

Natural Calamity & Disaster Management

- Disaster is a serious disruption of the functioning of a society involving Human and material loss.
- Disaster is broadly classified into natural and man-Made disasters.

Natural Disasters:**Earthquake:**

- The sudden shaking of the earth at a place for a short spell of time is called an earthquake.
- The duration of the earthquake may be a few seconds to some minutes.
- The point where an Earthquake originates is called its 'focus'.
- The vertical point at the surface from the Focus is called 'epicentre'.
- Seismic Zones Level of Risk Regions.
- **Zone V** Very High Comprises entire north-eastern India, parts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Rann of Kutch in Gujarat, part of North Bihar and Andaman & Nicobar Islands.
- **Zone IV** High covers remaining parts of Jammu and Kashmir and Himachal Pradesh, National Capital Territory (NCT) of Delhi, Sikkim, northern parts of Uttar Pradesh, Bihar and West Bengal, parts of Gujarat and small portions of Maharashtra near the west coast and Rajasthan.
- **Zone III** Moderate Comprises Kerala, Goa, Lakshadweep Islands, remaining Parts of Uttar Pradesh, Gujarat and West Bengal, parts of Punjab, Rajasthan, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Maharashtra, Odisha, Andhra Pradesh, Tamil Nadu and Karnataka.
- **Zone II** Low covers remaining parts of country.

Volcanoes:

- Volcanoes are openings or vents where lava, small rocks and steam erupt onto the earth's surface, Barren Island (Andaman & Nicobar Island) – only Active Volcano in India.

Tsunami:

- Tsunami are waves generated by earthquake, volcanic eruptions and Underwater landslides.

Cyclones:

- A low pressure area which is encircled by high-pressure wind is called a cyclone. Cyclonic Storms.
- A cyclonic storm is a strong wind circulating around a low pressure area in the atmosphere.
- It Rotates in anti-clockwise direction in Northern Hemisphere and clockwise in the Southern Hemisphere.

Tropical cyclones

- They are characterised by Destructive winds, storm surges and exceptional Levels of rainfall, which may cause flooding.
- Wind speed may reach upto 200 km/h and Rainfall may record upto 50 cm/day for several Consecutive days.
- A sudden rise of seawater due to tropical Cyclone is called storm surge.
- It is more common in the regions of shallow coastal water.
- East coastal areas vulnerable to storm surges North Odisha and West Bengal coasts.
- Andhra Pradesh coast between Ongole and Machilipatnam.
- Tamil Nadu coast (among 13 coastal districts, Nagapattinam and Cuddalore districts are frequently affected).
- West coastal areas vulnerable to storm surges the west coast of India is less vulnerable to Storm surges than the east coast.
- Maharashtra coast, north of Harnai and Adjoining south Gujarat coast and the coastal Belt around the Gulf of Cambay.

Floods:

- An overflow of a large amount of Water, beyond its normal limits, especially on the rainfed areas is called a flood.

Landslide:

- The movement of a mass of rocks, Debris, soil etc., downslope is called a Landslide.

Avalanche:

- A large amount of ice, snow and Rock falling quickly down the side of a Mountain is called an Avalanche.

Thunder and lightning:

- Thunder is a series of sudden electrical Discharge resulting from atmospheric Conditions.
- This discharge results in Sudden flashes of light and trembling Sound waves which are commonly known as thunder and lightning.

Man-made disasters:

Fire:

- Massive forest fires may start in hot and Dry weather as a result of lightning, and Human carelessness or from other causal Factors.

Destruction of buildings:

- Demolition of buildings by human Activities.

Accidents in industries:

- Chemical, biological accidents that Occur due to human error. (e.g.) Bhopal Hazardous Wastes.
- The wastes that may or tend to cause Adverse health effects on the ecosystem and Human beings are called hazardous wastes.
- The following are the major hazardous wastes
 - **Radioactive substance:** tools and unused fuel Pipe of nuclear power plants.
 - **Chemicals:** synthetic organics, inorganic Metals, salts, acids and bases, and flammables and explosives.
 - **Medical wastes:** hypodermic needles, Bandages and outdated drugs.
 - **Flammable wastes:** organic solvents, oils, Plasticisers and organic sludges. Gas tragedy Accidents in Transport Violation of road rules, carelessness Cause accidents.

Terrorism:

- The social unrest or differences in Principles leads to terrorism.

