International Journal on Emerging Technologies **8**(1): 392-397(2017)

ISSN No. (Print) : 0975-8364
ISSN No. (Online) : 2249-3255

Disasters in India: An Overview

Abdullah Tabish Ahmed* and Deepti Sagar**
**Assistant Professor, Department of Architecture, Aligarh Muslim University, Aligarh, (Uttar Pradesh), INDIA*
***Assistant Professor, School of Architecture, BBD University, Lucknow, (Uttar Pradesh), INDIA*

(Corresponding author: Abdullah Tabish Ahmed)
(Received 25 December, 2016 accepted 22 January, 2017)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: India's geo-climatic conditions as well as its high degree of socio-economic vulnerability, makes it one of the most disaster prone country in the world. A disaster is an extreme disruption of the functioning of a society that causes widespread human, material, or environmental losses that exceed the ability of the affected society to cope with its own resources. For example, disasters caused by floods, droughts, tidal waves and earth tremors are, generally considered "natural disasters." Disasters caused by chemical or industrial accidents, environmental pollution, transport accidents and political unrest are classified as "human-made" or "human- induced" disasters since they are the direct result of human action.

The Disaster Management Act, 2005 defines disaster as *"a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering 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 the affected area".*

About 60% of the landmass of India is prone to earthquakes of various intensities; over 40 million hectares is prone to floods; about 8% of the total area is prone to cyclones and 68% of the area is susceptible to drought. [2]

In the decade 1991-2000, an average of about 4344 people lost their lives and about 30 million people were affected by disasters every year. The loss in terms of private, community and public assets has been astronomical. [3]

Research Outcome (indicative)

It is now recognized that it requires involving diverse scientific, engineering, financial and social processes to address the problem of disaster management. But first and foremost is the mapping of disasters hitting India. The research paper will look to give an overview on the types of disasters and the geographical locations affecting India. The paper will look to dwell upon and analyze the paradigm shift in the approach to disaster management in India. The paper will also give a brief insight in the policies of National Disaster Management framework in India.

I. INTRODUCTION

India's geo-climatic conditions as well as its high degree of socio-economic vulnerability, makes it one of the most disaster prone country in the world. A disaster is an extreme disruption of the functioning of a society that causes widespread human, material, or environmental losses that exceed the ability of the affected society to cope with its own resources. Disasters are sometimes classified according to whether they are "natural" disasters, or "human-made" disasters. For example, disasters caused by floods, droughts, tidal waves and earth tremors are generally considered "natural disasters." Disasters caused by chemical or industrial accidents, environmental pollution, transport accidents and political unrest are classified as "human-made" or "human- induced" disasters since they are the direct result of human action.

Definition. Disaster is an event or series of events, which gives rise to casualties and damage or loss of properties, infrastructures, environment, essential services or means of livelihood on such a scale which is beyond the normal capacity of the affected community to cope with. Disaster is also sometimes described as a ***"catastrophic situation in which the normal pattern of life or eco-system has been disrupted and extra-ordinary emergency interventions are required to save and preserve lives and or the environment".***

The Disaster Management Act, 2005 defines disaster as ***"a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering 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 the affected area".***

Disasters not new to Mankind. Disasters are not new to mankind. They have been the constant, though inconvenient, companions of the human beings since time immemorial. Disasters can be natural or human-made. Earthquake, cyclone, hailstorm, cloud-burst, landslide, soil erosion, snow avalanche,

Flood etc. are the examples of natural disasters while fire, epidemics, road, air, rail accidents and leakages of chemicals/ nuclear installations etc. fall under the category of human-made disasters.

Five formats have been developed for capturing the information about

(i) Statistics on disaster at district level,

(ii) Statistics on relief, rehabilitation and reconstruction at district level,

(iii) District wise compilation of statistics on disaster,

(iv) District- wise compilation of statistics on relief, rehabilitation and reconstruction,

(v) Aggregation of damage and relief data at state level.

The High Power Committee on Disaster Management, constituted in 1999, has identified 31 various disasters categorized into five major sub-groups which are given in Box

Box 1.1: List of various Disasters

i.	Water and climate related disasters	a) Floods and drainage management b) Cyclones c) Tornadoes and hurricanes d) Hailstorm e) Cloud burst f) Heat wave and cold wave g) Snow avalanches h) Droughts i) Sea erosion j) Thunder and lightening k) Tsunami
ii.	Geological related disasters	a) Landslides and mudflows b) Earthquakes c) Dam failures/ Dam bursts d) Minor fires
iii.	Chemical, industrial and nuclear related disasters	a) Chemical and industrial disasters b) Nuclear disasters
iv.	Accident related disasters	a) Forest fires b) Urban fires c) Mine flooding d) Oil spills e) Major building collapse f) Serial bomb blasts g) Festival related disasters h) Electrical disasters and fires i) Air, road and rail accidents j) Boat capsizing k) Village fire
v.	Biological related disasters	a) Biological disasters and epidemics b) Pest attacks c) Cattle epidemics d) Food poisoning

Fig. 1. Regional Distributions of Disasters by Type.

