

# CHAPTER ONE

## WHAT IS DISASTER

### Learning objectives

At the end of the chapter the students are expected to:

- ❖ Define disaster, hazard, vulnerability and risk
- ❖ Describe the types and the causes of disasters.
- ❖ Discuss the magnitude and distribution of disasters
- ❖ Explain different phases of disasters

### 1.1. Introduction:

Disasters and emergencies are fundamental reflections of normal life. They are consequences of the way society structure themselves, economically and socially; the way societies and states interact; and the way that relationships between the decision makers are sustained. The disaster emanates from the fact that certain communities or groups are forced to settle in areas susceptible to the impact of ranging river or a volcanic eruption. The magnitude of each disaster, be in terms of deaths, property damage or costs for a given developing country increases with the increment of marginalization of the population. As the population increases, the best land in both rural and urban areas is taken up, and those seeking land for farming or housing are forced to accept inadequate

land. These offer less productivity and a smaller measure of physical or economic safety.

Disasters have massive human and economic costs. They may cause many deaths, severe injuries, and food shortages. Most incidents of severe injuries and deaths occur during the time of impact, whereas disease outbreaks and food shortages often arise much later, depending on the nature and duration of the disaster. Anticipating the potential consequences of disasters can help determine the actions that need to be started before the disaster strikes to minimize its effects. This Chapter deals with definitions of disaster and other related terms like hazard, vulnerability and prevention. Moreover it also addresses types of disaster and discusses the trends of the occurrence of disasters to introduce readers the basic concepts of the subject matter.

## **1.2. Definitions:**

**Disaster:** several definitions are frequently given to disaster. The World Health Organization (WHO) defines a disaster as “a sudden ecological phenomenon of sufficient magnitude to require external assistance”. It is also defined as any event, typically occurring suddenly, that causes damage, ecological disruption, loss of human life, deterioration of health and health services, and which exceeds the capacity of the affected community on a scale sufficient to require outside assistance (Landsman, 2001). It is an emergency of such severity and magnitude that the resultant combination of

deaths, injuries, illness, and property damage cannot be effectively managed with routine procedures or resources.

Disaster is further defined as an event in which a society or a community undergoes acute deprivation of food and other basic necessities due to natural and man made calamities to such an extent that the normal function of the society or the community is disrupted and that it cannot subsist without outside intervention <sup>(13)</sup>.

**Emergency** is a state in which normal procedures are suspended and extra-ordinary measures are taken in order to avert a disaster. An emergency can be defined in the context of the social, political and epidemiological circumstances in which it occurs.

**Hazard** is a rare or extreme event in the natural or human made environment that adversely affects human life, property or activity to the extent of causing a disaster. It is essential to make a distinction between hazards and disasters, and to recognize that the effect of the former upon the latter is essentially a measure of the society's vulnerability.

(12)

**Mitigation:** is permanent reduction of the risk of a disaster. Primary mitigation refers to reducing the resistance of the hazard and reducing vulnerability. Secondary mitigation refers to reducing the effects of the hazard (preparedness).

Mitigation includes recognizing that disasters will occur; attempts are made to reduce the harmful effects of a disaster, and to limit their impact on human suffering and economic assets.

**Prevention** is defined as those activities taken to prevent a natural phenomenon or potential hazard from having harmful effects on either people or economic assets. Delayed actions drain the economy and the resources for emergency response within a region. For developing nations, prevention is perhaps the most critical components in managing disasters, however, it is clearly one of the most difficult to promote. Prevention planning is based on two issues: hazard identification (identifying the actual threats facing a community) and vulnerability assessment (evaluating the risk and capacity of a community to handle the consequences of the disaster). Once these issues put in order of priority, emergency managers can determine the appropriate prevention strategies.

Disaster prevention refers to measures taken to eliminate the root-causes that make people vulnerable to disaster <sup>(13)</sup>.

**Preparedness:** Are the measures that ensure the organized mobilization of personnel, funds, equipments, and supplies within a safe environment for effective relief.

Disaster preparedness is building up of capacities before a disaster situation prevails in order to reduce impacts. Its measures include inter alia, availability of food reserve, emergency reserve fund, seed reserve, health facilities, warning systems, logistical infrastructure, relief manual, and shelves of projects <sup>(13)</sup>.

