

## Natural Hazards and Disaster Management in India

**Dr. Triveni Dutt\***

*\*Reader, Deptt of Ag. Extension, A.S. College, Lakhaoti, Bulandshahr*

### **Abstract**

*Disasters are as old as human history but the dramatic increase and the damage caused by them in the recent past have become a cause of national and international concern. India is one of the ten worst disaster prone countries of the world. The country is prone to disasters due to number of factors; both natural and human induced, including adverse geoclimatic conditions, topographic features, environmental degradation, population growth, Urbanization, industrialization, non scientific development practices etc. Hazards and the disasters they cause Natural hazards are agents or trigger mechanisms that can come into contact with a vulnerable human condition to result in a disaster. In this paper, we would discuss the following hazards namely earthquake, tsunami, landslide, floods, cyclone and drought etc. that we normally face in our country.*

**Key Words:** *Disaster, Hazards, Management, Avalanches.*

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## **Introduction**

Disaster means 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 (definition according to Disaster Management Act 2005, Government of India). A disaster happens when a hazard impacts on the vulnerable population and causes damage, casualties and disruption. The term disaster owes its origin to the French word “Desastre” which is a combination of two words ‘des’ meaning bad and ‘aster’ meaning star. Thus the term refers to ‘Bad or Evil star’. A disaster can be defined as “A serious disruption in the functioning of the community or a society causing wide spread material, economic, social or environmental losses which exceed the ability of the affected society to cope using its own resources”. Hazard may be defined as “a dangerous condition or event, that threat or have the potential for causing injury to life or damage to property or the environment.” The word ‘hazard’ owes its origin to the word ‘hasard’ in old French and ‘az-zahr’ in Arabic meaning ‘chance’ or ‘luck’. Hazards can be grouped into two broad categories namely natural and manmade.

## **Natural hazards**

Natural Hazards are hazards which are caused because of natural phenomena (hazards with meteorological, geological or even biological origin). Examples of natural hazards are cyclones, tsunamis, earthquake and volcanic eruption which are exclusively of natural origin. Landslides, floods, drought, fires are socio-natural hazards since their causes are both natural and manmade. For example flooding may be caused because of heavy rains, landslide or blocking of drains with human waste. In India there is no different from the global context. The super cyclone of Orissa (1999), the Gujarat earthquake (2001) and the recent Tsunami (2004) community. There are 59 per cent of the land mass is susceptible to seismic hazard; 5 per cent of the total geographical area is prone to floods; 8 per cent of the total landmass is prone to cyclones; 70 per cent of the total cultivable area is vulnerable to drought. Apart from this the hilly regions are vulnerable to valanches/ landslides/ hailstorms/cloudbursts. Apart from the natural hazards, we need to know about the other manmade hazards which are frequent and cause huge damage to life and property. The factors either in original or by accelerating the intensity and frequency

of disasters are responsible for heavy toll of human lives and disrupting the life supporting system in the country.

The basic reason for the high vulnerability of the country to natural disasters is its unique geographical and geological situations. As far as the vulnerability to disaster is concerned, the five distinctive regions of the country i.e. Himalayan region, the alluvial plains, the hilly part of the peninsula, and the coastal zone have their own specific problems. While on one hand the Himalayan region is prone to disasters like earthquakes and landslides, the plain is affected by floods almost every year. The desert part of the country is affected by droughts and famine while the coastal zone susceptible to cyclones and storms. Natural Hazards are natural phenomenon and occur without any intention while man-made disasters are events which, either intentionally or by accident cause severe threats to public health and well-being. Because their occurrence is unpredictable, Manmade disasters pose an especially challenging threat that must be dealt with through vigilance, and proper preparedness and response.

