Disaster Management and India:
Responding Internally and Simultaneously in Neighboring Countries

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Introduction

India is one of the most disaster prone countries of the world. It has had some of the world's most severe droughts, famines, cyclones, earthquakes, chemical disasters, mid-air head-on air collisions, rail accidents, and road accidents. India is also one of the most terrorist prone countries.

India was, until recently, reactive and only responded to disasters and provided relief from calamity. It was a relief driven disaster management system. India also has world's oldest famine relief codes. In recent times, there has been a paradigm shift and India has become or is becoming more proactive with emphasis on disaster prevention, mitigation and preparedness.

India traditionally accepted international help in responding to disasters. However, after the 2004 Indian Ocean tsunami, India refused to accept international response assistance from foreign governments. Not only that, India deployed its defense personnel, medical teams, disaster experts, ships, helicopters, and other type of human, material, and equipment resources to help Sri Lanka, Mauritius, and Indonesia. It may be noted that India itself suffered from the tsunami and was internally responding at the same time. India is also lower income group country, while Indonesia is middle-income group country.

As the tsunami experience illustrates, disasters do not recognize or respect national geographic boundaries. In the increasingly globalized world, more disasters will be spread over many countries and will be regional in nature. India has set up an example of responding internally and simultaneously in neighboring countries for the other countries to follow.

In the academic year 2003-2004, India took a pioneering step of starting disaster management education as part of social sciences in class VIII. In the subsequent academic year 2004-2005 disaster management, was added to class IX. In the following academic years disaster management was progressively added to classes XI and XII. This was done by the Central Board of Secondary Education. Along with disaster management education in schools, India is also implementing community based disaster management program with the help of United Nations Development Program in all-hazard vulnerable districts.

Some of the catastrophic disasters in recent times have led to changes in disaster policy and creation of new organizations. Policy changes include the enactment of Disaster Management Act, 2005 and development of the national disaster management response framework. The National Disaster Management Authority was established to spearhead in creation of culture of disaster resilience. The National Institute of Disaster Management itself

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and along with Disaster Management Cells in the states is providing training opportunities in disaster management.

This chapter covers hazards, vulnerability, history of disasters in India, development of disaster policy, organization of disaster management, challenges and opportunities, and conclusions.

India and its Hazards

India is the largest democracy in the world with 1.2 billion population. It is the second most populous country in the world with about 6 billion people. That means on an average, every fifth person on the earth is an Indian. Seventy-two percent of the Indian population lives in rural India. Nearly 60% of the workforce is engaged in agriculture, and India now ranks second in the world in farm production.

India is integrated, yet highly diversified country. On an average, every about 250 kilometers away there is different culture in terms of food habits, clothing, language, rituals, and other symbolic interactions. India has fourteen constituently recognized languages, but the vernacular or local languages are around 600.

India lies in South Asia, surrounded on three sides by the Arabian Sea, the Indian Ocean, and the Bay of Bengal. To the north there are the Himalayan mountain ranges. The geographical area of India is 3.4 million square kilometers, and the coastline is 7,500 kilometers long. Although India is one of the youngest democratic nations (having obtained independence in 1947) it is a country that has one of the oldest culture and history among the nations of the world.

India was economically the richest country in the world till Mughals invaded for looting. India knew mining and processing of diamonds, and all the great diamonds belonged to India. Mohd. bin Qasim robbed Sind of 630 million dirhams in the 11th century. Mahmud Ghazni raided India 17 times to loot temples and palaces, including the Somnath temple which had offerings of centuries accumulated. A tiny ruling group consisting of the Mughal Emperor and 8,000 or so nobles (of a total population of 100 million) actually collected over half to one-third of the GNP as revenue after imposing their rule over India for over seven centuries (Raychaudhuri and Habib 2007). The per capita GDP in 2005 was only $ 736, and India stood at 128th among the countries in terms of the Human Development Index (UNDP 2007). Poverty is the main root cause of disasters in India.

Simplistically speaking, a hazard is an event which is a possible source of danger. Floods, droughts, cyclones, earthquakes and landslides have been recurrent hazardous phenomena in India. Seventy five percent of the annual rainfall is received during June to September monsoon making almost all the rivers carry heavy discharge during this period. The flood hazard is compounded by the problems of sediment deposition, drainage congestion and synchronization of river floods with sea tides in the coastal plains. The monsoon failure or excess in some part of India creates hazard for the agricultural communities.

In contrast, drought is a temporary reduction in water or moisture availability significantly below the normal or expected amount for a specific period. This condition occurs either due to inadequacy of rainfall, or lack or irrigation facilities, under-exploitation or deficient availability for meeting the normal crop requirements in the context of the agro-climatic conditions prevailing in any particular area. Rajasthan is the most drought prone state of India. Cyclones are other hazards in India that generally strike the East Coast. However, some of the Arabian Sea Cyclones strike the west coast of India, mainly the Gujarat and North Maharashtra

coast. Out of the storms that develop in the Bay of Bengal, more than half approach or cross the east coast in October and November. The Himalayan and sub-Himalayan regions, Kutch and the Andaman and Nicobar Islands are particularly earthquake hazard prone (National Institute of Disaster Management 2009).

Hazards in India are spread throughout the country. In one part of the country there could be heat wave, while at the same time in another part there could be cold spell. In one part of the country there may be floods, while another part there may be drought. Complicating the regional nature of hazards, some parts of habituated India are not easily assessable by road or railways or even waterways.

Apart from natural hazards, India faces intended and unintended terrorist attacks and technological hazards, which have been increasing recently. Technological hazards include the well-known Bhopal chemical disaster. India is also considered to be one of the most terrorist prone countries in the world. Examples include terrorist attack on the Indian parliament and in the Mumbai in Taj Hotel and other places in November 2008. There are 174 terrorist, insurgent, and extremist groups in India; many of the unknown groups are operating across the country, according to the South Asia Terrorism portal.

Vulnerabilities in India

Vulnerability is the susceptibility of being harmed. Scholars have debated on the concepts of hazards and vulnerability. Two of the explanations for these concepts can be found in McEntire (2004 and 2005). A disaster occurs when hazard interacts with vulnerability. For example, if an earthquake (hazard) occurs, a structurally safe building will withstand the shock (resistant), but a hutment (vulnerable) may collapse; creating a disaster for the hutment dwellers.

Vulnerability could be due to the human related factors or natural features. The human related factors that increase vulnerability of India could be intended or unintended, and include apathy, poverty, corruption, illiteracy, land use pattern, technological misuse, and terrorism. Poor land use planning and inconsistent emergency management systems leads to vulnerability to floods, drought, cyclones, earthquake, heat and cold waves, and landslides.

As mentioned, India has a highly diversified range of natural features. Its unique geo-climatic conditions make the country among the most vulnerable to natural disasters in the world. Disasters occur with amazing frequency in India and while the society at large has adapted itself to these regular occurrences, the economic and social costs continue to mount year after year. It is highly vulnerable to floods, drought, cyclones, earthquakes, landslides, volcanoes, etc. Almost all parts of India experience one or more of these events (Gupta 2000).

Many regions in India are highly vulnerable to natural and other disasters on account of geological conditions. About 60% of the total area of the country is vulnerable to seismic damage of buildings in varying degrees. The most vulnerable areas, according to the present seismic zone map of India, are located in the Himalayan and sub-Himalayan regions. Kutch and the Andaman and Nicobar Islands, which are particularly earthquake hazard prone**.** Over 8% Indian area of 40 million hectares is prone to floods, and the average area affected by floods annually is about 8 million hectares. Of the nearly 7,500 kilometers long coastline, approximately 5,700 kilometers is prone to cyclones, and 68% area is susceptible to drought. Disasters are no longer limited to natural catastrophes. Man-made emergencies also cause disasters in terms of fatalities and economic losses.