**Reconstruction:** the full resumption of socio-economic activities plus preventive measures.

**Rehabilitation:** is the restoration of basic social functions.

**Resilience:** is adaptability, capacity to recover.

**Response:** is the set of activities implemented after the impact of a disaster in order to assess the needs, reduce the suffering, limit the spread and the consequences of the disaster, open the way to rehabilitation.

**Risk** is the expected losses (lives lost, persons injured, damages to property and disruption of economic activity) due to a particular hazard. Risk is the product of hazard and vulnerability.

Risk is the probability that a person will experience an event in a specified period of time. Risk as a function of hazard and vulnerability, a relationship that is frequently illustrated with the following formula, although the association is not strictly arthematic:

$$\text{Risk} = \text{hazard} \times \text{vulnerability}.$$

Risk is the probability of being affected by the unwanted consequences of a hazard. It combines the level of hazard and degree of vulnerability.

**Risk assessment** is a term used widely for a systematic approach to characterizing the risks posed to individuals and populations by potentially adverse exposures.

**Susceptibility:** is exposure to danger.

**Vulnerability:** is the degree of loss resulting from a potentially damaging phenomenon.

It is the susceptibility of a population to specific type of event. Vulnerability is also associated with the degree of possible or potential loss from a risk that results from a hazard at a given intensity. The factors that influence intensity include demographics, the age, and resilience of the environment, technology, social differentiation and diversity as well as regional and global economics and politics.

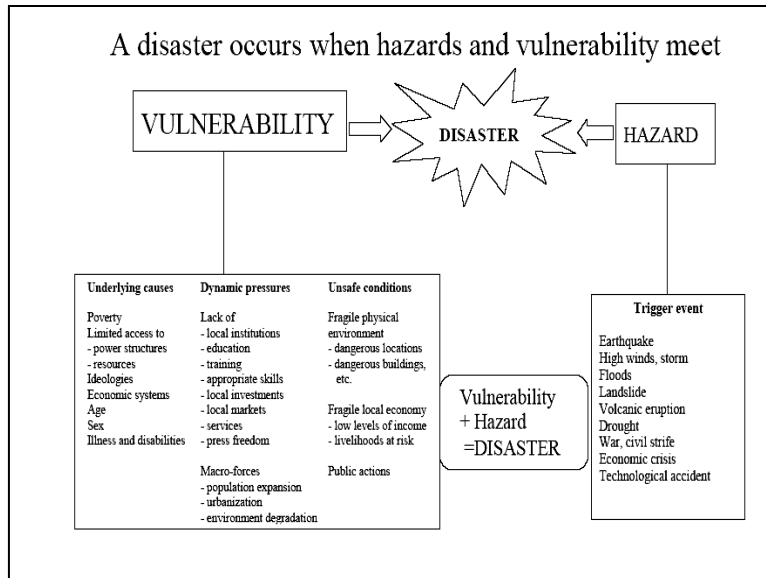
It is essential to make distinction between hazard and disaster. The presence of hazard by its self can neither cause risk nor disasters. There are different predisposing factors that make vulnerable the survivors. The following are some of such underlying causes:

- ❖ Poverty: Virtually all disaster studies show that the wealthiest of the population survive the disaster, remains unaffected or are able to recover quickly.
- ❖ Population growth: Increasing number of people will compete for limited amount of resources which can lead to conflict and conflict may result in crisis-induced migration.
- ❖ Rapid urbanization: competition for scarce resources is an inevitable consequence of rapid urbanization, leading to human-made disasters.
- ❖ Transitions in cultural practices: Societies are constantly changing and in continuous state of transition. These transitions are often extremely disruptive and uneven, leaving gaps in social coping mechanisms and technology. Conflicts as well as transitional cultural practices can also

lead to civil conflict (e.g. communal violence triggered by religious differences).

- ❖ Environmental degradation: Deforestation leads to rapid rain run off, which contributes to flooding.
- ❖ Lack of awareness and information: Disasters can also happen because people vulnerable to them simply do not know how to get out of harm's way or to take protective measures.
- ❖ Wars and civil strife are among the principal man made factors precipitating disaster.

