

UNIT IV

DISASTER RISK MANAGEMENT IN INDIA

4.1 Hazard and vulnerability profile of India

The Key natural disasters in India include floods, droughts, cyclones, earthquakes, landslides and avalanches that have resulted in loss of lives and livelihoods.

According to a Planning Commission report, the key vulnerabilities of India include the following :

- Coastal States, particularly in the East Coast and Gujarat on west coast, are vulnerable to cyclones.
- 4 crore hectare land mass is vulnerable to floods and river erosion.
- 68 per cent of net sown area is vulnerable to drought.
- 55 per cent of total area is in Seismic Zones III-V and vulnerable to earthquakes of moderate to high density.
- Sub-Himalayan/ Western Ghat are vulnerable to landslides.
- Vulnerability to disasters or emergencies of Chemical, Biological Radiological and Nuclear (CBRN) origin has increased on account of socioeconomic development. The changing climate also exasperates the vulnerabilities. The occurrence of heat waves, cold waves, floods, droughts, intense cyclones and flash floods is getting increased due to climate change and global warming.

Further, Disaster vulnerability is function of poverty and poverty is inextricably linked to disaster vulnerability. Poverty compels the people to compromise in matters of shelters and dwellings and more and more people live at unsafe places.

4.1 Hydrological and climate related hazards

a. floods

- Floods can be caused by heavy rainfall, inadequate capacity of rivers to carry the high flood discharge, inadequate drainage to carry away the rainwater quickly to streams/ rivers. ice jams or landslides blocking streams, typhoons and cyclones.

- Further, flash floods occur because of high rate of water flow particularly in areas with less permeability of soil.
- Over 40 million hectare of landmass in India is prone to floods.
- Nearly 75 % of the total annual rainfall is concentrated over a short south-west monsoon season of three to four months from June to September.
- As a result there is a very heavy discharge from the rivers during this period causing widespread floods.
- Flood problem is chronic in at least 10 states. From October to December each year, a very large area of South India, including Tamil Nadu, the coastal regions of Andhra Pradesh and the union territory of Puducherry, receives up to 30 percent of its annual rainfall from the northeast monsoon (or winter monsoon).

b. Cyclones

- India has a very long coastline which is exposed to tropical cyclones arising in the Bay of Bengal and Arabian Sea.
- Indian Ocean is one of the six major cyclone-prone regions in the world.
- In India cyclones occur usually in April-May, and also between October and December.
- The Eastern coastline is more prone to cyclones as about 80 percent of total cyclones generated in the region hit there.
- The worst hitting cyclones have been the Andhra Pradesh cyclone of November 1977 and the super cyclone of Odisha in the year 1999.
- The impact of the cyclones is mainly 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.

C. Heat waves, cold waves, fog

- Heat waves refer to the extreme positive departure from the maximum temperature in summers.
- The fatalities caused by heat waves have increased in recent decades.
- The problem of heat wave is compounded by a decrease in Diurnal Temperature Range

(DTR).

In urban areas, the heat wave is increasing gaining notoriety for more and more fatalities

d.Thunder storm, Hail storm, Dust storm

- India's central, north-eastern, north-western and northern parts are generally affected by these.
- The southern coastal areas are less prone to thunderstorms, hailstorms and duststorms.
- The hailstorms are more frequent in Assam, Uttarakhand and some parts of Maharashtra.
- Dust storms are common in Rajasthan, MP and Haryana. Tornadoes are rare in India.

e.Droughts

- Drought refers to the situation of less moisture in the soil (which makes the land unproductive) and scarcity of water for drinking, irrigation, industrial uses and other purposes, usually caused by deficient/less than average rainfall over a long period of time.
- Some states of India feature the perennial drought such as Rajasthan, Odisha, Gujarat, Madhya Pradesh etc.
- Sixteen percent of the country's total area is drought-prone and approximately 50 million people are affected annually by droughts. In India about 68 percent of net sown area in the country is drought-prone.