#### **Earthquake-**

Earthquake is one of the most destructive natural hazards. They may occur at any time of the year, day or night, with sudden impact and little warning. They can destroy buildings and infrastructure in seconds, killing or injuring the inhabitants. Earthquakes not only destroy the entire habitation but may de-stabilize the government, economy and social structure of the country. Globally, earthquakes result in a loss of about 50,000 lives every year. Earthquakes over 5.5 magnitude on the Richter scale are progressively damaging to property and human life. However, there are many other factors that influences the damage pattern. India has been divided into five seismic zones according to the maximum intensity of earthquakes expected. Of these, zone V is most active and comprises whole of Northeast India, the northern portion of Bihar, western Uttar Pradesh hills, Himachal Pradesh and Andaman & Nicobar Islands.

Earthquake is the sudden shaking of the earth crust. The impact of an earthquake is sudden and there is hardly any warning, making it impossible to predict.

#### **Tsunami**

The term Tsunami has been derived from a Japanese term Tsu meaning 'harbor' and nami meaning 'waves'. Tsunamis are popularly called tidal waves but they actually have nothing to do with the tides. In the Tamil language it is known as "Aazhi Peralai". Seismicity generated tsunamis are result of abrupt deformation of sea floor resulting vertical displacement of the overlying water. These waves which often affect distant

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shores, originate by rapid displacement of water from the lake or the sea either by seismic activity, landslides, volcanic eruptions or large meteoroid impacts. Whatever the cause may be sea water is displaced with a violent motion and swells up, ultimately surging over land with great destructive power. The effects of a Tsunami can be unnoticeable or even destructive. Contrary to the popular belief, the tsunami is not a single giant wave. It is possible for a tsunami to consist of ten or more waves which is then termed as 'tsunami wave train'. The waves follow each other 5 to 90 minutes apart. Tsunami normally causes flooding as a huge wall of water enters the main land.

### **Cyclone**

Cyclone is a region of low atmospheric pressure surrounded by high atmospheric pressure resulting in swirling atmospheric

Disturbance accompanied by powerful winds blowing in anticlockwise direction in the Northern Hemisphere and in the clockwise direction in the Southern Hemisphere. They occur mainly in the tropical and temperate regions of the world.

There are two distinct cyclone seasons in India: pre-monsoon (May-June) and post-monsoon (October-November). The impact of these cyclones is confined to the coastal districts, the maximum destruction being within 100 km from the centre of the cyclones and on either side of the storm track. Most casualties are caused due to coastal inundation by tidal waves, storm surges and torrential rains. The occurrence of tropical cyclone is almost a common natural phenomenon. However, their characteristics like frequency, intensity and coastal impact vary from region to region. But many of these have been the deadliest after 7 crossing the coast bordering the north bay of Bengal like coastal areas of Andhra Pradesh, Orissa, West Bengal and Bangladesh, mainly because of the serious storm surge problem in this area. The classification of cyclonic disturbances (low pressure areas) is made by the strength of the associated winds.

### **Avalanches**

Avalanches constitute a major hazard in the higher elevations of Himalayas. Parts of the Himalayas receive snowfall round the year and adventure sports are in abundance in such locations. Severe snow avalanches occur in Jammu & Kashmir, Himachal Pradesh and the Hills of Western Uttar Pradesh. The population of about 20,000 in Nubra and Shyok valleys and mountaineers and trekkers face avalanche hazard on 11 account of a steep falls. . Losses of life and property have been reported due to avalanches.

## Major Losses in India due to Disasters ( 2001-2013)

Year	Lives Lost	Cattle Lost	Houses damaged	Cropped area affected (in lakh Ha)
2001-02	834	21,269	3,46,878	18.72
2002-03	898	3,729	4,62,700	21.00
2003-04	1,992	25,393	6,82,209	31.98
2004-05	1,995	12,389	16,03,300	32.53
2005-06	2,698	1,10,997	21,20,012	35.52
2006-07	2,402	4,55,619	19,34,680	70.87
2007-08	3,764	1,19,218	35,27,041	85.13
2008-09	3,405	53,833	16,46,905	35.56
2009-10	1,677	1,28,452	13,59,726	47.13
2010-11	2,310	48,778	13,38,619	46.25
2011-12	1,600	9,126	8,76,168	18.87
2012-13	984	24,360	6,71,761	15.34
2013-14	5,677	1,02,998	12,10,227	63.74

### Floods

Flood is a state of high water level along a river channel or on the coast that leads to inundation of land, which is not usually Submerged. Floods may happen gradually and also may take hours or even happen suddenly without any warning due to breach in the embankment, spill over, heavy rains etc.