(Note: - After 2004, Tsunami has also been included in the list of disasters)

Disasters – Global Scenario. *Disasters* - natural or human-made are common throughout the world. Disasters continue to occur without warning and are perceived to be on an increase in their magnitude, complexity, frequency and economic impact. Hazards pose threats to people and assume serious proportions in the under developed countries with dense population. During the second half of the 20th century, more than 200 worst natural disasters occurred in the different parts of the world and claimed lives of around 1.4 million people. Losses due to natural disasters are 20 times greater (as % of GDP) in the developing countries than in industrialized one. Asia tops the list of casualties due to natural disasters.

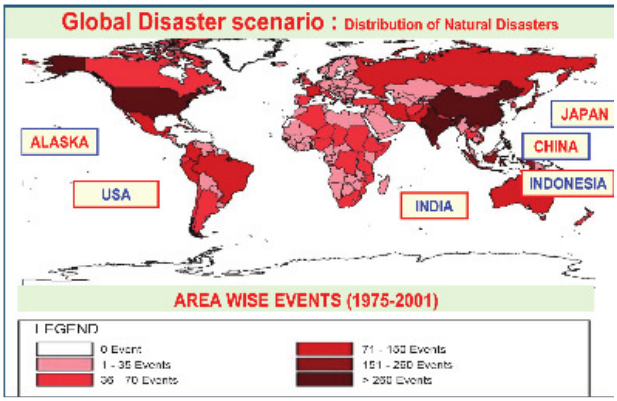


Fig. 2. Global Disaster Scenario: Distribution of Natural Disasters.

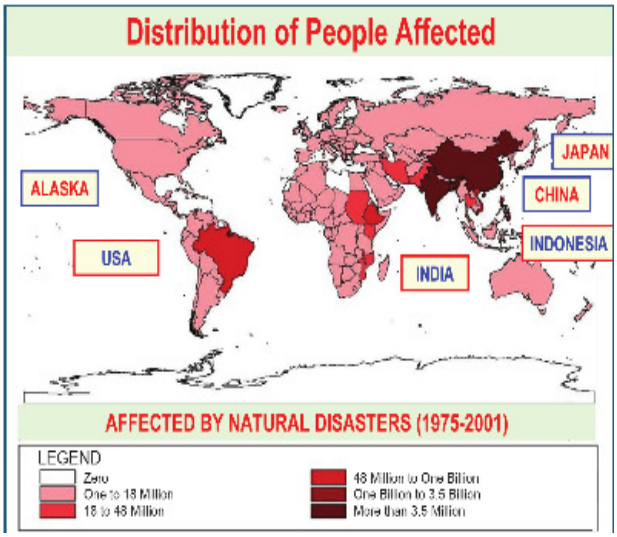


Fig. 3. Distribution of People Affected.

Fig. 2 and 3 shows the vulnerability scenario across the globe in terms of events and India has faced more than 260 events of disasters and over 3.5 million people affected from 1975 -2001. It further analyses that the vulnerability of people and severity of disasters.

Disaster events which have occurred between 1900-2009 may be further categorized based on hydro meteorological, geological and biological reasons.

Table 1: Events of Disasters globally between 1900 – 2009.

Disaster Types	Decades											
	1900 -09	1910 -19	1920 -29	1930 -39	1940 -49	1950 -59	1960 -69	1970 -79	1980 -89	1990 -99	2000 -09	Total
Hydro meteorological	28	72	56	72	120	232	463	776	1498	2034	3529	8880 78.4%
Geological	40	28	33	37	52	60	88	124	232	325	354	1373 12.1%
Biological	5	7	10	3	4	2	37	64	170	361	612	1275 11.3%
Total	73	107	99	112	176	294	388	964	1900	2720	4495	11328