Stampede:

- The term stampede is a sudden rush of a crowd of people, usually resulting in Injuries and death from suffocation and Trampling.

Pollution of Air:

- Air is a mixture of several gases.

- The main Gases are nitrogen (78.09%) for forming products such as, fertilisers for plants and for making the Air inert, oxygen (20.95%) for breathing and Carbon dioxide (0.03%) for photosynthesis.
- Some other gases like argon, neon, helium, krypton, Hydrogen, ozone, zenon and methane are also present.
- Besides, water vapour and dust particles make their presence felt in one way or the other.
- Air pollution is the contamination of the Indoor or outdoor air by a range of gases and solids that modify its natural characteristics and Percentage.
- Air pollutants can be categorised into primary and secondary pollutants.
- A primary pollutant is an air pollutant Emitted directly from a source.
- A secondary Pollutant is not directly emitted as such, But forms when other pollutants (primary Pollutants) react in the atmosphere.

Primary Pollutants:

- Oxides of Sulphur
- Oxides of Nitrogen
- Oxides of Carbon
- Particulate Matter
- Other Primary Pollutants

Secondary Pollutants:

- Ground Level Ozone
- Smog

Tsunami and floods:

- A killer Tsunami hit the south east Asian countries on the 26th of December, 2004.
- A massive earthquake with a Magnitude of 9.1 -9.3 in the Richter scale Epicentre in the Indonesian island of Sumatra.
- It triggered one of the biggest Tsunamis the world had ever witnessed.
- The massive waves measuring up to 30 Metres that killed more than 2,00,000 People of Asia.
- In India, over 10,000 People were killed by this disaster.
- Tamil Nadu alone accounted for 1,705 deaths.

- All the coastal districts were affected, Nagapattinam was the worst hit in the State of Tamil Nadu.
- Fishermen, tourists, Morning walkers, children playing in Beach and people living on the coast Were unprepared for the waves.
- So, they Lost their life and the most of the loss of Lives and damage to property was within 500 metres of the shore.
- After that the Indian government set up a Tsunami Early Warning System at **Indian National Centre for Ocean Information Services (INCOIS), Hyderabad in 2007.**

Floods:

- Floods are high stream flows, which Overlap natural or artificial banks of a River or a stream and are markedly higher than the usual flow as well as inundation of low land.

Types of floods:**Flash floods:**

- Such floods that occur Within six hours during heavy rainfall.

River floods:

- Such floods are caused by Precipitation over large catchment Areas or by melting of snow or sometimes Both.

Coastal floods:

- Sometimes floods Are associated with cyclone high tides and tsunami.

Causes of floods:

- Torrential Rainfall.
- Encroachment of rivers bank.
- Excessive rainfall in catchment.
- Inefficient engineering design in the construction of embankments, Dams and canals.

Effects of floods:

- Destruction of drainage system
- Water pollution
- Soil erosion

- Stagnation of water
- Loss of agricultural land and cattle
- Loss of life and spread of contagious Diseases.

Disaster Risk Reduction (DRR):

Disaster Risk Reduction:

- The practice of reducing disaster risks through Systematic efforts to analyze and manage the causal factors of disasters.
- There are Four key approaches to public awareness for disaster risk reduction.
- Campaigns, Participatory learning, informal education, And formal school based interventions.
- Forecasting and Early Warning Weather forecasting, Tsunami early Warning system, cyclonic forecasting and Warning provide necessary information Which help in reducing risks during Disasters.
- School Disaster Management Committee, Village Disaster Management Committee, State and Central government Institutions take mitigation measures Together during disaster.
- Newspaper, Radio, Television and social media bring updated information and give alerts on the vulnerable area, risk, Preparatory measures and relief measures Including medicine.

Disaster Management:

- The systematic process of applying administrative directives, organizations, and operational skills and capacities to implement Strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster is called Disaster Management.
- Disaster Management is necessary or Expedient for:
 - Prevention
 - Mitigation
 - Preparedness
 - Response
 - Recovery
 - Rehabilitation

- Disaster Management Cycle or Disaster cycle the six disaster management phases that have been used in the concept of disaster cycle are as follows

Pre – Disaster Phase:

Prevention and Mitigation:

- Reducing the risk of disasters involves Activities, which either reduce or modify the Scale and intensity of the threat faced or by improving the conditions of elements at risk.
- The use of the term reduction to describe Protective or preventive actions that lessen the scale of impact is therefore preferred.
- Mitigation embraces all measures taken to Reduce both the effects of the hazard itself and the vulnerable conditions to it, in order to reduce the scale of a future disaster.
- In addition to these physical measures, Mitigation should also be aimed at Reducing the physical, economic and social Vulnerability to threats and the underlying Causes for this vulnerability.
- Therefore, Mitigation may incorporate addressing issues Such as land ownership, tenancy rights, wealth Distribution, implementation of earthquake Resistant building codes etc.