With urbanization and concentration of population in metropolitan cities, more and more people are becoming vulnerable to locational disasters (Planning Commission 2008, Vol. 1, 207). For instance, a quarter of Indian population lives within 50 km of the coastal line. The population within 1 km of the coast is 1.6 million, and 3.4 million within 2 km of the coast. These people are vulnerable to river flooding, and coastal surges following cyclone or tsunami.

By and large in the lower and middle management in the public sector, there is wide spread apathy, due to which professionalism, effectiveness, efficiency, and equity in public service is lacking. The public perception of politicians and bureaucrat is not good. The government employees, due to lack of rewards for better performance on the one hand, and near impossibility of firing them become apathetic and are not motivated for better performance. Additionally, the affirmative action of reservations for recruitment and promotion (with comparatively lax merit standards) for the scheduled casts and scheduled tribes (the historically disadvantaged and legally defined cast groups) also leads to apathy, although it benefits scheduled casts and scheduled tribes.

The percentage of the population below the official poverty line was 28% in 2004-2005. The absolute number of poor people was 302 million in 2004-2005. Forty six percent of the children in the age group zero to three years suffered from malnutrition in 2005-2006. India has been ranked a lowly 74, among countries of the world on the worldwide Corruption Perceptions Index, prepared by independent international agency Transparency International. Corruption is wide spread and percolates most of the sections of the society. Corruption is not only wide spread, but is also blatant. The literacy rate has steadily gone up to 64.8% in 2001, the number of illiterate persons still exceeds 304 million, making India the country with the highest number of illiterate persons in the world (Planning Commission 2008: Vol. 1). Some parts of India still do not have even electricity and/or telephone connectivity. All of these factors – from illiteracy and poverty to infrastructure inadequacy and apathy, indicate that India is highly vulnerable to disasters.

The History of Disasters in India

Kapur et al. (2005, 2) say India should hang her head in shame. With the Bengal famine, Orissa Super Cyclone, Latur earthquake, Bhopal chemical disaster, Andhra cyclone, Gujarat earthquake, recurring floods, Mumbai 2008 bomb blasts and many other disasters there is no foyer in the world with space large enough to exhibit the collective pain on the face of India. India has ranked at the top or near top in almost all type of disasters with number of deaths and people affected. India does not appear in the world tally of damages in financial terms due to disasters because of poverty and lack of infrastructure. Indian history is dappled with so many disasters that it is difficult to cover in a section of the chapter in a book. Therefore, only a sample of disasters is given in this chapter. Some type of disasters and some of the disasters need to be excluded due to space limitations.

The data in this chapter are sourced from Université catholique de Louvain, Brussels EM-DRT International Disaster Database (2009). EM-DAT contains essential core data on the occurrence and effects of over 16,000 mass disasters in the world from 1900 to present. Among the other source of data are Indian Metrological Department (2009) and Wikipedia.

Historically India has suffered from droughts and famine. The world's top 2^{nd} to 5^{th} droughts, according to number of people killed, occurred in India. And, the world's top 1^{st} to 5^{th}, and 8^{th} drought, according to number of people affected, also occurred in India.

The main **droughts** were:

- Drought of 1900, killing 1.25 million people.
- Drought of 1942, killing 1.5 million people.
- Drought of 1943, in Easter part of Bengal (now part of Bangladesh) killing 1.9 million people.
- Drought of 1965, killing 1.5 million and affecting 100 million people.
- Drought of 1972, affecting 200 million people.
- Drought of June 1982, affecting 100 million people.
- Drought of May 1987, affecting 300 million people.
- Drought of April 2000, affecting 50 million people.
- Drought of July 2002, affecting 310 million people.

The main **famines** were:

- In the year 650, famine throughout India.
- 1022, and 1033, great famines, entire provinces were depopulated.
- 1344-1345, great famine.
- 1396-1407, the Durga Devi famine.
- 1630-1631, there was a famine in Ahmedabad, Gujarat.
- 1630-1632, Deccan famine in India killed 2 million (Note: There was a corresponding famine in northwestern China, eventually causing the Ming dynasty to collapse in 1644).
- 1661, famine, when not a drop of rain fell for two years.
- 1702-1704, 2 million died of famine in Deccan.
- Great Bengal Famine of 1769-1770 covered Bihar, Northern and Central Bengal and estimated to have resulted in the death of about 10 million people, which was one-third of the population.
- The Chalisa famine of 1783-1784 was severe and covered present-day Uttar Pradesh, Delhi region, Rajputana (present day Rajasthan), eastern Punjab region and Kashmir areas. It is estimated that 11 million people died and large areas were depopulated.
- 1788-1792, another 11 million people may have died in the Doji bara famine or Skull famine in Hyderabad State, Southern Maratha country, Gujarat and Marwar.
- 1800-1825, 1 million Indians died of famine.
- The Agra famine was in 1837-1838, killing 800,000 people.
- 1850-1875, 2.5 million died in Orissa famine, mostly in 1866.
- The Rajputana famine of 1868-1870 was blamed for death of 1.5 million people.
- Bihar famine of 1873-1874 was responded by generous relief effort by import of rice from Burma (now Myanmar) avoiding deaths.
- The Great Famine of 1876-1878, also known as South India Famine, spread from Southern India to Central and Northern parts of India. It covered an area of 670,000 square kilometers and affected 58.5 million people. In the aftermath of the famine about 5.5 million people died of starvation.
- Indian famine of 1896-1897 covered almost whole of India and resulted in the death of about 8 million people.

- The Indian famine of 1896-1897 was followed in quick succession by the Indian famine of 1899-1900 estimated to have caused death of 1.25 million to 10 million people.
- India experienced the second Bengal famine of 1943 (first was 1769-70). Scanlon (2005, 15) says, *"The British colonial government imposed wartime censorship on the Bengal famine of 1943 in which over 2,000,000 died, to avoid pressure to divert resources from the war effort."* Some estimates of death put the figure of over 3 million people died.
- In 1965, there was nationwide, except in south, famine killing 1.5 million people.
- In 1966, there was a 'near miss' in Bihar. The USA allocated 900,000 tons of grain to fight the famine.
- A further 'near miss' food crisis occurred due to drought in Maharashtra in 1970-1973.

Some of the major **earthquakes** in India were:

- There was a earthquake in 1618 in Mumbai in which 2,000 people lost lives.
- The loss of lives is estimated to be 300,000 in the Bengal earthquake of 1737 (that time Bangladesh was part of Bengal).
- The January 16, 1819 Kutch earthquake was of 8.0 on the Richer scale (XI intensity on Modified Mercalli scale) razed to the ground chief towns of Tera, Kathara and Mothala.
- An area of 250,000 square miles was affected by January 10, 1869 earthquake of 7.5 Richer scale in Assam.
- In the neighboring Shillong there was wide spread destruction when 8.7 Richer scale and XII Modified Mercalli scale earthquake struck on June 12, 1897.
- Kanga, in Himachal Pradesh had an 8.0 on Richer scale earthquake on April 4, 1905, killing 20,000 people.
- In Bihar, India (near the Nepal border) there was 8.3 Richer scale and XI Modified Mercalli intensity earthquake in 1934 in which 6,000 people were killed.
- In the following year, at Quetta (now part of Pakistan), there was an earthquake of 7.5 and IX Modified Mercalli intensity, killing 25,000 people.
- In the year 1941, in the Andaman Islands there was 8.1 on the Richer scale (X on Modified Mercalli scale) earthquake causing very heavy damage. It is contemplated that survivors passed on the earthquake survival knowledge by oral tradition, which saved many local inhabitants in the 2004 Indian Ocean Tsunami.
- Assam faced yet another huge earthquake of 8.6 Richer / XII Modified Mercalli Scale in 1950 (earlier earthquake in Assam were in 1869, neighboring Shillong in 1897, and 1918) killing 1,500 people.
- On August 21, 1988, Assam, once again, had an earthquake. This time it was 7.2 on Richer scale (IX Modified Mercalli scale intensity) killing people. Twenty million people were affected from this earthquake, which is the 2nd largest number of people affected by any earthquake.
- Anjur in Gujarat had a 7.0 Richer or XII Modified Mercalli intensity earthquake in 1956 killing hundreds of people. Anjur is very near to the epicenter of 2001 Gujarat earthquake (see below).
- The Latur, Marthawada region of the Maharashtra state, had a 6.4 on the Richter Scale (or VIII Modified Mercalli intensity) earthquake struck http://en.wikipedia.org/wiki/Indiaat 03:55 AM on September 30, 1993 affecting primarily Latur and Osmanabad districts of Maharashtra. Approximately 7,928 people died and another 30,000 were injured. A

reconstruction project was launched with the help of the World Bank and the victims were given structurally safe constructed houses.