4.1.2 Geological disaster

a.Earthquake

- Earthquake is almost impossible to be predicted, so it is the most destructive of all natural disasters.
- It is almost impossible to make arrangements and preparations against damages and collapses of buildings and other man-made structures hit by an earthquake.
- More than half of India's total area is vulnerable to seismic activity of varying intensities.
- The most vulnerable regions are located in the Himalayan, Sub-Himalayan belt and

Andaman & Nicobar Islands.

b. Tsunami

- Tsunami refers to the displacement of a large volume of a body of water such as Ocean.
- Most Tsunamis are seismically generated, result of abrupt deformation of seafloor resulting vertical displacement of the overlying water.
- The Tsunami waves are small in amplitude and long wavelength (often hundred of kilometers long).

c. Land slides

- Landslides are common in India in Himalayan region as well as Western Ghats. The Himalayan ranges are among the youngest fold mountains of world.
- They comprise a series of seven curvilinear parallel folds running along a grand arc of around 3400 kilometers.
- The landslides in this region are probably more frequent than any other areas in the world.

4.1.3 Nuclear, chemical disaster

- The industrial and chemical disasters can occur due to accident, negligence or incompetence.
- They may result in huge loss to lives and property.
- The Hazardous industries and the workers in these industries are particularly vulnerable to chemical and industrial disasters.

4.2 Components of disaster Relief

- **Disaster relief** means first aid provided for alleviating the suffering of domestic disaster victims.
- Hence it aims to meet the immediate needs of the victims of a disastrous event. Usually, it includes humanitarian services and transportation, food, clothing, medicine, beds and bedding, temporary shelter and housing, medical materiel, medical and technical personnel, and repairs to essential services

4.2.1 water

Global access to safe water, adequate sanitation, and proper hygiene education can reduce illness and death from disease, leading to improved health, poverty reduction, and socio-economic development. However, many countries are challenged to provide these basic necessities to their populations, leaving people at risk for water, sanitation, and hygiene (WASH)-related diseases.

Prepare an emergency water supply

- Store at least 1 gallon of water per day for each person and each pet. Consider storing more water than this for hot climates, for pregnant women, and for people who are sick.
- Store at least a 3-day supply of water for each person and each pet. Try to store a 2-week supply if possible.
- Observe the expiration date for store-bought water; replace other stored water every 6 months.
- Store a bottle of unscented liquid household chlorine bleach to disinfect your water and to use for general cleaning and sanitizing. Try to store bleach in an area where the average temperature stays around 70°F (21°C). Because the amount of active chlorine in bleach decreases over time due to normal decay, consider replacing the bottle each year.

4.2.2 Food

Prepare an emergency food supply

A disaster can easily disrupt the food supply at any time, so plan to have at least a 3-day supply of food on hand.

Keep foods that :

- Have a long storage life.
- Require little or no cooking, water, or refrigeration, in case utilities are disrupted.
- Meet the needs of babies or other family members who are on special diets.
- Meet pets' needs.

Preparing food

- Preparing food after a disaster or emergency may be difficult due to damage to your

home and loss of electricity, gas and water.

4.2.3 Sanitation and Hygiene

- Sanitation and hygiene are critical to health, survival, and development. Many countries are challenged in providing adequate sanitation for their entire populations, leaving people at risk for water, sanitation, and hygiene (WASH)- related diseases.
- Basic sanitation is described as having access to facilities for the safe disposal of human waste (feces and urine), as well as having the ability to maintain hygienic conditions

The need for latrines and toilets

- Proper sanitation facilities (for example, toilets and latrines) promote health because they allow people to dispose of their waste appropriately.
- Throughout the developing world, many people do not have access to suitable sanitation facilities, resulting in improper waste disposal.

Handwashing

Keeping hands clean during an emergency helps prevent the spread of germs. If your tap water is not safe to use, wash your hands with soap and water that has been boiled or disinfected. Follow these steps to make sure you wash your hands properly :

- Wet your hands with clean, running water (warm or cold) and apply soap.
- Rub your hands together to make a lather and scrub them well; be sure to scrub the backs of your hands, between your fingers, and under your nails.
- Rinse your hands well under running water.
- Dry your hands using a clean towel or air dry them.