Disaster mainly occurs when vulnerability and hazard meet. The interaction and association of such phenomena is depicted in the following figure (Figure 1).



**Figure1: Relationship of vulnerability, hazard and disaster**

**Source: WHO/EHA, 2002**

### 1.3. TYPES OF DISASTERS

Disasters are broadly divided into two types comprising natural and man made (technological) disasters. There is also other basis by which disasters can be categorized which has been mentioned later in this section.

#### 1.3.1. Natural disasters

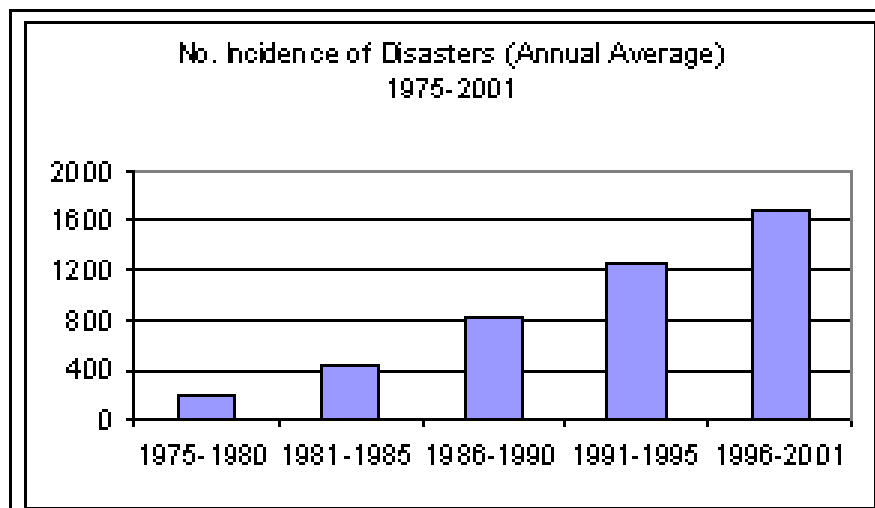
Natural disasters occur as the **result of action of the natural forces** and tend to be accepted as unfortunate, but inevitable. The



natural disasters result from forces of **climate** and **geology**. Natural disasters are perhaps the most “unexpected” and costly overall in terms of loss of human lives and resources. In the last few years, natural disasters have claimed 100,000 lives costing above 140 billion US dollars.

During the 1980s, more than 700,000 people lost their lives as a direct result of severe weather, including floods and droughts. Natural disasters can be categorized as “acute” or “slow” in their onset. They should be predictable in certain instances since they cluster in geographical areas. Natural disasters with acute onsets include events such as earthquake, flood, hurricane, cyclone or typhoon, tornado, fire, tsunami or storm surge, avalanche, volcanic eruption, extreme cold or blizzard, and heat wave. Natural hazards with slow or gradual onset include drought, famine, desertification, deforestation, and pest infestation.

The 1990s and beyond proved to be even more calamitous, as global natural disaster trends rose with increasing rapidity (Figure 2). Among the different types of natural disasters, floods, tropical storms, droughts and earth-quakes are the most destructive, followed by landslides and storms.



Source: Emergency Disasters Data Base, EM-DAT.

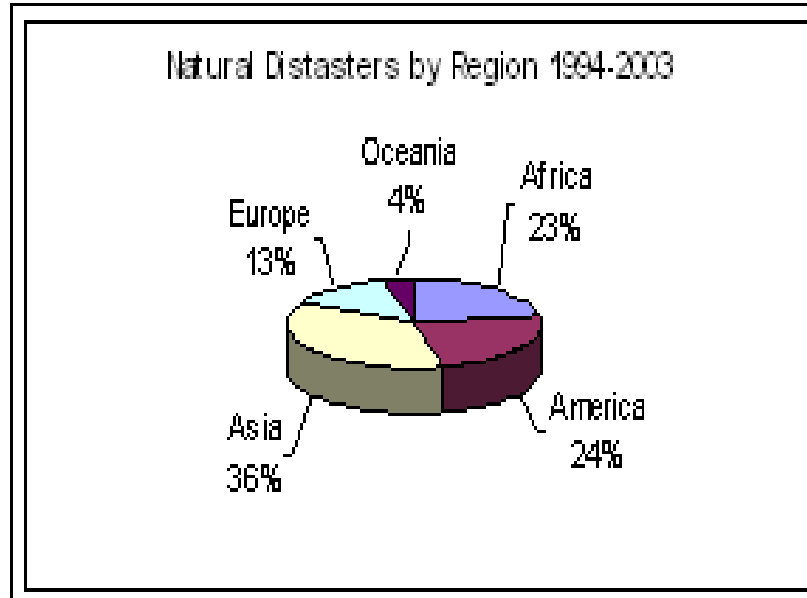
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Figure 2: Global trends of natural disasters.

