
UNIT 1 MEANING AND CLASSIFICATION OF DISASTERS

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1.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the classification of disasters;
- Highlight global dimensions of disasters;
- Have an overview of natural and man-made disasters; and
- Understand the relationship between development and environment.

1.1 INTRODUCTION

The International Strategy for Disaster Reduction (ISDR) of the United Nations (U.N.) defines a hazard as “a *potentially* damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.” Hazards could be, natural (geological, hydro-meteorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be *single*, *sequential* or *combined* in their origin and effects. Accordingly, Hazard Analysis entails the identification, study and monitoring of a hazard to determine its potential, origin and characteristics.

A fine line separates environmental hazards and environmental resources, as between *water out of control* (flood hazard) and *water under control* (reservoir resources). The

atmosphere is considered 'benign' when it produces holiday sunshine but 'hostile' when it produces damaging 'loo' (Smith, 1996).

A disaster is a result of natural or man-made causes that leads to sudden disruption of normal life, causing severe damage to life and property to an extent that available social and economic protection mechanisms are inadequate to cope. Even at the outset, the conceptual distinction between 'hazards' and 'disasters' needs to be brought out clearly. Floods, Cyclones, *et al* are events in nature until a configuration of factors, which could be man-made or natural or both, cause the hazard to turn to a disaster. Disaster is the actual occurrence of the apprehended catastrophe.

Disasters proceed by cause-effect due to *endogenous* (inherent) and *exogenous* (external) factors, which combine to *excite* the phenomenon into a large-scale destructive event. Disasters are a result of vulnerabilities, which go on unabated/unchecked over time, which crystallises finally in a destructive event of great magnitude, which is a disaster.

Disaster is disturbance of 'equilibrium' which can be restored/ remedied by proactive policy in this regard. Hence, traditional perception of disasters as natural phenomena outside the realm of human intervention is misconstruing the problem; it is giving way to a 'systems perspective', which encompasses, ecological and social perspective to disasters, whereby disasters are understood as totalising events in which all dimensions of a social-structural formation involving organised human action in the environmental context in which it takes place is studied" (Oliver Smith and Hoffman, 1999). As a society interacts with its environment with its values and perceptions and engages in a series of processes over which it has incomplete control and knowledge of, for example, development and planning processes involving production and distribution of goods over long periods of time; underlying hazards turn to disasters (Oliver Smith, 1999). By systemic understanding, hazard simply acts as a 'catalyst' in that it brings forth underlying tensions that are always present as potential pressures. Systems' perspective is therefore rightly applied to understanding the phenomenon underlying disasters (Watts, 1983).

With this understanding, Disaster Management is an attempt to inquire into the *process* of a *hazard turning to disaster*; to identify the causes and rectify the same through public policy. Administrative factors, such as poor building in an earthquake prone zone, poor land use planning in flood prone areas which lead to housing critical facilities in at-risk zones; allowing habitation in such zones, poor laws that fail to regulate facilities leading to disasters, such as the Bhopal gas leak, general low risk perception among people, more significantly policy-makers that hinders interest articulation for preventive policy for disaster management create conditions that lead to low lying /inherent hazards turning to disasters. This leads us to the issue of sustainable development since study and research in the area of disaster management is increasingly revealing human causatives behind disaster phenomena.

Hence, disaster management is a policy issue. Accordingly, the Tenth Plan included a full chapter on Disaster Management. Hitherto, it had been treated as a subject of 'calamity relief', hence, classified under non-plan expenditure. There has been a policy shift, post Yokohama Conference(1994), in that plan allocations would henceforth be made under respective sector *plan heads* for disaster mitigation. The reasoning is simple; if disasters are inherent in the socio-physical circumstances/environment, their manifestation could be controlled through better management of the environment by reducing the potency of socio- economic and physical variables that contribute to disaster losses over time.

1.2 CLASSIFICATION OF DISASTERS

Disasters are classified as per origin, into *natural* and *man-made* disasters. As per severity, disasters are classified as *minor* or *major* (in impact). However, such classifications are more academic than real as major disasters could simply be events that received relatively more media coverage (Parasuraman and Unnikrishnan, 2005).

High Powered Committee (HPC) was constituted in August 1999 under the chairmanship of J.C.Pant. The mandate of the HPC was to prepare comprehensive model plans for disaster management at the national, state and district levels. This was the first attempt in India towards a systematic comprehensive and holistic look at all disasters. Thirty odd disasters have been identified by the HPC, which were grouped into the following five categories, based on generic considerations:

1) **Water and Climate**

- Floods
- Cyclones
- Tornadoes and hurricanes (cyclones)
- Hailstorms
- Cloudburst
- Heat wave and cold wave
- Snow avalanches
- Droughts
- Sea erosion
- Thunder/ lightning

2) **Geological**

- Landslides and mudflows
- Earthquakes
- Large fires
- Dam failures and dam bursts
- Mine fires

3) **Biological**

- Epidemics
- Pest attacks
- Cattle epidemics
- Food poisoning

4) Chemical, industrial and nuclear

- Chemical and Industrial disasters
- Nuclear

5) Accidental

- Forest fires
- Urban fires
- Mine flooding
- Oil spill
- Major building collapse
- Serial bomb blasts
- Festival related disasters
- Electrical disasters and fires
- Air, road, and rail accidents
- Boat capsizing
- Village fire

Depending on the type of disaster, a nodal ministry has been assigned the task of coordinating all activities of the state and district administration and the other support departments/ministry. The following table below vividly gives the information:

Type of Disaster/Crisis	Nodal Ministry
Air Accidents	Ministry of Civil Aviation
Civil Strife	Ministry of Home Affairs
Major breakdown of any of the Essential Services posing widespread and protected problems	Concerned Ministries
Railway Accidents	Ministry of Railways
Chemical Disasters	Ministry of Environment
Biological Disaster	Ministry of Health
Nuclear Accident inside or outside the country which poses health or other hazards to people in India	Department of Atomic Energy

Source: *Manual on Natural Disaster Management in India: NCDM, IIPA.*

It is not the classification but the understanding of the term ‘disaster’ itself that is important. As reported in the World Disasters Report, 2004, *heat waves* have been missing from disaster and public health policies, despite mounting death tolls, particularly in Europe. This is probably because sudden high profile disasters, such as earthquakes evoke greater *dread* than road accidents, despite evidence that more people die in road accidents than earthquakes. The higher the dread factor, the more people want action to reduce those risks. During August 2003, between 22,000 and 35,000 people died due to heat waves across Europe. Economic losses totaled over US\$ 13 billion. The challenge

for health professionals and disaster specialists is to raise public awareness of the potential harm caused by extreme temperatures and treat the problem as a disaster.

The *problem of migrants* is another example. They are an important development resource for their home countries, remitting about US\$ 80 billion per year to developing nations (compared to US\$ 50 billion in world aid). But while many opt to migrate, tens of millions are forced to flee life-threatening conditions at home and become refugees. Largely unprotected by international laws and institutions, their plight is a *forgotten disaster*. As observed in the World Disasters Report, 2003, over 175 million people now live outside their countries of birth, double the figure in 1975. Many are economic migrants, who may be fleeing poverty or severe deprivation.

There is also increasing understanding of man-made causes behind most natural disasters, which calls for, and has, in fact, effected renewed understanding/perception of disasters. For both natural and man-made disasters, there is increasing evidence to suggest that both are in fact 'policy disasters' rather than the results of nature's vagaries or designs of fate. Increasing evidence suggests that human fallacies, such as inadequate legal framework to regulate hazardous units, have resulted in tragedies like the Bhopal tragedy and the in-house Vizag steel accidents where minor fires and deaths of employees due to mishaps have been reported. Unrestricted felling of forests, serious damage to mountain ecology, overuse of groundwater, changing patterns of cultivation, etc., has precipitated recurring floods and droughts. The spate of landslides in the Himalayas in recent years can be directly related to unchecked exploitation of forests and mountain vegetation and networks of roads that have been indiscriminately laid in the name of development. As articulated in the India Disasters Report (2005), lack of policy restricting tobacco and liquor sale has led to disasters by way of increasing mortality, globally, almost on epidemic proportions. Tobacco related diseases are increasingly incident, such as oral cancer and heart disease in young people under 40. It is apprehended that each year, tobacco causes 3.5 million deaths worldwide, or about 10,000 deaths per day. One million of these deaths occur in developing countries. By 2020, it is predicted that tobacco will become the leading cause of death and disability, killing more than 10 million people annually; thus, causing more deaths worldwide than HIV, tuberculosis, maternal mortality, motor vehicle accidents, suicide, and homicide combined. India has one of the highest rates of oral cancer in the world.

Similarly, experience of floods in Rajasthan (1996) and Mumbai (2005) suggests that more deaths are caused due to epidemic outbreaks following vector proliferation in accumulated waters rather than the natural disaster of the flood itself. This is clearly system failure, rather than nature's 'retribution.'

Experience of droughts in some pockets of Orissa suggests that unimaginative policy shifts, such as precocious exposure of farmers to market competition, falling overall standards of health and nutrition owing to reduced investments in education and health and other system weaknesses were the real causes of mortality rather than the natural feature of lack of enough rainfall. Policy-makers in third world countries allegedly seem to respond more to exogenous policy influences by way of international pressure to liberalise or 'open up' (markets) more than endogenous requirements, which is the real cause behind increasing vulnerability of people to death and disease in relatively impoverished parts of India, such as Orissa and Madhya Pradesh (Alternative Economic Survey, 2004-05).

Disasters, therefore, compel a re-look on developmental planning. It is obvious that the previous developmental policy has given us vulnerabilities in the form of slum creation/

proliferation, insufficient jobs, ecological degradation; though, ostensible growth in sectors, such as, industry, energy *et al* could not be denied. It remains a fact and has to be conceded that the basic needs of a large proportion of India's population have remained unmet despite schemes to provision the same. Though the Government of India, Economic Survey, 2004-05 indicates decline in the number of people below the poverty line (BPL), from 51.3 per cent in 1977-78 to 26.1 per cent in 1999-2000, it conceded that there are wide variations across states. Poverty is spatially concentrated in pockets in backward states such as Orissa though there may have been an overall decline in terms of averages. Figures never tell the complete picture. These are gross estimations, at best averages that give only a broad outlook, not the real details. There is endemic malnutrition and numerous reported incidences of starvation deaths. As per the results of the 55th round of National Sample Survey Organisation, rate of growth of employment on current daily status (CDS) basis declined from 2.7 per cent per annum in 1983-94 to 1.07 per cent in 1994-2000. The decline is largely attributed to stagnation in the agriculture sector. Share of agriculture in total employment dropped from 60 per cent in 1993-94 to 57 per cent in 1999-2000. Most growth has been recorded in the services sector.

Balanced regional development has also remained an unmet goal. Several states and regions in the country, such as Bihar, Orissa, Uttar Pradesh, Rajasthan, are relatively backward and suffer higher incidence of poverty compared to the national average. Noticeably, poverty is also widespread in areas more prone to natural disasters, like flood-prone areas, such as in north Bihar, east Uttar Pradesh, and north Bengal, and drought-prone areas, such as Rajasthan, Marathwada, and north Karnataka.

Poverty is also exacerbated due to excessive resource use/exploitation, which has caused depletion of ecological resources. As per the India Disasters Report, 2005, almost 40 per cent of India's population currently is forced to survive on depleted resources. Driven to desperation, they migrate, which has created the problem of unsustainable cities and a conflict ridden city culture, typically pronounced in slums. Increased pressure has encountered a crumbling local government structure, inept to manage change. Consequently, vulnerabilities have got complicated and harder to understand over time. They are increasingly manifest as conflicts along caste, religious, and ethnic lines and have assumed an endemic nature (Alternate Economic Survey, 2004-05).

1.3 GLOBAL DIMENSIONS OF DISASTERS

Disaster losses have shown an increasing trend, globally, due to urbanisation and increasing population. According to the United Nations, in 2001 alone, natural disasters of medium to high intensity caused at least 25,000 deaths around the world, more than double the previous year and caused economic losses world- wide of over \$36 billion. The data excludes the many small-scale events that have affected local economies adversely, and disturbed the life pattern for perhaps always. Some of the major events were, the Earthquakes that ravaged Gujarat, El Salvador and Peru, floods that ravaged countries in Asia, Africa and elsewhere, droughts that affected regions in Central Asia; Afghanistan, Asia and Central America, Cyclones in Madagascar and Orissa, and floods in Bolivia. Global disaster statistics for 1996-2000 revealed staggering economic costs estimated at US\$ 235 billion and 425,000 lives lost (CRED International Disaster Database).

Disasters caused by natural hazards alone reportedly affected an average of 211 million people per year in the past decade. Asia bears much of the brunt. Nearly half of the

world's major natural disasters, recorded over more than three decades, occurred in the region. As a result, Asia has become the world's most disaster-prone region, involving 80 per cent of the total affected populations, 40 per cent of the total deaths, and 46 per cent of the total economic losses (CRED statistics for 1997-2001).

Disasters have international ramifications in terms of direct and indirect impact (s). Hence is explained the need for concerted action on the part of the international community to tackle regional vulnerabilities. Developing countries have suffered more from disaster events since system capacity to cope with events of such large magnitude is considerably lower as compared to developed countries, and the vulnerability quotient on account of physical social and economic vulnerability of the multitudes, significantly higher. Since 1991, two-thirds of the victims have been from developing countries and just 2 per cent from the developed countries.

Asia is particularly vulnerable to disaster strikes. Between 1991-2000, 5,54,439 people died in Asia compared to 1, 1159 casualties in rest of the world. Within Asia, 24 percent of the casualties occurred in India owing to its size, population and vulnerability. Floods and High Winds account for most deaths in India (Tenth Plan, 2002-07).

Between 1994 and 2003, disasters, both 'natural' and 'technological', claimed 68,671 Indian lives, affected an average of 68 million people every year, and cost US\$1.9 billion annually in direct economic damage. This toll is worse than for the previous decade, so the task of supporting the resilience of Indian communities to disasters has never been more urgent (World Disasters Report, 2004).

1.4 OVERVIEW OF NATURAL DISASTERS IN INDIA

India's Key Vulnerabilities as articulated in the Tenth Plan, (2002-07) are as follows:

- Coastal States, particularly on the East Coast and Gujarat are vulnerable to cyclones.
- 4 crore hectare landmass is vulnerable to floods
- 68 per cent of net sown area is vulnerable to droughts
- 55 per cent of total area is in seismic zones III- V, hence vulnerable to earthquakes
- Sub- Himalayan sector and Western Ghats are vulnerable to landslides.

The succeeding text analyses in brief vulnerabilities to specific natural hazards in India (Menon and Kalmadi).

A) Floods

Seventy five per cent of rainfall is concentrated over four months of monsoon (June - September) as a result of which almost all the rivers carry heavy discharge during this period. The problems of sediment deposition, drainage congestion and synchronisation of river floods compound the flood hazard with sea tides in the coastal plains. Brahmaputra and the Gangetic Basin are the most flood-prone areas. The other flood-prone areas are the northwest region of the west flowing rivers like Narmada and Tapti, Central India and the Deccan region with major east flowing rivers like Mahanadi, Krishna and Cauvery. While the area liable to floods is 40 million hectares, the average area affected by floods annually is about 8 million hectares.

B) Droughts

India has a largely monsoon dependant irrigation network. An erratic pattern, both low (less than 750 mm) and medium (750 - 1125 mm) makes 68 per cent of the total area vulnerable to periodic droughts. A 100-year analysis reveals that the frequency of occurrence of below normal rainfall in arid, semi-arid, and sub-humid areas is 54-57 per cent. Severe and rare droughts occur in arid and semi-arid zones every 8-9 years. The semi-arid and arid climatic zones are subject to about 50 per cent of severe droughts that cover generally 76 percent of the area. In this region, rare droughts of most severe intensity occurred on an average once in 32 years and almost every third year was a drought year.

C) Cyclones

India has a long coastline. There are two distinct cyclone seasons: pre-monsoon (May-June) and post-monsoon (October-November). The impact of these cyclones is 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. Most casualties are caused by coastal inundation by tidal waves, storm surges and torrential rains.

D) Earthquakes

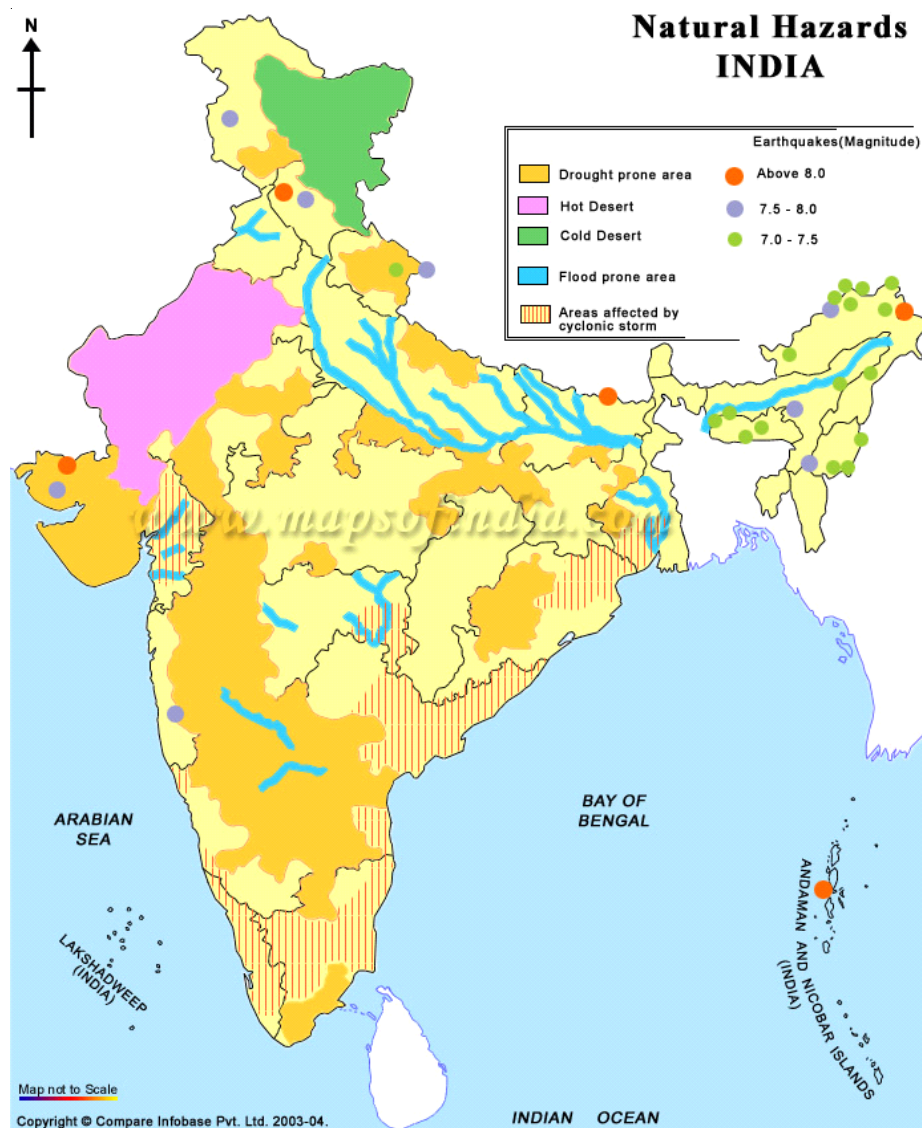
The Himalayan mountain ranges are considered to be the world's youngest fold mountain ranges. The subterranean Himalayas are geologically very active. In a span of 53 years, four earthquakes exceeding magnitude 8 on the Richter scale have occurred in this region. The peninsular part of India comprises stable continental crust. Although these regions were considered seismically least active, an earthquake that occurred in Latur in Maharashtra on September 30, 1993 of magnitude 6.4 on the Richter scale caused substantial loss of life and damage to infrastructure.