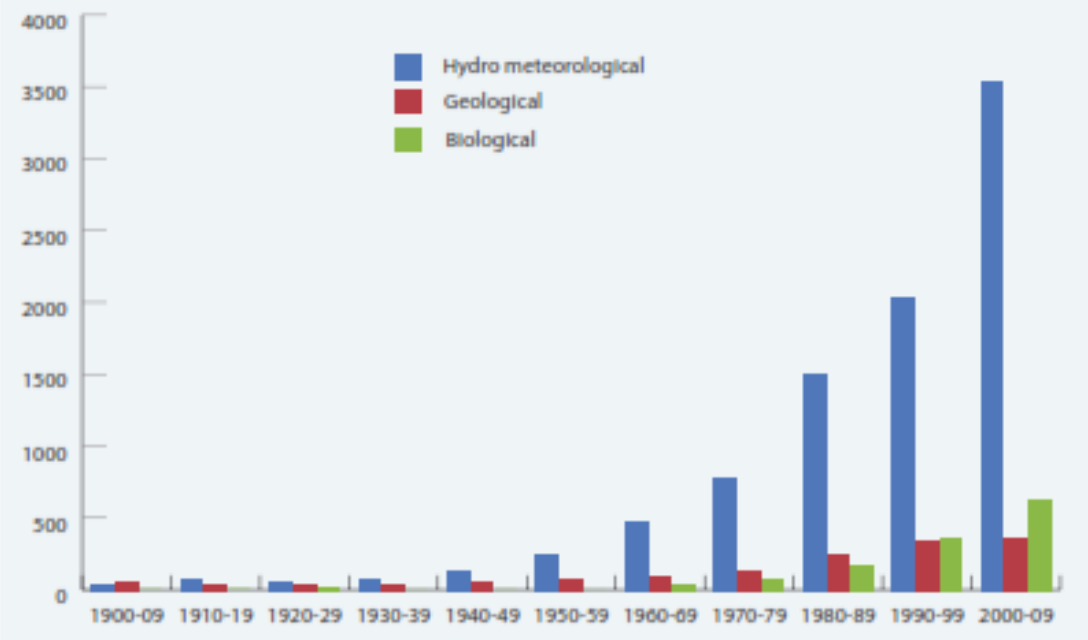


Fig. 4. Event of Disasters globally in between 1900 – 2009.
Source: Centre for Research on Epidemiology of Disasters (CRED).

Vulnerability Profile of India. India has been vulnerable, in varying degrees, to a large number of natural, as well as, human-made disasters on account of its unique geo-climatic and socio-economic conditions. It is highly vulnerable to floods, droughts, cyclones, earthquakes, landslides, avalanches and forest fires. Out of 35 states and union territories in the country, 27 of them are disaster prone. Almost 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12 per cent of land) are prone to floods and river erosion; of the 7,516 km long coastline, close to 5,700 km is prone to cyclones and tsunamis; 68 per cent of the cultivable area is vulnerable to drought and hilly areas are at risk from landslides and avalanches. A multi-hazard map of India may be seen in Fig. 5.