Bathing

- Bathing or showering after a water-related emergency should only be done with clean, safe water. Sometimes water that is not safe to drink can be used for bathing, but be careful not to swallow any water or get it in your eyes.

Wound care

- Keeping wounds clean and covered is crucial during an emergency. Open wounds and rashes exposed to flood waters can become infected. To protect yourself and your

family :

- Avoid contact with flood waters if you have an open wound.
- Cover clean, open wounds with a waterproof bandage to reduce chance of infection.
- Keep open wounds as clean as possible by washing well with soap and cleanwater.
- If a wound develops redness, swelling, or oozing, seek immediate medical care.

4.2.4 Shelters

- Individual family shelter should always be preferred to communal accommodation as it provides the necessary privacy, psychological comfort, and emotional safety.
- It also provides safety and security for people and possessions and helps to preserve or rebuild family unity.
- Emergency shelter needs are best met by using the same locally available, sustainably sourced materials and construction methods as would be normally used by the refugees themselves or the local hosting population.
- Only if adequate quantities cannot be quickly obtained locally should emergency shelter material be brought into the country.
- Regardless of the type of emergency shelter used the following principles generally apply :
- Shelters must provide protection from the elements, space to live and store belongings, privacy and emotional security.
- Blankets, mats, and tarpaulin must be provided as needed.
- Refugee shelter should be culturally and socially appropriate and familiar where possible. Suitable local materials are best, if available.

4.2.5 Health

Management of medical supply

- Disasters can also cause disruptions to the health care infrastructure.
- Hospitals and health centers may suffer structural damage, or health personnel may be among the casualties, limiting the ability to provide health services to disaster victims.

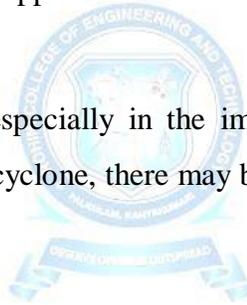
- Emergency health kits that contain essential medical supplies and drugs are often provided to victims as part of the immediate response to disasters.
- These kits are designed to meet the primary health care needs of people without access to medical facilities.

Assessment of immediate health needs

- Natural disasters do not usually result in infectious disease outbreaks. However, certain circumstances can increase the chance for disease transmission.
- Immediately after a disaster, most increases in disease incidence are caused by fecal contamination of water and food supplies

Disposal of dead

- In many emergency situations, especially in the immediate aftermath of a natural disaster such as an earthquake or cyclone, there may be many dead bodies that require appropriate disposal.



4.2.6 Waste Management

- Depending on their nature and severity, disasters can create large volumes of debris and waste.
- The waste can overwhelm existing solid waste management facilities and impact on other emergency response and recovery activities.
- If poorly managed, the waste can have significant environmental and public health impacts and can affect the overall recovery process

4.2.7 Institutional Arrangements

National level

- In the event of a disaster of a severe nature, National Crisis Management Committee under Cabinet Crisis Management Committee under Cabinet Secretary gives policy directions and guidelines to the Secretary gives policy directions and guidelines to the Crisis Management Group where national/ international efforts are required. international efforts are required.
- Crisis Management Group in MHA reviews the situation in Inter situation in Inter-

Ministerial meeting to coordinate various emergency support functions for the affected States.

State level

- A State level Crisis Management Committee under the Chairmanship of Chief Secretary is responsible for formulating policies and guidelines for management of natural disasters in the States.
- This committee comprises of concerned functionaries in various State Departments and representatives of Central Organizations located in the State.
- State Relief Commissioner is the Nodal Officer for coordinating the activities for relief operations in the event of natural disasters

District level

- District level is the focal point in a disaster situation from which disaster management related activities are coordinated and implemented.
- A district level committee exists under the District Collector / Deputy Commissioner

4.3 Mitigation, Response and preparedness

1. **Mitigation** : Activities aimed at trying to mitigate the impact of a disaster if prevention is not possible, such as building schools to be more earthquake resistant.
 2. **Response** : Activities aimed at understanding needs and responding to them, including rapid assessments, provision of food and non-food items, provision of water, sanitation and hygiene services, and health and shelter interventions.
 3. **Preparedness** : Activities aimed at trying to prepare communities for a disaster, such as emergency drills or pre-stocking relief items in logistic hubs.
- This involves measures designed for lessening the likely effects of emergencies. Includes appropriate land-use planning, flood mitigation works, improved building codes improving structural qualities of schools, houses and such other buildings so that medical casualties can be minimized.
 - Ensuring the safety of health facilities and public health services including water

supply and sewerage system to reduce the cost of rehabilitation and reconstruction.