E) Landslides and Avalanches

The Himalayan, the northeast hill ranges and the Western Ghats experience considerable landslide activity of varying intensities. River erosions, seismic movements and heavy rainfalls cause considerable activity. Heavy monsoon rainfall often in association with cyclonic disturbances results in considerable landslide activity on the slopes of the Western Ghats.

Avalanches constitute a major hazard in the higher reaches of the Himalayas. Parts of the Himalayas receive snowfall round the year and adventure sports are in abundance in such locations. Severe snow avalanches occur in Jammu & Kashmir, Himachal Pradesh and the Hills of Western Uttar Pradesh. The population of about 20,000 in Nubra and Shyok valleys and mountaineers and trekkers face avalanche hazard on account of steep fall.

The following map gives the multi- hazard vulnerability of the Indian landmass.



Source: Compare InfoBase Pvt. Ltd.

1.5 OVERVIEW OF MAN-MADE DISASTERS

Man-made disasters refer to non-natural disastrous occurrences that can be sudden or longer term. Sudden man-made disasters include structural collapses, such as building and mine collapse, when this occurs independently without any outside force. In addition, air disasters, land disasters and sea disasters are all man-made (International Red Cross).

The countries in Asia region are densely populated and are low-income economies. Recurrent disasters, specifically, road and rail accidents, fire outbreaks, deaths of pavement dwellers due to heat and cold wave conditions etc., cause serious setback to the developmental process; in fact disasters and development have a chicken and egg relationship in that one is in fact the primary cause of the other. For example, disasters exacerbate poverty conditions in affected regions; and the poor are the worst sufferers in disasters. The fast pace of growth and expansion without comprehensive understanding or preparedness in urban planning, for instance, has brought forth a range of issues that seek urgent attention at all levels. Local administrative weaknesses have allowed the situation

to get out of hand. Institutional weaknesses have created system vulnerabilities over time. In the absence of mitigation measures, growing numbers in our population are at risk of prospective hazards, such as air accidents, boat capsizing, building collapse, electric fires, festival related disasters, forest fires, mine flooding, oil spills, rail accidents, road accidents, serial bomb blasts, and fires. The safeguards within existing systems are limited and the risks involved high. The situation with regard to road accidents is particularly acute.

A comprehensive document prepared by the Transportation Research and Injury Prevention Programme (TRIPP) brings out the magnitude of the problem in India and abroad. It gave the first official data of accidents in 2002, recording 80,118 deaths and 342,200 injuries on Indian roads but conceded at the same time that many cases went unreported and that 1,200,000 required hospitalisation. Of the worldwide annual average of 700,000 road accidents, 10 per cent occur in India. The latest annual statistics indicate that over 80,000 people are killed on Indian roads. These figures do not reflect the human suffering and social problems caused by accidents. Nearly three lakhs per year sustain injuries.

Financial losses are staggering. A decade's worth of saving the Rs 50,000 million estimated loss in traffic accidents every year could finance building 7,000 km long, six lane national highway at today's rates. The figures are always on the increase, which corresponds to the tremendous increase in the production and sale of motor vehicles (Moorthy and Karnick, 2005).

Nuclear, Chemical and Biological threats are apparent in the present scenario. Deliberate international terrorism or accidental secondary fallouts can be fatal. There has been considerable agitation in India of late over advanced countries dumping hazardous waste in India. This falls within the realm of international relations. Rapid and effective response as also mitigation policy needs intensive research and laboratory support in this regard to frame convincing legislation, which can ensure internal security without jeopardising external relations with foreign countries. Globalisation would have to be effectively managed through legislation regulating Multi-national and Transnational corporation activity, especially with regard to safety precautions for hazardous facilities. EIAs or environment impact assessments are already underway in India. There is need for better implementation of the same. A good EIA needs good data support to base arguments on, which is presently lacking. Acknowledging the need, Environmental Information Centre (EIC) has been set up to serve as a professionally managed clearing house of environmental information that can be used by MoEF, project proponents, consultants, NGOs and other stakeholders involved in the process of environmental impact assessment in India. EIC caters to the need of creating and disseminating organised environmental data for various developmental initiatives all over the country. Regarding oil spills, experts opine that satellite imagery should be used to mark out vulnerable areas and mitigation measures put in place, as for example, restricting habitation in the areas.

In India, the man-made disaster category also includes communal riots, which affect parts of India periodically, as in the wake of the Babri Masjid demolition or unabated violence against Dalits, the sub-ethnic North-East tangle, and others. Vulnerability studies in this regard would require empirical unearthing of facts with regard to the socio-economic profile of the regions with a view to pinpointing the exact cause (s) of recurrent violence in the area (s). In this regard, generation of awareness among communities, strengthening/generating positive social capital proactively, through measures like mustering opinion in support of measures to ameliorate the situation, lending active state support to social

workers involved in movements towards the same would be some of the desirable activities.

Health is a major factor in disaster management efforts. As reported in the World Disasters Report, 2004, across southern Africa, HIV/AIDS is combining with food insecurity, poverty, worsening health care, dirty water and sanitation, uncontrolled urbanisation and common disease to create an unprecedented disaster that conventional intervention can no longer contain. The problem is no less acute in India, where figures of actual and potential victims keep rising. The pace of improvement in health services does not compare favourably with countries in East Asia and Latin America where life expectancy is almost as good as developed countries. This is because inter-sector linkages between sanitation, nutrition, poverty alleviation, education, drinking water supply *et al* have not been duly explored. In states where such linkages obtain for historical reasons, or as a result of deliberate effort in this regard on the part of the government, results in health improvement are significantly better than other states. Hence, emphasis in the tenth plan was on improved logistics with regard to drug supply and diagnostics and exploring systems of health care financing so that essential health care is available to all at affordable cost (Tenth Plan).

As per the Red Cross, long-term man-made disasters refer to civil strife, civil war and international war, which are equally pertinent policy concerns. On a national level, this involves war-like encounters between armed groups from the same country, which take place within the borders. Such outbreaks of war, besides threatening national security, may pose large-scale medical problems such as epidemics, lack of water, accumulation of rubbish, displaced persons, refugees, food shortage, hunger etc. Our country has been plagued by civil strife in Kashmir and North-East particularly, besides South India and West Bengal, occasionally. Tensions with neighbouring states have been persistent. As solution has evaded attempts in this regard, the emphasis in diplomacy has currently shifted to 'management' of the problem with a view to normalising relations on other counts such as commerce *et al* instead of insisting on solving persistent political issues, for instance, the Kashmir issue with Pakistan, first.

Scenario with regard to preparedness, with respect to both internal and external problems, however, need not be too pessimistic, since, theoretically, transport accidents, terrorism *et al* have hitherto not been considered, 'disasters' *per se*; on account of increasing losses from such events however, the term 'Disaster' today is more inclusive in that the above enumerated are being counted disasters, leading to mitigation policy in this regard and urgency with which they need to be reviewed. This is significant from the point of view of Risk Perception in the sense of resource allocation and prioritisation in development planning. Considering the seriousness with which they are being studied/perceived, comprehensive mitigation plans expectedly, would now be built into wider development planning for the future. The World Health Organisation says India scores high on a number of criteria for disaster-readiness. The country also earned praise from a global study for its immediate response to the tsunami disaster. India is among the five countries in South Asia that meet many of the criteria for disaster-preparedness and have a legal framework in place for the purpose, says the World Health Organisation (WHO).

The other four countries categorised by the WHO as having adequate levels of disaster-readiness are Bangladesh, Indonesia, Sri Lanka and Thailand. India, Myanmar, Sri Lanka and Thailand also have a legal framework in place.

Disaster management is now part of plan commitments, which means it is already a frontline development issue/priority, which improves its position with respect to resource allocation.

Also, awareness generation is already being attempted with regard to retrofitting and earthquake resistant structures *et al*, which is a positive development. It also means government strategy towards disaster mitigation envisages active cooperation of people, which has been advocated as an essential requirement by concerned world bodies, like the United Nations Development Programme (UNDP) and the International Red Cross.

Items high on agenda for administrative reforms, as articulated in the Tenth Plan, henceforth, for overall/comprehensive disaster management, would be, *development of capacity at local levels* through effective decentralisation, *improvement in law and order administration*, through modernisation and training, *urban development* with a perspective of disaster mitigation planning involving all stakeholders.

1.6 VULNERABILITY PROFILE OF INDIA

Vulnerability is defined as ***“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”***. The concept of vulnerability therefore implies a measure of risk combined with the level of social and economic ability to cope with the resulting event in order to resist major disruption or loss. This susceptibility and vulnerability to each type of threat will depend on their respective differing characteristics. The 1993 Marathwada earthquake in India left over 10,000 dead and destroyed houses and other properties of 200,000 households. However, the technically much more powerful Los Angeles earthquake of 1971 (taken as a benchmark in America in any debate on the much-apprehended seismic vulnerability of California) left over 55 dead.

Physical Vulnerability

Physical vulnerability relates to the physical location of people, their proximity to the hazard zone and standards of safety maintained to counter the effects. For example, people are only vulnerable to a flood because they live in a flood-prone area. Physical vulnerability also relates to the technical strength of buildings and structures to resist the forces acting upon them during a hazard event. The Indian subcontinent can be primarily divided into three geophysical regions with regard to vulnerability, broadly, as, the Himalayas, the Plains and the Coastal areas. The topographic and climatic characteristics of each region make them susceptible to different type of disasters (study along with map given in the text).

Socio-economic Vulnerability

The degree to which a population is affected by a calamity will not purely lie in the physical components of vulnerability but in *contextual*, relating to the prevailing social and economic conditions and its consequential effects on human activities within a given society.

Disparate capacities of people are exposed during disasters, which explains differential vulnerability/losses, which are explained in disaster literature as socio-economic vulnerabilities. Disaster effects are seen to be directly proportionate to the poverty gap and poverty

intensity in the society/location as it is the poor that normally live in high concentration in marginal areas (unstable slopes, flood plains) with little infrastructure and fewer resources to cope. Research in areas affected by earthquakes indicates that single parent families, women, handicapped people, children and the aged are the particularly vulnerable social groups.

Bad land use planning in seismic and flood prone zones; unplanned and inadequate developmental activity in high- risk areas is a cause for increased losses during disasters. One million houses are damaged annually in India apart from high human, social and other losses. Urban growth and concentration of limited resources are realities of our times, while the rural sector faces lack of access. This compounds the problems of disaster vulnerability, especially during earthquakes. Informal settlements that house most of the urban and rural poor give way easily to physical stress, during earthquakes and floods, causing large scale fatalities during disasters such as earthquakes and floods. Single scale event fast turns into a compound phenomenon as the infrastructure gives way, leading to fire breaks, deaths due to electrocution, besides making response ever more difficult.

Following steps are imperative for the vulnerability assessment and preparedness in high-risk zones:

- Identification of various hazard prone areas. Preparation of detailed vulnerability profiles, mapping food insecurity, aviation hazard, landslide hazard etc.
- Vulnerability and risk assessment of buildings
- Developing disaster damage scenarios
- Developing technical guidelines for hazard resistant constructions
- Upgrading of hazard resistance of existing housing stock by *Retrofitting*, and
- Crafting techno-legal regime to be adopted for infrastructure development.

1.7 ENVIRONMENTAL CONCERNS

Nature is an abundant resource but indiscriminate and rampant exploitation creates threat of destruction. The balance in nature, between man, animal and resources must be maintained/nurtured. Oil spills; forest fires or nuclear leaks can cause widespread and irreparable damage to the environment. Time cycles to renew these resources are long and therefore measures for safety, maintenance and containment have to be strengthened.

Some of the environmental concerns are discussed as follows:

I) Global Warming & Extreme Climate

Global warming is going to make other small local environmental issues seemingly insignificant, because it has the capacity to completely change the face of the Earth. Global warming is leading to shrinking glaciers and rising sea levels. Along with floods, India also suffers acute water shortages. The steady shrinking of the Himalayan glaciers means the entire water system is being disrupted; global warming will cause even greater extremes. Impacts of El Nino and La Nina have increasingly led to disastrous impacts across the globe.

Scientifically, it is proven that the Himalayan glaciers are shrinking, and in the next fifty to sixty years they would virtually run out of producing the water levels that we are seeing

now. This will cut down drastically the water available downstream, and in agricultural economies like the plains of Uttar Pradesh (UP) and Bihar, which are poor places to begin with. That, as one may realise, would cause tremendous social upheaval. Similar would be problems in the coastal areas where sea level rise would inundate large tracts. Some of the islands would get submerged.

The changing environmental equilibrium as well as the diverse geographical setting of the region is leading to extreme weather conditions, often emerging as disastrous phenomena. A large number of deaths are periodically reported due to heat or cold waves, mostly from northern and coastal states of the country.

II) Agro-forestry

Sustainable management of the natural resources, of land, water and vegetation is essential to provide livelihood and environmental security. Ever-increasing demographic pressures coupled with developmental activities are causing tremendous pressure in the utilisation of these resources, leading to various kinds of ecological disasters, such as droughts, floods, cyclones, landslides, mine spoils, siltation of reservoirs, deterioration of water bodies, loss of biodiversity etc. In recent times, India has witnessed large-scale disasters such as frequent floods in the Indo-Gangetic and Brahmaputra flood plains, cyclones of the east coast and Gujarat, earthquakes of Uttarkashi, Latur, Jabalpur, Chamoli and Gujarat; and small-scale hazards, such as landslides in the Himalayan range, forest fires and desertification. These natural disasters have not only affected the economy but also taken a huge toll of human life. The increasing frequency of these disasters is the outcome of excessive biotic and abiotic interferences, which have resulted in considerable degradation of our natural resources.

Large scale deforestation across the globe in general, and under-developed as well as developing countries in particular, coupled with faulty management practices have resulted in various kinds of environmental degradations, such as wind and water erosion; physical and chemical degradation of soil, water and biodiversity; and global warming. Deforestation is a slow onset disaster that contributes to other cataclysmic disasters. The rapid rate of deforestation in the tropics is the key factor in increasing the frequency of flood disasters. The greatest and the most immediate danger of deforestation is that gradually diminishing forested areas contribute to or worsen other types of disasters, such as accelerated soil erosion, floods, drought and desertification. Deforestation of watersheds, especially around smaller rivers and streams increases the severity of flooding, reduces stream flows and dries up springs during dry seasons and increases the load of sediment entering the waterways. Most hazards in the Himalayan region emanate primarily from the natural processes of geologic, hydrologic and physiographic nature but are greatly affected by human interventions. Ever increasing demand for food and fodder has resulted in conversion of forests and exploitation of fragile and marginal lands into agriculture, migratory grazing and shifting cultivation practices. Mining and other human activities have led to over-exploitation of natural resources and consequent occurrence of ecological disasters. Rapid degradation of the Himalayan ecosystem is posing a potential danger to the greenery of the Indo-Gangetic basin, causing sporadic floods in some areas and droughts in others. As a result, more than half of the geographical area of the country is now partially exposed to various forms of land degradation processes, such as water and wind erosion, salinisation, water logging, flooding, ravines, shifting cultivation, mining, quarrying, landslides etc. About two-thirds of the 142 million ha of agricultural land in the country is drought affected and about 40 million ha area is prone to flooding, of which

about 8 million ha area gets annually flooded. It is estimated that about 56 per cent of the country is susceptible to earthquake damages.

Human population of India has already crossed the one billion mark and the livestock population has reached a figure of 445 million. The per capita availability of cultivated land has declined over the years from 0.53 ha in 1950 to 0.15 ha in 2000 and is expected to further reduce to 0.12 ha by 2015 A.D. owing to population pressures. The requirements of food grains, fodder and fuel wood by 2015 A.D. have been estimated at 275 million tonnes, 1083 million tonnes and 235 million m³, respectively to meet the requirements of 1225 million human and 600 million livestock population indicating a shortfall of 73 million tonnes, 570 million tonnes and 195 million m³ of food grains, fodder and fuel wood at the current level of production. Besides, tremendous pressure on limited forest resources (63 million ha) and over-exploitation of land resources, particularly the marginal lands, might further aggravate land degradation and jeopardise sustainability of these resources beyond retrieval. Agriculture is the mainstay of the rural population in the country. There has been a spectacular increase in food production since independence, which has increased four times from 51 million tonnes in 1950-51 to 203 million tonnes in 2000-01 against three-fold increase in population. However, uneven development of agriculture across regions and also among different sections of the farming community has widened the disparity between resource-rich and resource-poor farmers and has resulted in low levels of productivity, especially in rainfed areas and degradation of natural resources. Of the 142 million ha cultivated area in the country, 63 per cent (89 million ha) is rainfed which accounts for only 45 per cent of the total food production while 37 per cent irrigated area (53 million ha) contributes 55 per cent to the national food basket. Moreover, agriculture on marginal and fragile lands in the hilly regions has resulted in enormous soil loss. The government has therefore, accorded high priority to holistic and sustainable development of rainfed areas.