- The 2001 Gujarat earthquake struck India at about 08:14 AM when India was celebrating its republic day on January 26, 2001. It was 7.6 to 8.1 Richer scale earthquake, which was felt widely in India and Pakistan. In the aftermath of the earthquake, about 25,000 people died in different parts of Gujarat, including Bhuj, Bachao, Anjur, Ahmedabad, and Surat. There were 6.3 million people affected, which is the third largest number of people affected by any earthquake in the world. Immediately after the earthquake there was a total failure of command and control system, but afterwards many innovative changes and institutional mechanisms were initiated. One of the important innovation was the training of people and their involvement with labor along with professional mason in rebuilding their own houses.
- The December 26, 2004 earthquake of magnitude 9.3 on the Richter scale off the coast of Sumatra in the Indonesian archipelago generated tsunami that affected nearly 2,260 kilometers of the mainland coastline of Tamil Nadu, Kerala, Andhra Pradesh and Pondicherry, as well as the Andaman and Nicobar Islands, with tidal waves up to 10 meters high penetrating up to 3 kilometers inland. This tsunami took at least 10,749 lives, and resulted in 5,640 persons missing. It affected more than 2.79 million people across 1,089 villages. It is estimated that 11,827 hectares of crops are damaged, and that about 300,000 fisher folk have lost their livelihoods (Gupta Forthcoming).
- On October 8, 2005 there was an earthquake of 7.6 richer scale intensity near the Muzaffarabad city of Pakistan killing 79,000 people in Pakistan; 1,309 in Kashmir of India; and 4 in Afghanistan. The severe cold weather conditions increased the sufferings of the evacuees sheltered in tents.

Floods recur every year during the monsoon season in India. On an average every year, 1,588 lives are lost, 7.5 million hectares of land is affected, and the damage caused to crops, houses and public utilities is 18 billion Indian Rupees (Rs.) due to the floods. Between 1953 to 2005, a total of 84,207 lives were lost due to the floods in India, with maximum of 11,316 in 1977, and a minimum of 37 in 1953. The only other year that had less than 100 deaths was 1965.

The data regarding each year's flood damage, with totals, averages, and maximum losses from 1953 to 2005 in terms of human lives lost, cattle lost, population affected, monetary value of damage to public utilities, and total monetary damage loss, area affected, crops damaged, and houses damaged could be seen in National Disaster Management Guidelines: Management of Floods (National Disaster Management Authority 2008, 89-90).

On average, 32 million people are affected due to flooding. The maximum people affected were in 70 million in 1978. The total damage due to the floods during the 1953 to 2005 period of half a century was Rs 977 billion, a staggering figure for a poor country. The maximum damage was Rs 88 billion in 2000, and the average damage during 1953 to 2005 was Rs 18 billion. Heavy flood damages have occurred during the monsoon years of 1955, 1971, 1973, 1978, 1980, 1984, 1988, 1989, 1998, 2004, 2005 and 2008.

There were wide spread floods in Gujarat in the beginning of July 2005, taking away lives and disrupting many lives. This was followed by the eighth heaviest ever recorded 24-hour rainfall figure of 994 mm (39.1 inches) which lashed the Mumbai metropolis on July 26, 2005, and intermittently continued for the next day. That day 644 mm (25.4 inches) rain was received

within the 12 hour period between 8 AM and 8 PM. Apart from Mumbai, many parts of Maharashtra state were also flooded. Many people in the cars on the roads of Mumbai could not open their car doors to escape and died. Due to disruption of the transport system people could not reach their homes in the night. At least 1,000 people are feared to have passed away.

In 2008 there were floods in many parts of India. There was diversion of water by Nepal near the India-Nepal border which lead to the flooding of the Koshi (is a Hindi word that literally meaning angry) river in Bihar. The severe floods made it difficult to reach the marooned people due to logistic difficulties. Many people remain trapped in flood waters for days. Approximately 1,500 people died due to Koshi river flooding.

India also has history of suffering from **cyclones.**

- The 1935, tropical cyclone killed 30,000 people.
- In 1942, tropical storm in Orissa and West Bengal killed 40,000 people.
- In 1943, Rajputana tropical storm, 5,000 people were killed.
- In eastern coast of Orissa, 1971 tropical storm killed 9,658.
- In 1977 cyclone, in Tamil Nadu, Andhra Pradesh and Kerala 14,204 people were killed.
- The biggest cyclone disaster is the Orissa super cyclone. It hit the Orissa coast of India on October 29, 1999 accompanied with 155 mph (250 km/h) cyclone winds and water surge from the sea. It caused the deaths of over 10,000 people, and heavy to extreme damage in its path of destruction. Following the cyclone, with the help of the World Bank, Orissa State Disaster Management Authority was formed.

The World's 2nd and 4th to 8th deadliest **epidemics** also occurred in India. These included:

- Bubonic bacterial plague infectious diseases in 1907, killing 1.3 million people.
- Viral infectious diseases in parts of India (which is now Bangladesh) in 1918 killing 393,000 people.
- Bubonic bacterial plague infectious diseases in 1920, killing 2 million people.
- Cholera bacterial infectious diseases in 1920 killing, 500,000 people.
- Bubonic bacterial plague infectious diseases in 1924, killing 300,000 people.
- Viral infectious diseases in 1926, killing 423,000 people.

There have been many **terrorist** attacks in India. The major terrorist attacks are:

- March 12, 1993 - A series of bomb blasts, alleged to be planted by Muslim underworld figures, rock Mumbai killing some 260 people and injuring 713.
- February 14, 1998 - 46 persons were killed and more than 200 injured when 13 blasts ripped through Coimbatore.
- December 24-31, 1999 – Pakistani militants hijack an Indian Airlines flight from Kathmandu to New Delhi with 189 people aboard, kill one passenger and force the release of three jailed Muslim militants in exchange.
- October 1, 2001 - At least 21 people were killed in a suicide bomb explosion and gunfire at the assembly in Kashmir in an attack.

