

## Hazards: - (Disambiguation )

(Removing uncertainty, certainty of Threat )

“The Event that threaten or have the potential for causing injury to life or damage to Property or the Environment to an Individual, Family or as a whole to the Society”

### Natural Calamity & Hazard

- A massive earthquake in an unpopulated area, is a natural phenomenon, *not a hazard*
- *But* when this interact with the man made environment or fragile areas it causes Hazard that may spread damage.

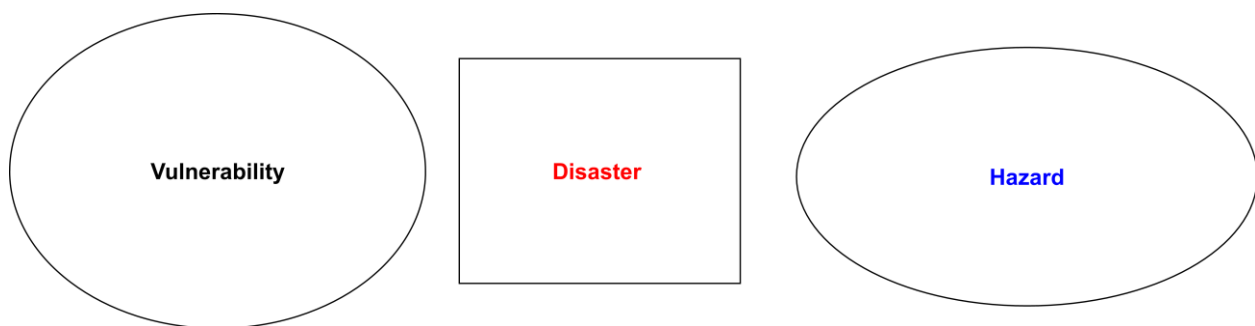
1. Natural Hazards (hazards with meteorological, geological or even biological origin)

2. Unnatural Hazards (hazards with human-caused or technological origin)

## VULNERABILITY

*“The extent to which a community, structure, service, or geographic area is likely to be damaged or disrupted by the impact of particular hazard, on account of their nature, construction and proximity to hazardous terrain or a disaster prone area.”*

### Hazard- Disaster – Vulnerability



### Trigger event

- Earthquake, Tsunamis, Floods, Cyclones
- Volcanic eruption, Drought, Landslide, War
- Technological accident, Environmental pollution
- Socio- Economic -----

### Hazard, Vulnerability & Disaster

- Without vulnerability or hazard there is no disaster.
- A disaster occurs when hazards and vulnerability meet / coincides

#### Disasters different from Accidents.

- The loss of a sole income earner in a car crash may be a disaster to a family, but only an accident to the community.

## IMPACTS OF DISASTER

- Deaths since 1950s increased 50 per cent each decade.
- Natural disasters increased from 1993 to 2002, with 2,654 disasters.
- ✓ Floods and windstorms : 70%

- ✓ Droughts, landslides, forest fires and heat and cold waves : 30 %.

#### Causes of Natural Hazards -

- Extreme climatologically hazards- Drought Storm, Cyclone, Typhoon etc.
- Hydrological hazards- Tsunami, Flood etc,
- Meteorological hazards- Cyclone; Extreme weather events
- Geological hazards- Earthquake, landslides, mudslides, volcanoes etc.

#### Moral-Eco Hazard

- From almost the last decade or so, the news of suicides by debt-ridden farmers has been constantly hogging the headlines of Indian newspapers. These suicides have been taking place largely in relatively more advanced States like Punjab, Maharashtra, Andhra Pradesh, Karnataka etc. The relatively backward States like Orissa, Bihar, UP, Jharkhand, Chhattisgarh etc. have been largely immune from this epidemic.
- Economic hogging / recession etc.