- Mitigation complements the disaster preparedness and disaster response activities.
- Preparedness efforts include plans or preparations made in advance of an emergency that help individuals and communities get ready to either respond or to recover.

Preparedness efforts include plans or preparations made in advance of an emergency that help individuals and communities get ready to either respond or to recover. It aims to achieve a satisfactory level of readiness to respond to any emergency situation through programs that strengthen the technical and managerial capacity of governments, organizations, and communities

- The preparations may include the stocking of reserve food and water, the gathering and screening of willing community volunteers, or citizens education & evacuation plan, holding disaster drills, and installing smoke detectors, mutual aid agreements, development of hospital disaster plans, emergency medical service plans, etc.
- This preparedness cycle is one element of a broader National Preparedness System to prevent, respond to, recover from, and mitigate against natural disasters, acts of terrorism, and other man-made disasters.
- Typical preparedness measures include developing mutual aid agreements and memorandums of understanding, training for both response personnel and concerned citizens, conducting disaster exercises to reinforce training and test capabilities, and presenting all-hazards education campaigns.

4.4 Disaster management Act and policy

Definitions - In this Act, unless the context otherwise requires -

"Affected area" means an area or part of the country affected by a disaster;

"Capacity-building" includes -

- Identification of existing resources and resources to be acquired or created;
- Acquiring or creating resources identified under sub-clause (i);
- Organization and training of personnel and coordination of such training for effective management of disasters;

"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;

Prevention of danger or threat of any disaster;

- Mitigation or reduction of risk of any disaster or its severity or consequences;
- Capacity-building;
- Preparedness to deal with any disaster;
- Prompt response to any threatening disaster situation or disaster;
- "Mitigation" means measures aimed at reducing the risk, impact or effects of a disaster or threatening disaster situation;
- "National Authority" means the National Disaster Management Authority established under sub-section (1) of section 3;
- "National Executive Committee" means the Executive Committee of the National Authority constituted under sub-section (1) of section 8;
- "National Plan" means the plan for disaster management for the whole of the country prepared under section 11;
- "Preparedness" means the state of readiness to deal with a threatening disaster situation or disaster and the effects thereof;
- "Prescribed" means prescribed by rules made under this Act;
- "Reconstruction" means construction or restoration of any property after a disaster;
- "Resources" includes manpower, services, materials and provisions;
- "State Authority" means the State Disaster Management Authority established under sub-section (1) of section 14 and includes the Disaster Management Authority for the Union territory constituted under that section;
- "State Executive Committee" means the Executive Committee of a State Authority constituted under sub-section (1) of section 20;

India : National policy on Disaster Management 2009

This policy aims at :

- i) Promoting a culture of prevention, preparedness and resilience at all levels through knowledge, innovation and education;
- ii) Encouraging mitigation measures based on technology, traditional wisdom and environmental sustainability;
- iii) Mainstreaming disaster management into the developmental planning process;
- iv) Establishing institutional framework to create an enabling regulatory environment and a compliance regime;

4.5 Other related policies, plans, programmes and legislation

A) Indian Constitution and Natural Disaster

- Indian Constitution, the Magna Carta of Fundamental Rights for Indians guarantees protection of life and security with the purpose of ensuring a welfare State.