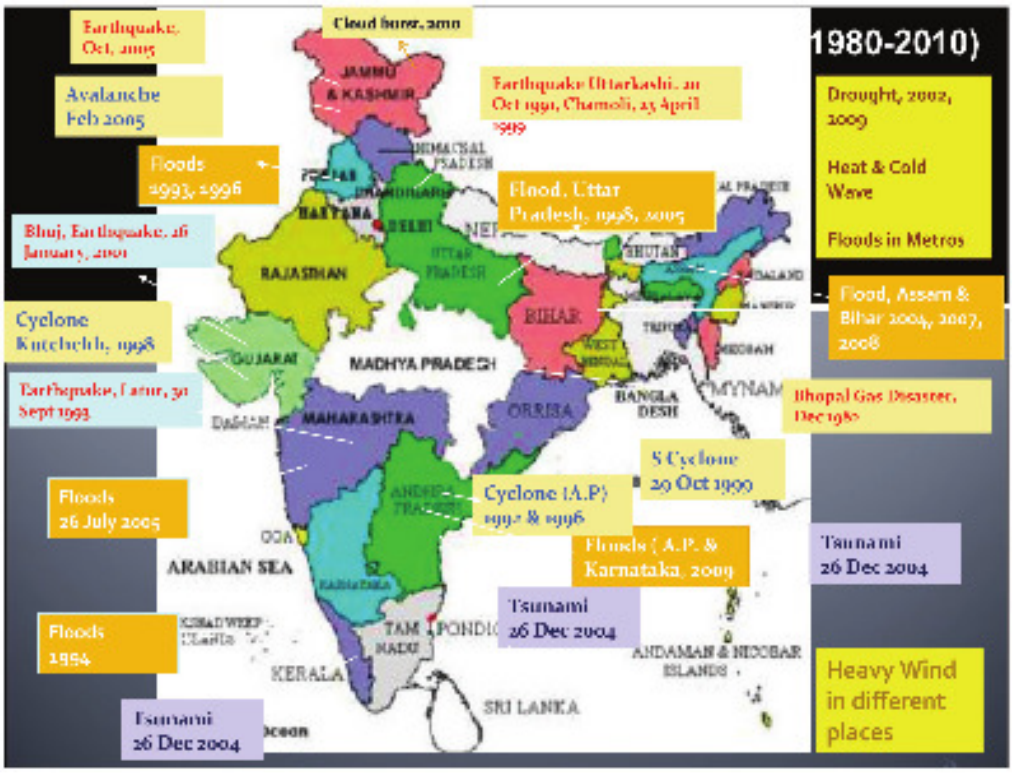


Fig. 5. Major Disasters in India from 1980-2010.

II. CAUSE AND EFFECT OF DISASTERS

India is vulnerable to extreme weather events. Over the decade of the 1990s, both the number and severity of such events have increased. Weather events can be classified as extreme on the basis of various factors such as the impact, the socio-economic losses, environmental degradation and long term damages etc. With more than 70 percent of India's population relying on agriculture directly or indirectly, the impact of extreme weather on human life and other living beings. is critical. In the state of Orissa, 49 years have experienced floods, 30 have had droughts, and 11 faced cyclones. These analyses have yielded a 30-year cyclicity of the Indian monsoons. Droughts were more common in the 1960s. Of the 14 major drought years in the 85-year record, eight occurred in the first 30 year period (1891-1920) whereas there was only one in the second 30 year period (1921-1950).

According to the World Meteorological Organization (WMO), data of major natural disasters/ extremes that occurred around the world during the period 1963-2002, indicates that floods and droughts cause the maximum damage as shown in Table 2.

Table 2: Worldwide view of damage caused by Natural disasters.

Type of natural disaster around the world	Damage caused by natural calamities (%)
Floods	32
Tropical Cyclones	30
Droughts	22
Earthquakes	10
Other disasters	6

Examples of Extreme Weather Events

Primary Climatic Events

- Cold wave, fog, snow storms and avalanches
- Hailstorm, thunderstorm and dust storms
- Extreme temperature
- Tropical cyclone and tidal wave
- Floods, heavy rain
- Droughts (hydrological, meteorological and agricultural etc.)

Secondary Events (May be climate-driven)

- Incidence of epidemics or diseases
- Urban and rural water shortage
- Crop plantation failure or harvest failure
- Malnutrition or under nutrition and hunger
- Landslides, saline water intrusion and mudflows

Droughts. The primary cause of any drought is deficiency of rainfall and in particular, the timing, distribution and intensity of this deficiency in relation to existing reserves. A prolonged period of relatively dry weather leading to drought is a widely recognized climate anomaly. Drought can be devastating as water supplies dry up, crops fail to grow, animals die, and malnutrition and ill health become widespread The environmental effects of drought, including Stalinization of soil and groundwater decline, increased pollution of freshwater ecosystems and regional extinction of animal species.

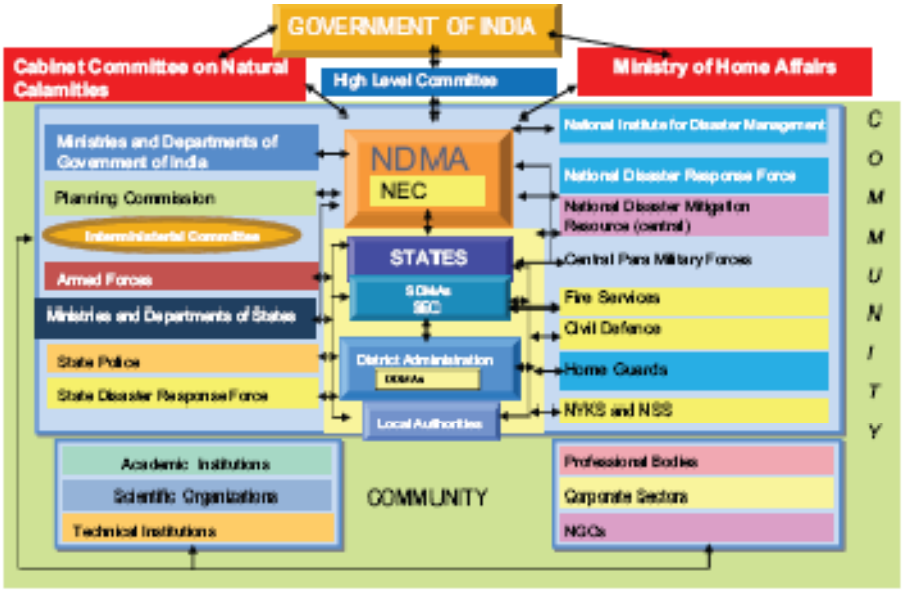
Floods. India is one of the most flood prone countries in the world. The principal reasons for flood lie in the very nature of natural ecological systems in this country, namely, the monsoon, the highly silted river systems and the steep and highly erodible mountains, particularly those of the Himalayan ranges. The average rainfall in India is 1150 mm with significant variation across the country. The annual rainfall along the western coast and Western Ghats, Khasi hills and over most of the Brahmaputra valley amounts to more than 2500 mm. Most of the floods occur during the monsoon period and are usually associated with tropical storms or depressions, active monsoon conditions and break monsoon situations.