In 1992 alone, natural disasters costed the world economy more money than it spent on development aid. The November 2004 typhoons in the Philippines also claimed over 1,000 lives and devastated the livelihoods of many more. The recent Indian Ocean Tsunami was even more destructive that more than 150,000 lives were lost. As reported by the secretariat of the International Strategy for Disaster Reduction (ISDR), the last ten years have seen 478,100 people killed, more than 2.5 billion people affected and about US\$ 690 billion in economic losses. Disasters triggered by hydro-meteorological hazards amounted for 97 percent of the total people affected by disasters, and 60 percent of the total economic losses<sup>(30)</sup>. The damage and costs inflicted by natural disasters spread well

beyond the immediate regions affected, to countries as a whole and often to the wider global community.

The incidence of hazards demonstrates considerable geographic variation. During the period 1994-2003, Asia was disproportionately affected by natural disasters (Figure 3). Approximately half of the 650 natural catastrophes recorded in 2004 were windstorms and severe weather events, while 80 were due to geological hazards (70 damaging earthquakes and 10 volcanic eruptions). As a result of increasingly effective preventive measures, while the number of disasters has more than tripled since the 1970s, the reported death toll has almost been reduced by half.

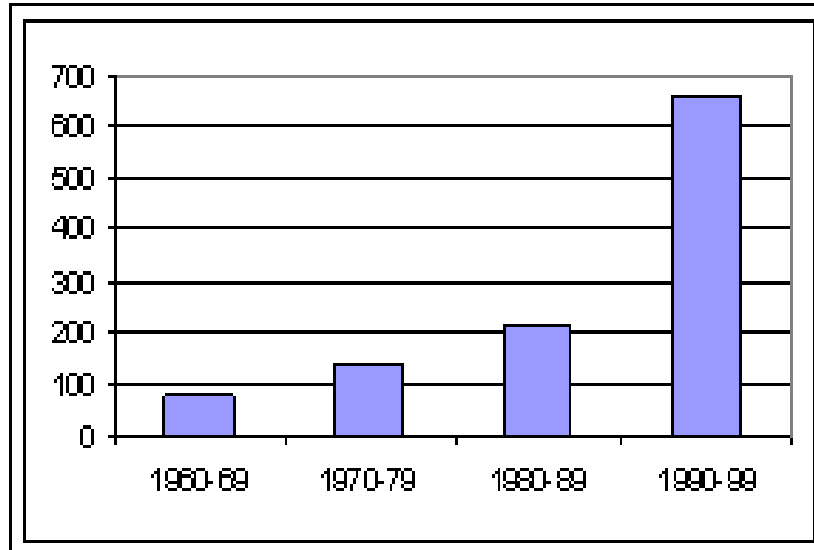


Source: Emergency Disasters Data Base, EM-DAT.  
(<http://www.em-dat.net/>)

Figure 3: Distribution of natural disasters by Region

Around 75 percent of the world's population lives in areas affected at least once by earthquake, tropical cyclone, flood or drought between 1980 and 2000. Billions of people in more than 100 countries are periodically exposed to at least one event of earthquake, tropical cyclone, flood or drought. As a result of disasters triggered by these natural hazards, more than 184 deaths per day are recorded in different parts of the world, 11 percent of the people exposed to natural hazards live in countries classified as having low human

development, and they account for more than 53 percent of total recorded deaths<sup>7</sup>. For each hazard type, disaster risk is considerably lower in high-income countries than in medium- and low-income countries.