Diversification of land use systems is a necessary strategy for providing a variety of products for meeting varied requirements of the people, insurance against risks caused by weather aberrations, controlling erosion hazards and ensuring sustainable production of the land on a long-term basis. Agro- forestry is a viable alternative to prevent and mitigate natural disasters. Besides, agro-forestry may be one of the important tools for disaster management. Agro- forestry may be defined as a technique of growing food crop annuals in association with woody perennials to optimise the use of natural resources, minimise the need for inputs derived from non-renewable resources and reduce the risk of environmental degradation. Agro- forestry, a multiple use concept of land management, is also capable of meeting the present challenges of shortage of fuel wood, fodder, fibre, timber, unemployment, environmental degradation, protection and improvement of wastelands and agriculture land. It has immense potential to ensure stability and sustainability in production and to provide ecological and economic security. In India, agro- forestry practices are dovetailed in the various developmental programmes/schemes in the Five Year Plans of Government of India, either to prevent natural disasters or to overcome the problems of the affected people during and after natural disasters. These programmes include, Flood Control/Management Programmes, Multi-purpose River Valley Projects, Agriculture Development Programmes, Integrated Rural Development Programmes (IRDP), and National Watershed Development Programme for Rainfed Areas (NWDPR), Forestry Development Scheme, Drought Prone Area Development Programme (DPADP) and Desert Development Programme (DDP). In other words, agro- forestry has a wide and diverse potential to protect the environment in varying agro-climatic situations. The major environmental functions of agro-forestry may be summarised as:

- Control of soil degradation
- Control of desertification
- Flood control
- Drought moderation
- Reduction in the pollution of groundwater resulting from high inputs of fertilizers
- Increasing biodiversity in the farming system and watershed scale
- Increasing food security and thereby reduce pressure on land resources
- Checking deforestation and its associated impact on environment
- Reducing pressure on forests through on-farm supply of fuel wood, fodder and other forest products
- Reduction in the build-up of atmospheric carbon dioxide and other greenhouse gases
- Disaster prevention, rehabilitation and reconstruction.

III) Urban Risks

India is experiencing massive and rapid urbanisation. The population of cities in India is doubling in a period ranging just two decades according to the trends in the recent past. It is estimated that by 2025, the urban component, which was only 25.7 per cent (1991) will be more than 50 per cent. The Ninth Five Year Plan estimates India's population size, by 2011, to be 1178.89 million with an urban population share of 32 per cent. A characteristic feature of the urbanisation process is the increasing 'metropolitanisation' leading to the creation of huge urban agglomerates.

The trend indicates the continued urbanisation and metropolitanisation in the decades to come. Some of the urban agglomerations today accommodate more than 10.0 million people. Their number and sizes will continue to grow. Such concentration trends in the Indian demographic scenario would surely subject its cities to greater risk of damage to life and property in the event of a disaster.

Urbanisation is increasing the risks at unprecedented levels; communities are becoming increasingly vulnerable, since high-density areas with poorly built and maintained infrastructure are subjected to natural hazards, environmental degradation, fires, flooding and earthquake. Urbanisation dramatically increases vulnerability, whereby communities are forced to squat on environmentally unstable areas such as steep hillsides prone to landslide, by the side of rivers that regularly flood, or on poor quality ground, causing building collapse.

Nature of Risks

Most prominent amongst the disasters striking urban settlements frequently are, floods and fire, with incidences of earthquakes, landslides, droughts and cyclones. Of these, floods are more devastating due to their widespread and periodic impact. Fires have more localised effects but are very frequent in urban areas, leading to heavy losses of life and property.

Studies indicate that the loss of life and property due to floods has been increasing over the past decades. The prime reason for this is unplanned urban growth on the banks of

the rivers and in other low-lying areas in the vicinity. The 2005 floods of Maharashtra bear testimony to this. Heavy flooding caused the sewage system to overflow, which contaminated water lines. On August 11, the state government declared an epidemic of *leptospirosis* in Mumbai and its outskirts (Wikipedia, 2005). These kinds of disasters can only be averted with the help of disaster conscious urban planning and development in flood sensitive areas.

Fires have emerged as a critical issue in urban planning due to the rising frequency of fire incidents leading to huge losses. Fires are very common in slum and squatter settlements in large cities and in high-rise buildings. Fire fighting capabilities are indeed very essential, but these are mostly curative measures. More importantly than these, preventive measures are required to address this critical issue, effectively and efficiently. Hence, for efficient control and management of fire disasters, it is essential to have, and implement, proper land use zoning, land sub-division, and building regulations.

1.8 DEVELOPMENT vs ENVIRONMENT

Developmental activities compound the damaging effects of natural calamities. The floods in Rohtak (Haryana) in 1995 are an appropriate example of this. Even months after the floodwaters had receded; large parts of the town were still submerged. Damage had not accrued due to floods, but due to water-logging which had resulted due to peculiar topography and poor land use planning. Ad-hoc land use decisions are a common practice in our system due to immense demand/ pressures for/on scarce land supply. In Punjab, highly chemicalised canal irrigation has led to large-scale salinisation and water-logging as well as groundwater contamination. In other parts of India, mega development projects like dams displace millions of people from their homes, and submerge tens of thousands of forest acreage and fertile soil. In a parallel development, many of these large dams with their massive reservoirs may have induced or enhanced seismicity in quake-rocked areas such as Koyna in Maharashtra.

Disasters have come to stay in the forms of recurring droughts in Orissa, the desertification of swaths of Gujarat and Rajasthan, where economic depredations continuously impact on already fragile ecologies and environmental degradation in the upstream areas of Uttar Pradesh and Bihar. Floods in the plains are taking an increasing toll of life, environment, and property, amplified by a huge population pressure.

The unrestricted felling of forests, serious damage to mountain ecology, overuse of groundwater and changing patterns of cultivation precipitate recurring floods and droughts. When forests are destroyed, rainwater runs off causing floods and diminishing the recharging of groundwater. The spate of landslides in the Himalayas in recent years can be directly traced to the rampant deforestation and network of roads that have been indiscriminately laid in the name of development. It is by now a well-established fact that human-made structures, including canals, dams and embankments, have worsened the flood situation in the country (Menon and Kalmadi).

Destruction of mangroves and coral reefs has increased the vulnerability of coastal areas to hazards, such as storm surges and cyclones. Commercialisation of coastal areas, particularly for tourism has increased unplanned development in these areas, which has increased disaster potential, as was demonstrated during the Tsunami in December 2004.

Risks due to Environmental Stresses: Example of Delhi

Every ninth student in Delhi's schools suffers from Asthma. Delhi is the world's fourth most polluted city. Each year, poor environmental conditions in the city's informal areas lead to epidemics. In 1995, 423 lives were lost due to dengue fever. Delhi faces air pollution problems due to three major sources: transport, domestic, and industrial sectors. The maximum contribution is from vehicles (72%), which are growing rapidly. There are many factors associated with urban growth pressures. The current population of Delhi is about 13.8 million and is estimated to rise to 22.42 million by 2021. The major cause anticipated for this rise is the high in-migration rate due to better employment opportunities in Delhi in comparison to neighbouring states. The number of registered vehicles has also increased nine-fold since 1970/71. This rise in registered vehicles is primarily due to the increase in personalised vehicles, which in turn has resulted in high pollution loads and large-scale congestion in Delhi. The fast rising trends of industrialisation and trade and commerce has almost increased the per-capita income of Delhi by 60 per cent since 1993-94.

Delhi has one of the highest road accident fatality ratios in the world. In many ways, Delhi reflects the sad state of urban centers within India that are exposed to risks, which are misconstrued and almost never taken into consideration for urban governance.

Pressure on land for housing purposes has increased. Agriculturally productive land is being used up for residential purposes, which is affecting agricultural employment and productivity adversely. There is much cultivable wasteland lying fallow and proposed to be acquired for industrial activity in the future. Water is a major worry. The Delhi government is eyeing groundwater resources of surrounding areas in Uttar Pradesh, such as Meerut, which could mean political trouble in coming times. Engineers contend that water in Meerut if left unutilised could go saline and affect good water further. Arguments on the other side would have their own logic.

According to the State of Environment Report for Delhi (SoE 2001), sustainable development is the most important concern in Delhi's current environmental crisis. As per SoE (state of environment) reporting, Delhi lacks an integrated system and a relevant database to measure the environmental quality, to manage it, and also to evaluate the effectiveness of the management actions. Until such knowledge gaps are plugged, the action plans to ensure a sustainable Delhi cannot be initiated.

Safety Factor for Human Existence

The quality of life of an individual is determined largely by socio-economic and the physical environment. From a different perspective, enhancing quality of life necessitates minimising frequency and intensity of disturbances to average human existence. The core issue therefore, is to reduce the vulnerability of the community. It is also obvious that the nature of the vulnerability of the community is largely dependent on the social structures, the physical structures and the economic assets.

The core issue therefore becomes promoting measures that ensure safety of individuals against such vulnerability, which often gets manifested as hazards in form of accidents, illnesses and other factors that could contribute to mortality.

Need for Action

In the contemporary context, a broader approach is required which not just looks into

technology, adaptability and the cost aspects but also on how these aspects could be imparted effectively to the community. The users in general need to appreciate the high priority that needs to be given to *safer living*.

The urban planning, development and management processes have traditionally been dealt with in a sectoral manner. The safe city concept, particularly due to its participatory approach, would try to bring about strategic integration of various urban sub-sectors and present an integrated development framework. This is a need that has also been stressed by the National Commission on Urbanisation Working Group on Physical Planning in India, in stating that, “it also provides for checking costs compared to the benefits of alternative packages of projects aiming at pragmatic goals and permits a much tighter and more efficient implementation control and evaluation of large scale innovations”.

Risk reduction efforts need to be based as much in urban governance and management as in *urban planning*. Good urban governance includes the state, but transcends it by including the private sector and civil society. All three are critical for sustaining human development. The state creates conducive political and legal environment. The private sector generates jobs and income and civil society facilitates political and social interaction, mobilising groups to participate in economic, social and political activities. Because each has its weaknesses and strengths, a major objective of our support for good governance is to promote constructive interaction among all three.

Significantly, post- modernism is impacting urban planning in developed countries. While modernism dictated city design to increase industrial efficiency and tackle housing shortage in the twentieth century, the intangibles like isolation, alienation, and stratification of cities *et al* were ill-considered. This led to high-density settlements around industrial areas. Modern cities developed globally in the post- war period as part of the construction boom. Not much thought was given to city planning, rather to money minting by the construction sector. Indigenous practices were sidelined, indigenous wisdom ill-considered. This went along with developments in mass transportation, which furthered the trend. Post- modern is a converse trend. It seeks to rediscover the city in its historical heterogeneous form so as to revisit the golden age where people had enough space for health and recreation. City is not uniform but variegated; an expression of diverse cultures and traditions that subsist within it. To explain post-modern impact on urban planning in the words of David McLeod: “In the case of post-modernist planning, “pluralistic” and organic” strategies are sought for dealing with urban development. Under this “new” way of thinking, urban development is a “collage” of highly differentiated spaces and attention is given to “other worlds” and “other voices”. In the context of urban planning, post-modernism implies a shift to “participatory planning processes and to compact urban forms, appreciation of historic spaces and return to traditional urban forms (as opposed to modernist belief in the supremacy of new forms); a search for urbanity, urban identity and cultural uniqueness (in lieu of modernist functionalism and efficiency); mixing of compatible land uses and flexible zoning (rather than orderly land use segregation, enforced through strict zoning); pursuit of human use pedestrian friendly, higher density, urbane compact forms” (Arbor, 2003). The arguments draw mainly on Ingelhart’s (1997) theory of post-modernism in cultural ‘transition’.

Some key ideas on post-modernism could be summarised as: diversity in the landscape, local context; renewal and regeneration, and coping with conditions. Within the framework of safe urban planning and management, the traditional wisdom of urban planning that was evolved during the historic Vedic period in India needs to be revived and imbibed in the

current practices. The concept of the 'Vastu Purusha Mandala' that dealt with the habitat space as a living organism was very conscious of the fragile relationship between development and environment, and this consciousness led to design and development parameters that were far safer than those followed today. It is especially pertinent, as high-density settlements increase, and so do the quantum of likely losses. Housing has not taken the disasters perspective in structural stipulations adequately. Interestingly/conspicuously, old architecture still manages to withstand earthquakes in old city areas.

Goodchild (1990) has prepared an extensive chart of the differences between *Modernism* and *Post-Modernism*. Parts of it can be selected to highlight differences between these two approaches to planning.

DIFFERENCES BETWEEN MODERNIST AND POST-MODERNIST APPROACHES TO PLANNING

DIFFERENCES BETWEEN MODERNIST AND POST-MODERNIST APPROACHES TO PLANNING		
	MODERNIST	POST-MODERNIST
CONCEPTS OF THE CITY	the city as an object; as mass housing	the city as landscape, as an expression of social diversity
THEMES IN URBAN DESIGN	continued emphasis on lower densities and sunlight; functional zoning; mixed flats and housing	more diversity, more emphasis on local context, mixed land uses
THEMES IN STRATEGIC PLANNING	redevelopment of slums; controlled expansion through suburbs, new town and greenbelts	renewal and regeneration, containment
DECISION MAKING STYLE	comprehensive, either blueprint, "unitary" (1940's-1960's) or "adaptive"	piecemeal, "coping with conditions"

Urban populations are growing rapidly and the situation is most alarming, since it is taking place in the absence of well-planned and structured settlements. The civic services and the general quality of the settlements is of an abysmally low standard, as a result of which, the urban communities are being subjected to an ever increasing risk of natural as well as technological disasters. In such a situation, the only viable way to a safer living is through preparedness to face disasters, since hazards cannot be completely controlled. This requires concerted efforts on part of the government agencies, voluntary organisations, and most importantly, the community itself. Risk awareness has to be created, and preparedness plans formulated, so that the urban populace may live a safer life.

It has been realised that with the introduction of relatively simple, effective, risk reduction measures (those which 'reduce vulnerability and increase capacity') into existing urban improvement practices, and those which involve communities in decision-making, degrees of protection can be afforded within the most vulnerable urban settlements, which in the long-term contribute to both protecting lives and enhancing livelihoods, thus reducing poverty.

1.9 CONCLUSION

Disaster is an unwelcome guest. It disrupts normal life and puts the developmental targets out of gear. Disasters can result from natural or man-made causes or a combined effect of both. The impact of disasters are felt more strongly when the affected community is more vulnerable, either in terms of physical exposure or vulnerable socio-economic conditions. Therefore, disaster management is a *public administration issue*, since disaster mitigation has to be achieved in time through public policy. In line with post-modernism, sustainability of progress/ development is being accorded primacy, currently. It could be termed as coming full circle in some ways. Thus development, as is the perception now, in itself may not be sustainable if it runs counter to environmental concerns. Environmental concerns are therefore gaining importance, since environmental factors are increasingly having the adverse impact of the frequency and intensity of disastrous events. Sustainable development is being considered largely in terms of sustainable city growth. More than rural development, it is urban development that has to be stabilised/regulated through well-meaning/planned policies. Rural development partakes by way of spin-off effects from public good externalities from nearby/surrounding urban areas, as rightly pointed out in the Tenth Plan. Areas of concern are urban risks, since the concentration of populations in urban areas is constantly increasing with inadequate corresponding investment in safety measures. Disaster management needs to be seen in a developmental context and pre-emptive action needs to be taken to reduce the impact of disasters.

1.10 KEY CONCEPTS

- | | |
|----------------------------|--|
| Biological Hazards | : Processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Examples of biological hazards are outbreaks of epidemic diseases, plant or animal contagion, insect plagues and extensive infestations (ISDR). |
| El Nino | : As explained in the Discovery Encyclopedia (<i>Series One</i>), in a year with normal weather pattern winds blow westward and push the warm surface water towards the western Pacific Ocean leading to upwelling of cold water from lower levels in Ocean. In some years when the winds weaken, warm water spreads almost over the entire tropical Pacific Ocean This warm water prevents the upwelling of cool, nutrient rich deeper water along the east coast of the pacific. Fish die and severe climate change takes place. Rain follows the warm water eastwards causing drought in Southern Asia and Australia and Floods in North and South America. |
| Environmental risks | : Release of industrial effluents in rivers, green house gases in the atmosphere, et al pose environmental |

risks like release of harmful chemicals in water bodies that harm aquatic life, contaminate drinking water, disturb the PH balance of soil *et al.* Excess of Green house gases lead to global warming that is manifest and increasingly being talked about now.

Geological hazard

- : Geological hazards include internal earth processes or tectonic origin, such as earthquakes, tsunamis, volcanic activity and emissions as well as external processes such as mass movements: landslides, rockslides, rock falls or avalanches, surface collapse, expansive soils and debris or mud flows. Geological hazards can be single, sequential or combined in their origin and effects floods, debris and mud floods; tropical cyclones, storm surges, thunder/hailstorms, rain and wind storms, blizzards and other severe storms; drought, desertification, wild land fires, temperature extremes, sand or dust storms; permafrost and snow or ice avalanches (ISDR).

Hazard

- : A precise definition of hazard is difficult. The International Strategy for Disaster Reduction (ISDR) has defined hazard as a potentially damaging physical event, phenomenon or human activity that may cause loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards have both natural and human components. For example, flood problems may be exacerbated by fluctuations in climate, such as increased storm frequency, and also by certain human activities, such as land drainage and deforestation. The loss of life caused by a tropical cyclone will depend to some extent on storm severity but it can be greatly reduced by means of a warning system. Attempt has continually been made to employ science and technology to harness nature and evolve better living conditions.

Hydro meteorological hazards: These hazards are of *atmospheric, hydrological or oceanographic nature*. Hydro-meteorological hazards include: floods, debris and mud floods; tropical cyclones, storm surges, thunder/hailstorms, rain and wind storms, blizzards and other severe storms; drought, desertification, wild land fires, temperature extremes, sand or dust storms; permafrost and snow or ice avalanches. Hydro-meteorological hazards can be single, sequential or combined in their origin and effects (ISDR).

La Nina

- : La Nina is the reverse of El Nino. At the end of December, westbound winds get stronger than usual,

pushing warm water further west than normal. As a result, there is enhanced upwelling of cold sea water. This action allows hurricanes crossing the Atlantic to move farther west and to become more powerful than usual. However, La Nina is generally good for the Indian summer monsoon.

- Man-made disasters** : Accidents, chemical spills nuclear disasters are man-made disasters since they are caused by human activity.
- Natural disasters** : Floods, Cyclones, Earthquakes, etc. are natural disasters since they originate in natural phenomenon/processes.
- Physical vulnerability** : Vulnerability of the landmass to natural hazards such as earthquakes owing to natural factors is explained as physical vulnerability. Vulnerability of the physical landscape as well as the infrastructure is included in physical vulnerability.
- Socio-economic vulnerability** : Poverty predisposes people to disaster losses/suffering. The poor mostly inhabit flood prone/multi-hazard prone areas perforce. These areas are cheaper to access and also provide certain advantages like fertile land near volcanoes and flood plains. Poverty also reduces resilience to epidemics that hit an area along with/in the aftermath of a disaster.
- Urban risks** : Risks created due to specific conditions in the urban environment are termed urban risks. For example, threat of fire outbreaks, epidemics due to congestion and poor drainage in slums are urban risks.

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1.12 ACTIVITIES

- 1) List and discuss the natural disasters that your city or village is prone to. Identify the sections of society most likely to be affected in a probable disaster.
- 2) List and discuss man-made disasters that your city or village is likely to experience. Identify disasters that can happen due to failure of man-made structures or technology as a secondary result of natural disasters.

