

# Chapter 1

## INTRODUCTION TO DISASTER MANAGEMENT

### Objectives of the chapter:

*The main objective of this chapter is to have a basic understanding of various concepts used in Disaster Management. The concepts explained here are: Disaster, Hazard, Vulnerability, Capacity, Risk and Disaster Management Cycle. Apart from the terminologies, the chapter also tries to explain various types of disasters. In standard VIII, IX and X many of you have already been introduced to some of these concepts. This chapter has been designed to upgrade your knowledge and skill so as to have a better understanding of natural hazards, disasters and their management.*

*After reading this chapter the students and the teachers will be able to have a basic understanding of the concepts and should be able to differentiate between them with suitable examples.*

### Background:

The global context:

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. Over the past decade, the number of natural and manmade disasters has climbed inexorably. From 1994 to 1998, reported disasters average was 428 per year but from 1999 to 2003, this figure went up to an average of 707 disaster events per year showing an increase of about 60 per cent over the previous years. The biggest rise was in countries of low human development, which suffered an increase of 142 per cent.

The figure 1.1 shows the deadliest disasters of the decade (1992 – 2001). Drought and famine have proved to be the deadliest disasters globally, followed by flood, technological disaster, earthquake, windstorm, extreme temperature and others. Global economic loss related to disaster events average around US \$880 billion per year.

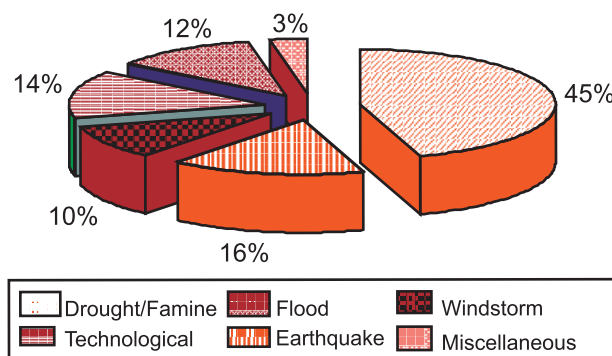


Fig : 1.1 World Scenario: Reported Deaths from all Disasters (1992-2001)

**Indian scenario:**

The scenario in India is no different from the global context. The super cyclone of Orissa (1999), the Gujarat earthquake (2001) and the recent Tsunami (2004)

affected millions across the country leaving behind a trail of heavy loss of life, property and livelihood. Table 1.1 shows a list of some of the major disasters that have caused colossal impact on the community.

**Table 1.1 Major disasters in India since 1970**

Sl. No	Disaster	Impact
	<b>Cyclone</b>	
1	29 <sup>th</sup> October 1971, Orissa	Cyclone and tidal waves killed 10,000 people
2	19 <sup>th</sup> November, 1977, Andhra Pradesh	Cyclone and tidal waves killed 20,000 people
3	29 <sup>th</sup> and 30 <sup>th</sup> October 1999, Orissa	Cyclone and tidal waves killed 9,000 and 18 million people were affected
	<b>Earthquake</b>	
4	20 <sup>th</sup> October 1991 Uttarkashi	An earthquake of magnitude 6.6 killed 723 people
5	30 <sup>th</sup> September 1993 Latur	Approximately 8000 people died and there was a heavy loss to infrastructure
6	22 May 1997 Jabalpur	39 people dead
7	29 <sup>th</sup> March 1997, Chamoli	100 people dead
8	26 <sup>th</sup> January, 2001, Bhuj, Gujarat	More than 10,000 dead and heavy loss to infrastructure
	<b>Landslide</b>	
9	July 1991, Assam	300 people killed, heavy loss to roads and infrastructure
10	August 1993, Nagaland	500 killed and more than 200 houses destroyed and about 5kms. Road damaged.
11	18 <sup>th</sup> August 1998, Malpa	210 people killed. Villages were washed away
	<b>Flood</b>	
12	1978 Floods in North East India	3,800 people killed and heavy loss to property.
13	1994 Floods in Assam, Arunachal Pradesh, Jammu and Kashmir, Himachal Pradesh, Panjab, Uttar Pradesh, Goa, Kerala and Gujarat	More than 2000 people killed and thousands affected

While studying about the impact we need to be aware of potential hazards, how, when and where they are likely to occur, and the problems which may result of an event. In India, 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 avalanches/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. It is therefore important that we are aware of how to cope with their effects.

We have seen the huge loss to life, property and infrastructure a disaster can cause but let us understand what is a disaster, what are the factors that lead to it and its impact.

### What is a Disaster ?

Almost everyday, newspapers, radio and television channels carry reports on disaster striking several parts of the world. But what is a disaster? 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”.

A disaster is a result from the combination of hazard, vulnerability and insufficient capacity or measures to reduce the potential **chances** of risk.

A disaster happens when a hazard impacts on the vulnerable population and causes damage, casualties and disruption. Fig: 1.2 would give a better illustration of what a disaster is. Any hazard – flood, earthquake or cyclone which is a triggering event along with greater vulnerability (inadequate access to resources, sick and old people, lack of awareness etc) would lead to disaster causing greater loss to life and property. For example; an earthquake in an uninhabited desert cannot be considered a disaster, no matter how strong the intensities produced.