Source: Emergency Disasters Data Base, EM-DAT  
(<http://www.em-dat.net>)

Figure 4: Economic losses due to natural disasters 1960-2000  
(million US\$)

Natural disasters can have significant economic and food security impacts, especially on the poorest households. In the last three decades, there has been a clear increase in the number of natural hazard events, the size of affected populations and the extent of economic losses (Figure 4). Several million victims have suffered

homelessness, disaster induced ill health, severe economic losses and personal tragedies.

Direct economic losses increased five times in the 1990s (Figure 4) and are mostly concentrated in the developed countries. Underlying these economic figures is not only the destruction of productive assets and vital infrastructure and the loss of livelihood systems but also their implication to economic development and poverty aggravation. When disasters occur, poor households suffer greater relative losses in terms of physical and social assets, resulting in deepening their poverty further. Such losses of assets can trap households in chronic poverty and food insecurity.

An important development in disaster management approaches over the past decade has been the recognition of their cyclical nature. Although the response phase captures most of the attention, much of the hard work on disaster risk management is carried out before disasters occur, in the form of risk assessment, prevention, mitigation, and establishing early warning systems. After the crisis has passed, the emphasis is on rehabilitation, reconstruction, and the commencement of a new cycle of assessment, incorporating lessons derived from the previous cycle.

### **1.3.2. Human (technological) causes**

The technological or manmade disasters result from some human activities, such as explosions, fires, the release of toxic chemicals or radioactive materials, bridge or building collapse, crashes, dam or levee failure, nuclear reactor accidents, breaks in water, gas, or

sewer lines, deforestation, war, etc. Technological disasters tend to involve many more casualties than natural disasters of the same magnitude of energy release.

Technological or man-made disasters are unpredictable, can spread across geographical areas, may be unpreventable and may have limited physical damage but long-term effect. They are also much more difficult for the community to deal with and for victims to accept. In technological disasters, there are issues of blame involved and the community spends much time discussing who was responsible and what mistakes were made. Increasingly, agencies involved in disasters and their management are concerned with the interactions between man and nature, which can be complex and can aggravate disasters.

Communities in which industrial sites are located or through which hazardous material pass via high way, rail, or pipeline are at risk for technological disasters. Injuries can occur to workers at the site, to responders bringing the incident under control and providing emergency medical care, and to residents in the community. Those with pre-existing medical conditions, such as lung or heart diseases, could be at increased risk for negative health outcomes if exposed to toxic related skin disorders, and lung damage can result from exposure to specific agents.

Ensuring that local industry implements basic safety procedures can significantly reduce negative health outcome from accidental release of toxins. Emergency preparedness – including the ability of pre-

hospital and hospital systems to care for patients exposed to industrial agents, the training of medical personnel to work in contaminated environments, and the stockpiling of personal protective equipment for responders – is key for providing care following industrial accidents.

**Another classification of disasters will be as follows:**

1. **Sudden-onset disasters** include floods, earthquakes, tsunamis, or tidal waves, tropical storms, volcanic eruptions, and landslides. As their name implies, sudden-onset disasters occur swiftly and often without any warning. Floods are the most frequent type of natural disaster associated with sudden migration of large populations and food shortages. Other types of disasters generally occur more frequently in Asia, Latin America, and the Caribbean rather than in Africa. When these disasters occur, they frequently cause thousands of deaths and casualties. Earthquakes cause the greatest number of deaths and overwhelming infrastructural damage. Communities at risk of these types of disasters should recognize and respond to threats posed by local weather patterns and the shape and contours of the land.

2. **Slow-onset disasters** include droughts, famine, environmental degradation, deforestation (loss of trees and vegetation), pest infestation and desertification (conversion of arable lands to deserts). These disasters are usually the result of adverse weather conditions combined with poor land use. Traditionally, African communities, particularly the poor, have been at increased risk of



these types of disasters because of poverty and social inequality, environmental degradation from poor land use and rapid population growth. Slow-onset disasters can be prevented because they happen over a long period of time and human decisions contribute to (or cause) problems. Early warning systems can be easily put in place to lessen or even prevent the disaster.

