief Commissioners who are in charge of the relief measures in the wake of natural disasters in their respective states. In the absence of the Relief Commissioner, the Chief Secretary or an Officer nominated by him is overall in-charge of the Relief operations in the concerned State.

The Chief Secretary is the head of the State Administration. The State Headquarters has, in addition, a number of Secretaries who head the various Departments handling specific subjects under the overall supervision and co-ordination of the chief Secretary. At the level of the State Government natural disasters are usually the responsibility of the Revenue Department or the Relief Department.

States are further divided into districts, each headed by a District Collector (also known as District Magistrate or Deputy Commissioner). It is the District Collector who is the focal point at the district level for directing, supervising and monitoring relief measures for disaster and for preparation of district level plans.

Non Governmental Organizations

Emerging trends in managing natural disasters have highlighted the role of Non Governmental Organizations (NGOs) as one of the most effective alternative means of achieving an efficient communication link between the Disaster Management agencies and the affected community. Many different types of NGOs are already working at advocacy level as well as grassroots level; in typical disaster situations they can be of help in preparedness, relief and rescue, rehabilitation and reconstruction and also in monitoring and feedback.

The Community

It has now been revealed that the community as an institution in itself is emerging as an effective player in the entire mechanism of disaster administration. In the event of actual disasters, the community, if well aware of the preventive actions it is required to take can substantially reduce the damage caused by the disaster. Awareness and training of the community is particularly useful in areas that are prone to frequent disasters.

New Strategies for A Safer Future

Preparedness, Mitigation And Prevention

In disaster situations, a quick rescue and relief mission is inevitable; however damage can be considerable minimized if adequate preparedness levels are achieved. Indeed, it has been noticed in the past that as and when attention has been given to adequate preparedness measures, the loss to life and property has considerably reduced. Going along this trend, the disaster management setup in India has, in the recent years, oriented itself towards a strong focus on preventive approaches, mainly through administrative reforms and participatory methods.

Preparedness measures such as training of role players including the community, development of advanced forecasting systems, effective communications, and above all a sound and well networked institutional structure involving the government organizations, academic and research institutions, the armed forces and the non-governmental organizations have greatly contributed to the overall disaster management in the country. This can clearly be seen from the various instances of reduced damages from disasters due to better preparedness and coordinated inter-agency response. Preparedness is the key to breaking the disaster cycle.

The good practices are a result of the heightened awareness and sensitivity towards communities at risk. The approach of reducing community vulnerability for reducing disasters has paid rich dividends. The first step in this direction has been of identification of vulnerable communities. Those communities periodically exposed to natural hazards, and within them those with low levels of coping powers, such as economically weaker sections, are the first focus of preparedness efforts. Marginal sections of rural communities and dwellers of informal settlements and slums in urban areas fall within this class.

Efforts in the direction of integrating disaster prevention into habitat planning processes are one of the most viable disaster prevention means. The National Centre for Disaster Management's work on developing and testing methods for integrating risk reduction using community participation into urban planning is one such initiative. The general direction of current efforts is one of multi-pronged approach of mobilization of community perceptions towards a culture of prevention of natural disasters.

Role of Local Bodies

The Constitution 73rd and 74th Amendments paved the way for a constitutional status for local governments - Urban Local Bodies and Panchayati Raj institutions, to play a greater role in matters of immediate concern. While they have started taking active interest and initiatives in most of the subjects under their jurisdiction, disaster management is a topic that has not captured their attention so far.

Local governance institutions, with their grass-root level contacts with the common people, can make a substantial contribution to the process of spreading awareness and ensuring an active people's participation in disaster mitigation activities. They are the ideal channels for NGOs and other agencies that conduct any disaster management programme, right from relief, recovery and rehabilitation to planning for mitigation and prevention.

Institutional and Policy Framework

1. The institutional and policy mechanisms for carrying out response, relief and rehabilitation have been well-established since Independence. These mechanisms have proved to be robust and effective insofar as response, relief and rehabilitation are concerned.

2. At the national level, the Ministry of Home Affairs is the nodal Ministry for all matters concerning disaster management. The Central Relief Commissioner (CRC) in the Ministry of Home Affairs is the nodal officer to coordinate relief operations for natural disasters. The CRC receives information relating to forecasting/ warning of a natural calamity from India Meteorological Department (IMD) or from Central Water Commission of Ministry of Water Resources on a continuing basis.

