

DISASTER

What is Disaster?

- Disaster is an undesirable occurrence resulting from forces that are largely outside human control, strikes quickly with little or no warning, which causes or threatens serious disruption of life and property including death and injury to a large number of people, and requires therefore, mobilisation of efforts in excess of that which are normally provided by statutory emergency services”.
- Disasters are also caused by some human activities. There are some activities carried by human beings that are directly responsible for disasters. Bhopal Gas tragedy, Chernobyl nuclear disaster, wars, release of CFCs (Chlorofluorocarbons) and increase of green house gases, environmental pollutions like noise, air, water and soil are some of the disasters which are caused directly by human actions. There are some other activities of human beings that accelerate or intensify disasters indirectly. Landslides and floods due to deforestation, unscientific land use and construction activities in fragile areas are some of the disasters that are the results of indirect human actions
- Natural Hazards are elements of circumstances in the Natural environment that have the potential to cause harm to people or property or both. These may be swift or permanent aspects of the respective environmental settings like currents in the oceans, steep slope and unstable structural features in the Himalayas or extreme climatic conditions in deserts or glaciated areas.
- As compared to natural hazards, natural disasters are relatively sudden and cause large scale, widespread death, loss of property and disturbance to social systems and life over which people have a little or no control. Thus, any event can be classed as disaster when the magnitude of destruction and damage caused by it is very high.
- Almost, 59% of India’s territory is vulnerable to earthquakes.
- Between 1998-2017, earthquakes caused nearly 750 000 deaths globally, more than half of all deaths related to natural disasters.
- More than 125 million people were affected by earthquakes during this time period, meaning they were injured, made homeless, displaced or evacuated during the emergency phase of the disaster.
- Earthquakes may be caused due to tectonic plates movement, volcanic eruption, rock fall, landslides, subsidence, particularly in the mining areas, impounding of dams and reservoirs, etc. have limited area of influence and the scale of damage.
- Earthquakes that are of tectonic origin have proved to be the most devastating and their area of influence is also quite large.
- Some of the most vulnerable states are Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, and the Darjiling and subdivision of West Bengal and all the seven states of the northeast.

Table 7.3 : Effects of Earthquakes

<i>On Ground</i>	<i>On Manmade Structures</i>	<i>On Water</i>
Fissures Settlements	Cracking Slidings	Waves Hydro-Dynamic Pressure
Landslides Liquefaction Earth Pressure Possible Chain-effects	Overturning Buckling Collapse Possible Chain-effects	Tsunami Possible Chain-effects

Types of Disaster:

<i>Atmospheric</i>	<i>Terrestrial</i>	<i>Aquatic</i>	<i>Biological</i>
Blizzards Thunderstorms Lightning Tornadoes Tropical Cyclone Drought Hailstorm Frost, Heat Wave or Loo, Cold Waves, etc.	Earthquakes Volcanic Eruptions Landslides Avalanches Subsidence Soil Erosion	Floods Tidal Waves Ocean Currents Storm Surge Tsunami	Plants and Animals as colonisers (Locusts, etc.). Insects infestation— fungal, bacterial and viral diseases such as bird flu, dengue, etc.

Earthquakes

- Earthquakes are by far the most unpredictable and highly destructive of all natural disasters.

Consequences of Earthquakes

Infrastructure

Human & Natural

- **Change in Course of River:** A similar tragedy unfolded in 1833 when an earthquake shook the region near Kumaon, India. The Kosi River, also known as the “Sorrow of Bihar,” switched from flowing southeast to a course flowing south. The river flooded surrounding lands, displacing over 100,000 people.

Structural Damage:

Human Factor

Loss of Life & Injuries:

- **Structural Damage:** Earthquakes can cause extensive damage to buildings, bridges, roads, and other infrastructure. Poorly constructed buildings are

especially vulnerable, leading to collapses that can result in injuries and fatalities.

- **Loss of Life:** One of the most tragic consequences of earthquakes is the loss of human life. Buildings can collapse, landslides can occur, and tsunamis may be triggered, all of which can lead to fatalities.
- **Injuries:** Even in areas where buildings are not severely damaged, people can still be injured by falling debris, broken glass, or during attempts to evacuate.
- **Displacement:** Earthquakes can force people to evacuate their homes either temporarily or permanently, leading to displacement and the need for emergency shelters.
- **Economic Impact:** The destruction caused by earthquakes can have a significant economic impact. This includes the cost of rebuilding infrastructure, repairing buildings, and the loss of productivity due to disruptions in business activities.
- **Environmental Damage:** Earthquakes can also cause environmental damage, such as landslides, soil liquefaction, and changes in groundwater levels. These can have long-term effects on ecosystems and water sources.
- **Disruption of Services:** Earthquakes can disrupt essential services such as electricity, water supply, communications, and transportation networks, making it challenging for emergency responders to reach affected areas and provide assistance.
- **Risk of Secondary Hazards:** Earthquakes can trigger secondary hazards such as fires, tsunamis (if the earthquake occurs under the ocean), and gas leaks, further exacerbating the impact on affected areas.