#### RISK

- Risk is a measure of the expected losses (deaths, injuries, property, economic activity etc.) due to a hazard of a particular magnitude occurring in a given area over a specific time period.
- A hazard is a situation that poses a level of threat to Life, Health, Property, or Environment.
- Most hazards are dormant or potential with only a theoretical risk of harm; however, once a hazard becomes 'active', it can create an emergency situation.
- A hazard does not exist when it is happening.
- A hazardous situation that has come to pass is called an incident.
- Hazard and Vulnerability interact together to create Risk.

#### Disaster Risk

Risk = Likelihood of Occurrence x Seriousness if incident occurred.

A low score on likelihood of occurrence may mean hazard is dormant, whereas a high score would indicate that it may be an Active hazard.

#### Risk assessment

- Risk has been defined as the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.
- Risk = Hazards x Vulnerability.



### Measurement of Economic Vulnerability

Disaster Risk Indicator (Index) :

1. Disaster Deficit Index ( DDI)
2. Local Disaster Index ( LDI)
3. Prevalent Vulnerable Index ( PVI)
4. Risk Management Index (RMI)

### EARTHQUAKES-ENVNTAL HAZARD

2. Worldwide =  $10^6$  EQ every yr
3. 2 shocks per minute.
4. About 50 EQ/ day to be felt locally.
5. Every few days an EQ, may cause damage.
6. Most of the day to day EQ produce distant ground motion-too weak to be felt & detected. But c'd be recorded by modern seismograph anywhere on the globe. (Bath, M.1979 ,Intr to Seismology, pp-428).

Hazards are the dangerous conditions or some extreme events either natural or man- induced which exceeds the tolerable magnitude and have the potential for causing injury to life and property. The extent of damage depends on frequency and magnitude of the event. Hazards are the natural processes and disasters are the outcomes of those processes. The intensity, magnitude and dimension and quantum of damage done by any hazard make it disaster.

The major hazards causing disaster in and around the world are namely -

- a) Structural hazards ---- Volcanoes and Earthquakes
- b) Fluvial hazards---River Flood, soil erosion by water , river course migration, sheet flood erosion, river sedimentation, rill and gully erosion.

- c) Coastal hazards ----- Sea flood tsunami, cliff erosion, beach destruction, slope instability etc.
- d) Other hazards ----- Mass movement, desertification, deflation, weathering, denudation process etc.

Disaster is a sudden, calamitous event bringing great damage, loss, destruction and devastation to life and property. WHO defines Disaster as "any occurrence, that causes damage, ecological disruption, loss of human life, deterioration of health and health services, on a scale sufficient to warrant an extraordinary response from outside the affected community or area" The damage caused by disasters is immeasurable and varies with the geographical location, climate and the type of the earth surface/degree of vulnerability. This influences the mental, socio-economic, political and cultural state of the affected area. Generally, disaster has the following effects in the concerned areas:

1. It completely disrupts the normal day to day life.
2. It negatively influences the emergency systems.
3. Normal needs and processes like flood, shelter, health, etc. are affected and deteriorate depending on the intensity and severity of the disaster.

It may also be termed as "a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected society to cope using its own resources"

Thus, a disaster may have the following main features:

- ▶ Unpredictability
- ▶ Unfamiliarity
- ▶ Speed
- ▶ Urgency
- ▶ Uncertainty
- ▶ Threat

Disaster Management And Mitigation Strategies :

Disaster Management is the discipline of dealing with and avoiding risks. It is a discipline that involves preparing for disaster before it occurs, disaster response (e.g. emergency evacuation, quarantine, mass decontamination, etc.), as well as supporting, and rebuilding society after natural or human-made disasters have occurred. In general, any disaster management is the continuous process by which all individuals, groups, and communities manage hazards in an effort to avoid or ameliorate the impact of disasters resulting from the hazard. Mitigation efforts attempt to prevent hazards from developing into disasters altogether, or to reduce the effects of disasters when they occur. The mitigation phase differs from the other phases because it focuses on long-term measures for reducing or eliminating risk. The implementation of mitigation strategies can be considered as part of the recovery process if applied after a disaster occurs.