Brahmaputra and the Gangetic Basin are the most flood prone areas. The other flood prone areas are the north-west region of west due to over flowing rivers such as the Narmada and Tapti, Central India and the Deccan region with major eastward flowing rivers like Mahanadi, Krishna and Cavery. The average area affected by floods annually is about 8 million hectares while the total area in India liable to floods is 40 million hectares in which Uttar Pradesh has 21.9%, Bihar (12.71%), Assam (9.4%), West Bengal (7.91%), Orissa (4.18%) and other states have 43.9% flood prone area.

### Drought

Drought is either absence or deficiency of rainfall from its normal pattern in a region for an extended period of time leading to general suffering in the society. It is interplay between demand that people place on natural supply of water and natural event that provides the water in a given geographical region. **The state of Kerala which receives more than 3000 mm of rainfall every year is declared drought affected as it is insufficient to have two good crops.** The more the imbalance in

supply the higher is the drought.

Drought is a perennial feature in some states of India. 16% of the country's total area is drought prone and approximately 50 million people are annually affected by droughts. Infact, persistent drought with less than average rainfall over a long period of time gives rise to serious environmental problems.

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.

### **Land Slides**

The term ' landslide' includes all varieties of mass movements of hill slopes and can be defined as the downward and outward movement of slope forming materials composed of rocks, soils, artificial fills or combination of all these materials along surfaces of separation by falling, sliding and flowing, either slowly or quickly from one place to another. It is estimated that 30 percent of the world's landslides occur in the Himalayas. The Himalayan Mountains, which constitute the youngest and most dominating mountain system in the world, are not a single long landmass but comprises a series of seven curvilinear parallel folds running along a grand arc for a total of 3400 kilometers. Due to its unique nature, the Himalayas have a history of landslides that has no comparison with any other mountain range in the world.

Although the landslides are primarily associated with mountainous terrains, these can also occur in areas where an activity such as surface excavations for highways, buildings and open pit mines takes place. They often take place in conjunction with earthquakes, floods and volcanoes. At times, prolonged rainfall causing landslide may block the flow of river for quite some time.

River erosions, seismic movements and heavy rainfalls cause considerable landslide activity. Heavy monsoon rainfall often in association with cyclonic disturbances result in considerable landslide activity on the slopes of the Western Ghats.a The Himalayan, the north-east hill and the westeOrn ghats experience considerable land-slides activities of varying intensities. The rock and debris carried by the rivers like kosi originating in the Himalayas cause enormous landslide in the valleys. The seismic activity in the Himalayan region also results in considerable

landslide movement.

### **National Policy on Disaster Management**

Community involvement and awareness generation, particularly that of the vulnerable segments of population and women has been emphasized as necessary for sustainable disaster risk reduction. This is a critical component of the policy since communities are the first responders to disasters and, therefore, unless they are empowered and made capable of managing disasters, any amount of external support cannot lead to optimal results.

Each Ministry/Department of the Central/State Government will set apart an appropriate quantum of funds under the Plan for specific schemes/projects addressing vulnerability reduction and preparedness. Where there is a shelf of projects, projects addressing mitigation will be given priority. Mitigation measures shall be built into the on-going schemes/programmes each project in a hazard prone area will have mitigation as an essential term of reference. The project report will include a statement as to how the project addresses vulnerability reduction. All lifeline buildings in seismic zones III, IV & V – hospitals, railway stations, airports/airport control towers, fire station buildings, bus stands major administrative centre will need to be evaluated and, if necessary, retro-fitted. The existing relief codes in the States will be revised to develop them into disaster management codes/manuals for institutionalizing the planning process with particular attention to mitigation and preparedness.

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