- December 13, 2001 - Heavily armed Islamic militant group opened fire in Parliament complex, killing several people in an unprecedented attack on the seat of power in the world's biggest democracy.
- January 22, 2002 - Four people were killed in an attack on the American Center, Kolkata allegedly by Lashkar-e-Taiba militants.
- May 14, 2002 - More than 30 army men were killed in a terrorist attack on an Army camp near Jammu.
- September 24, 2002 - 35 people were killed when 2 terrorists attacked the Akshardham temple in Gandhinagar, Gujarat.
- December 6, 2002 - Twenty-five people were injured in a bomb blast by members of the Students Islamic Movement of India at McDonalds fast food restaurant at Mumbai Central railway station. The bomb was planted in the air conditioner duct. It was suspected to be a crude bomb.
- January 27, 2003 - At least 30 people were injured when a bomb planted on a bicycle went off throwing splinters of sharp nails outside Vile Parle railway station in Mumbai.
- March 13, 2003 - A powerful bomb blast shattered a bogie of a local train at Mulund railway station in Mumbai during peak hours killing 11 people and injuring more than 65.
- August 23, 2003 - Two bombings at the Gateway of India and the Mumba Devi temple in Mumbai killed 52, injured 167.
- October 29, 2005 - 67 people were killed and 224 injured in serial bombings in major Delhi markets on Diwali (biggest festival, like Christmas) eve. A Pakistani group, Islamic Inquilab Mahaz, claimed responsibility for the attack. The group is linked to Lashkar-e-Taiba.
- March 7, 2006 - At least 20 persons were killed and over 101 injured when two blasts rocked Varanasi. The first blast took place at the Sankat Mochan Hanuman temple, the second at the Varanasi railway station.
- July 11, 2006 - Seven explosions ripped through crowded commuter trains and stations in Mumbai, killing at least 200 people and leaving 700 more bloodied and injured.
- The popular tourist destination and the pink city of Jaipur, capital of Rajasthan state faced seven bomb (left in bags hanging on the bicycles) blasts on the evening of May 13, 2008. These explosions took place within a span of 12 minutes during the peak evening 7 PM time at various locations in the down town busy religious and shopping places. An eighth bomb was found and was defused. There were about 65 dead with 150 people injured.
- The Ahmedabd city, the commercial hub of Gujarat state was bombed by a series of 21 bomb blasts that hit on July 26, 2008, within a span of 70 minutes, killing 56 people and injuring over 200 people. The blasts occurred just a day after the blasts in Bangalore.
- The Mumbai city was attacked by more than ten coordinated shooting and bombing attacks in different parts of the financial capital and largest city. The attacks began on November 26, 2008 and lasted till November 29, 2008, killing at least 173 people and wounding at least 308. Eight of the attacks occurred in the prominent places of South Mumbai, including the Oberoi Trident Hotel, the Taj Mahal Palace & Tower Hotels, and Chhatrapati Shivaji Railway Terminus. Ajmal Amir Kasab, the only attacker who was captured alive, disclosed that the attackers were members of Lashkar-e-Taiba, the Pakistan-based militant organization, considered a terrorist organization by India, the United States, and the United Kingdom, among others. In the wake of the failure of the security system the Home Minister resigned.

- Recently there have been many bomb explosions in Assam and other parts of North-Eastern Indian cities.

There have been many **technological disasters** in India. In 1979 the Koyna dam at Morvi in Gujarat collapsed killing 1,335 people. Many gas leakages from the chemical plants have killed workers as well. Some of the more well-known blasts are discussed below.

On December 4 and 6, 1985 a major leakage of oleum gas took place from Shriram Food and Fertilizers Industry, in the heart of the capital city of Delhi which resulted in the death of several persons. Following this, The Supreme Court of India established the principle of 'strict and absolute liability', making owners of hazardous plants strictly and absolutely liable for damages originating from their activities regardless of their fault.

The Bhopal chemical catastrophe is the world's biggest industrial disaster to date. On the night of December 3, 1984 in the Union Carbide plant at Bhopal, 40 tones of methyl isocyanate (MIC) gas leaked without any warning. The poisonous gas leakage killed 3,828 people immediately, injuring hundreds of thousands, incapacitating most of them for life. In addition, thousands of cattle, nearly poisoning water, polluting surrounding air for miles affected the breathing capacity of the people, and other long lasting disastrous effects (Gupta Forthcoming). According to Amnesty International (2004, 1) 22,000 people have died of their injuries.

Union Carbide plant in Bhopal was the subsidiary of Union Carbide Corporation incorporated in USA. The Government of India and the Union Carbide reached an out of court settlement for $490 million. Compensation claims of 1,029,517 people were registered, out of which 574,304 claims were awarded (Bhopal Gas Tragedy Relief and Rehabilitation Department 2009). However, only a small portion of the compensation has been distributed to the victims due to legal and administrative procedures.

Mr. Warren Anderson, then CEO of Union Carbide, was declared absconder by the Bhopal Court since he did not appear in the court after signing a bail and promised to appear when summoned following his release after arrest. The Indian Government, the US Government, and INTERPOL were not able to find out his whereabouts for nineteen years. Journalists have found him living in Bridgehampton, New York and Florida. Nielsen (2006), a journalist, writes about actually having a face to face encounter with Warren Anderson, 84, at the Vero Beach, Florida home, but Anderson refused to give him an interview.

There have been many **transportation accidents** in India. The deadliest **head-on mid-air collision** of aircrafts in the world, the worst air disaster in India, and the fourth deadliest air disaster in the world, occurred over Charkhi Dadri, near Delhi on November 12, 1996, killing 349 people. The aircrafts involved were a Saudi Arabian Airlines Boeing 747 passenger aircraft carrying 312 passengers and crew and an Ilyushin II-76TD belonging to Kazakhstan Airlines, carrying 37 passengers and crew. The Saudi 747 had just taken off from New Delhi airport while the Il-76 was descending. The Air Traffic Control (ATC) allowed the Saudi Jumbo to climb to 14,000 feet, and simultaneously, the IL-76 was allowed to descend to 15,000 feet. One of them, or both, did not stick to the prescribed height, and did not maintain the required vertical separation. The radar controller cautioned the Kazakh pilot that the Saudi Jumbo was approaching head on, but did not give a direct order on evasive action. Another possible cause of the accident was the misunderstanding due to different languages problem. Both the planes collided at a speed of 500 km per hour and instantly caught fire. There were no survivors (Gupta, Dangayach, and Bhardawaj 2007).

Following the head-on mid-air collision, the Civil Aviation Authority in India made it mandatory for all aircrafts flying in and out of India to be equipped with an Airborne Collision Avoidance System. This was the first time in the world that ACAS was made mandatory.

On August 16, 1991 Indian Airlines flight IC-257 operating from Kolkatta to Imphal with Boeing 737 aircraft crashed in the jungles near Imphal killing all the 69 passengers and the crew. This author was waiting at the Imphal airport for going back to Kolkatta in the same plane. The Indian Airlines announced a flight delay, but accurate information was either not coming or not provided to the public. It was only after many hours of waiting that public information of the plane crash was given. The release of factual and timely information of the accident would have created good public relations.

The Indian Railways is the world's largest railway system under a single management; with about 63,000-km route network that operates over 11,000 trains every day. There have been many **railway accidents which could be considered as disasters**, some of them are:

- September 21, 1993, Seventy-one killed as Kota-Bina passenger train collides with a goods train near Chhabra in Rajasthan.
- August 20, 1995, Three hundred and two killed as Delhi-bound Purushottam Express rams into the stationary Kalindi Express near Firozabad in Uttar Pradesh.
- September 14, 1997, Eight-one killed as five bogies of the Ahmedabad-Howrah Express plunge into a river in Bilaspur district of Madhya Pradesh.
- November 26, 1998, Over 200 people die as Jammu Tawi-Sealdah Express rams into three derailed bogies of Amritsar-bound Frontier Golden Temple Mail near Ludhiana.
- August 2, 1999, Two hundred and eighty-six killed and 359 injured in a collision involving Awadh-Assam Express and Brahmaputra Mail at Gaisal in North Frontier Railway's Katihar division.
- September 10, 2002, One hundred and twenty are killed when the Kolkata-New Delhi Rajdhani Express derails over a bridge in Bihar.
- May 15, 2003, A burst stove caused a devastating fire that swept through a speeding passenger train in Punjab, killing 40 people and injuring more than 50.
- June 22, 2003, In the first major accident on the Konkan Railway, 53 people, including three children, were killed and 25 injured when the engine and three coaches of the Karwar-Mumbai Central Holiday Special train derailed after crossing Vaibhavwadi station in Sindhudurg district in Maharashtra.
- July 11, 2006, A series of bomb attacks strikes commuter trains in Mumbai, India, killing at least 200
- February 13, 2009, Twelve carriages of the Coromandel Express derails soon after the train left Jajpur Road station near the city of Jajpur in the state of Orissa. Ironically, the accident occurred on the day of Railway Budget presentation when the then Railway Minister Lalu Prasad Yadav boasted about increased safety measures at Indian Railways.