Not only the laws and regulations framed by the Central and State Governments have to be in conformity with the Constitutional provisions, but also the authorities have a duty under the Constitution to safeguard and protect the Fundamental Rights

B) The Environment Protection Act, 1986

- After the Bhopal Gas Leak Tragedy, the Indian Parliament enacted the Environment (Protection) Act (EPA), 1986 for the purpose of safeguarding and protecting the environment from unregulated industrial or other activities. Under the EPA, the central Government is entrusted with responsibility to take all the measures for protecting and improving the quality of the environment and preventing controlling and abating environmental pollution.
- It prohibits persons carrying on any industry, operation or process from discharging or emitting any environmental pollutants in excess of prescribed standards.
- The EPA imposes obligations on persons handling any hazardous substance to follow prescribed procedure and comply with prescribed safeguards.

C) Environment Impact Assessment Statement

- In the year 1994, a notification was issued by the Central Government under Section 3 of EPA making it mandatory on the part of all new industrial units and those with intent

to modernize or expand to submit an Environment Impact Assessment (EIA) Statement for the purpose of obtaining clearance from the Central Government for setting up industrial projects.

D) The ‘Manufacture, Storage and Impact of Hazardous Chemical Rules’, 1989

- In the Year 1989, the Central Government framed the „Manufacture, Storage and Import of Hazardous Chemical Rules“, 1987 under the EPA.
- The principal objective of the rules is the prevention of major accidents arising from industrial activity, the limitation of the effects of such accidents both on humans and the environment, and the harmonization of the various control measures and the agencies to prevent and limit major accidents.

E) The Coastal Regulation Zone (CRZ) Notification, 1991.

- In the year 1991, with a view to protect the fragile ecosystem of the coastal areas in India from unregulated developmental activities, the Government of India issued Coastal Regulation Zone (CRZ) Notification under the EPA to control the developmental activities within 500 meters of High Tide Line (HTL).

F) The Public Liability Insurance Act, 1991

- The parliament also enacted the “Public Liability Insurance Act, 1991” to provide for public liability insurance for the purpose of providing immediate relief to the persons affected by accidents occurring while handling hazardous substances.

4.6 Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster

- Disasters are spatial in nature as they strike at a specific location and influence a particular area.
- Location intelligence plays a critical role in disaster management. GIS coupled with remote sensing provides a basic framework that helps in all the stages of disaster management starting from preparedness, to response and recovery.
- Through advanced wireless technologies and web-based GIS applications, disaster management by governments and other agencies is being revolutionized and is enhancing the coordination of response efforts as well as planning for disaster risk

reduction.

- GIS decision support systems for disaster have been applied in several parts of the world for effective management.
- Use of GIS and remote sensing, helps conduct all these tasks in a planned and efficient manner.
- Earlier, when the concept of GIS did not exist, response decisions during disasters were taken mostly on the basis of prior experience and intuition rather than any live information.
- But today, live data on many parameters such as topography, geographic features, population, infrastructure, demographics can be crucial to the response and recovery activities.
- GIS has the power to integrate data from various sources into a common platform and make it readily accessible to various stakeholders for disaster management. It enables dissemination of critical information in a timely manner in cases of emergencies.
- Further, the visualization of this data helps in analyzing a situation and taking quick decisions. In advanced countries of the world, GIS has been successfully utilized to address all phases of disaster management-preparedness, mitigation, response, and recovery.

4.6.1 Risk Assessment

- A fundamental principal of risk assessment is that risk due to natural catastrophes such as earthquakes, hurricanes and flood, is location dependent, and that it can be assessed within an acceptable range of uncertainty if reliable historical and location specific data is available.
- Risk assessment of natural catastrophes has two components-hazard and vulnerability. The hazard is a measure of the physical intensity of the peril (earthquake, wind, surge, etc.) at a particular location and the associated probabilities of these intensities. Hazard is location dependent.
- Vulnerability is a measure of the damage that the peril can cause to the built environment (house, buildings, infrastructure and utilities) at that location.
- Manmade structure respond to different perils in different ways, depending on the

design of their structural systems and methods of constructions.

- Now, the Andhra Pradesh State Remote Sensing Applications Centre (APSRC) has developed a remote sensing application to overcome some of the problems that the state faces.