## Disaster Preparedness :

Disasters occur rapidly, instantaneously and indiscriminately, and wipe out years of development in a matter of hours. What do we do then? Repeated experiences have shown that the people, the community, the society, the government can reduce the risk by preparedness. But it is not enough. Preparedness is only a part of the broader risk reduction agenda. And reducing the risk posed by disasters is not an optional extra – it is central to the very success of development itself. Disasters happen anytime and anywhere. And when disaster strikes, you may not have much time to respond. An earthquake, flood, tornado, winter storm, highway spill or hazardous material or any other disaster could cut water, electricity, and telephones-for days, require evacuation or confine your family at home for days. After a disaster, local officials and relief workers will be on the scene, but they cannot reach everyone immediately. You could get help in hours, or it may take days. So we should be aware and prepared to cope with the emergency until help arrives.

### a) Flood:

Flood refers to any high stream flow which overtops natural or artificial banks of a stream, as opined by Rostvedt et al in 1968. If this geomorphic event create an unexpected to human life and property, it becomes hazard (Smith, 1996). The hazardous and disastrous activity of flood continue to occur due to the combination of natural and anthropogenic factors such as high potential monsoon rainfall, weak geologic formation, active seismicity, accelerated rate of erosion, rapid channel aggradations, massive deforestation, storm surge along coast, tsunami, melting snow, dam burst, intense land use pressure and high population growth.

#### -- Structural

- \* Reservoirs to be released in a regulated after the peak flood flows passes.
- \* Improvement of flow conditions in the channel and anti-erosion measures.
- \* Prevention of over bank spilling by construction of embankment & flood walls.
- \* Improved drainage network.

#### -- Non-Structural

- \* Mapping of flood prone areas. \* Flood forecasting & warning services.
- \* Disaster relief, flood fighting & public health measures, flood shelters.
- \* Flood insurance.
- \* Use of flood plain for other purpose instead of house construction.

### *Key points to understand this hazard*

- Concept of flood and flood plain.
- Flood plain morphology (Channel, Char, back swamp deposit, OX-bow lack, beels, natural levees, palaeo channels, denudational hills).
- Flood frequency analysis.

- Flood hazard management measures (Structural & Non-structural)
- Nature of flood damages (Area, Crop, Population, House, Cattle affected & Loss of Human lives.

b) Earthquake : An earthquake is a series of underground shock waves and movements on the earth surface caused by natural processes within the earth's crust. The main factors contributing to the vulnerability of human population to this Geomorphic hazards are namely--

- Location of settlement in earthquake prone area.
- Dense collection of weak buildings with high occupancy.
- Non-engineered buildings.

The earth's crust consists of six major plates and 20 minor plates. The Indian subcontinent lies upon the Indian plate. This plate is moving in a north-north-easterly direction at about 5 cms. per year & in doing so, collides with the Eurasian plate. This collision is causing deformation and instability in the Brahmaputra basin area and many earthquakes are generated in this process from the Himalayas to Arakan Yoma. As per record available, about 455 earthquake of magnitude higher than 5 Richter scale were recorded on the Brahmaputra valley region in between 1920-1980. The magnitude, intensity of earthquake waves depend to a great extent upon the distance of the epicenter of the earthquake from the location.

#### *Main mitigation strategies*

- Designed and engineered building structure to withstand shaking
- Earthquake drills/training and public awareness programme.

#### *key points to understand this hazard*

- Interior structure of the earth (Layers of earth crust and seismic waves)
- Earthquake waves, center, epicenter, scale to measure.
- Concept of plate tectonic (Sea-floor spreading, plate motion causing earthquake)
- Effects of seismicity on landform processes acting on them (Rejuvenation, inversion of relief, fault and fold structure, changes in process activity)