UNIT 2 DISASTER MANAGEMENT CYCLE

Structure

- 2.0 Learning Outcome
- 2.1 Introduction
- 2.2 Stages in Disaster Management
- 2.3 The Disaster Cycle
- 2.4 Shift to Mitigation and Preparedness Planning in India
- 2.5 Response Mechanism in India
- 2.6 Conclusion
- 2.7 Key Concepts
- 2.8 References and Further Reading
- 2.9 Activities

2.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand Disaster Management Cycle with the objective of illustrating the different situations and actions required before, during and after a disaster, and in non-disaster times;
- Discuss preparedness, mitigation, response and safe development principles; and
- Appreciate the need for a multi-sector approach to disaster management, and the importance of disaster mitigation and preparedness for reducing disasters.

2.1 INTRODUCTION

The concept of Disaster Management Cycle has entered disaster management efforts over the past few years, especially since the Yokohama Conference (1994). Hitherto, disaster management had been perceived as a short-term relief undertaking, which lasted till some time after a disaster. Other purposive activities undertaken in the *pre* or *post*-disaster stages on the part of civil society or the government towards mitigating the impact of disasters or tackling long-term vulnerabilities and dealing with newer threats in the wake/aftermath of a disaster were not included in disaster management activities. They were rather classified, developmental activities or ‘social action’ on the part of civil society actors(s), motivated by philanthropic concerns. The concept of Disaster Management Cycle integrates isolated attempts on the part of different actors, government and non-government, towards vulnerability reduction or disaster mitigation, within the enveloping domain of disaster management, *as phases* occurring in different time periods in *disaster management continuum*, though essentially relating to/comprising disaster management. This has facilitated a *planned approach to disaster management* in that post-disaster recovery and pre-disaster mitigation planning are perceived as integrated/related activities

and not separate. Thus, prevention, mitigation and preparedness form pre-disaster activities in the Disaster Management Cycle and, response, comprising relief, recovery and rehabilitation are *post-disaster activities*. Whilst emergency relief and rehabilitation are vital activities, successful disaster management planning must encompass the complete realm of activities and situations that occur *before, during* and *after* disasters. These phases can best be represented as a cycle, which if followed through public policy can obstruct future development of disasters by impeding the vicious cycle of cause and effect. These activities are implemented at specific times, the length of any one phase depending on the type of disaster, its breadth and scale. Therefore, one of the key issues in disaster management planning is the allocation of resources at all stages of the disaster cycle, which optimises the total effectiveness of risk reduction activity and maximises the overall impact of disaster management.

This approach has imparted a more holistic perception to disaster management and has served to integrate disaster management with development planning in that most pre-disaster activities, involve activities for vulnerability reduction like poverty reduction, employment provision etc. which are also mainstream development concerns. *Thus disaster management cycle implies development is essentially/conceptually related to disaster management.*

Disasters and Development

Another significant consequence/effect of this concept relates to understanding the inherent correlation between disasters and development. Development had proceeded with relative unconcern for environmental issues. The result has been newer vulnerabilities/risks arising as a result of indirect/direct consequences of development strategies. For example, air pollution has been caused due to uncontrolled emission of green house gases, water pollution due to unregulated working of industrial enterprises as also agriculture, leading to adverse impacts on the environment.

Short- terminism has prevailed in public policy in that long-term impacts have not been considered at the policy formulation stage. The concept of disaster management cycle is expected to impart the much needed long-term perspective /viability to developmental policy since vulnerability reduction would be factored in mainstream planning to reduce costs on response efforts when disasters strike. Also, the process preceding policy formulation, that is deliberation with involved stakeholders and citizen groups, is likely to get more participatory and inclusive of disaster related concerns(Guzmán, 2005).

Impact of disasters has been debilitating, both in terms of economic cost and loss/injury caused to human life and livestock, and the environment. According to the United Nations, in 2001 alone, natural disasters of medium to high range caused at least 25,000 deaths around the world, more than double the previous year and economic losses amounting to over US\$ 36 billion. These figures exclude many small, unrecorded disasters that have hit various parts of the world. Chief recorded disasters in recent years have been devastating earthquakes in Gujarat, El Salvador and Peru; floods in parts of Asia, Africa, droughts in Central Asia, including Afghanistan, Central America and Africa. What are chiefly disturbing are the unabated nature of these disasters and the inability of governments to check their onset or their impacts. There has been increasing resultant loss of life and property, recurrence of disasters, which is largely unexplained, though climate change suggestions have been attempted, which are at best tentative. There is, however, increasing belief in human causation behind disasters.

There is increasing realisation, as also explained earlier, of a cause-effect relation between disasters and development in that development has not factored environmental concerns sufficiently in mainstream policy and has been predominantly productivity centred. For example, as brought out in the India Disasters Report, 2005, (Parasuraman and Unnikrishnan, 2005) excessive use of chemical fertilisers has led to salinisation of water in Punjab, water-logging and groundwater contamination. Elsewhere, large dams have displaced communities, heightened seismic risk, such as in Koyna, Maharashtra. Large scale felling of trees has led to desertification of large stretches in Gujarat and Rajasthan and environmental degradation in upstream areas of Uttar Pradesh and Bihar.

The World Disasters Report, 2002 categorically states that International development targets set for the year 2015, such as reducing world poverty and hunger by one half, will not be reached unless the heavy toll of disasters on the poor is reduced through effective measures.

In its tenth year, the report published by the International Federation of Red Cross and Red Crescent Societies, calls for disaster risk reduction targets to be added to the international development goals for 2015 and beyond. These targets include reducing by one half, the number of people killed and affected by disasters and increasing the number of governments with dedicated plans and resources for risk reduction programmes (ICRCS, World Disasters Report, 2002).

Logically, since/if disasters have human causation, their impact could be minimised by planned human intervention. These efforts comprise immediate control of the situation in the aftermath of a disaster, implying *disaster response*, long-term planning with a view to curtailing its frequency and impact and curbing its disaster potential, hence losses when onset, implying *mitigation*, and *preparedness*, which is explained/understood as a state of readiness on the part of administration to swing into action.

2.2 STAGES IN DISASTER MANAGEMENT

Disaster Management efforts are geared towards *disaster risk management*. Disaster Risk Management “implies the systematic process of using administrative decisions, organisation, operational skills, and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impact of natural hazards and related environmental and technological disasters. These comprise all forms all activities including structural and non- structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects to hazards” (UNISDR, 2004).

There are three key stages of activities in disaster management:

- 1) **Before a disaster:** to reduce the potential for human, material, or environmental losses caused by hazards and to ensure that these losses are minimised when disaster strikes;
- 2) **During a disaster:** to ensure that the needs and provisions of victims are met to alleviate and minimise suffering; and
- 3) **After a disaster:** to achieve rapid and durable recovery which does not reproduce the original vulnerable conditions.

Common perception of disaster management, as explained earlier, is limited to emergency relief and post- disaster rehabilitation. This is so because these two elements are by far

the strongest in terms of high profile visibility, political support and funding provision. Instead of allocating funds before an event to reduce future disasters, action normally only takes place after an event has occurred. The situation is similar to that of preventive health care where curative medicine is relatively well funded whilst preventive medicine is not.

The focus on emergency relief also depends on *risk perception*; that is, whether there is belief that disaster could be avoided. If disasters were believed to be of such a scale that it is believed, nothing could be done to reduce either the phenomenon or the risk involved, and risk mitigation would not be pressed for/attempted. However, once belief develops that disaster losses are exacerbated by human agency, and could be curbed thereby, disaster risk mitigation would be attempted.

2.3 THE DISASTER CYCLE

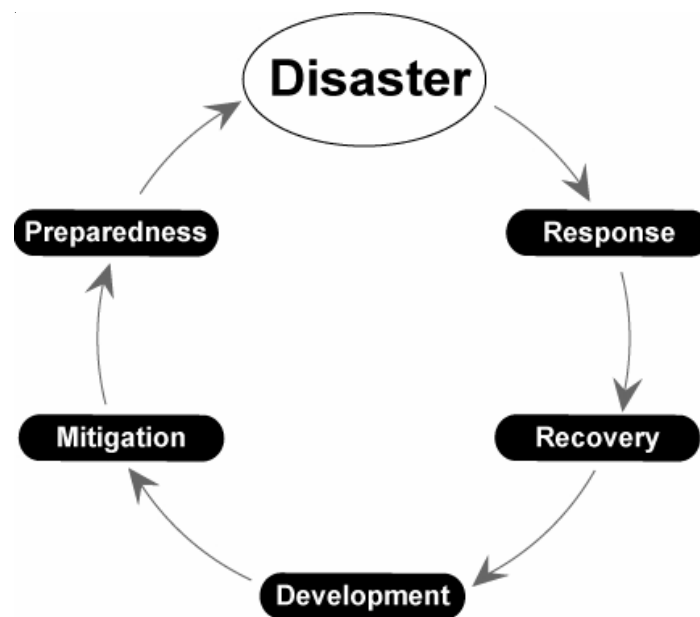
The different phases of disaster management are represented in the disaster cycle diagram overleaf. The Disaster Cycle consists of three stages:

I) The Disaster Event

This refers to the real-time event of a hazard occurring and affecting the 'elements at risk'. The duration of the event will depend on the type of threat, for example, ground shaking may only occur for a few seconds during an earthquake while flooding may take place over a longer period of time. Disasters have tremendous modifying impact on the physical landscape. Within a few minutes, an entire region is reduced to rubble in the event of an earthquake. The recent Tsunami has permanently altered the physiography of affected coastal areas in Sri Lanka, Andaman and Nicobar islands. The impact leads to loss of life and property in affected areas; losses being directly correlated to the vulnerability of the region, physical and socio-economic. Physically weak structures, especially in illegal/informal settlements give way easily and cause large-scale losses. Vulnerability is also socio-economic. Weaker sections of society, viz. women, children, aged and handicapped, mentally infirm, etc., suffer a lot more than their stronger counterparts. Studies have also unearthed positive correlation between poverty and vulnerability. The poor inhabit the most hazardous physical areas because they are easier to procure and offer added advantages, like proximity to sea for fishermen or fertile soil for farmers near flood prone areas etc., that makes them prone to losses, both of assets and life. The poor also lack the resilience to recover from shock in the aftermath of a disaster. For example, fishermen lose their boats, street side vendors, the homeless, orphans, widows and beggars fall easy prey to epidemics and insidious activities of unsocial elements like thieves, robbers, pimps, etc.

This brings to light the need for multi-faceted response to disasters, which takes account of all social political and economic ramifications. Issues to be addressed range from physical, relating to damaged structures and physical vulnerability of areas and infrastructure to social and economic vulnerability of weaker sections that suffer more relative to other, better placed. The following diagram is a vivid description of the disaster cycle.

The Disaster Cycle



II) Disaster Response

A Disaster is a cataclysmic event that has severe modifying impact. Consequences are both physical and social/ human. Communication is disrupted; infrastructure is affected adversely, many buildings giving way completely, critical facilities are disturbed, economic losses accrue, loss of employment, ranging from temporary to permanent occurs, development is rendered a severe set-back, law and order situation worsens, social fabric is disturbed, in that parochial tendencies are seen to come forth, such as on caste, communal, linguistic *et al* lines, and most importantly, people lose lives. Disaster Response has to tackle all aforesaid challenges. Disaster response entails restoring physical facilities, rehabilitation of affected populations, restoration of lost livelihoods and reconstruction efforts to restore the infrastructure lost or damaged. There are inherent important lessons to be learnt from disaster response. Retrospectively, it brings to light flaws in efforts pertaining to policy and planning with respect to location and type of infrastructure and social schemes to improve the social positioning of the under privileged, particularly with respect to access to resources of the underprivileged. Disaster aftermath is evaluation time for the administrative set up in that disaster response exposes system weaknesses. Disaster is the ultimate test of administrative efficiency, in the sense of positive impact on the environment, preparedness, procedural simplicity, logistics, speed and expertise. There are inherent important lessons to be learnt for the future. Strong infrastructure and service support base is the fundamental and the most important requirement, which is often found wanting in poor third world countries. Disaster event simply exacerbates the losses that accrue almost every time/ unabated due to poor health and hygiene arrangements in vulnerable pockets, inefficient municipal administration, top-down orientation in policy making and administration, poor institutionalisation of development planning and administration at the local level, implementation bottlenecks, unchecked poverty, unresponsive administration, poor informational and logistical arrangements *et al*.

Such critical evaluation as also articulation of displeasure on the part of the people through the electoral mechanism is not as effective in third world countries where elections are fought less on 'rational' criterion and more on ascriptive 'traditional'/ 'charismatic',

criteria, which shifts attention/ focus away from performance to *rhetoric* which are designed to excite inherent social differentiations based on caste, language or community, etc., which is political demagoguery. Disaster event brings to the fore such inherent failings of a system; hence is explained the reliance on outside aid which is often found misdirected and misused due to lack of familiarity with local circumstances in recipient countries and rampant corruption in disbursements due to poor administrative infrastructure. Since Risk Perception of disasters is low in developing countries, pressure for policy in this regard is not strong enough. Hence, pressure for disaster management policy/planning in developing countries is articulated externally, that is, on the part of external/ international bodies like the International Red Cross and Red Crescent Societies, and the UNDP, the ISDR etc., based in the United Nations which may not always be guided by local concerns.

Hence, proactive planning for disaster response on the part of governments, especially in developing countries with regard to administrative reforms is imperative to protect development and/by lessening the disaster potential of a catastrophe, natural or man-made or otherwise by way of policy interventions to ensure:

- Better institutional preparedness;
- Countering contrary pulls such as lack of social cohesion owing to irrational differentiations that effectively impede response, in the sense of self- help and 'communitarianism'; and
- Long- term mitigation policy to counter vulnerabilities, structural and non- structural by enabling legal provisions and honest implementation of the same.

Significance of Response

Response has immediate mitigation impact. Disaster losses can be minimised to a large extent by effective response on the part of government and civil society. Sheer impact of disasters on life and property endorses the significance of response. Globally, natural disasters account for nearly 80 per cent of all disaster-affected people. The insurance industry estimates that natural disasters represent 85 per cent of insured catastrophe losses globally (World Disasters Report, 1997).

World Disasters Report (2003) focuses on *ethics* in humanitarian aid. It looks at how humanitarian agencies and governments can best help disaster-affected communities to recover, to become stronger and more resilient. It addresses issues like how the gaps between short-term relief and longer-term recovery can be bridged. There is growing concern over politicisation of disaster relief. "Millions of the world's most vulnerable remain beyond the reach of humanitarian assistance and protection. Saving lives alone is not sufficient. Respecting people's dignity and livelihoods is equally important. Humanitarian organisations bear two responsibilities. They must operationalise humanitarian principles by developing field indicators to put principles into practice and disseminate good practice in humanitarian judgement." Acting in tandem with local communities, particularly the vulnerable segments, this could be done.

There is also criticism of over-reliance on high-profile aid operations to save lives when long-term investment in disaster mitigation at the local level has proven to be much more effective. No international aid effort was necessary when the worst hurricane since 1944 hit Cuba in 2001 but only five people died. Local mechanisms were in place to evacuate 700,000 people from Havana and other threatened areas. Of the 53,000 people rescued

from the flood waters in Mozambique's two great floods, *local people* saved 34,000(IRCRCs).

In 1996, 40 million disaster-affected people depended on humanitarian assistance, a 60 per cent increase over the average figure of 25 million in the 1980s. In the first half of this decade, over US\$ 30 billion was spent on humanitarian assistance. The average cost of natural disasters over the past 25 years stands at over US\$ 87 billion a year (CRED, 1999) The average amount spent on humanitarian response is US\$ 3 billion a year. Compared to expenditure on disaster mitigation, the average annual global military spending is around US\$ 780 billion (UNDP, 1998 *in* India Disasters Report, 2005).

The World Disasters Report of 2002 states that thousands of lives are lost and millions of people left weakened each year because of donor reluctance to invest in measures that *reduce the impact* of disasters. Last year alone, the lives of 170 million people worldwide was disrupted by disasters.

Investing in mitigation issues like building long- term resilience of vulnerable communities would better serve the purpose of disaster management. There are reports of widespread corruption/leakage in disaster relief disbursements. Besides, business interests press on public policy, as there are huge profits involved in reconstruction activities.

It is also asserted that disaster mitigation as part of the development process can minimise economic losses from disasters. However, Disaster Mitigation refers to a future perspective of development. Immediate concern of minimising disaster losses can be attended only by efficient and quick disaster response.

Governments have been known to suffer political losses in the follow- up elections after a disaster. For example, the Polish government suffered terrible election loss after alleged disastrous handling of the disaster situation, following extensive flooding of Central Europe in 1997. Unprecedented downpour lasted two weeks from July 5 onwards and affected large masses of people in Poland and the Czech Republic. In total more than 100 people were killed, countless rendered destitute and about 160,000 people in Poland and the Czech republic, respectively had to be evacuated. While the Czech and Polish governments were cash starved, Germany's handling of the situation was much better due to its better financial position (Parasuraman & Unnikrishnan, 2005, India Disasters Report). Hence, preparedness, understood as readiness of the administrative apparatus in terms of logistics such medical supplies, hospitals, doctors, temporary shelters etc. is crucial for disaster response.

Issues in Disaster Response

The key word in disaster response is coordination between actors involved, viz. the government and civil society, including international donor organisations. For effective coordination, local government infrastructure has to be strong as response effort is channelised/ concentrated at the local level. Unfortunately, local governance has not been sufficiently institutionalised in India. That makes service delivery inefficient. Common administrative problems, like, maintenance of health and hygiene in their respective areas, good drainage, open spaces in settlement vicinities, largely go unattended. This creates vulnerability to disease owing to system failure; manifested as water accumulation following floods, physical vulnerability of informal settlements wherefrom most deaths are reported during catastrophes like earthquakes etc. Coupled with institutional failure, are *negative sociological dynamics* like rural to urban migration, which exacerbate problems like

congestion and poor basic services in urban areas and possibly, ethnic and communal tensions.