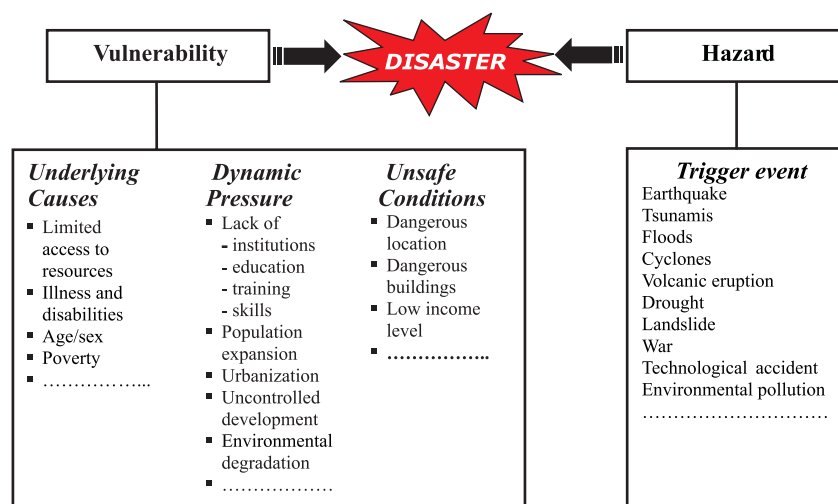


Fig: 1.2

An earthquake is disastrous only when it affects people, their properties and activities. Thus, disaster occurs only when hazards and vulnerability meet. But it is also to be noted that with greater capacity of the individual/community and environment to face these disasters, the impact of a hazard reduces. Therefore, we need to understand the three major components namely **hazard, vulnerability and capacity** with suitable examples to have a basic understanding of disaster management.

**What is a Hazard ? How is it classified ?**

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.

**1. 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 man made. For example flooding may be caused because of heavy rains, landslide or blocking of drains with human waste.

**2. Manmade hazards** are hazards which are due to human negligence. Manmade hazards are associated with industries or energy generation facilities and include explosions, leakage of toxic waste, pollution, dam failure, wars or civil strife etc.

The list of hazards is very long. Many occur frequently while others take place occasionally. However, on the basis of their genesis, they can be categorized as follows:

**Table 1.2: Various types of hazards**

Types	Hazards	
Geological Hazards	1. Earthquake 2. Tsunami 3. Volcanic eruption	4. Landslide 5. Dam burst 6. Mine Fire
Water & Climatic Hazards	1. Tropical Cyclone 2. Tornado and Hurricane 3. Floods 4. Drought 5. Hailstorm	6. Cloudburst 7. Landslide 8. Heat & Cold wave 9. Snow Avalanche 10. Sea erosion
Environmental Hazards	1. Environmental pollutions 2. Deforestation	3. Desertification 4. Pest Infection
Biological	1. Human / Animal Epidemics 2. Pest attacks	3. Food poisoning 4. Weapons of Mass Destruction

Types	Hazards	
Chemical, Industrial and Nuclear Accidents	1. Chemical disasters 2. Industrial disasters	3. Oil spills/Fires 4. Nuclear
Accident related	1. Boat / Road / Train accidents / air crash Rural / Urban fires Bomb /serial bomb blasts 2. Forest fires	3. Building collapse 4. Electric Accidents 5. Festival related disasters 6. Mine flooding

**What is vulnerability ?**

Vulnerability may be defined as *“The extent to which a community, structure, services 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 terrains or a disaster prone area.”*

Vulnerabilities can be categorized into physical and socio-economic vulnerability.

**Physical Vulnerability:** It includes notions of **who** and **what** may be damaged or destroyed by natural hazard such as earthquakes or floods. It is based on the physical condition of people and elements at risk, such as buildings, infrastructure etc; and their

proximity, location and nature of the hazard. It also relates to the technical capability of building and structures to resist the forces acting upon them during a hazard event.

Figure 1.3 shows the settlements which are located in hazardous slopes. Many landslide and flooding disasters are linked to what you see in the figure 1.3. Unchecked growth of settlements in unsafe areas exposes the people to the hazard. In case of an earthquake or landslide the ground may fail and the houses on the top may topple or slide and affect the settlements at the lower level even if they are designed well for earthquake forces.

**Socio-economic Vulnerability:** The degree to which a population is affected by a hazard



Figure 1.3 : Site after pressures from population growth and urbanization

will not merely lie in the physical components of vulnerability but also on the socio-economic conditions. The socio-economic condition of the people also determines the intensity of the impact. For example, people who are poor and living in the sea coast don't have the money to construct strong concrete houses. They are generally at risk and lose their shelters whenever there is strong wind or cyclone. Because of their poverty they too are not able to rebuild their houses.