Like other disasters, India also has the dubious distinction of having the highest number of **road accident deaths** in the world. According to the Secretary of Road Transport, Government of India, nearly 105,000 people die in road accidents every year in India, and it is the highest in the world (Brahm Dutt 2007). This is despite the fact that India has very low

number of vehicles for a given population compared to many of the countries. There are many reasons. Among them are the non-enforcement of laws, lack of safety conscience, poor road conditions, poorly maintained vehicles, and overcrowding. In addition, emergency medical facilities for the road accidents, particularly outside the cities were lacking.

As can be seen, India has had more than its share of disasters. In the decade from1990-2000, an average of about 4,344 people lost their lives and about 30 million people were affected by disasters every year. The major natural disaster in 2008 in India was floods. There were 1,808 deaths in 2008 in India due to natural disasters, the third largest number of death in any country (after China and Myanmar). The number of people affected due to natural disasters in 2008 were 14 million, second highest after China. "*The loss in terms of private, community and public assets has been astronomical"* (National Disaster Management Division 2004, 3).

Disaster Policy

Indian disaster policy is geared to make a paradigm change from response and calamity relief to disaster prevention, preparation and mitigation. Another significant change is to move from disaster management largely from government to public private partnership, and community disaster management. In this regard, significant changes have been made, but the authoritarian attitude of the government officials is the main stumbling block.

The Great Famine of 1876-1878 lead to constitution of the Famine Commission of 1880 and eventual adoption of **Famine Relief Code**. India probably has the world's oldest disaster relief code which started in1880. This relief code provides details of the relief to be given by the government to the affected people.

The India Disaster Report (Parsuraman and Unikrishnan 2000) provides the nature of disaster response by the government of India. It identifies key issues with respect to the availability of and access to disaster-related information and its quality, the absence of coherent disaster preparedness and response policy, and urgent actions and interventions needed. It shows that significant advances in health and social and economic development have been repeatedly interrupted and reversed by disasters.

India has been following **five year national plans**, although they are not on a rolling basis. The earlier five year plans did not mention disaster management. The Tenth Five-Year Plan 2002-2007 for the first time had a detailed chapter entitled Disaster Management: The Development Perspective. The plan emphasized the fact that development cannot be sustainable without mitigation being built into the development process. Disaster mitigation and prevention were adopted as essential component of the development strategy.

The Eleventh Five Year Plan 2007-2012 (Planning Commission 20008) states,

> "*The development process needs to be sensitive towards disaster prevention, preparedness and mitigation. Disaster management has therefore emerged as a high priority for the country. Going beyond the historical focus on relief and rehabilitation after the event, there is a need to look ahead and plan for disaster preparedness and mitigation in order to ensure that periodic shocks to our development efforts are minimized."*

Disaster management has emerged as a high priority for the country. The Eleventh Five Year Plan aims at consolidating the process by giving impetus to projects and programs that develop and nurture the culture of safety and the integration of disaster prevention and mitigation into the development process. The guidance and direction to achieve this paradigm shift will need to flow from **National Disaster Management Authority (NDMA),** and in the true spirit of the **Disaster Management Act, 2005** to all stakeholders including State Governments and Union Territories, right up to the Panchyat Raj (local administration by five locally elected citizens) Institutions. Communities at large will need to be mobilized to achieve this common objective as they are the first responders (and not the usually thought fire, ambulance, and police)**.** Even the best of isolated efforts will not bear fruit unless they are part of an overall, well-considered approach, and responsibilities of all stakeholders are clearly spelt out and accountability and sustainability factored in.

The 2001 Gujarat Earthquake was huge and had very serious impacts on the government and policy makers, in addition to victims, their families, and general citizenry. The Government of Gujarat for the first time in India enacted the **Gujarat Disaster Management Act, 2003**. Before that, neither at the federal level nor at the state level there was any act to deal with the management of disasters of various kinds in a comprehensive manner. The state and federal governments were largely following the relief code and the rules and regulations, and the government orders issued over the years, which were not consolidated.

Section 31 of the Gujarat Disaster Management Act, 2003 states that,

> *"It shall be the duty of every citizen to assist the Commissioner, the Collector or such other person entrusted with or engaged in disaster management whenever his aid is demanded generally for the purpose of disaster management and particularly for the following purposes, namely :-*
>
> *(a) prevention,*
> *(b) response,*
> *(c) warning,*
> *(d) emergency operation,*
> *(e) evacuation, and*
> *(f) recovery."*

The Commissioner in the act refers to the State Commissioner of Relief. The Commissioner of Relief is the government official who is over all in charge of providing relief to the victims of the disasters. The Collector is the administrative head of a district. It is interesting to note that there is legal duty cast on every citizen to help in disaster management.

The recurrent occurrences of different types of disasters compelled Government of India to establish many different committee and commissions to suggest dealing with the problem. The most recent and the important was the establishment of **High Power Committee on Disaster Management** (HPC) in 1999 for making recommendations on the preparation of Disaster Management plans and suggestions for effective mitigation mechanisms. The High Power Committee gave its recommendations in October 2001 including a draft of the disaster management act, a National Response Plan, move from disaster response to disaster preparedness, and establishment of National Disaster Management Authority. Following one of the HPC recommendations, the disaster management function was transferred from Ministry of Agriculture to Ministry of Home Affairs.

The Government of India has long been thinking of a National Disaster Management Authority. The Gujarat earthquake gave extra impetus for having a national disaster management authority. However, the bureaucracy does take its claims on the time from a decision is taken to the actual action. The Indian Ocean Tsunami of 2004 really gave a jolt for this decision process.

Finally on December 23, 2005 the Disaster Management Act, 2005 was enacted by the Government of India. The Disaster Management Act, 2005 mandated creation of National Disaster Management Authority, with Prime Minister as the Chairman, and State Disaster Management Authorities headed by the respective Chief Ministers, to spearhead and implement a holistic and integrated approach to disaster management in India. The act also provided for creation of National Institution of Disaster Management.

NDMA has come out with the national vision statement of:

> *"To build a safer and disaster resilient India by developing a holistic, pro-active, multi-disaster and technology-driven strategy for disaster management through collective efforts of all Government Agencies and Non-Governmental Organisations."*

NDMA has prepared a **disaster management policy framework**. The themes underpinning this policy are:

- Community-based disaster management, including integration of the policy, plans and execution at the grass root level.
- Capacity development in all related areas.
- Consolidation of past initiatives and best practices.
- Cooperation with agencies at national, regional and international levels.
- Compliance and coordination to generate a multi-sectoral synergy.

The objectives guiding the policy formulation have evolved to include:

- Promoting a culture of prevention and preparedness – by centre-staging disaster management (DM) as an overriding priority at all levels and at all times.
- Encouraging mitigation measures based on state-of-the-art technology and environmental sustainability.
- Mainstreaming DM concerns into the development planning process.
- Putting in place a streamlined institutional techno-legal framework in order to create and preserve the integrity of an enabling regulatory environment and a compliance regime.
- Developing contemporary forecasting and early warning systems backed by responsive and fail-safe communications and Information Technology (IT) support.
- Promoting a productive partnership with the Media, NGOs and the Corporate Sector in the areas of awareness generation and capacity development.
- Ensuring efficient response and relief with a caring humane approach towards the vulnerable sections of the society.
- Making reconstruction an opportunity to build back better and construct disaster-resilient structures and habitats (NDMA 2009).