Civil society is contributing significantly to all aspects of disaster management cycle, particularly, relief. Civil society is the new hope of the new world order in the face of state and market failure in different respects. It is being seen as the answer/alternate / counterpoise to globalisation and weakening states. Civil society is hence, the buffer against state excesses and the market; the latter now developing in collusion with state governments, hence sharing interests with it, especially in the third world. In the newfound nexus, citizen could be a mute spectator, unless there are optional protection mechanisms. Civil society, in this respect offers new hope in that it has fought successfully for human causes round the world, such as landmine ban, protection of environment etc. It has also successfully challenged arbitrary political regimes such as Marcos's in Philippines. However, there is the darker side, which should not be overlooked. The civil strife in Rwanda involved civil society organisations in a negative way (Rieff, 1999). Besides, civil society is an inseparable/organic entity of a culture; the members therefore could be as indoctrinated as any with flawed perceptions. Also, perceiving civil society as an alternative to State (roll back of state) would be a fundamental error, as all said and done, State remains the principal agency for citizens' welfare and it is to it that people turn in distress situation. Also, civil society organisations work systematically only under the aegis of the state. Left alone, they are an amorphous entity; potentially perhaps, chaotic. Also, their international linkages/origin make them suspect with regard to national security. Behavioural aberration on their part in the sense of being generally non-cooperative with and distant from the state is also discomfiting. During the Marathwada earthquake, non-government organisations were seen to leave work midway and withdraw. They were also not organised and systematic to the desired degree. They even messed up, creating unnecessary chaos in the recent Muzaffarabad earthquake. As articulated in the India Disasters Report, 2005, crises in Marathwada and other places in India showed that the involvement of local people and civil society groups in rescue and relief was not a clearly defined process. According to Parasuraman and Unnikrishnan in the India Disasters Report, (2005), the specific arenas where civil society participation is desirable should be specifically laid down to avoid chaos and confusion in emergency situations. Those are; training project staff, information dissemination, programmes monitoring, housing, and social and economic rehabilitation measures. They, in turn, must be given adequate room to explore and innovate. The agencies must submit a time-bound plan of action, outline their approach unambiguously, clearly defining their specific roles, articulating a programme management strategy, and must establish that they have the necessary resources to see the things through.

The converse picture is equally important. Attitudinal change on the part of the governments to reinforce participation is also required. The response in the Marathwada earthquake exhibited that the government views rescue and relief work as a piecemeal business; the responsibility of its revenue department, and therefore, public support need not be factored into it. In the absence of a well-defined process of involving people, spontaneous involvement has often gone misdirected and is viewed as *obstruction* by the authorities. The overall perspective of the administration is to view people as passive recipients of government largesse rather than as valuable partners in any undertaking. This is retrograde and undemocratic. The general perception is that people impede disaster response, not facilitate it. The result is too many isolated, ill- coordinated efforts on the part of individuals and government and non-government agencies with lack of proper coordination between them. Institutionalisation/strengthening *social capital* during normal times to be

tapped in readiness during emergencies in the form of *organised collective effort* at the level of the society is the right policy stance in this regard. The desideratum of the discussion is that government and civil society and the private corporate sector should operate in tandem for effective disaster response.

The most desirable virtue in 'good governance' that is often asserted/reiterated in public administration literature, is peoples' participation. But it is rather confusing as to participation, in what way? Studies suggest that participation succeeds only when it is invoked by the state, such as, government planners eliciting people's opinion on choice of site for relocation, or local craftsmen's in structure design and/or implementation. Even where major effort is on the part of people in the form of self-help, catalytic state role would be no less significant. One cannot even say with any degree of assurance that the state has in fact weakened since the 'roll back' got underway. Hence, guarded optimism with regard to civil society activism is needed. It is a welcome development but needs to be tempered with justifiable criticism.

III) **Recovery**

The recovery phase involves implementation of actions to promote sustainable re-development (reconstruction, rehabilitation) following a disaster. It covers long-term measures like, rebuilding of houses, assets, infrastructure, school building, hospital buildings, and other public buildings. It is a process undertaken by a disaster-affected community to fully restore itself to pre-disaster level. Recovery is the activity that returns infrastructure systems to minimum operating standards and guides long-term efforts designed to return life to normal or improved levels after a disaster. Recovery is also sometimes used to describe the activities that encompass the three overlapping phases of emergency relief, rehabilitation and reconstruction.

The chief behavioural attribute required in recovery is resilience. As highlighted in the World Disasters Report, 2004, community resilience is a big factor in disaster recovery. Recovery is used to describe the activities, which encompass the three overlapping phases of emergency *relief, rehabilitation and reconstruction*.

1) **Emergency Relief**

Emergency relief refers to the period immediately following the disaster when steps are taken to meet the needs of survivors with regard to shelter, water, food and medical care. Activities undertaken during and immediately following a disaster, include, immediate relief, rescue, damage and needs assessment and debris clearance. Rescue and relief are critical elements of response. As expressed in the India Disasters Report (2005), voluntary effort on the part of people, if recognised and institutionalised as supplementary to official government effort, could substantially minimise loss of life if not property to that extent. This would necessitate institutional/ organisational improvements by way of better delegation to field agencies, improvements in decision-making and communication processes, incorporation of indigenous traditional knowledge on warning signs, a cartographic knowledge of safe and unsafe areas, survival methods, and traditional forms of insurance built around kinship and families. The most crucial aspect in relief and rescue is communication across involved agencies. Disaster zone is often equated with a war zone, where communication is the critical factor, often, crucial, in fact, the deciding factor between success and failure.

2) **Rehabilitation**

Rehabilitation implies activities that are undertaken to support the victims' return to

normalcy and re-integration in regular community functions. It may include the provision of temporary housing and public utilities as interim measures to assist longer-term recovery through permanent housing and infrastructure. Besides physical elements, rehabilitation programmes also include economic rehabilitation through livelihood recovery and support actions and finding alternate employment options for those who cannot get back to their original occupations due to irreparable damage. Rehabilitation also includes psycho-social rehabilitation for those who are badly traumatised and need support in terms of psycho-social counseling or even medication in some cases.

Rehabilitation therefore includes the provision of temporary employment and restoration of lost livelihoods. Actual strategy adopted in rehabilitation would be dictated by circumstances, condition of the physical landscape, state of economic activity, whether relocation of affected communities is necessary, or whether resumption of normal life could take place in that region itself. It is important to incorporate past lessons in rehabilitation. Vulnerability mapping is recommended for identifying areas where access is to be completely restricted and the safe areas for viable construction activity.

Rehabilitation policies suffer due to short-term perspective, in that they are pursued as unplanned, ad-hoc measures. Rehabilitation is not factored in wider development strategy. A study conducted by the UNDP in the 1980s which focused on disaster mitigation efforts in Bangladesh, Ethiopia, and Ecuador, concluded that disaster preparedness and prevention is most effective only when it is built into the larger scheme of sustainable development, which enhances social opportunity and economic growth (India Disasters Report, 2005). Desired approach was followed in Marathwada with conspicuous benefits. Those affected by the later Uttarkashi earthquake, or the even more recent Jabalpur earthquake suffered for lack of policy in this regard. (India Disasters Report, 2005)

Also, people are expected to access regular government welfare schemes for relief in disaster situations, which is difficult, given the exigent circumstances.

Crucial factor in rehabilitation as borne out by experiences from past disasters is training of personnel in various aspects of rehabilitation, such as, special concerns of widows and orphans, with respect to health and livelihood requirements besides community participation in damage and loss assessment and vulnerability analysis

3) **Reconstruction**

Reconstruction attempts to return communities to improved pre-disaster functioning. It includes the replacement of buildings, infrastructure and lifeline facilities such as roads, bridges and communication links, so that long-term development prospects are enhanced rather than reproducing the same conditions which made an area or a population vulnerable in the first place. Mitigation measures can effectively be incorporated into reconstruction since there is generally "openness" to change and improved safety following a disaster event. Hence, this is mainly the technocrat's arena of function/action.

Post-modern thinking, as also referred earlier, is impacting urban planning in a major way. Instead of 'modernist' emphasis on uniformity, diversity is being lauded as the desired virtue. Accordingly, indigenous knowledge is being incorporated in modern engineering technology to produce viable structures in earthquake, flood and cyclone prone areas. Physical vulnerability of structures causes maximum disaster casualties. Hence, stress is also on retrofitting old structures with a view to making them disaster-resistant besides making new ones with disaster-resistant technology. Also, instead of the *old cluster*

approach to housing which, as more in consonance with industrialisation would be changed for more *differentiated housing and open spaces*, which would provide for more aesthetic and safer cities. From a social perspective, modern cities have increased isolation and alienation of human beings. This has led theorists in the West to talk about 'social capital' as it is increasingly getting scarcer in modern societies that are getting 'atomised'. Social capital is an intangible resource that invests in social ties, which proves an invaluable resource in recovery during emergencies. In simple terms, it means people reaching out to each other and helping rebuild lives. Isolation is counter-effective of social capital.

IV) Development

The inclusion of development as a phase in the disaster cycle is intended to ensure that following the natural disaster, societies factor hazard and vulnerability considerations into their development policies and plans in the interest of overall progress. The rationale behind the use of the expression 'disaster management cycle' is that disaster and its management is a continuum of inter-linked activities. It is sometimes also referred to as the 'disaster-development cycle', implying that disasters are periodic phenomena and occur regularly in such a way that there is development, followed by a disaster, then back to development till the next disaster. Yet, such expressions are slightly deceiving in that they suggest that the periodic occurrence of disasters is something inevitable, always requiring the same response. On the contrary, if effective prevention and preparedness measures are implemented, natural disasters may be avoided by limiting the adverse impact of inevitable natural phenomena.

Sustainable development is another term that is useful in this context, implying development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts of 'needs' in particular, to the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet the present and the future needs.

Illustration of Disaster Cycle through Case Study

The processes covered by the disaster cycle can be illustrated through the case of the Gujarat Earthquake of 26 January 2001. The devastating earthquake killed thousands of people and destroyed hundreds of thousands of houses and other buildings.

The State Government as well as the National Government immediately mounted a large-scale relief operation. The help of the Armed Forces was also taken. Hundreds of NGOs from within the region and other parts of the country as well as from other countries of the world came to Gujarat with relief materials and personnel to help in the relief operations. Relief camps were set up, food was distributed, mobile hospitals worked round the clock to help the injured; clothing, beddings, tents, and other commodities were distributed to the affected people over the next few weeks.

By the summer of 2001, work started on long-term recovery. House reconstruction programmes were launched, community buildings were reconstructed, and damaged infrastructure was repaired and reconstructed. Livelihood programmes were launched for economic rehabilitation of the affected people.

In about two year's time the state had bounced back and *many of the reconstruction projects had taken the form of developmental programmes* aiming to deliver even

better infrastructure than what existed before the earthquake. Good road networks, water distribution networks, communication networks, new schools, community buildings, health and education programmes, all worked towards developing the region.

The government as well as the NGOs laid significant emphasis on *safe development* practices. The buildings being constructed were of earthquake resistant designs. Older buildings that had survived the earthquake were retrofitted in large numbers to strengthen them and to make them resistant to future earthquakes. Mason and engineer training programmes were carried out at a large scale to ensure that all future construction in the State is disaster resistant. Since the state is also drought and cyclone affected, building construction for cyclone resistant housing was propagated in the coastal areas, and water harvesting systems were given a thrust for drought mitigation.

A preparedness programme was taken up in earnest by the government and the NGOs. Community awareness campaigns were carried out on *dos* and *don'ts* for different kinds of disasters. These told people what to do and what not to do before, during and after a disaster. School safety programmes were taken up under which, teachers, students and parents were trained on how to prepare for a disaster and how to respond to one. Disaster management plans were prepared for the state, districts, local areas and schools. A system of drills and plan updating was established. All of this contributed to a higher level of preparedness in the state.

Subsequently, hazardous events struck the state again. There was a cyclone warning in 2004, which was responded to with a very efficient evacuation implemented by the government and the NGOs. The community was already aware of the evacuation plan and was trained how to react. Similarly, major floods hit the state in June-July 2005. Once again, the role allocation was clear to all the concerned stakeholders in the government as well as the NGOs and the community too knew how to help the relief teams help them. Losses were minimised, and the relief and rehabilitation process went off smoothly.

This case study shows how there was a disaster event during the earthquake, followed by immediate response and relief, then by recovery including rehabilitation and retrofitting, then by developmental processes. The development phase included mitigation activities, and finally preparedness actions to face future disasters. Then disaster struck again, but the impact was less than what it could have been, primarily due to better mitigation and preparedness efforts. The disasters were again followed by response and recovery, and the cycle goes on.

Risk Reduction: Mitigation And Preparedness

The Risk Reduction is chronologically the latest paradigm for mitigating the impact of disasters. The precursor to the Risk Reduction approach is the *Total Disaster Risk Management Approach (TDRM)*. Guzmann (2005) explains the essentials of the approach. The TDRM approach is the immediate forerunner of the *Risk Reduction Framework*, which is currently being emphasised. In the Isephan Typhoon in 1959, Japan suffered heavy losses. A ferryboat sank in Bangladesh in a cyclone on May 3, 2002, killing 450 passengers. These disasters could have been prevented if close cooperation between concerned organisations had been achieved.

The TDRM Approach

The strategic objectives of the TDRM Approach as explained in the Regional Workshop on TDRM, held in 2001 at Kathmandu, organised by the Asian Disaster Reduction Centre (ADRC) and OCHA, Kobe are as follows:

- 1) “To address holistically and comprehensively the various concerns and gaps in the different phases of the disaster management cycle by considering the underlying causes of disasters (that is, the conditions of disaster risks) and the contextual factors in disaster risk and its management.
- 2) Enhancement of local capacity and capability, especially in disaster risk management as part of a decentralised approach and build reliable database for policy reference.
- 3) To promote multilevel, multidimensional and multidisciplinary coordination and collaboration among stakeholders in disaster reduction and response. This broadening involvement of various sectors previously less concerned with disaster reduction and response is a positive development.”

The proposed implementation strategies for the TDRM Approach are the following:

- 1) Achieving effectiveness in disaster reduction and response through *multilevel, multidimensional and multidisciplinary* cooperation and collaboration, engaging all concerned stakeholders/organisations and political actors. Emphasis is on *networking* which can harness positive organisational potential by complementing in strategic areas and bridging knowledge gaps.
- 2) Making decisions based on reliable disaster risk information derived from hazard mapping and vulnerability assessment. The TDRM Approach attaches great importance to hazard mapping and vulnerability assessment as a fundamental tool for generating reliable disaster risk information, which serves as basis for making decisions on disaster reduction and response interventions, including the best use of limited resources.
- 3) Enhancing coordination and integration of stakeholders’ action through good communication and efficient exchange of relevant and reliable information exchange of critical disaster risk information, which could enhance coordination and integration of stakeholders’ actions in disaster reduction and response. However, ensuring the availability and accessibility of accurate and reliable disaster risk information when required entails an efficient system for information sharing. In this regard, an efficient disaster risk management information system is important. Moreover, it should be effectively linked to local early warning systems, local authorities and the media, to ensure effective use of disaster risk information for public awareness and education, among other important activities such as strategising for quick response.
- 4) Ensuring that appropriate enabling mechanisms are in place, including policy, structure, capacity building, and resources.

The following enabling mechanisms support the successful implementation of the TDRM Approach:

- 1) *Policy*: Establish clear and comprehensive policy that defines the objectives and commitment of the government, organisation, or community to disaster reduction and response efforts. This may assume the form of a law, policy guidelines, promulgated

plans, or protocols. A policy developed through a strategic and consultative planning process could effectively address the identified gaps in the disaster management cycle.

- 2) *Structures and systems*: Establish organisational structures and systems that facilitate and ensure coordination of stakeholders' action and puts contributions in place. This involves the establishment and strengthening of focal points and coordination bodies.
- 3) *Capacity-building*: The enhancement of national and local capacity to establish and implement disaster reduction and response measures, especially for vulnerable sectors and communities. This is a regular undertaking.
- 4) *Resources*: The identification and provision of resource requirements, including funds and trained human resources. This includes the means to access and use authorised fund appropriations for disaster reduction and response. These enabling mechanisms are more effective when sustained by institutional enthusiasm, political commitment, focal points and committed advocates in government.
- 5) *Implementation*: Implement the disaster risk management process from the national level to the community level in continuation. The disaster risk management process is a process for good decision-making and for ensuring the best use of limited resources. It applies standard principles, process and techniques of risk management to disaster management. The process presents a framework and a systematic method for identifying and managing disaster risks in six systematic steps, as under:
 - 1) Establish the disaster risk context
 - 2) Identify the disaster risks
 - 3) Analyse the disaster risks
 - 4) Assess and prioritise the disaster risks
 - 5) Treat the disaster risks
 - 6) Lastly, monitor, review and communicate.

In general, this process aids decision makers in determining possible outcomes of risks and undertake appropriate measures to control or mitigate their impact based on reliable information and the available resources. In this regard, disaster risk management promotes good disaster management practice, and therefore, should be implemented in all sectors.

Pertinence of TDRM for Disaster Management Cycle

Based on the above explanation, the TDRM Approach is a *purposive approach* that addresses *holistically* and *comprehensively*, the various concerns and gaps in the different phases of the disaster management cycle. It focuses on the underlying causes of disasters, the conditions of disaster risks and the vulnerability of the community. It also emphasises multi-level, multi-dimensional and multi-disciplinary cooperation and collaboration in achieving effective disaster reduction and response. This approach intends to integrate, complement, and enhance existing disaster reduction and response strategies. Moreover, the TDRM Approach could serve as a framework for policy action in identifying and addressing the gaps in existing policies, programs, structures, systems and resources towards more efficient and effective implementation of disaster reduction and response activities. Of fundamental importance in the TDRM Approach is hazard mapping and

vulnerability assessment. This diagnosis helps ensure good decisions in choosing appropriate interventions and in ensuring the best use of limited resources.

Overall, the TDRM Approach presents a creditable disaster management strategy by way of enhanced efficiency in disaster reduction and response, and cost effectiveness through sound allocation of limited resources. The challenge at hand is to explore opportunities and initiatives to pilot the TDRM Approach at the provincial and community levels. It is also crucial to build consensus and political commitment at the highest level for adopting the TDRM Approach as a strategy to address effectively, the prevalence of disaster risks, the current state of disasters, and the existing gaps in the disaster management cycle. 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. Although the term 'prevention' is often used to embrace the wide diversity of measures to protect persons and property, its use is not recommended since it is misleading in its implicit suggestion that natural disasters are preventable. The use of reduction to describe protective or preventive actions, which lessen the scale of disasters, is therefore preferred. Even with effective preparedness and mitigation measures being in place it is realistic to expect some level of damage from extreme natural forces.

Risk Reduction is the *end* to which the TDRM is geared. Chronologically, the earlier approaches to disaster management have been the *comprehensive approach*, based on factoring articulated risks in public policy; the *integrated approach*, stressing inter-sector administrative coordination and organising work, within organisations, with a disaster management orientation, through required modifications in structure, such as, rearranging hierarchy to promote team work, specialist expertise, etc.; the *prepared community approach*, stressing harnessing social capital to build disaster resilience through training workshops, organising volunteer effort *et al* and the *developmental relief approach*, implying administering relief with a long-term development perspective, such as, building *pucca* roads, where communication is found wanting and not some temporary arrangement as a *kuccha* pathway. The TDRM incorporates all articulated concerns and gears it towards the 'end' objective of *Disaster Risk Reduction*.