Other Reasons

Tropical Cyclones
Heat Wave
Cold Wave and Fog
Thunderstorm, Hailstorm and Dust Storm
Earthquakes
Landslides
Industrial and Chemical Disasters
Tsunami
Stampede, Road-Rail-Air accidents, Epidemics, Mine disasters

III. INSTITUTIONAL FRAMEWORK

Disaster management in India has evolved from an activity-based reactive setup to a proactive institutionalized structure. The beginnings of an institutional structure for disaster management can be traced to the British period following the series of disasters such as famines of 1900, 1905, 1907 & 1943, and the Bihar-Nepal earthquake of 1937. Over the past century, the disaster management in India has undergone substantive changes in its composition, nature and policy.



Organization and Structure of Disaster Management. The Disaster Management Division is headed by Joint Secretary (DM) in MHA, who is assisted by three Directors, Under Secretaries, Section Officers, Technical Officer, Senior Economic Investigator consultants and other supporting staff. The upper echelon of the structure consists of Secretary (Border Management), Home Secretary, Minister of State in charge and the Home Minister.

National Disaster Management Authority (NDMA). The National Disaster Management Authority (NDMA) was initially constituted on May 30, 2005 under the Chairmanship of Prime Minister vide an executive order. Following enactment of the Disaster Management Act, 2005, the NDMA was formally constituted in accordance with Section-3(1) of the Act on 27th September, 2006 with Prime Minister as its Chairperson and nine other members, and one such member to be designated as Vice-Chairperson.

State Disaster Management Authority (SDMA). The DM Act, 2005 provides for constitution of SDMAs and DDMAs in all the states and UTs. As per the information received from the states and UTs, except Gujarat and Daman & Diu, all the rest have constituted SDMAs under the DM Act, 2005. Gujarat has constituted its SDMA under its Gujarat State Disaster Management Act, 2003. Daman & Diu have also established SDMAs prior to enactment of DM Act 2005.

National Disaster Response Force (NDRF). The National Disaster Response Force (NDRF) has been constituted under Section 44 of the DM Act, 2005 by up-gradation/conversion of eight standard battalions of Central Para Military Forces i.e. two battalions each from Border Security Force (BSF), Indo-Tibetan Border Police (ITBP), Central Industrial Security Force (CISF) and Central Reserve Police Force (CRPF) to build them up as a specialist force to respond to disaster or disaster like situations.

The eight battalions of NDRF consist of 144 specialized teams trained in various types of natural, manmade and non-natural disasters. 72 of such teams are designed to cater to the Chemical, Biological, Radiological and Nuclear (CBRN) calamities besides natural calamities. Each NDRF battalion consists of 1149 personnel organized in 18 teams comprising of 45 personnel, who are being equipped and trained for rendering effective response to any threatening disaster situation or disaster, both natural and manmade. All these eight battalions are being trained in natural disasters while four of them are being additionally trained for handling CBRN disasters.

REFERENCES

[1]. Disaster Management in India, Ministry of Home Affairs, Government of India

[2]. Mustafa, Danish; Sara Ahmed, Eva Saroch and Heather M. Bell; "Pinning Down Vulnerability: From Narratives to Numbers," Disasters: The Journal of Disaster Studies, Policy and Management, Wiley-Blackwell, August 2010.

[3]. Winchester, Peter - Power choice vulnerability: Case Study of Disaster Management in South India

[4]. http://www.igbc.in [last accessed on December 29, 2016]