In recent times the Emergency Management and Research Institute (EMRI) has brought out significant improvements in dealing with emergency medical services. EMRI is a nonprofit professional organization operating in the Public Private Partnership mode. EMRI handles medical, police and disaster emergencies, although the emphasis is on medical help, through the "1-0-8 Emergency service". This is a free service delivered through state-of-art emergency call response centres and has over 1,800 ambulances across Andhra Pradesh, Gujarat, Uttarakhand, Goa, Chennai, Rajasthan, Karnataka, Assam and Meghalaya. With the expansion of fleet and services set to spread across more states, EMRI plan to have more than 10,000 ambulances covering over a billion population by 2010.

India had accepted foreign aid in response and relief after all the disasters. However, immediately after the tsunami hit on December 26, 2004, Dr. Man Mohan Singh, Prime Minister of India announced that India will not accept foreign aid for rescue and relief operations. The government thought that it is capable of dealing with the disaster and has the necessary resources. India steadfastly stood for not accepting charity. Not only that, India deployed its defense personnel, medical teams, disaster experts, ships, helicopters and other type of human, material, and equipment resources to help Sri Lanka, Mauritius, and Indonesia. It may be noted that India itself suffered from the tsunami and was at the same time internally responding to the aftermath of the tsunami. India is lower income group country, while Indonesia is middle-income group country. During a field research visit to Sri Lanka in June 2005, this author and various colleagues traveled over a bridge rebuilt by Indian army that was destroyed by the tsunami. Whomsoever we talked in Sri Lanka, were very appreciative of the help provided by India (Gupta 2005).

In comparison in the aftermath of Katrina, with offers from the four corners of the globe pouring in, Secretary of State Condoleezza Rice has decided "no offer that can help alleviate the suffering of the people in the afflicted area will be refused," State Department spokesman Sean McCormack said (Express India 2005). More than 150 countries and foreign organizations, including some improvised, poor small countries, and even the countries which did not had friendly ties with USA pledged $ 454 million in cash. However, only $126 million from 40 donors was actually received.

It is debatable whether refusing to accept foreign assistance for response and relief is a good thing, as India did after the Tsunami. This author thinks that it is good thing if the country is capable. The Government of India made a good decision by not accepting foreign help for response and relief. The reasons for this being a good decision is evident from the fact that India was not only able to respond internally, but simultaneously and successfully in Sri Lanka, Mauritius, and Indonesia also. This author's filed visits in Sri Lanka, and India found that India responded to tsunami in a better way. The findings were corroborated by other scholars' research including in Thailand. The research findings of all the researchers conclude that Indian response to the tsunami was better compared to Indonesia, Sri Lanka and Thailand; the other three most affected countries. For example, Perera (2006) states, "*The management of the deceased was exceptionally deficient in Sri Lanka following tsunami"*.

The corollary to the question replied above is the question, whether it was bad for USA not to refuse offer of help from foreign countries? This author think accepting foreign assistance for some specific expertise or equipment which the USA was not having would have been appropriate. But to receive $ 126 million from 40 donor countries of the world was not appropriate. For the economy of USA, $ 126 million is insignificant. This is if we consider only

the financial aspects of accepting donations, however, if we consider the political ramifications, the equation totally changes.

As stated above India point blank refused any foreign aid for response and relief after the tsunami. Nevertheless, India welcomed foreign institutional support for rehabilitation, and reconstruction investment. India has reconstruction investment projects with World Bank and the Asian Development Bank.

It may be clarified that the Government of India refused to receive the financial assistance for response and relief from the foreign governments. However, the government did not prevent private organizations or individuals from providing assistance through private channels. In fact, in order to facilitate relief operations, regulations relating to foreign contributions were relaxed up to March 31, 2005, through a Central Government Order dated December 30, 2004 that exempted all associations involved in tsunami relief operations (other than political parties) from Section 6 of the Foreign Contribution (Regulation) Act, 1976 with immediate effect. This Section requires prior formal approval of the Central Government before accepting foreign contributions in cash or kind. Therefore, with this order, agencies receiving foreign funds for the tsunami relief work do not have to approach the Central Government for sanction. The order also permitted voluntary organizations that have already received permission to accept foreign contributions for a particular project to use the same for the tsunami relief work under intimation to the Ministry of Home Affairs.

Following the 2004 tsunami many policy changes were made. The Tamil Nadu state government deployed 12 teams each of about 13 senior officials to the tsunami affected districts with adequate financial delegated authorities to make on the spot decisions. To deal with the unprecedented situation, the state governments issued about 150 orders to facilitate the tsunami response, including financial help to affected people. The Government of India started putting on the website Situation Reports for the public from 10:00 Hrs. on December 26, 2004 (immediately after the tsunami struck the Indian coast).

Four hundred fifteen NGOs came to respond to the tsunami, apart from numerous non-affiliated spontaneous volunteers. South India Federation of Fishermen Society, and Social Need Education for Human Awareness initiated a NGO Coordination and Resource Center (NCRC) with the support of district administration and United Nations Development Program. After the response and relief work, the NCRC also worked for reconstruction, although with less than 50 NGOs.

The Central Government directed all State Chief Secretaries and Relief Commissioners to maintain proper records and ensure transparency in relief operations in order to make the relief process fair and just. In line with the government's policy on the right to information, it was mandated that lists giving details of beneficiaries and the quantity and quality of relief distributed be prepared and made available to local representatives in Panchayats and Municipalities, and displayed in Panchayat and Municipal offices, with a consolidated list being displayed at the Taluka level. These lists were to be made available to the general public at a nominal charge of Rs. 10 ($ 0.25) each.

Six public interest litigations were filed before the Mumbai High Court pertaining to the Mumbai terror attacks of November 26, 2008. Following this, the High Court has appointed a committee headed by Former judge of the Supreme Court, Justice B.N. Srikrishna, to recommend measures to the state government to prevent recurrence of terror incidents (although it may be almost impossible to prevent terrorist incidents in a open society like India, with 1.2 billion population). The committee headed by Justice Srikrishna would consist of top officials

like the state chief secretary, finance secretary, home secretary, director-general of police, representatives of lawyers and solicitors and eminent personalities from different fields.

The Bhopal chemical disaster was the wakeup call for the world. In the aftermath of the Bhopal, the chemical industry, and many countries of the world, including USA and India made number of legal changes for safety. The Government of India amended three key acts that deal with industrial hazards (i.e. the Factories Act, 1948; the Water Act, 1974 and 1977; and the Air Act, 1981). The government also passed a comprehensive new environmental law called the Environmental Protection Act of 1986. The new law vastly improved regulatory coverage of hazardous technologies and substances (Srivastava 1992, 128-129).

Organization of Disaster Management

India has a federal system with Government of India at the federal level. For the administrative purpose, India has been divided into 35 jurisdictions known as states and union territories. The union territories consist of six jurisdictions that are centrally or federally administered. These are Andaman and Nicobar Islands, Lakshadweep, Chandigarh, Panducherry, Dadra and Nagar Haveli, and Daman and Diu. The remaining twenty nine states have their own duly elected state governments.

Disaster management is the responsibility of local administration, under the supervision of the State Government, facilitated by the Government of India. The 35 states and union territories are divided into about 600 districts. Each district is administrated by a Collector and District Magistrate (same person performs both the duties). Although there is a separate judicial system in India, certain judicial powers are given to the administrators, like Collectors. The British government ruling India was mainly concerned with collection of revenue and taxes. Therefore, the British administrator was designated as Collector. After 62 years of independence the name tag, unfortunately still remains.

A Collector of the district is the administrative head for all matters within the district. The Collector is an Indian Administrative Service cadre official. Under the Disaster Management Act, 2005 each district is supposed to have a disaster management plan, district disaster management committee, district EOC, training and drills, and do disaster prevention, preparedness, and mitigation activities.