Each Ministry/Department/ Organization nominates their nodal officer to the Crisis Management Group chaired by Central Relief Commissioner. The nodal officer is responsible for preparing sectoral Action Plan/Emergency Support Function Plan for managing disasters.

3. National Crisis Management Committee (NCMC): Cabinet Secretary, who is the highest executive officer, heads the NCMC. Secretaries of all the concerned Ministries /Departments as well as organizations are the members of the Committee. The NCMC gives direction to the Crisis Management Group as deemed necessary.

4. Crisis Management Group: The Central Relief Commissioner in the Ministry of Home Affairs is the Chairman of the CMG, consisting of senior officers (called nodal officers) from various concerned Ministries. The CMG's functions are to review

every year contingency plans formulated by various Ministries/ Departments/Organizations in their respective sectors, measures required for dealing with natural disasters coordinate the activities of the Central Ministries and the State Governments in relation to disaster preparedness and relief and to obtain information from the nodal officers on measures relating to above.

5. Control Room (Emergency Operation Room): An Emergency Operations Center (Control Room) exists in the nodal Ministry of Home Affairs, which functions round the clock, to assist the Central Relief Commissioner in the discharge of his duties. The activities of the Control Room include collection and transmission of information concerning natural calamity and relief, keeping close contact with governments of the affected States, interaction with other Central Ministries/ Departments/Organizations in connection with relief, maintaining records containing all relevant information relating to action points and contact points in Central Ministries etc., keeping up-to-date details of all concerned officers at the Central and State levels.

6. Contingency Action Plan: A National Contingency Action Plan (CAP) for dealing with contingencies arising in the wake of natural disasters has been formulated by the Government of India and it had been periodically updated. It facilitates the launching of relief operations without delay. The CAP identifies the initiatives required to be taken by various Central Ministries/Departments in the wake of natural calamities, sets down the procedure and determines the focal points in the administrative machinery.

7. State Relief Manuals: Each State Government has relief manuals/codes which identify that role of each officer in the State for managing the natural disasters. These are reviewed and updated periodically based on the experience of managing the disasters and the need of the State.

8. Funding mechanisms: The policy and the funding mechanism for provision of relief assistance to those affected by natural calamities are clearly laid down. These are reviewed by the Finance Commission appointed by the Government of India every five years. The Finance Commission makes recommendation regarding the division of tax and non-tax revenues between the Central and the State Governments and also regarding policy for provision of relief assistance and their share of expenditure thereon. A Calamity Relief Fund (CRF) has been set up in the State as per the recommendations of the Eleventh Finance Commission (Centre contribute 75 percent where as State 25 percent). State can get assistance through National Calamity Contingency Fund (NCCF).Also through Prime Minister Fund.

9. At the State level, response, relief and rehabilitation are handled by Departments of Relief & Rehabilitation. The State Crisis Management Committee is set up under the Chairmanship of Chief Secretary in the State. All the concerned Departments and organizations of the State and Central Government Departments located in the State are represented in this Committee. This Committee reviews the action taken for response and relief and gives guidelines/ directions as necessary. A control room is established under the Relief Commissioner. The control room is in constant touch with the climate monitoring/forecasting agencies and monitors the action being taken by various agencies in performing their responsibilities.

The district level is the key level for disaster management and relief activities. The Collector/ Dy. Commissioner is the chief administrator in the district. He is the focal point in the preparation of district plans and in directing, supervising and monitoring calamities for relief. A District Level Coordination and Relief Committee is constituted and is headed by the Collector as Chairman with participation of all other related government and non governmental agencies and departments in addition to the elected representatives.

National Disaster Management Act 2005

The Parliament of India has enacted the National Disaster Management Act in November 2005, which brings about a paradigm shift in India's approach to disaster management. The centre of gravity stands visibly shifted to preparedness, prevention and planning from earlier response and relief centric approach. The Act provides for establishment of:

- National Disaster Management Authority (NDMA)
- State Disaster Management Authority (SDMA)
- District Disaster Management Authority (DDMA)

The Act also provides for -

- Constitution of *Disaster Response* Fund and *Disaster Mitigation* Fund at National, State and District levels.
- Establishment of NIDM and NDRF.
- Provides penalties for obstruction, false claims, misappropriation etc.
- It states that there shall be no discrimination on the ground of sex, caste, community, descent or religion in providing compensation and relief. ❑