Preparedness:

- The process includes various measures that enable governments, communities and Individuals to respond rapidly to disaster Situations to cope with them effectively.
- Preparedness includes for example, the Formulation of viable emergency plans, The development of warning systems, the Maintenance of inventories, public awareness and education and the training of personnel.
- It May also embrace search and rescue measures as well as evacuation plans for areas that may Be “at risk” from a recurring disaster.
- All Preparedness planning needs to be supported by appropriate rules and regulations with clear Allocation of responsibilities and budgetary Provision.

Early Warning:

- This is the process of monitoring the Situation in communities or areas known to be vulnerable to slow onset hazards, and passing the knowledge of the pending hazard to people harmless way.
- To be effective, Warnings must be related to mass education and training of the population who know, what actions they must take, when warned.

The Disaster Impact:

- This refers to the “real-time event of a Hazard occurrence and affecting elements at Risk.
- The duration of the event will depend on the type of threat; ground shaking may only occur in a matter of seconds during an earthquake.
- Whereas flooding may take Place over a longer sustained period.

During Disaster Phase:

Response:

- This refers to the first stage response to any calamity, which include setting up control Rooms, putting the contingency plan in action, Issue warning, action for evacuation, taking People to safer areas, rendering medical aid To the needy etc.,
- Simultaneously rendering Relief to the homeless, food, drinking water, Clothing etc.
- To the needy, restoration of Communication, disbursement of assistance In cash or kind.
- The emergency relief activities undertaken during and immediately following a disaster, which includes immediate relief, Rescue, and the damage needs assessment and Debris clearance.

The Post- Disaster Phase:

Recovery:

- Recovery is used to describe the activities that encompass the three overlapping phases of emergency relief, rehabilitation and Reconstruction.

Rehabilitation:

- Rehabilitation includes the provision of temporary public utilities and Housing as interim measures to assist long-term Recovery.

Reconstruction:

- Reconstruction attempts to return communities with improved pre-Disaster functioning.
- It includes replacement of Buildings; infrastructure and lifeline facilities so that long-term development prospects are Enhanced rather than reproducing the same Conditions, which made an area or population Vulnerable.

Development:

- In an evolving economy, the development process is an ongoing activity.
- Long-term prevention/disaster reduction Measures like construction of embankments against flooding, irrigation facilities as drought proofing measures, increasing plant Cover to reduce the occurrences of landslides, Land use planning, construction of houses, Capable of withstanding the onslaught of heavy Rain/wind speed and shocks of earthquakes are some of the activities that can be taken up as part of the development plan.
- Management measures that are in practice in India.

Hazards essential:

- It is more cost-effective to mitigate the risks from natural disasters than to repair damage after the disaster.
- Hazard mitigation refers to Any action or project that reduces the effects of Future disasters.

Warning System in India:

- Department of Science and Technology (DST) Department of Space (DOS) and CSIR Laboratories have set up early warning system For tsunami and storm surges in the Indian Ocean.

Disaster Management in India:

- **National Disaster Management Authority**, Abbreviated as NDMA, is an agency of the Ministry of Home Affairs whose primary Purpose is to coordinate response to natural or Man-made disasters and for capacity-building in disaster resiliency and crisis response.
- NDMA was established through the Disaster Management Act enacted by the Government of India on 23rd December 2005.

- The **National Disaster Response Force (NDRF)** is a specialized force constituted for the Purpose of specialist response to a threatening Disaster situation or disaster under the Disaster Management Act, 2005.
- **National Institute of Disaster Management (NIDM)** is a premier institute for training and Capacity development programs for managing Natural disasters in India, on a national as well As regional basis.