Each state has a Disaster Management Cell, located generally in the State Administrative Training Institutes. Major funding for the faculties of the Disaster Management Cell comes from the Central Government. Each cell is supposed to carry training in disaster management and prepare plans and documents.

The Building Materials Promotion and Technology Council have prepared a Vulnerability Atlas of India giving details of different types of vulnerabilities of each state and district. On the basis of the Vulnerability Atlas, Ministry of Home Affairs of the Government of India, and UNDP, identified 199 multi-hazard prone districts in the country in different states. UNDP and Government of India launched a comprehensive disaster management program focusing on all multi-hazard prone districts in select States, which are extremely vulnerable to natural hazards such as Gujarat, Orissa, Bihar, Tamil Nadu, West Bengal, Maharashtra, Delhi, Uttar Pradesh, Uttaranchal, Assam, Meghalaya and Sikkim for disaster risk management. In this program, a multi-pronged strategy is adopted for ensuring administrative, institutional, financial, and legal mechanisms for disaster risk management. The first phase of the program was during

2002 to 2007. Lot of good work has been done under this program and now it is in its second phase.

Droughts and famine were recurrent and the administration developed considerable expertise in calamity relief operations. In fact, even today in many states the chief disaster management government official is still called the Relief Commissioner, although the Government of India has suggested the state governments to re-designate them as Secretary, Disaster Management.

As already stated India has probably the world's oldest famine relief code from 1880. That time famine were a recurring occurrence and British government prepared Relief Code giving guidelines how much calamity relief to be provided to each family after a famine. Over the passage of time Indian calamity relief system had lot of experience and it is well developed, and documented in the government records. After India got independence from the British in 1947, India continued with the Relief Commissioner system. At the Government of India level or the federal level there was and still is a Central Relief Commissioner. The Central Relief Commissioner is a second official in hierarchy in the Ministry, below the Secretary, either an Additional secretary or a Joint Secretary. The main job of the Relief Commissioner was to arrange for relief after drought or famine and help the state governments.

At the state level, there is a Relief Commissioner, who is generally a Secretary or Principal Secretary of the relevant department. On the basis of reports received from lower level local land administration, the official would recommend the state government for declaration of drought and for the relief to be granted.

Even before the enactment of the Disaster Management Act, 2005 the National Disaster Management Authority was set up in July 2005 by an executive order with the Prime Minister of India as the Chairperson of NDMA. Gen N. C. Vij, former Chief of Army staff is the Vice Chairperson and ex-officio CEO of the NDMA, with the status of a Cabinet Minister. There are seven other Members of the NDMA with the rank of the State Minister (in India, there are three levels of ministers in descending rank as Minister, State Minister, and Deputy Minister).

The NDMA is responsible and has the authority for laying down the policies, plans, and guidelines to be followed by Ministries and Departments of the Central Government for disaster management. The NDMA is to coordinate the enforcement and implementation of the policies and plans for disaster management and arrange for, and oversee the provision of funds for mitigation measures, preparedness and response.

The NDMA is to frame guidelines for the minimum standards of relief to be provided to persons affected by disaster, and give directions regarding relief in loan repayment or grant fresh loans on such confessional terms as may be deemed appropriate. The NDMA can take such measures for prevention of disaster, of mitigation of its effects, or for preparedness and capacity building for dealing with a threatening disaster situation or disaster.

A multi-disciplinary, multi-skilled, high-tech National Disaster Response Force (NDRF) of eight battalions has been set up for dealing with all types of disasters capable of insertion by air, sea and land. This is a military related response force. All the battalions are to be equipped and trained for all natural disasters including four battalions in combating nuclear, biological and chemical disasters. Each battalion will provide 18 self-contained specialist search and rescue teams of 45 personnel each including engineers, technicians, electricians, dog squads and medical/paramedics. The total strength of each battalion will be approximately 1,158. These NDRF battalions are located at nine different locations in the country based on the vulnerability profile to cut down the response time for their deployment. During the preparedness period/in a

threatening disaster situation, proactive deployment of these forces will be carried out by the NDMA in consultation with state authorities.

The National Disaster Mitigation Resource Center (NDMRC) will be co-located with the NDRF battalions. These will also serve as repositories for NDMRC bricks of relief stores for 25,000 affected people, in each of the nine locations. These will cater to the emergent requirements especially for the first 72 to 96 hours. At Kolkata and Chandigarh, additional bricks of stores for 50,000 people each will be kept for high altitude areas. These stores will supplement the reserves maintained by the respective states/UTs. In addition, these centers will assist in running mock drills and capacity development programs. During disasters, they will act as facilitators to the states/UTs in deployment of central resources and provide much needed additional link to the centre.

The Ministry of Agriculture, Department of Agriculture and Cooperation, in the Government of India, was historically the nodal ministry for disaster relief in the country. One of the senior officials of the Ministry was designated as the Central Relief Commissioner. The Ministry of Agriculture in March 1995 set up a National Centre for Disaster Management (NCDM), which was located at Indian Institute of Public Administration, New Delhi. The NCDM had been functioning as a nodal Centre for the human resource development in the area of disaster management.

The Government of India decided to make the Ministry of Home Affairs as the nodal ministry. The government issued an order on October 16, 2003 upgrading the NCDM and establishing the National Institute of Disaster Management (NIDM). NIDM is a premier national organization working for human resource development at national level in the area of disaster mitigation and management. The NIDM is gearing up the national, state and district level administration to tackle disasters and also in coordinating research projects, training programs and building a database on disasters with case studies. NIDM's vision is to be the leading center of excellence in the field of disaster risk mitigation and management in India and the region.

After the Orissa Super Cyclone of 1999 under the influence of reconstruction donor organizations, led by the World Bank, the Government of Orissa established Orissa State Disaster Management Authority (OSDMA). This was an institutional innovation for speedy reconstruction, disaster management planning, preparedness, training, and related matters, avoiding the bureaucratic red tape.

Immediately after the Gujarat Earthquake of 2001 there was a total failure of command system. However, subsequently the Government of Gujarat acted swiftly and also established Gujarat State Disaster Management Authority (GSDMA) on the models of OSDMA. The GSDMA, used public-private partnership model, and community based disaster management systems. The GSDMA trained affected people in basic masonry, carpentry, and other skills for reconstruction of their own homes.

GSDMA was awarded the UN Sasakawa award 2003 for outstanding work in the field of disaster management and risk reduction. The Sasakawa award is administered by the International Strategy for Disaster Reduction (ISDR), a specialized wing of the United Nations. Gujarat Emergency Reconstruction and Rehabilitation Program implemented by GSDMA has been awarded the prestigious "Green Awards of the World Bank" in 2004. The Green Awards is given by the World Bank for promotion and maintenance of environmental concerns in the implementation of the projects funded by the World Bank. GSDMA also received Gold Award by the Commonwealth Association for Public Administration & Management for the initiatives undertaken in governance.

The Mumbai terror attacks acted as a catalyst for the establishment of the National Investigation Agency (NIA). After the National Investigation Agency Act, 2008 came into force this federal agency was set up on January 01, 2009. Radha Vinod Raju, Special Director General of Police in Jammu and Kashmir, is appointed as Director General of the newly established NIA. The NIA will have concurrent jurisdiction (both federal and state government having jurisdiction) which empowers the Central Government to probe terror attacks in any part of the country, covering offences including challenge to country's sovereignty and integrity, bomb blasts, hijacking of aircraft and ships and attacks on nuclear installations. The agency will probe such incidents which are found to have complex inter-state and international linkages and possible connection with other activities like smuggling of arms and drugs, pushing in and circulation of fake Indian currency and infiltration across the borders.