4.6.2 Planning and mitigation

- GIS is enabling development of decision support systems capable of assessing risk from natural disasters and helping governments in mitigation and planning.
- RMSI has developed an innovative 'Decision support system for disaster risk reduction' that utilizes the outcomes of multi-hazard risk assessment for activities performed for mitigation, preparedness, response and recovery.
- This framework has been successfully implemented in several nations of the world and has proven to be an impactful tool for mainstreaming disaster risk reduction. Mathematical modeling and GIS analytics form the backbone of this framework.

4.6.3 Response and recovery

- Responding to a disaster adequately requires critical information like the location where the disaster has occurred, intensity and severity of the event in various disaster zones, areas of maximum damage, location of impacted population and the kind of resources needed to evacuate the trapped population.
- GIS and remote sensing techniques coupled with technologies like satellite imagery, aerial photography using aircraft or drones can help find answers to many such questions.
- There is a greater need for liaisoning of the public and private sector. GIS organizations such as RMSI are equipped to turn around such tasks at a faster rate, provided high resolution satellite imagery is made available by the government bodies or private companies.
- Damage assessment helps in estimating the number of households damaged and families displaced along with casualties and injured in short term, as well as the damaged infrastructure.
- It also helps in re-establishing communication so that it performs better in future or laying foundation for an emergency communication network that could activate

immediately in the aftermath of a disaster.

. In the past few years, GIS emerged as a powerful risk assessment tool and is being put to use to assess risk to property and life stemming from natural hazards such as earthquakes, hurricanes, cyclones and floods. Manipulation, analysis, and graphic presentation of the risk and hazard data can be done within a GIS system, and because these data have associated location information which is also stored within the GIS, their spatial interrelationships can be determined and used in computer based risk assessment models

4.7 Disaster damage Assessment

Damage assessment is an important tool for retrospective and prospective analysis of disasters to assimilate the extent of impact of a disaster. This forms the basis for future disaster preparedness and preventive planning. It is essential in determining : what happened, what the effects were, which areas were hardest hit, what situations must be given priority and what types of assistance are needed, for example, Local, State

The basic objectives of damage assessment could be summarized as follows :

- To make a rapid assessment of areas affected to know the extent of impact for purpose of immediate rescue and relief operations;
- To prepare estimates for the amount of relief to be provided and the mode of relief, be it food, clothing, medicines, shelter or other essential commodities;
- Damage assessment is therefore a prerequisite for effective disaster response effort. For effective decisions, officials responsible for organizing post-disaster relief operations should be properly informed of the damage/possible damage should the event repeat itself some-time in the future, so that they can know the needs, current, as well as prospective, in precise terms.
- They must have appropriate and timely information about : what happened, what needs to be done, and what resources are available ? Their decisions can save lives; minimize injury, damage and loss; prevent any further escalation; prevent secondary hazards and inform people who need to know.

4.7.1 Essential Features of Damage Assessment

a) Flow of information

Data would be required regarding:

- Identification of the predominant food and cash crops, cropping patterns, and normal production levels.
- Likely losses, such as; if whole or part of a crop is likely to be damaged, if any portion could be salvaged by timely mitigation, the quantum of insurance that would suffice, keeping in view, estimated losses.
- Identification of land problems to identify the extent of erosion, landslide zones, flood-prone areas, and areas where desertification could occur.
- Identification of water supply problems as certain disasters create special problems in water supply, for example, salt water flooding in cyclones can pollute local water wells and leave irrigation water salty
- Determination of local farming practices since it is important to identify the social, cultural and traditional aspects of farming, especially in the low-income and subsistence farming sectors
- It is also important to identify traditional responses to the disaster such as crop diversification, growing alternative varieties or alternative crops, altering cropping patterns, growing “famine foods,” or building food reserves.
- Determine the status of drought animals to check total losses and determine whether the losses will delay rehabilitation. Check to see if animals need emergency feeding, and determine whether farmers would have to sell them off.

b) Utility of damage assessment

The information would enable :

- Quantified assessment of losses that would accrue to farmers and the likely impact on food supply in the market.
- Planning interim assistance like insurance needs of identified vulnerable segments, which are mainly, small-scale farmers, repairing irrigation systems, contouring, farmland repair etc. that would help further mitigation efforts.

c) Levels of assessment

Damage assessment is required at two basic levels of intervention. Firstly, it is required for

emergency relief measures in which quick assessment of damage is the basis for the amount of relief material and food stocks that reach the disaster area. This type of an assessment is called Rapid Damage Assessment. At the second level would be, a detailed technical analysis of damage for long-term restoration and rehabilitation works.