3. **Industrial/technological disasters** result from a society's industrial and technological activities that lead to pollution, spillage, explosions, and fires. They may occur because of poor planning and construction of manmade facilities (buildings, factories, etc.) or from neglect of safety procedures. Sudden-onset disasters such as earthquakes, floods, and terrorist acts may trigger secondary disasters such as fires or pollution. Industrial events have the potential to cause large-scale loss of life and infrastructural damage, especially in developing countries with unregulated industrialization, and inadequate safety standards and disaster response capacity. Wherever there is a man-made facility, there is the potential for an industrial or technological disaster to occur. Reducing the occurrence and effects of industrial disasters requires a multi-sectoral approach.

4. **Complex emergencies** are usually man-made, with multiple contributing factors. They often follow wars between states, internal conflict, and, increasingly, terrorist acts. Massive population displacements may occur due to lack of food, insecurity, and increasing death rates. Poverty and risk of conflict go hand in hand. Civilians that are not part of the conflicts end up bearing the majority

of casualties because they are often targets of both sides of the conflict.

5. **Epidemic diseases** are those diseases that normally do not occur in stable communities but have the potential to spread under certain conditions. This can cause frequent and severe outbreaks. These diseases may be spread by contaminated water or food, person-to-person contact, or through animals or insect vectors. Examples of epidemic diseases that commonly threaten displaced populations include cholera, measles, dysentery, respiratory infections, malaria, and, increasingly, HIV. After a major disaster, the risk of epidemic diseases increases mainly as a result of overcrowding and unhygienic conditions

#### **1.4. Phases of Disasters:**

Disaster situations are dynamic, always changing and demanding a change in response. Disasters can be viewed as a series of phases on a time continuum. Even though the evolving situation may appear continuous, identifying and understanding these phases helps to describe related needs and to conceptualize appropriate disaster management activities. These phases are described below:

**1. Pre-emergency phase:** the period before the disaster strikes may be used to assess how often a particular community is exposed to different risks (risk mapping) and how good is their preparedness. Protective actions can be undertaken based on the disaster warning and the available resources, e.g. identifying temporary shelters,

stocking basic supplies, planning evacuation routes, monitoring trends, etc.

**2. Impact and flight phase:** when a disaster strikes the hazard (fire, earthquake, floods, conflicts, etc) may trigger the displacement of large number of people from their homes. How long this phase lasts depends on the type of disaster, the number people affected and the distance they must travel to find sanctuary. Search and rescue and other assistances, e.g. providing transportation, shelter and basic supplies to affected people may be carried out to reduce the loss of lives.

**3. Acute phase:** this phase begins immediately after the impact of the disaster and marked by intense, often reactive activities by many humanitarian agencies responding to media reports of very high death rate (may be 5-60 times the normal death rate). The priority is to keep the affected people alive. Security may be a major concern in complex emergency situations. Critical services such as providing food, water, sanitation, basic health care, protection from violence and harassment are to be quickly organized. This phase ends when crude death rate falls below 1/10,000 persons per day (the crude mortality rate for stable population in Africa is about 0.5/10,000 individual per day).

**4. Post emergency phase:** the population movement usually slows down. This enables critical services to be properly established and maintained. During this phase the cause of displacement may be evolving. The displaced people wait for “something to happen” so

that they can return home, integrate with the local community or relocate else where. As international support declines, the emphasis shifts to building local capacity of and promoting community participation. Tracing reproductive health care, mental health care and other services may be initiated, based on the epidemiological information. It is difficult to set time limits on the post-disaster time phases or to accurately define the limits of each, even for one specific type of disaster. For example, the emergency phase of a hurricane or a flood may be only a few days, or as long as a week. A drought and a resulting famine can last for months or even a year or more.

**5. Repatriation phase:** after the emergency situation is over, displaced people are expected to return to their place of origin either on their own or with the help of relief agencies. Repatriation may be either forced or voluntary.

**6. Rehabilitation or reconstruction phase:** once permanent solution is obtained, the focus shifts from relief to development. The aim is to help the affected community become self-reliant. The responsibility of providing assistance is handed over to the affected community, the local authorities, development agencies and other non-governmental organizations. Because humanitarian and development technicians have different approaches to providing assistance and the infrastructure for relief is inadequate for development, the programs are re-oriented and redesigned.