Challenges and Opportunities

The Bengal famine of 1943 in the undivided India (which includes present day Bangladesh) under the British rule is the world's worst recorded food disaster in which four million people died of starvation. The disaster that time was explained as due to the food shortage. Nobel Economics prize winning Amitya Sen in his best known essay Poverty and Famines: An Essay on Entitlement and Deprivation (Sen 1983) established that famine occurs not from a lack of food, but from inequalities built into mechanisms for distributing food.

Famine was a product both of uneven rainfall and British economic and administrative policies. While food shortage was a contributor to the problem, a more potent factor was the result of hysteria related to World War II which made food supplies a low priority for the British rulers. The hysteria was further exploited by Indian traders who hoarded food in order to sell at higher prices.

After the independence, the challenge of famines was met by the Government of India by taking many measures. The government made many policy changes for increase in agriculture production. Some of these measures were construction of dams, irrigation projects, subsidized fertilizer production and distribution, subsidiary in electricity for agriculture use, and purchase and storage of huge quantities of food grains by the government owned Food Corporation of India. The government policies, scientific research, and the efforts of the *kisan* (agriculture workers) lead to green revolution and India not only became self sufficient, but even started exporting agriculture products.

One of the greatest challenges India is facing in becoming disaster resistant and resilient is corruption. After a through grass root research in ten of the poorest of the poor districts in five states, Sainath (1996) has written *Everybody Loves a Good Drought: Stories from India's Poorest Districts*. Sainath shows how poorest of the poor manage, what sustains them, and the efforts by the politicians and the bureaucracy, often ludicrous, to do something for them. In the process he exposes the corruption. The prevailing statistical methods used by the government to calculate the poverty line was to use certain fixed income based criteria that do not fully reflect all the variables of poverty. Sainath offered clear statistics on unemployment through independent surveys. It enabled policy makers to make informed decisions based on their ability to access this more accurate and reliable data. The opportunity arising from the Sainath writing resulted in the revamping of the Drought Management Programs of Tamil Nadu.

With an increase in the perception towards spreading a culture of prevention in the disaster management scenario, considerable emphasis is being placed on research and

development activities. In India, a number of research institutes are conducting active research in the field of disaster management. The examples are the National Institute of Disaster Management, Tata Institute of Social Sciences, Indian Remote Sensing Organization, Indian Space Research Organization, and Indian Metrological Organization to name a few. Valuable inputs in technical, social, economic as well as management areas of the field are being investigated. Research activities are being coordinated by different ministries depending on the type and level of research. An important role is played by the universities (Gupta 2000).

In the academic year 2003-2004, India took a pioneering step of starting disaster management education as part of social sciences in class VIII. In the subsequent academic year 2004-2005 disaster management, was added to class IX. In the following academic years disaster management was progressively added to classes XI and XII. This was done by the Central Board of Secondary Education in its nearly 8,000 schools spread thorough out India, and also in Nepal, Bangladesh, and some other foreign countries. The disaster management curriculum is included or being included in all 39 other school boards in the country. The students are required not only to learn theoretical lessons, but to do some projects also. In the process it is not only the students who are learning about the disaster management, but their families are also becoming aware of disaster management and preparing for disaster management. In addition, the teachers and their families are also learning about disaster management. It is hoped that disaster management knowledge in this generation of middle and high school students will amount to a revolution in community based disaster management, which is the only proven method of disaster management; and it is hoped that India would be world leader in disaster management.

For the first time since India's independence from the British, ordinary people now have the right to scrutinize performance of public officials and hold them answerable for their actions that they professedly take on behalf of people. Under the Right to Information Act, 2005 ordinary citizens can access records, documents, e-mails, circulars, and any other information held by public authority - including central and state governments, local bodies, and publically funded nongovernmental organizations. This information is to be provided free of cost for those living below the poverty line, and with a nominal fee (mostly Rs 10 or $ 0.25, excluding coping charges) for others.

Dalit (low cast) Communities in the coastal villages exist in clusters either within the village, or in hamlets that are situated just outside the village. The Dalit community is typically engaged in activities subsidiary to the main fishing operations, and is involved in lifting, transporting and sorting fish. Some also earn a livelihood as agricultural labor in fields close to the fishing villages. The Dalits were left without a livelihood after the tsunami as both fishing and agricultural operations came to a standstill. Despite the fact that they have no means of survival except relief material, many Dalit communities were not getting access to the same. They were either not given tokens, or were not allowed to stand in queues, or were simply not given relief material by the Panchayat (aid was typically distributed through the caste panchayats). Even debris near the Dalit settlements was not cleared. The situation was exacerbated by the early closure of relief camps where Dalits got at least some amount of aid. Further, the Dalit hamlets had no access to clean drinking water, nor was there any proper enumeration of loss of belongings or livestock (Citizens Platform for Tsunami Affected 2005).

Any rehabilitation policy must take into account that the Dalit community is an integral part of the coastal economy, and that the tsunami has equally affected their livelihoods, even though they are property-less. Therefore, the need for rehabilitation measures that encompass their needs is vital.

After the tsunami, for relief and rehabilitation fishermen got boats and fishing nets, some families got two boats (although they had one), or mechanized boats (although they had non mechanized boat). However, other people, who were not involved in fishing activity, like agriculture workers, traders, and territory workers, were left out of entitlements. There have been many complaints from the tsunami-affected areas that local elected representatives and local bodies were not being included in the relief and rehabilitation process (Kumar and Kamatchi 2005). Local body representatives are the most conversant with local realities and their active role in any relief and rehabilitation policy is mandatory. Many elected representatives are restricted by the lack of funds and powers, and are in fact not even consulted by either the state or central governments, and thus are unable to proactively participate in relief work.

In the tsunami the Nagapattinam district of Tamil Nadu state had the most fatalities. Seventy five percent (4,592) of total the deaths in the district was in a thin 10 kilometers stretch (450 deaths per square km) in the pilgrim towns of Velankanni (Christian) (Gupta 2005). Facing so many dead bodies suddenly was a great challenge. This is also an opportunity for the scholars to do research and come out with strategies about managing such type of mass fatality incidents.

The greatest challenge India faces in disaster management is the challenge of removal of poverty, illiteracy, apathy, and corruption. Considerable pioneering and innovative advances are being made in disaster management education. Corruption is likely to reduce by use of Right to Information Act, 2005. Local and global competition and professionalism is likely to reduce apathy. But poverty is a herculean task for disaster management. For example, even if a fisherperson receives a warning and understands it properly, he may still take risk and venture in the sea in order to have means to feed his family in the evening.

India's Prime Minister Dr. Manmohan Singh is reported to have said at the International Conference on Development, Freedom and Welfare in New Delhi in December 2008 that developing countries would find their own ways to deal with challenges as developed countries have no monopoly on good ideas. He further said that the global community has a great stake in India's experiment in seeking for its people social, political and economic betterment within the framework of a liberal democracy (Yehoo News 2008).

Conclusion

From the grim realities of the shame of having different type of world’s worst disasters, India has become a glowing example for other countries to follow in not only responding within the country during regional catastrophic disasters (exemplified by 2004 tsunami), but also to respond simultaneously in the neighboring countries.

India has also shown the path to the world for starting disaster management education from middle and high school. This generation of middle and high school students will make probably near revolution in community based disaster management, which is the only proven method of disaster management; and it is hoped that India would be world leader in disaster management. Probably casting legal duty on citizens for providing help during disasters would also make India leading the way.

There is paradigm shift in India from reactive approach of responding and calamity relief after the disaster to proactive approach of disaster prevention, preparedness, and mitigation. The enactment of Disaster Management Act, 2005, establishment of National Disaster Management Authority with the Prime Minister as its Chairperson, and disaster management training by the

National Institute of Disaster Management along with the Disaster Management Cells of the state Administrative Training Institutes will help in India becoming disaster resilient.

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