Risk reduction can take place in two ways:

1) **Long-term Mitigation**

Mitigation embraces all measures taken to reduce both the *effect* of the hazard itself and the vulnerable conditions in order to reduce the *potency* of a future event. 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; modifying the occurrence of the hazard, for example, water management in drought prone areas, avoiding the hazard by siting people away from the hazard and strengthening structures to reduce damage when a disaster occurs.

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 the same. Therefore, mitigation may incorporate addressing issues such as land ownership, tenancy rights, wealth distribution, etc.

Some common mitigation measures are:

- Hazard Assessment

- Vulnerability Analysis
- Risk Assessment
- Vulnerability Reduction/mitigation strategies (structural and non- structural)
- Integration of disaster risk reduction activities in all development activities
- Disaster-resistant buildings and infrastructure
- Awareness among the community
- Preventing habitation in risk zones.

2) Short-term 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, maintenance of inventories and 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 that are taken before a disaster event, which are aimed at minimising loss of life, disruption of critical services, and damage when the disaster occurs. All preparedness planning needs to be supported by appropriate legislation specifying clear allocation of responsibilities and budgetary provisions for specific activities.

Some common preparedness measures are:

- Forecasting and warning systems for different disasters
- Emergency management plans for responsible agencies (for monitoring, alert and evacuation, immediate disaster assistance, deployment of search and rescue teams and distribution of relief material, etc.)
- Community awareness and education
- Preparation of disaster management plans for the community
- Mock drills, training and rehearsals.

2.4 SHIFT TO MITIGATION AND PREPAREDNESS PLANNING IN INDIA

The DMTP (Coburn *et al*, 1994) defines Disaster Mitigation as “a collective term used to encompass all activities undertaken in anticipation of the occurrence of a potentially disastrous event, including preparedness and long-term risk reduction measures.” Disaster Mitigation measures entail planning and implementation of risk reduction measures based on vulnerability and risk assessments and political decisions based on acceptable risk and the level of risk perception in society.

The Yokohama Message

Alarmed at increasing disaster losses all round the world, world leaders assembled at

Yokohama in May 1994, to meet the challenge collectively, since environment is an international concern. The message was to factor disaster mitigation in development policy. It marked a paradigm shift, since disaster management had been conceived more in terms of response, post-event, not as something, which could be tackled in initial stages with policy intervention. The Yokohama principles (1994) for risk reduction are as follows:

- 1) Risk assessment is a required step for the adoption of adequate and successful disaster reduction policies and measures.
- 2) Disaster prevention and preparedness are of primary importance in reducing the need for disaster relief.
- 3) Disaster prevention and preparedness should be considered integral aspects of development policy and planning at national, regional, bilateral, multilateral and international levels.
- 4) The development and strengthening of capacities to prevent, reduce and mitigate disasters is a top priority area to be addressed so as to provide a strong basis for follow-up activities to IDNDR (International Decade for Natural Disaster Reduction).
- 5) Early warnings of impending disasters and their effective dissemination are key factors in successful disaster prevention and preparedness.
- 6) Preventive measures are most effective when they involve participation at all levels from the local community through the national government to the regional and international level.
- 7) Vulnerability can be reduced by the application of proper design and patterns of development focused on target groups by appropriate education and training of the whole community.
- 8) The international community accepts the need to share the necessary technology to prevent, reduce and mitigate disasters.
- 9) Environmental protection as a component of sustainable development consistent with poverty alleviation is imperative in the prevention and mitigation of natural disasters.
- 10) Each country bears the primary responsibility for protecting its people, infrastructure, and other national assets from the impact of natural disasters. The international community should demonstrate strong political determination required to make efficient use of existing resources, including financial, scientific and technological means in the field of natural disaster reduction, bearing in mind the needs of the developing countries, particularly the least developed countries.

Post-Yokohama, there is an increasing awareness of ‘factoring’ disaster mitigation concerns in mainstream development planning, especially at the local level. Disaster Management in India, therefore, has now been imparted a development perspective following realisation of the imminence of such effort to sustain development achieved in /over the years. Traditionally, disaster management had been treated as a contingency expenditure, which could be conveniently classified, non- plan. There is an unfortunate tendency on the part of policy makers to look upon non-plan expenditure as relatively unimportant, when that is a grievous error from a development perspective. A plan item in a particular year would be non-plan in subsequent years, when expenditure has to be incurred on maintenance.

Hence, it is illusory to assume that the significance of non-plan expenditure is any less than plan. Nevertheless, disaster management has been treated “calamity relief,” and therefore, non-plan. Indirectly, though there are plan schemes for subjects like drought proofing, drinking water, and afforestation etc., which concern disaster management. Henceforth, however, there would be renewed commitment and greater role on the part of the Planning Commission towards disaster mitigation. Need for the same has been envisaged/endorsed by the Eleventh Finance Commission and the High Powered Committee on Disaster Management(2001). The attempt/emphasis would be on planning for “safe national development”.

As articulated in the Tenth Plan, disasters set back development and reduce new investment, further constricting the growth of the region. Besides, response is a lot costlier than risk reduction or mitigation. The World Bank and United Nations Geological survey calculated that economic losses worldwide from natural disasters in the 1990s could be reduced by \$280billion if \$40 billion were invested in preparedness, mitigation and prevention strategies. In China, \$3.15 billion has been invested over the past 40 years in measures to control floods: this is believed to have averted potential losses of \$ 12 billion. UN estimates, the total cost of disasters worldwide during the 1980s at \$120 billion. As per Charlotte Benson (2005), Direct Costs relate to the capital costs of assets (such as buildings and the physical infrastructure, raw materials, and the like) destroyed or damaged in a disaster, crop losses included. Indirect losses result from adverse impacts on businesses that result as a consequence.

For structural mitigation measures, measures like making disaster mitigating, a condition for financial assistance can be expected. This underlines the regulating role of the state, which would assume increasing significance in the face of rising newer threats. Mandatory risk mitigation stipulations for construction companies, for example, are an instance of the monitoring/policing role of the state that would set to rest most conjectures regarding ‘defunct state’!

2.5 RESPONSE MECHANISM IN INDIA

In India, there is integrated administrative machinery for management of disasters at the National, State, District and sub-District levels. The primary responsibility of undertaking rescue, relief and rehabilitation measures is that of the State governments. The Central government supplements the efforts of the state governments by way of physical and financial resources, if need arises. The extent/necessity of Central response/assistance depends on the severity and scale of the calamity and the requirements of Central assistance for augmenting the financial resources at the disposal of the State Government. The effort is more in the nature of support to the state governments. Drawing from the Ministry of Home Affairs’, official document, “National Policy”, Union government’s response could be in two ways:

- 1) Policy Response, provided by the Prime Minister, Cabinet Committees, and the Home Affairs and/or Agriculture Minister; and
- 2) Administrative Response

The Central response can be:

- i) Policy response, keeping in view the short and long term policy objectives of the government

- ii) Administrative response, broadly relating to:
 - a) Operational requirements
 - b) Provision of Central assistance as per existing policy.

Central initiatives are in the form of:

- i) Visits of the calamity affected areas by President, Prime Minister and other dignitaries;
- ii) Activating the administrative machinery for assisting in relief measures; and
- iii) Setting up machinery for implementing, reviewing and monitoring of relief measures.

The operational aspects of the administrative response could, further, be classified into:

- i) Primary relief functions, and
- ii) Secondary relief functions.

The *primary* relief functions of the Central Government relate to:

- i) Forecasting and operation of warning system
- ii) Maintenance of uninterrupted communication
- iii) Wide publicity to warnings of impending calamity, disaster preparedness and relief measures through TV, AIR and Newspapers
- iv) Transport with particular reference to evacuation and movement of essential commodities and petroleum products
- v) Ensuring availability of essential commodities at reasonable prices particularly the commodities through the Public Distribution System
- vi) Ensuring availability of medicines, vaccine and drugs
- vii) Preservation and restoration of physical communication links
- viii) Investments in infrastructure; and
- ix) Mobilisation of financial resources.

The *secondary* functions of the Central Government which supplement the States' relief efforts, would relate to:

- i) Flood/inflow forecasts from the Central Water Commission
- ii) Relief, rehabilitation and restoration through military aid to civil authorities
- iii) Contingency plans for crops, cattle preservation nutrition and health measures
- iv) Technical and technological inputs for provision of drinking water
- v) Technical assistance in the water budgeting and water management for various uses; and Coordination of the activities of the State agencies and voluntary agencies.

Energising Local Government

Since, efforts at controlling disasters are concentrated at the local level, and much depends on the initiative at that level, particularly by local people, institutionalising inherent

social capital in panchayat raj institutions and local volunteer groups (civil society) *inter se* could strengthen administrative preparedness for disaster response. Following the 73rd and 74th constitutional amendments, development planning at the local level is expected to incorporate disaster mitigation, which would make planning and implementation for/of the same more targeted and cost-effective. Efforts would be made to organise civil society activity to make it operate in tandem with the state apparatus under the aegis of the local institutions of self government (Tenth Plan).

Civil society actors at the local level are now proposed to be trained through mainstream administrative organisations like the Police, for better, more educated effort in various aspects of disaster management. As articulated in the Tenth Plan, their participation would be better institutionalised in close cooperation with government agencies. Presently, as evidenced during the recent Muzaffarabad quake, and also cited earlier, effort is a little scattered in that it is ill-organised and inconsistent. Efforts are in order through state initiative for better organisation of effort on the part of these agencies.

Stakeholder Involvement

Apart from national, state, district and local levels, there are various institutional stakeholders, who are involved in disaster management at various levels in the country. These include the police and paramilitary forces, civil defence and home guards, fire services, ex-servicemen, non-government organisations, public and private sector enterprises and the media, all of who have important roles to play.

The Government of India GoI-UNDP Disaster Risk Management Programme envisages active association and involvement of all stakeholders in various disaster prevention, mitigation and preparedness measures. Recognising the potential of the private corporate sector in contributing to disaster management, it envisages, sensitisation, training, and co-option of the private corporate sector and their nodal bodies and organisations in disaster planning process and response mechanisms. The Ministry of Home Affairs has outlined areas for substantial involvement of the corporate sector; some of the more pertinent of which are:

- Organisation of sensitisation programmes for building the knowledge, attitude and skills of the industries in adopting and implementing disaster risk reduction measures to make the industrial structures and infrastructures, disasters resistant.
- Development of onsite and offsite disaster management (DM) plans by the industries. The process of developing DM plans is being explained to the industries during sensitisation programmes.
- Training of industrial personnel in various facets of disaster management and response; viz. first aid, search and rescue, evacuation, etc.

The objectives of the work plan area to mainstream private sector participation in disaster management; create linkages between the community and the private corporate sector to strengthen/facilitate cooperation between some of the major stakeholders in disaster management (that is, the corporate sector, local authorities and the community).

2.6 CONCLUSION

Disaster management encompasses a range of activities, which are envisaged as a cycle involving, disaster event, response, preparedness and mitigation in that sequence. In the

immediate aftermath of a disaster, search and rescue and immediate relief activities are imminent. Long-term risk reduction or mitigation measures include rehabilitation, securing/restoring livelihoods and infrastructure restoration. Later, development strategy incorporates lessons learnt from the past, as safe development practices. This is known as mitigation. In addition, preparedness activities need to be carried out in the sense of instituting infrastructure and crafting required policy for effective disaster response and vulnerability reduction for reduced disaster losses in the future. Disaster mitigation includes preparation of disaster management plans, pre-positioning of equipment and materials, and practice and drills of response procedures. The cycle is a visual depiction of activities in disaster management and the logical sequence of their instance. The Total Disaster Risk Reduction Management discussed above, involves; human resource development, hazard mapping, vulnerability and risk assessments, information management systems, communication, coordination and funds, among others, as articulated in the regional workshop on TDRM held in Kathmandu on Aug. 9, 2002, organised by the ADRC and OCHA, UN.

Disaster occurrences are *cyclic phenomena*. Hazards exist in nature, which when the vulnerability conditions allow, turn into disastrous events with devastating impacts on populations. Following disasters, communities slowly recover and get back to life. Normal developmental processes set in after some time, till disaster strikes again, setting the cycle into motion all over again. During or immediately after a disaster, search and rescue, immediate relief and shelter activities are taken up. In the longer-term rehabilitation, housing, livelihoods and infrastructure restoration are carried out. Later, during non-disaster times, it is important to ensure *safe development practices* so that there is lesser impact of disasters in the future. In addition to this, preparedness activities need to be carried out for responding to a disaster. This is put to use when the next disaster happens, and the cycle goes on.

2.7 KEY CONCEPTS

- | | |
|----------------------------|--|
| Disaster Management | : As per Coburn, Spence, Pomonis DMTP, 1994, “Disaster Management is a collective term, encompassing all aspects of planning for and responding to disasters, including both pre and post disaster activities. It refers to both the risks and the consequences of disasters.” |
| Mitigation | : Mitigation is a long-term measure to reduce vulnerabilities, both physical, which is of infrastructure, and socio-economic, that is, pertaining to social positioning that predisposes vulnerable sections to disaster losses. Mitigation is an integral aspect of planning. Post-Yokohama, countries have been exhorted to follow the path of mitigation which mandates dovetailing vulnerability reduction measures in development planning, through resource allocation with the added perspective of disasters in sectoral schemes. It implies treating disaster mitigation as a plan commitment and not a non-plan contingency issue, as had been the approach up till now. The rationale for mitigation comes from repeated occurrence of disasters in recent times and the unsustainable impacts. |

- Preparedness** : Preparedness is explained as a state of readiness of the administrative apparatus to respond to a disaster quickly and in a way that minimises the loss of life and property that could accrue, implying, minimum time lag and maximum effectiveness.
- Prevention** : Disaster Prevention entails measures to preempt a disaster by controlling a potentially threatening hazard. For example, water harvesting can prevent droughts. To that end, it entails advance planning to forestall a disaster.
- Risk Reduction** : As per DMTP, 1994, “risk reduction is a long-term measure to reduce the *scale*, and/or the *duration* of eventual adverse effects of unavoidable or unpreventable disaster hazards on a society which is at risk by reducing the vulnerability of its people, structures, services and economic activities to the impact of known disaster hazards. Typical risk reduction measures include improved building standards, flood plain zoning and land use planning, crop diversification and planting windbreaks. Disaster mitigation, prevention, risk reduction are often used interchangeably. Hence, it is the activity and not the semantics that are/should be stressed.
- Risk Perception** : Risk perception is the degree to which people are aware of disaster risks and willing to budget for the same. It applies to general people as well as policy makers in government. Awareness generation through proactive measures, like television programmes and door-to-door campaigns improve the level of Risk Perception in society. Risk perception is generally low in developing countries and high in the developed world.
- Safe Development** : Development should be physically sustainable in that it should be able to withstand the vicissitudes of changing environment and disasters. Hence, the ‘safety parameter’ has to be incorporated in development schemes. Theoretically, it implies viewing development as a means to a long and healthy living and not as an end in itself.

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2.9 ACTIVITIES

- 1) Identify the most probable natural disaster in your city or village. Trace its disaster management cycle, identifying when the last disaster event occurred, what was the response after it, and which mitigation and preparedness activities need to be taken up for reducing the impact of a similar disaster in the future.
- 2) Make a list of agencies that have a role in the Disaster Management in your area according to the different stages of the Disaster Management Cycle.

UNIT 3 DISASTER MANAGEMENT – RECENT TRENDS

Structure

- 3.0 Learning Outcome
- 3.1 Introduction
- 3.2 Development Perspective to Disaster Management
- 3.3 Disaster Management in Mountainous Regions
- 3.4 Disaster Management in Riverine Regions
- 3.5 Disaster Management in Coastal Regions
- 3.6 Trends in Disaster Management
- 3.7 Conclusion
- 3.8 Key Concepts
- 3.9 References and Further Reading
- 3.10 Activities

3.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the recent trends in disaster management worldwide;
- Identify requirements in disaster management with respect to specific natural hazards; and
- Appreciate the significance and importance of disaster management.

3.1 INTRODUCTION

Disasters have been increasing in frequency and intensity over the past few decades. This has been directly linked to the nature and extent of human activities taking place in erstwhile natural surroundings. Human populations are settling in areas hitherto left untouched due to those being declared hazard prone. This trend of increasing disasters has necessitated changes in the disaster management systems too. The trends in disaster management can be studied with reference to vulnerabilities of specific regions in India and the requirements of disaster management in those areas, viz. the Himalayan regions, the Riverine regions and the Coastal regions. The chief emerging requirement in disaster management is sustainable development practices, factoring vulnerabilities of each specific geographic region in development policy. In this Unit, an attempt is made to apprise the learners with the recent general trends in disaster management, which pertain to all disasters- natural and man made- affecting us today.

3.2 DEVELOPMENT PERSPECTIVE TO DISASTER MANAGEMENT

Member States of the United Nations and other States met at the World Conference on Natural Disaster Reduction, in the city of Yokohama, Japan, from 23 May to 27 May 1994, in partnership with non-governmental organisations, international organisations, the scientific community, business, industry and the

media to deliberate within the framework of the International Decade for Natural Disaster Reduction, on immense human suffering that has been incident over the past years, globally, owing/due to natural disasters. It acknowledged increasing human vulnerability to disasters, especially of the poor and disadvantaged groups that are least equipped to cope with crises of such serious magnitude. The *correlation* between disaster prevention, mitigation, preparedness and relief with sustainable development policy in general is only too evident to be any longer overlooked. Hence, the three interrelated concerns of disaster management, (encompassing mitigation, prevention and preparedness), environmental protection and sustainable development need to be *simultaneously addressed* through 'all- encompassing' policy in this regard, for protection of life and preservation of development in the short run and more importantly, for future generations over the long run. Therefore, nations have to rework development strategy to some extent to incorporate these concerns in mainstream development planning, since these have hitherto been addressed as contingent measures, not mainstream measures that are treated consistently through adequate policy responses in this regard on the part of governments. There is another significant ramification to disaster management, which needs to be taken cognisance of. The need for international cooperation for integrated action to combat the threat could not be understated. Since natural disasters are not limited by natural boundaries, regional and international cooperation is imperative to build capacity of governments at regional/global scale(s) to combat the threat concertedly. Particularly, technology transfer to developing countries by the developed to build capacity to fight disasters was emphasised as an imperative in the conference. To that end, bilateral and multilateral assistance and financial resources need to be mobilised by developed countries to support the efforts of developing countries towards disaster preparedness and mitigation. Hence, technology transfer to developing countries along with corresponding training should be attempted as a necessary requirement in concerted disaster management.