4.7.2 Rapid Damage Assessment

There is a hierarchy of officials who report from the lowest level of Villages/Panchayats through Blocks/Revenue Circles, Tehsils/ Talukas, and Sub-divisions and finally to the districts and then to the state headquarters.

The basic items covered in rapid assessment are :

- Name of the place.
- The relevant disasters.
- Date and time of disaster strike.
- Area affected.
- Total number of villages or neighborhoods affected.
- Total population.
- Population affected in terms of number of people and households.
- Details of local bodies (panchayats or wards/municipalities) affected.
- In case of floods, area still under water.
- In case of an earthquake or cyclone, buildings damaged.
- Infrastructure affected (transportation, power, social infrastructure).
- Estimated number of deaths and injuries.
- Estimated loss of property.
- Closest sources of emergency aid.



4.7.3 Detailed Damage Assessment

Detailed damage assessment goes further than the rapid assessment, and it includes the following additional information regarding disaster damage :

Verified number of human lives lost and number of injuries.

Livestock lost

- a) Number.
- b) Estimated value.

Details of damage to crops in hectares and estimated loss of produce in quintals

- a) Hectares completely damaged.
- b) Hectares partially damaged.
- c) Hectares likely to be replanted or re-sown.
- d) Extent affected in percentage.
- e) Crops lost in quintals.
- f) Estimated value of crops lost in rupees.



Houses damaged or destroyed

- a) Number.
- b) Estimated value.

Loss to public works and utilities including local bodies property

- a) Name of the work and utility.
- b) Nature of damage.
- c) Estimated value of damage.
- d) Estimated cost to restore work or/and utility.

4.7.4 Assessing Loss and Damage to Human Life

- Safety of human life is one of the prime objective of any humanitarian action. The life of any human being is invaluable for the family, friends and for the larger community and social groups.
- Risk to human life during natural disasters varies depending on factors such as gender, age,

social status, etc.

- The inequalities, poverty and other social imbalances contribute to this risk.
- The disaster may not cause deaths but injury or disability and stress and trauma to the affected persons.
- The loss of human life shapes the humanitarian response, as this is the greatest loss that any affected region has to bear.
- The loss of human life, therefore, is the most critical part of any damage assessment.
- The loss and damage to human life can be understood by its varying extent such as
 - i) Deaths,
 - ii) Permanent disabilities,
 - iii) Major injuries,
 - iv) Minor injuries and
 - v) Missing.
- Details of minor injury, major injury and permanent disability are essential to formulate immediate care and support system; as well as to plan long-term support and follow-up mechanisms.
- In cases of death or injury, information like death certificate by police or authorities, injury certificate by hospital or the government doctor is needed for government support or compensation.
- Similarly, in case of missing people, it is important to understand if legalities like police complaint have been registered or not, which may be essential for the affected families to access government assistance.



4.8 Mitigation Measures for Home

After a disaster strikes, actions can be taken to avoid or reduce the impact of the next disaster.

1. If your home was damaged during the disaster, consider implementing mitigation measures while you repair your home.
2. Be sure that all upgrade construction projects comply with local building codes that pertain to seismic, flood, fire and wind hazards. Make sure your contractors follow

the codes, including periodic building inspections of the construction.

3. If you live in a flood-prone area, consider purchasing flood insurance to reduce your risk to floods. Buying flood insurance to cover the value of a building and its contents will not only provide greater peace of mind, but will also speed recovery if a flood occurs.
4. If you live in an area prone to high winds, make sure your roof is firmly secured to the main frame of the residence. Consider building a wind “Safe Room or Shelter” in your home to protect your household.

There are several additional steps you can take to reduce wind damages and losses, including the following :

- Secure light fixtures and other items that could fall or shake loose in such events.
- Move heavy or breakable objects to low shelves.
- Anchor water heaters and bolt them to wall studs.