Disaster Management in Tamil Nadu:

- **Tamil Nadu State Disaster Management Authority (TNSDMA)** is responsible for All measures for mitigation, preparedness, Response, and recovery are undertaken Under the guidance and supervision of the Authority.
- **Tamil Nadu State Disaster Response Force (SDRF)** has been constituted with a Strength of 80 Police Personnel. They have Been trained in disaster management and Rescue operations in consultation with National Disaster Response Force (NDRF).
- **District Disaster Management Authority (DDMA)** is responsible for Disaster Management at district level.
- **State Disaster Management plan**
 - The perspective plan – 2018 -2030 prepared By the Revenue and Disaster Management Department hot line between Indian Meteorological Department and the State Emergency Operation Centre is established and mitigation in the district is done through telephone, fax and IP phones also available which connect the State with District Head Quarters, Taluks and Blocks of the State.
 - Wireless radio network with both high frequency and very high Frequency are also available in the State.

International Cooperation on Disaster Management

United Nations International Strategy for Disaster Reduction (UNISDR)

- In December 1999, the United Nations General Assembly passed Resolution 54/219, which established the UNISDR as the successor of the International Decade for Natural Disaster Reduction Secretariat in 2001.
- It is designated by UNISDR to serve as the focal point for disaster management in the United Nations System and to ensure synergies between disaster reduction

efforts of the United Nations Systems and regional organisations, as well as actions in the socio-economic and humanitarian domains.

- For developing the resilience of communities and nations to disasters employing operation of the HFA, the UNISDR attempts to catalyze, simplify and mobilise the commitment and resources of stakeholders in the ISDR system at the national, regional, and international levels.
- The Global Platform for Disaster Risk Reduction (GFDRR), which takes place every two years, serves as the principal global forum for a continuous and deliberate focus on disaster reduction.

Hyogo Framework of Action (HFA)

- In January 2005, representatives from 168 countries gathered in Kobe, Japan for a global conference on disaster risk reduction.
- Hyogo Framework of Action (HFA) (2005-2015) was adopted to work on a global level for sustainable reduction of disaster related losses of lives and the social, economic and environmental assets of communities and countries.
- The framework set three strategic goals given as under:
 - More effectual assimilation of disaster risk reduction into planning and programming at all levels, sustainable development policies, having a special emphasis on disaster prevention, mitigation, preparedness and reduction in vulnerability.
 - At every community level, institutions, capacities, and mechanisms that can systematically contribute to increasing disaster resilience are being developed and reinforced.
 - The systematic integration of risk reduction approaches into the design and application of emergency readiness, response and recovery packages in the reconstruction of the affected communities.
- Under the HFA the following priority areas have been identified for the countries to concentrate in their efforts for making the countries disaster resilient.
- Assuring that disaster risk reduction is a local and national priority with a strong institutional foundation for implementation.
- Improve early warning by recognising, assessing, and monitoring disaster risks.

- Build a culture of safety and resilience at all levels by utilising knowledge, innovation, and education.
- Minimize the underlying risk factors.
- Reinforce disaster preparedness for effective response at all levels.
- India is one of the participants, and it collaborates closely with the UN-ISDR to implement the HFA for DRR Priority Areas.

Sendai Framework for Disaster Risk Reduction 2015-2030

- Sendai Framework for Disaster Risk Reduction of 2015-2030 (Sendai Framework) was the first major agreement after-2015 development agenda and provides the Member States with concrete actions to protect development gains from the risk of disaster.
- The Third UN World Conference on Disaster Risk Reduction in 2015, the UN General Assembly approved it (WCDRR).
- It aims to reduce disaster risk and harm to lives, livelihoods, and health, as well as to people's, businesses', communities', and countries' economic, physical, social, cultural, and environmental assets, over the next 15 years.
- Hyogo Framework was succeeded by Sendai Framework.
- The Sendai Framework lays out seven global goals to steer and measure progress. The following are the seven global goals:
 - Greatly reduce global disaster mortality by 2030, aiming to lower the average per 100,000 worldwide mortality rate in the decade of 2020-2030 compared to the period 2005-2015.
 - Reduce the number of individuals impacted globally by 2030, to lower the average global figure per 100,000 in the decade 2020- 2030 compared to the period 2005-2015.
 - By 2030, reduce direct economic losses in terms of world gross domestic product (GDP).
 - Substantively reduce the damage due to disaster to critical infrastructure, disturbance of elementary services, health and educational facilities.
 - By 2020, the number of countries having national and local disaster risk reduction policies will have increased significantly.

- Significantly improve international cooperation to emerging countries through satisfactory and sustainable support to complement their national actions for implementation of the present Framework by 2030.
- By 2030, significantly improve the readiness of multi-hazard early warning systems and people's access to disaster risk information and assessments.