### ***What is capacity ?***

Capacity can be defined as *“resources, means and strengths which exist in households and communities and which enable them to cope with, withstand, prepare for, prevent, mitigate or quickly recover from a disaster”*. People's capacity can also be taken into account. Capacities could be:

*Physical Capacity:* People whose houses have been destroyed by the cyclone or crops have been destroyed by the flood can salvage things from their homes and from their farms. Some family members have skills, which enable them to find employment if they migrate, either temporarily or permanently.

*Socio-economic Capacity:* In most of the disasters, people suffer their greatest losses in the physical and material realm. Rich people have the capacity to recover soon because of their wealth. In fact, they are seldom hit by disasters because they live in

safe areas and their houses are built with stronger materials. However, even when everything is destroyed they have the capacity to cope up with it.

Hazards are always prevalent, but the hazard becomes a disaster only when there is greater vulnerability and less of capacity to cope with it. In other words the frequency or likelihood of a hazard and the vulnerability of the community increases the risk of being severely affected.

### ***What is risk ?***

Risk is a *“measure of the expected losses due to a hazard event occurring in a given area over a specific time period. Risk is a function of the probability of particular hazardous event and the losses each would cause.”* The level of risk depends upon:

- ❖ Nature of the hazard
- ❖ Vulnerability of the elements which are affected
- ❖ Economic value of those elements

A community/locality is said to be at 'risk' when it is exposed to hazards and is likely to be adversely affected by its impact. Whenever we discuss 'disaster management' it is basically 'disaster risk management'. Disaster risk management includes all measures which reduce disaster related losses of life, property or assets by either reducing the hazard or vulnerability of the elements at risk.



Disaster Risk Reduction can take place in the following ways:

### 1. Preparedness

This protective process embraces measures which enable governments, communities and individuals to respond rapidly to disaster situations to cope with them effectively. Preparedness includes the formulation of viable emergency plans, the development of warning systems, the maintenance of inventories 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.

Preparedness therefore encompasses those measures taken before a disaster event which are aimed at minimising loss of life, disruption of critical services, and damage when the disaster occurs.

### 2. Mitigation

Mitigation embraces measures taken to reduce both the effect of the hazard and the vulnerable conditions to it in order to reduce the scale of a future disaster. Therefore mitigation activities can be focused on the hazard itself or the elements exposed to the threat. Examples of mitigation measures which are hazard specific include water management in drought prone areas, relocating people away from the hazard prone areas and by strengthening structures to reduce damage when a hazard occurs.

In addition to these physical measures, mitigation should also aim at reducing the economic and social vulnerabilities of potential disasters

## ***Disaster Management Cycle***

Disaster Risk Management includes sum total of all activities, programmes and measures which can be taken up before, during and after a disaster with the purpose to avoid a disaster, reduce its impact or recover from its losses. The three key stages of activities that are taken up within disaster risk management are:

### ***1. Before a disaster (pre-disaster).***

Activities taken to reduce human and property losses caused by a potential hazard. For example carrying out awareness campaigns, strengthening the existing weak structures, preparation of the disaster management plans at household and

community level etc. Such risk reduction measures taken under this stage are termed as *mitigation and preparedness activities*.

### ***2. During a disaster (disaster occurrence).***

Initiatives taken to ensure that the needs and provisions of victims are met and suffering is minimized. Activities taken under this stage are called *emergency response activities*.

### ***3. After a disaster (post-disaster)***

Initiatives taken in response to a disaster with a purpose to achieve early recovery and rehabilitation of affected communities, immediately after a disaster strikes. These are called as *response and recovery activities*.



**Reference:** Are you prepared? Learning from the Great Hanshin-Awaji Earthquake Disaster - Handbook for Disaster Reduction and Volunteer activities

Figure 1.4 : Disaster Management

In the subsequent chapters we would discuss in detail some of the major hazards prevalent in our country its causes, impact, preparedness and mitigation measures that need to be taken up.

**Reference for further reading:**

<ol style="list-style-type: none"> <li>1. Reading materials of 11<sup>th</sup> Community Based Disaster Risk Management Course, Bangkok, Thailand July 21 – August 1, 2003.</li> <li>2. Anderson, M. and P. Woodrow. 1989. Rising from the Ashes: Development Strategies in</li> </ol>	<ol style="list-style-type: none"> <li>3. Times of Disaster. UNESCO and West view Press, Inc., Colorado.</li> <li>4. Anderson M. Vulnerability to Disaster and Sustainable Development: A General Framework for Assessing Vulnerability.</li> <li>5. UNDP Disaster Management Training Programme.1992. An Overview of Disaster Management.</li> <li>6. International Federation of Red Crescent Societies World Disaster Report: Focus on Community resilience.</li> </ol>
<ol style="list-style-type: none"> <li>7. <a href="http://www.unisdr.org/eng/library/lib-terminology">http://www.unisdr.org/eng/library/lib-terminology</a></li> </ol>	



**Exercise**

- 1) Explain with examples the difference between hazard, and vulnerability. How does capacity influence vulnerability?
- 2) Explain in detail the vulnerability profile of our country.
- 3) Define risk and suggest two ways of reducing risk with appropriate examples.
- 4) Briefly discuss the Disaster Management Cycle with suitable examples.