Experience with natural disasters over the past few years has led to the realisation that disasters are not one off events, rather a result of concretised vulnerabilities, which need to be addressed/treated over time through sustained public policy in this regard. *Positive correlation* has been unearthed through empirical researches between disaster vulnerability and socio-economic disadvantages stemming from adverse social positioning due to poverty, unemployment, lack of access to basic facilities like education, health and hygiene, as has been experienced in recent experiences with disasters.

While disaster response is limited to short- term relief, long-term strategy is imperative to curb disaster losses over time, by way of reducing vulnerabilities of disadvantaged sections; women, children and the disabled in particular. The same is achieved through building community resilience by way of targeted offensive at particular debilitating factors such as poverty, unemployment and other forms of social and economic deprivation, which create/increase susceptibility to losses. *Prevention* aims at nipping disaster potential in the bud, hence is essential for safeguarding development. Hence, disaster vulnerability can be reduced overtime through planned interventions towards building resilience through public policy. This necessitates *consistent* attempts at vulnerability reduction through plan budget allocations for disaster mitigation with a view to integrating disaster management with mainstream development planning.

In its tenth year of publication, The World Disasters Report, 2003, brought out by the International Red Cross and Red Crescent Societies, called for disaster risk reduction targets to be added to the international development goals for 2015 and beyond. These targets could include reducing by half, the number of people killed and affected by disasters and increasing the number of governments with dedicated plans and resources for risk reduction programs.

The World Disasters Report, 2003 contains criticism of over-reliance on high-profile aid operations, to save lives when long-term investment in disaster mitigation at the local level have proven to be much more effective. No international aid effort was necessary when the worst hurricane since 1944 hit Cuba in 2002, but only five people died. Local mechanisms were in place to evacuate 700,000 people from Havana and other threatened areas. Of the 53,000 people rescued from the floodwaters in Mozambique's two great floods, local people saved 34,000.

Building Community Resilience: Stress on Social Capital

The follow up report, that is, the World Disasters Report, 2004, published by the International Federation of Red Cross and Red Crescent Societies has 'community resilience' as its central theme. Community involvement and active participation in vulnerability reduction efforts are being emphasised as essential strategy for effective policy towards vulnerability reduction. The Report notes that, building community resilience for coping with disasters is the right strategy to adopt, instead of misdirected international aid, most of which does not reach the needy. It has been seen that people have been able to survive most adverse conditions on the strength of their capacities. Therefore, the aid community is advised to concentrate on the *capacities* of the vulnerable communities rather than their *vulnerabilities* and aim at building/reinforcing the same as part of practical strategy to counter- effect vulnerabilities and help people successfully combat disasters. In the same vein, the Report calls for dispelling the myth of *helpless* victims; hence, the requirement of study of the resources and resilience of vulnerable communities to discover ways to augment them to further facilitate/strengthen self- help on the part of *at risk* communities. In Swaziland, HIV/AIDS and drought are endemic. But Chief Masilela informed Red Cross that his community would prefer irrigation and seeds, not food aid, to grow crops, craft their own recovery and retain their dignity. A woman in Mumbai, to quote another instance, has chosen to reside in a low cost dwelling in a flood prone area because that would leave her money to finance her daughter's education (World Disasters Report, 2004).

This is following realisation of the fact that active cooperation of communities is vital for achieving real gains in both policy formulation and implementation. Synergetic partnership between the government and people is essential to have a clear understanding, for instance, of the cultural characteristics and organisational requirements in different societies/situations, respectively and accordingly, specific policy requirements, as per assessed particularities/peculiarities, following insights into a society's behaviour and its interactions with the physical and natural environment, for example, shifting cultivation among tribes in North-East or burning firewood for cooking among tribal communities and poorer segments generally, which were recently indicted as major causes of global warming. This is envisaged as a practical strategy to target vulnerabilities through 'relevant' policy, based on articulate concerns by people themselves, in keeping with the particular requirements of that place. The same is crucial for the success

of any policy measure, particularly planned strategies for environment protection, where community involvement has proven to be a necessary requirement.

There is need for awareness of the fact that unplanned urbanisation is creating newer risks. It creates a case for general upgrading of administrative services as a long-term mitigation strategy, particularly building capacities at the local level with active participation of the people, since, as borne out by experience, national, or even international interventions are likely to be less effective in tackling persistent problems like poor schools, poor quality housing, sanitation, drainage, etc. The same has been realised in successive experiences with disasters around the world, particularly, during the Bam (Afghanistan) Earthquake, when 34 search-and-rescue teams from 27 countries flew to the city and saved 22 lives but, meanwhile, local Red Crescent teams pulled 157 people alive from the rubble, using far fewer 'sniffer' dogs. *Investing in local response capacities therefore saves lives and money*; which is the main inference (Ibid).

Post- Modern Trends

Post-modern cultural values premised on *democratic pluralism* and *quality of life* is gaining credence in the post-industrial society facing the ills of development. It is a political science concept that marks a sharp breakaway from earlier approaches towards governance and towards life in general, so much so, that it could be termed revolutionary. Precisely, the trend is towards people-centered governance, which is *participatory* and accountable, public policy oriented towards sustainable development, in that *pluralism* and *decentralisation* are especially espoused virtues; in fact, preconditions for democratic governance, as is 'diversity' in all its forms which should be factored in public policy, as a necessary requirement for/in good governance. The chief divergence in post-modernism from earlier approaches is, that aesthetic and spiritual aspects of life are being emphasised against purely material. In the same vein, protection of ecology is the central theme in sustainable development. Apart from secular policy, post- modern influences can be discerned in religious and cultural spheres as well. It is chiefly manifest in the West's changed attitude towards 'indigenous cultures' which is different from the insistence on 'the one right way', which was presumably Western. In disaster management accordingly, the trend is towards respecting indigenous resilience strategies and even construction methodology, which is in line with post modernism. Merit is being recognised in traditional building knowledge such as in Marathwada, India. Malwad (timber under structure) constructions offer several good examples of stone masonry. Many traditional artisans possess skills in traditional building techniques such as good quality stone masonry construction, which withstands earthquakes reasonably well. Common practice is to discard local knowledge as inferior/unscientific. However, following studies in indigenous practices, there is increasing 'voice' for incorporating the same in modern engineering knowledge to find lasting solution to physical vulnerability of infrastructure in disaster prone areas (Jigyasu, 2002).

For organisational theory, post-modernism implies a shift of emphasis towards teamwork rather than strict stipulations of hierarchy with undesirables like status differentiation, monolithic order *et al*; cooperation rather than compliance, participatory management rather than monocentric order, peoples' participation, especially regarding choice in service provisioning, etc. To reiterate, this applies to both secular and religious organisations. This is partly a result of growing suspicion towards monocentric authority whereby public and private interests are often confused/diffused; former unknowingly acting as a camouflage for the latter

and similar suspicions, not wholly unfounded. Post modernism argues for more 'political space' for articulation of myriad concerns which in practice make up public interest. Post-modernism, in one word, epitomises harmony/balance in the physical, cultural, material and spiritual senses.

Sustainable Development

Akin to the spirit of post- modernism, sustainable development, in simple words, means development that can be sustained over time, implying, benefit to the present as well as future generations. This virtue would obtain only if development has been 'balanced' with respect to *other/related* concerns. For example, a dam would lead to power generation, which is its central purpose. But public policy would demand consideration of ancillary/related issues, or 'other concerns' such as impact on ecology, displacement of population, socio-economic impact of proposed measure, etc., which would ultimately count in/decide its success. The Brundtland Commission (1987) defines sustainable development as "development, which meets the needs of the present without compromising the ability of future generations to meet their own needs".

According to H. Ramchandran (1990), sustainable development is the latest 'end' in a linear continuum of growth concepts. Understanding of development has progressed from the "simple but nebulous notion of *progress* to *growth* (of GNP), to *growth with equity* in vertical and horizontal dimensions, to the *physical quality of life* and currently to *sustainable development* or *eco development*." The latter concepts have added to the former ones, not replaced them and hence have developed as inclusive ideas adding newer dimensions to the understanding of sustainable development. Thus the concept of sustainable development encompasses all previous ideas, viz. growth, equity, etc., with the added dimension of sustainability for *future use*. Sustainable development has both *ethical* and *utilitarian* value in that preservation of environment is as much a duty of the present generations as a right for future generations, to lead disease free and accidents/disaster free lives and touch higher levels of economic development.

Sustainable development is also a *generic* idea/concept in that development *per se* could be appreciated, applying the premise of sustainability. This broad understanding is credited to social science theorists who are increasingly evaluating policy outcomes on the basis of its *viability* in the cultural, political, socio economic senses. To elucidate, globalisation has cultural impact, besides economic and political, which needs to be studied to understand its potential for apocalyptic change to then question its desirability. The question would be; is a particular change sustainable? Context could be given here of welfare economics, where gainers and losers from/in each proposed measure, are identified to compute *net social welfare* derived/proposed from the measure. All ramifications of policy viz. political fallouts, economic impact, pertaining to distributional aspects, impact on ecology etc. is considered/possibly measured to judge the sustainability, hence, desirability of a measure.

Science and Technology for Disaster Management

Currently, the *All Hazards Approach* is being emphasised in America as a holistic strategy to combat disasters. The understanding that underlines this approach is that all disasters, irrespective of type can be dealt with on the basis of common knowledge/expertise based on academic researches and preparedness, based on information derived thus and constant updating of such knowledge. Its chief

reliance is on science and technology for capacity creation. It relies on creating capacity through R&D in science and technology to deal with any and every kind of disaster(s), ranging from earthquake to terrorism, based on and converting R&D to practice readily to attempt new and innovative ways to deal with crises, whether natural and/or man made. For this purpose collation of science and technology expertise scattered across institutions within the aegis of a single agency is necessary that acts as clearing house as well as a coordinating agency with respect to myriad disciplines/ concerns, even within science involved in disaster management.

This approach lends a fresh perspective to disaster management in that policy in this regard, never at any stage, suffers from redundancy. Disaster management requires a multidisciplinary approach, hence, the need for a single coordinating/overseeing agency.

The Sub-Committee on Disaster Reduction (SDR) of the National Science and Technological Council (NSTC) in the United States (2003) has articulated six important areas that require continued energy and appropriate resources to meet the challenges of hazard risk reduction. The same may be pertinent for all countries facing the threat of terrorism, which is the single most horrifying disaster possibility in recent times.

- 1) Leveraging existing knowledge of natural and technological hazards to address terrorism events
- 2) Improve hazard information data collection and prediction capability
- 3) Ensure the development and widespread use of improved hazard and risk assessment models and their incorporation into decision support tools and systems.
- 4) Speed the transition from hazard research to hazard management application
- 5) Increase mitigation activities and incentives
- 6) Expand risk communication capabilities, especially public warning systems and techniques

Kenneth Bloem of the Johns Hopkins University Center for Bio-Defense Studies has identified a number of parallel streams where preparation for terrorist incidents can be enhanced by decades of research in traditional disaster areas:

- Wildfires and Arson
- Accidental explosions and bombs
- Floods and dam sabotage
- Chemical spills and chemical attacks
- Epidemics and biological terrorism

Ultimately, effective public policy for disaster management is a result of deliberation/cooperation between scientists, decision makers and informed citizens. It should also be remembered that limiting disaster management to a technocratic perspective would exclude many pertinent issues that fall within the domain of social sciences, for example, greater relative vulnerability of the poor and the socially marginalised.

3.3 DISASTER MANAGEMENT IN MOUNTAINOUS REGIONS

The Himalayan range is one of the highest mountain chains in the world. Himalayas, also known as the Extra-Peninsula, are one of the three main geological divisions of India. The other two divisions are the Peninsula and the Indo-Gangetic Plains.

Geographically, the Himalayas extend for about 2400 km, from western Syntaxial bend-near Nanga Parbat to eastern Syntaxial bend-near Namcha Barwa, and exhibit a curvilinear disposition.

The Himalayas are classified, from west to east, into four regions:

- i) Punjab Himalaya - area between Indus and Sutlej rivers.
- ii) Kumaon Himalaya - area between Sutlej and Kali rivers.
- iii) Nepal Himalaya- area between Kali and Tista rivers.
- iv) Assam Himalaya- area between Tista and Brahmaputra rivers.

Presently, Himalayas are divided into three regions: the Western, Central and Eastern Himalaya. Nepal Himalaya constitutes the Central Himalaya and the mountainous area to its west and east are known as Western and Eastern Himalaya respectively. Thus the Western Himalaya includes Punjab and Kumaon Himalaya covering Himachal Pradesh and parts of Jammu and Kashmir, and Uttaranchal.

The Uttaranchal Himalaya extends from Tons river in the west to Kali river in the east and covers an area of about 46,480 sq.km. Garhwal and Kumaon are the two main regions of Uttaranchal Himalaya.

Major landforms of Uttaranchal Himalaya are arranged in three parallel ranges:

- i) Great Himalaya (GH) lies south of Tibetan Plateau and contains the highest elevations.
- ii) Lesser Himalaya (LH) lies south of GH and has elevations between 10,000 and 15,000 ft.
- iii) Outer Himalaya (OH) lies south of LH and borders Gangetic Plain. Altitude varies between 2000 and 3000 ft. and has geomorphologic depression-the Dun.

Himalaya, in Uttaranchal, can also be divided into four broad geological zones, each having distinct geological history. These are:

- i) **Tethys Himalaya Zone (THZ):** exposes mainly fossiliferous rocks of Phanerozoic and lies north of the central axis (line of highest elevation of CH)
- ii) **Central Himalaya Zone (CHZ):** contains crystalline and metamorphic rocks which are thrust over the sedimentary sequences of lesser Himalaya along the Main Central Thrust (MCT)
- iii) **Lesser Himalaya Zone (LHZ):** exposes largely sedimentary, unfossiliferous sequences of Proterozoic period, which are disposed in distinct tectonic belts between the MCT and Main Boundary Fault.

Fossiliferous rocks of Palaeozoic, Mesozoic and Cenozoic periods have very limited extent.

Regionally metamorphosed rock masses occur as Klippe.

- iv) **Outer or Sub Himalaya Zone (OHZ):** This is the southern most zone and exposes sedimentary sequence predominantly of Neogene period. The OHZ lies between MBF and Foot Hill Fault (FHF). FHF is the boundary between the outer Himalaya and Gangetic Plain.

Hazards in the Himalayan Eco-System

The Himalayan region, characterised by a wide variation in topography, geology, soil, climate, flora and fauna and various ethnic groups having different socio-cultural traditions, is a unique geographical entity. All major types of disasters, prominently, earthquakes, landslides, avalanches, flash floods and forest fires, and soil erosion hit this region. In high altitude regions (over 3500m), snow avalanches and glacial lake outburst floods (GLOFs) are common threats while flash floods; landslides and mudflows assume disastrous dimensions in the altitude range from 500 to 3500 m. (Bahadur, 1998).

The Himalayan region with soft weathering rocks, covered with a thin layer of soil is becoming increasingly susceptible/ sensitive to landslides. Such landslides cause disruption, create blockades in the road network and river system, which in turn, cause floods. Interference in the environmental system in the form of indiscriminate chopping down of trees has disrupted the ecological balance, thereby resulting in loosening of the soil and consequent soil erosion and frequent landslides. Over a period of time the eroded soil begins to settle down on the riverbed resulting in shifting of the river. This is one of the major reasons for floods.

A very befitting example in support of the above statement is the *slash and burn* cultivation technique called 'JHUM,' which is practiced in the hilly areas. Development of the communication system by means of road construction and mining of rich mineral reserves over a period of time has destroyed the dense natural evergreen forest cover.

Report of 'The Central Team on Landslides in Hill Areas of Uttar Pradesh' during 1998 indicates the damages caused due to hailstorms, heavy rains and the resulting crop damage in the state during the months of May to September 1998. The report observed that the Himalayan ecology is extremely fragile and falls under Seismic Zone V. Another problem is the rapidly growing urban centers within the Himalayan belt being important tourist basins, both nationally and internationally. They have grown rapidly, often with very little attention to building by-laws and planning principles, which are almost non-existent at this point!

Other main causes for the landslide have been unplanned and unscientific development activities in the hilly areas, unchecked organised crime that is involved in illegal felling of trees, poaching, mining, quarrying, construction and urbanisation which have caused ecological imbalances in the Himalayas. Increasing pressure of human and animal needs, rapid denudation, biotic interference etc. have further aggravated the problem of soil erosion, avalanches, flash floods etc.

Every year, landslides in the region kill dozens of people and cause widespread damage to several villages such that they have now become almost unfit for habitation. Landslides have caused havoc and the terraced fields have been destroyed that cannot be easily renovated or made productive again. The road network remains closed for long periods causing indescribable hardship to the villagers who get their basic supplies and provisions from the neighbouring areas. The water source is also disrupted due to landslides as they are breached from several places and are choked by the debris. The sediment load of rivers has also increased considerably, causing problems like irregular courses and frequent breaching of the banks, which create uncertainty regarding the river course and unexpected floods. More so, the water channels are affected from the up hillside due to which the villagers are devoid of water for irrigation purposes. This adversely affects agriculture production in the region.

As explained by Jagdish Bahadur (1998), related problem is that of soil erosion. The large fluctuation in temperature during the annual cycle generates a severe freeze - thaw cycle resulting in greater erosion of soil and rock formations. Another important factor for excessive soil erosion is very intense monsoon rainfall (from a few hundred mm to thousands of mm in 24 hrs.). Measured sediment yields range from less than one ton/ha/year to over 100 tons/ha/yr. It is normally assumed that the sediment yield of Himalayan rivers is about $16.4 \text{ ha.m} / 100 \text{ km}^2/\text{yr}$, which is about three to five times higher than the value assumed by the designers of water resource storage projects. These estimates are not totally representative of the sedimentation regime and represent only the *suspended sediments*. No quantitative estimates are available for *bed load sediments*, which play an important role for high mountain turbulent streams. Hence, we have to develop strategies for sediment harvesting (seclude sediments for other uses) for efficient water resources management for harmonious development of the region.

The region's agriculture and power generation are fully dependent on the freshwater supply fed by the discharges of the Himalayan glaciers. In the Ganga river only, the loss of glacier melt water would reduce July-September flows by two thirds, causing water shortage for 500 million people and 37 percent of India's irrigated land. Perennial rivers could be changed into seasonal streams giving rise to freshwater scarcity in the summer months when melt waters contribute the bulk of the water (around 75%) to the Himalayan Rivers.

Several glacial lakes have been formed as a result of glacier retreat due to raised temperatures, which could lead to catastrophic events like glacial lake outburst floods (GLOF) in valley's downstream, resulting in destruction of valuable resources such as forests, farms, costly mountain infrastructures and even human life. GLOFs can have devastating consequences for civil works, like bridges, dams and powerhouses, and communities living downstream.