India's Vulnerability

- Nearly 60 percent of India's territory is vulnerable to earthquakes.
- Some of the most vulnerable states are Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Darjeeling and subdivision of West Bengal and all the seven states of the northeast.
- National Geophysical Laboratory, Geological Survey of India, Department of Meteorology along with recently formed National Institute of Disaster Management have made an intensive analysis of more than 1200 earthquakes that have occurred in India in the past and based on these, they divided India into following five earthquake zones:
- However, the Bureau of Indian Standards (BIS) which is the official agency for publishing the seismic hazard maps and codes has grouped the country into four seismic zones by unifying the first two zones.

Other Vulnerabilities:

- **Densely populated cities in India:** Twenty-nine Indian cities and towns, including Delhi and capitals of nine states, fall under "severe" to "very severe" seismic zones, according to the National Centre for Seismology (NCS).

- **Population and Infrastructure:** The proportion of Child Population in the age group of 0-6 years to total population is 13.1 percent while the corresponding figure in 2001 was 15.9 percent

Earthquake Mitigation

- Establishing earthquake monitoring centres for regular monitoring and dissemination of information among the people in vulnerable areas. Use of GPS can be of great help in monitoring the movement of tectonic plates.
- Preparing a vulnerability map of the country and dissemination of vulnerability risk information among the people and educating them about the ways and means minimising the adverse impacts of disasters.
- Modifying the house types and building designs in the vulnerable areas and discouraging the construction of high-rise buildings, large industrial establishments and big urban centres in such areas.
- Making it mandatory to adopt earthquake resistant designs and use light materials in major construction activities in the vulnerable areas.

New Updates:

- **India Quake App-** The Ministry of Earth Sciences launched the 'India Quake' app to enable users to receive information about natural hazards on land and water.
- It has been developed by the National Centre for Seismology for the automatic dissemination of earthquake parameters such as location, time and magnitude after the occurrence of an Earthquake and avoid delay of information in the event of earthquake.

Some examples of Earthquakes in India:

- **Latur Earthquake (1993):** The Latur earthquake was a 6.2 magnitude earthquake that struck Maharashtra on September 30, 1993. The earthquake caused significant damage to property and infrastructure in the region and claimed more than 9,000 lives.
- **Bhuj Earthquake (2001):** The Bhuj earthquake was a 7.7 magnitude earthquake that struck Gujarat on January 26, 2001. The earthquake claimed more than 20,000 lives and caused widespread damage to property and infrastructure in the region.
- **Sikkim Earthquake (2011):** The Sikkim earthquake was a 6.9 magnitude earthquake that struck Sikkim on September 18, 2011. The earthquake caused widespread damage to property and infrastructure in the region and claimed more than 100 lives.

Tsunami

- India, like many other countries situated along coastlines, faces the potential risk of tsunamis due to its proximity to tectonic plate boundaries and the presence of underwater earthquake-prone zones.

- The most significant tsunami event in recent history for India was the 2004 Indian Ocean tsunami, triggered by a massive earthquake off the coast of Sumatra, Indonesia.
- On December 26, 2004, a 9.1 magnitude earthquake struck off the west coast of northern Sumatra.
- This earthquake generated a massive tsunami that affected several countries bordering the Indian Ocean, including India. Coastal regions of southern India, particularly the states of Tamil Nadu, Andhra Pradesh, Kerala, and the Andaman and Nicobar Islands, were severely impacted.
- The impact of the 2004 tsunami on India was devastating, resulting in thousands of deaths, widespread destruction of infrastructure, homes, and livelihoods, as well as significant environmental damage.
- It prompted India to enhance its tsunami warning and disaster management systems to better prepare for future events.
- Since then, India has taken several measures to improve its preparedness and response capabilities for tsunamis.
- This includes the establishment of the Indian Tsunami Early Warning Centre (ITEWC) in 2007, which is operated by the Indian National Centre for Ocean Information Services (INCOIS).
- The ITEWC is responsible for monitoring seismic activity and issuing timely warnings to coastal regions in the event of a tsunami threat.
- Additionally, India has conducted various drills and awareness campaigns to educate coastal communities about tsunami risks and evacuation procedures.
- These efforts aim to reduce the potential impact of tsunamis on coastal populations and enhance overall disaster resilience.