In order to manage the impacts of climate change on glaciers, the nature of these impacts with respect to individual glaciers or drainage basins needs to be studied and understood. In the Himalayas, although there has been research at a large scale on glacier retreat there has been no work at the scale of the individual glacier or drainage basin and so current research is too general to drive policy response (WWF, 2005). Adoption of appropriate soil and water conservation practices on a watershed basis is considered to be the only way to control soil erosion and improve the environment in the mountainous regions. The measures are to be adopted in conformity with the concept of integrated land use planning for development and improvement of catchment and command area. Efforts must

be directed towards utilising the maximum amount of rain to meet the human, animal and crop needs and at reducing to the minimum, the damage by floods and soil erosion. Excess water should be stored in the catchments areas, which will reduce the fury of flash floods, recharge the ground water and improve the environment. Runoff collection ponds in the catchments, though they might get silted up in a few years, will be more useful than the measures in the lower reaches. To prevent rapid siltation of tanks, the contributing catchments (even if they are not cultivated but used for grazing or forestry purposes) need to be well managed so that soil erosion is prevented. All common lands should be put under fuel/fodder trees. Planting of barren areas, especially on slopes, with grass cover is an important component of integrated watershed management programme. Grazing should be completely restricted. After the area is completely protected from grazing, better grasses can be planted. The grasses of industrial importance should also be planted so that there is some economic return to the farmers as well. The surface vegetative cover will not only protect the land from the beating action of rain drops and bind the soil particles but would also decrease the velocity of flowing water and cause less of soil erosion (Bahadur, 1998).

Availability of fresh drinking water is another problem in the region. Increasing urbanisation in the area is putting added pressure on water resources, and not much is being done to replenish the depleting resource. There is no detailed scientific evaluation available for Himalayan water resources. According to Jagdish Bahadur (1998), this is partly due to *insufficient network of observations* for both *precipitation* and *stream discharge* measurements.

Both saline and freshwater natural lakes exist in high altitude regions. Saline lakes abound in the arid region while those lakes, which are extremely poor in electrolytes, are abundant in the humid region, being nurtured by the monsoon. These lakes are situated at altitudes varying from 600m to 5600m and are exposed to climatic conditions that vary from cold deserts of Ladakh to wet humid of Manipur. Very few studies are undertaken on the Himalayan lake ecosystems and the water management programmes are either completely lacking or grossly inadequate (Zutshi, 1985). The inflow of high silt load from glaciers is gradually filling these lakes and rendering the lake waters turbid and unfit for biological activity. The other impact is from pollution from agricultural, industrial, and human and cattle wastes. Restoration plans for the lake systems should be undertaken on ecological considerations following their geophysical environment and annual rhythm in chemical and biological compositions.

To achieve these objectives, the following essential elements for action are considered necessary, as per Jagdish Bahadur (1998):

- i) All efforts should be made for proper assessment of water resources.
- ii) A comprehensive framework for water resource management is considered in preference to sectoral approach.
- iii) Interventions in water sector should move from curative to preventive ones.
- iv) A broad range of investments should be made on a continuous basis with ability to operate and maintain investments effectively.
- v) Infrastructural improvements must be complemented with measures to strengthen institutions, develop human resource and promote public awareness.

- vi) Promotion of water user's associations and increasing user participation.
- vii) The participation of the private sector in water management should be deliberately pushed forward.

The Fire Menace

Protection of forests is equally important. According to a Forest Survey of India Report, about 50 percent of forest areas in the country are fire prone (ranging from 50 percent in some states to 90 percent in the others). About 6 percent of the forests are prone to severe fire damage). The coniferous forest in the Himalayan region comprising of fir (*Abies* spp.), spruce (*Picea smithiana*), *Cedrus deodara*, *Pinus roxburgii* and *Pinus wallichiana*, etc., is very prone to fire. Every year there are one or two major incidences of forest fire in this region. Other areas with deciduous varieties have also shown susceptibility to fire.

The ecological and socio-economic consequences of wild land fires in India include loss of timber, loss of bio-diversity, loss of wildlife habitat, global warming, soil erosion, loss of fuel wood and fodder, damage to water and other natural resources, loss of natural regeneration, losses in productivity of the land, impacts on regeneration of species; and deleterious impacts on water shed also result from forest fires. Estimated average tangible annual loss due to forest fires in country is Rs.440 crore (US\$ 100 million approximately). In India, there are no comprehensive data to indicate the loss to forests in terms of area burned, values, and volume and regeneration damaged by fire. One reason to account for the same is alleged fear of accountability on the part of the forest department, and hence deliberate understatement of the problem.

According to the Constitution of India, the Central and State governments in the country are enabled to legislate on forestry issues. The implementation part of the forest policy/programmes lies with the state government. Thus, fire prevention, detection, and suppression activities are the responsibility of the state governments' forestry departments. The policy, planning, and financing are the primary responsibility of the Central Government. There is generally no separate department for carrying out forest fire management in the states. The regular staff of the forest department in the states carries out various activities of forest fire management. During forest fire seasons, in some of the divisions, the state governments recruit firewatchers as a special provision. At the central level, the Ministry of Environment and Forests is the ministry responsible for forest conservation and protection. The "Forest Protection Division" of the Ministry, which is headed by a Deputy Inspector General of Forests, administers Forest Fire management. The Ministry is implementing a plan called "*Modern Forest Fire Control Methods*" in India under which state governments are provided financial assistance for fire prevention and control. This assistance is being used by the state governments for procuring hand tools, fire resistant clothes, fire fighting tools, radios, fire watch towers, fire finders, creation of fire lines, research, training, and publicity on fire fighting. This project is carried out in fourteen states and covers more than 70 percent of the forest area of the country.

Community Involvement

In India, Joint Forest Management (JFM) Committees have been established at the village level to involve people in forest protection and conservation. At present, there are 36 165 JFM committees throughout the country, covering an area of more than 10.24 million hectares. These JFM committees also have been given responsibilities to protect the forests from fires. For this purpose, the

Modern Forest Fire Control plan is being revised and JFM is being made an integral component of the forest fire prevention strategy.

The incidence of forest fires in the country is on the increase and more area is burned each year. The major cause of this failure is the piecemeal approach to the problem. Both the national focus and the technical resources required for sustaining a systematic forest fire management programme are lacking in the country. Important forest fire management elements like strategic fire centres, coordination among Ministries, funding, human resource development, fire research, fire management, and extension programmes are missing.

Taking into consideration the serious nature of the problem, it is necessary to make some major improvements in the forest fire management strategy for the country. The Ministry of Environment and Forests, Government of India, has prepared a National Master Plan for Forest Fire Control. The thrust areas in the programme would be (Bahuguna & Singh, 2002):

- Prevention of human-caused fires through education and environmental modification. It will include silvicultural activities, engineering works, people participation, and education and enforcement. It is proposed that more emphasis be given to people participation through Joint Forest Fire Management for fire prevention.
- Prompt detection of fires through a well-coordinated network of observation points, efficient ground patrolling, and communication networks. Remote sensing technology is to be given due importance in fire detection. For successful fire management and administration, a National Fire Danger Rating System (NFDRS) and Fire Forecasting System are to be developed in the country.
- Fast initial attack measures.
- Vigorous follow up action.
- Introducing a forest fuel modification system at strategic points.
- Fire fighting resources.

Non-timber forest products such as medicinal plants and herbs, essential oils, fibres and silks, natural dyes and organic products, off-season vegetables, bamboo and bamboo products, bees and bee products, and enterprise-based pollination services can provide the basis for increasing incomes and improving livelihoods. Likewise, mountain tourism, hydroelectricity and other renewable energy sources, and the potential for obtaining reimbursement for environmental services, including carbon sequestration, have demonstrated the capacity to become drivers of local economic growth if structured in ways that empower local communities and poor households (Campbell, ICIMOD, 2005).

There is need to adopt a combination of traditional and modern control measures adopting bioengineering techniques for sustainable development. Integrated long-term planning is needed with local participation as an essential development strategy for water resource development of the tallest water tower of the world (Bahadur, 1998).

According to R.B. Singh (2005), some portion of money earmarked for relief should be spent in water management practices like creating storages and water harvesting structures in the upper reaches of the stream. Though floods in the region cannot be controlled for hydro-meteorological and topographical realities,

such measures can modify them to a large extent so as to minimise loss of life and property in the region. Drought and flood proofing programmes with satellite data for hazard zoning, survey of past disasters, and damage assessments etc. are important strategy.

3.4 DISASTER MANAGEMENT IN RIVERINE REGIONS

Several areas in the Hindu Kush Himalayan region (HKH) face flood disasters almost regularly. In particular, floods affect the Ganges, Brahmaputra, Meghna, and Indus flood plains every year. This region contains one of the highest concentrations of people in the world, with a high rate of poverty; population growth has increased the vulnerability to flood disasters. Flooding is a part of the growing spiral of poverty. Economically disadvantaged people move to the flood-prone lowlands because of certain advantages like fertile soil, cheap housing and also because they lack other options. At the same time, they lack the resources to respond to and recover from floods. Communities living in the great plains of India that spread across northern, western and central parts of the country, also including inland parts of the larger coastal states, are vulnerable to a host of disasters.

Floods are also a macro concern in that they constrict socio-economic development opportunities by adversely affecting investment in agriculture, infrastructure, and industrial production and also retard development. Hence, flood management is essential both for survival and for long-term growth (SAF, 2005).

As per the *Expert Group Report on Employment submitted to the Ministry of Urban Affairs in 1998*, losses from floods are exacerbated by poor drainage infrastructure, which are choked during heavy rains due to refuse disposal. This creates a situation referred as, local flooding. The India Meteorological Department has worked out the probable maximum precipitation values for different areas, which are worked out on the basis of observation/computation in 24 hrs. Drainages and embankments, which often breach during heavy rainfall, should be designed keeping in view the probable precipitation values. A Vulnerability Atlas has been prepared which shows hazard vulnerability in different areas. Flood prone areas are marked 'protected', where protective measures such as embankments have been provided. The unprotected areas are high-risk areas where no such effort has been undertaken. Even in protected areas, though, engineering attempts are put to the real test only when actual flooding takes place. In Punjab heavy damage was incurred in 1995, when the Sutlej flooded large parts and embankments usually gave way. The crisis gets worse in coastal areas where flooding is coupled with storm surges and heavy wind velocities, which exacerbates the risks manifold. Other vulnerable regions are the depressions or the poorly drained areas, which are subject to back-flow from flooded rivers, catchments of choked drains etc., which have random risks of flooding due to heavy rains. For identification of such areas, contour surveys are required at the micro level.

Regarding flood hazard, there is emerging consensus that structural mitigation measures have limited utility. Hence, the emphasis is now on non-structural mitigation measures, particularly flood monitoring and forecast, besides creating awareness among people regarding their vulnerable status, significance of following warnings, easy modes of information dissemination regarding

impending disasters, institutionalisation of social capital for better preparedness and so on.

It is most important to remember that natural disasters are not limited by/to national boundaries. For effective combating the threat, regional cooperation is needed. As yet, however, there is no regional framework for such multilateral exchange, although there are successful examples of agreements for bilateral exchange of data. Particular concern was voiced during the Second Steering Committee Meeting of the hydrological research network HKH-FRIEND (Flow Regime From International Experimental Network Data, part of UNESCO's International Hydrological Programme) held in April 2000 in Kathmandu. A regional flood information system is being set up for the Hindukush region. A number of agencies are involved, prime among whom are, the World Meteorological Organisation (WMO), supported by the US Department of State (Regional Environmental Office of South Asia), US Office for Foreign Disaster Assistance, and DANIDA. The scheme will benefit Bangladesh, Bhutan, China, India, Nepal, and Pakistan, who have agreed on an initial Action Plan for Regional Co-operation for Flood Information Exchange (SAF, 2005).

Apart from flooding, the other major problem is availability of fresh water. According to R.B Singh (2005), most people in the region do not have access to safe drinking water. Pollution is major concern and there is great biodiversity loss, both on land and in the inland waterways. Because of erratic rainfall and unequal distribution across regions, many districts in Haryana, Uttar Pradesh, West Bengal and Bihar suffer frequent droughts.

Hence, while on the one hand there are floods, increasingly now, because of global warming induced retreat/melting of glaciers in the Himalayan region; there is a situation of water scarcity in cities like Delhi, to an extent where water riots could ensue! Besides, glacial retreat would reach a point glaciers subside and run off decreases. Hence flood control and water conservation, along with concrete steps, through legislation for controlling water pollution and good maintenance of drainage are significant requirements in disaster management in riverine regions.

As per data cited by R.B. Singh (2005), the average run off in the river system in the country is assessed at $1,869\text{Km}^3$. Of this the utilisable portion by conventional storage and diversion is estimated, as about 690Km^3 . In addition there is substantial replenishable groundwater resource in the country, estimated at 432km^3 . Presently, there are two strategies being followed; excess water transfer from surplus to deficit regions through schemes like river linking, and water harvesting, which is, storing water at the place where rainfall occurs. This two-pronged strategy is expected to redeem the flood situation and also replenish aquifers, which have fast receded.

Indian River Systems

The major river systems in the country can be broadly classified into two groups, viz. the rivers of the Himalayan region and rivers of peninsular India. The melting snows and glaciers of the great Himalayan range feed the Himalayan Rivers, during spring and summer, as also by rains during monsoons. They are often uncertain and capricious in their behaviour. They carry significant flows during the winter. On the other hand, the peninsular rivers originate at much lower altitude, flow through more stable areas, and are more predictable in their

behaviour. Their flows are characterised by heavy discharges during monsoons followed by very low discharges during the rainless months.

Nature of Flood problem in various river systems: From the point of view of the flood problem, the rivers can be grouped under the four regions as under:

- (a) Brahmaputra region drained by the Brahmaputra Ganga river system
- (b) Ganga region drained by the Ganga river system
- (c) North West drained by Indus & its tributaries
- (d) Central India & Deccan region drained by rivers like Narmada, Tapi

Brahmaputra River System

The region drained by the Brahmaputra and Barak and its tributaries covers the state of Arunachal Pradesh, Assam, Meghalaya, Manipur, Tripura, Nagaland, Northern regions of West Bengal and Mizoram. The tributaries have very steep slopes and shallow braided channels, coarse sandy beds and carry heavy silt. They bring flash floods because of short distances between their source in the hills and the confluence. The major problems faced by this system are that of overflows, drainage congestion, bank erosion, landslides, and aggravation and changes in river course.

Ganga Region

Ganga has a large number of tributaries. Ganga basin with a drainage area of nearly 8,61,400 sq. Km. in India covers slightly more than $\frac{1}{4}$ of the total geographical area. The tributaries of Ganga are by themselves mighty rivers and most of them are highly flood prone. The northern tributaries of Ganga rise in the hills, some in Nepal, causing most of the flood problems on account of heavy flows and sediment they bring down from the Himalayas. Flooding takes place mainly in Uttar Pradesh, Bihar & West Bengal. In Haryana, the marginal areas along the Yamuna get flooded. Even though flood embankments have been constructed on both banks of the Yamuna, in the territory of Delhi, flooding can occur due to breaches as had happened in 1978. The danger of such flooding has increased, with jacketing of river in the upstream reaches, thus denying the benefit of valley storage.

North -West Rivers Region

Compared to the Ganga and the Brahmaputra river basins, the flood problem is relatively less in this region. The major problem is that of inadequate surface drainage, which causes inundation and water logging over vast areas. However floods are sometimes caused by the Ghaggar River, which used to disappear in the sand dunes of Rajasthan after flowing through Punjab and Haryana. In recent years, besides flooding Punjab and Haryana areas, flooding has become active in Rajasthan also. Jhelum, Chenab and their tributaries also cause occasional floods.

Central India and the Deccan Region

The region does not have very serious flooding problem because the rivers mostly have well- defined and stable courses. In Andhra Pradesh it is confined to spilling by the smaller rivers. Tapi and the Narmada are occasionally in high floods affecting areas in the lower reaches in Gujarat. Godavari and Krishna rivers on the East Coast have acute drainage problem and face flood particularly in the wake of cyclonic storms. The small rivers of Kerala when are in spate, cause

considerable damage. However, in Orissa, damage due to floods has been extensive, caused by the Mahanadi, the Brahmani and the Baitarni which have a common delta where the floodwaters intermingle, and when in spate simultaneously, cause considerable havoc. The problem is accentuated when the flood synchronises with high tides.

3.5 DISASTER MANAGEMENT IN COASTAL REGIONS

India has a coastal stretch of 5700 km. Out of this the east coast bordering Bay of Bengal has a length of 2700 km and the west coast bordering the Arabian Sea has a length of 3000 km. Though India has a long coastline, stretching across many states, the states most exposed to cyclone related hazards, including strong winds, floods and storm surges, are West-Bengal, Orissa, Andhra Pradesh, Tamil Nadu and Gujarat. Destructive natural system events that impact coastal areas can be either episodic or chronic. Together, these types of events define what is meant by natural coastal hazards. The destructive potential of such events is often made much worse by the increasing amount of development along the coastline. A variety of natural hazards regularly threaten the nation's coastal inhabitants. Severe meteorological events such as *Tropical Cyclones* are particularly harsh on coastal areas, often resulting in damages from high winds, storm surge, flooding, and shoreline erosion. *Tsunamis*, whose destructive force is characterised by potentially devastating flood inundation, are uniquely coastal events resulting from offshore sea-bed earthquakes, landslides, or volcanic activity. Coastal locations are also subjected to the impacts of long-term hazards such as chronic coastal erosion, potential sea-level rise, and global climate change. Other hazards impacting coastal areas include biological events such as *Red Tides* and *Harmful Algae Blooms*.

Coastal hazard events can significantly affect or even alter the natural environment, but their impacts are generally not considered "disastrous" unless they involve damages to human populations and infrastructure. Many of the coastal ecosystems that are particularly fragile and sensitive to the cumulative impacts of human development are also naturally fluid and generally capable of adapting to hazard impacts over time. When people and property are not present, hazards are merely natural processes that alter the environment. When people and property are present, however, the impacts of hazards on the developed and natural environments are viewed quite differently. The primary focus is no longer on the natural processes associated with a major hazard event, but instead on the *disastrous results* that can be measured by lives lost, property damages, and economic and environmental impacts. Hazard impacts on the natural environment become more devastating because human development has altered the ability of natural systems to recover from such events. Natural hazard events can also spawn secondary hazards such as sewage releases or hazardous materials spills that are particularly damaging to coastal environments.

Among the main reasons for the continuing increase in the loss levels caused by natural disasters is the continuing growth of the population by unchecked migration of people to coastal areas that are generally more exposed to natural disasters. The development of industry in regions that are subject to natural hazards, without appropriate protective measures, is another reason for the growing increase in the loss levels caused by natural disasters. In Asia, natural hazards cause a high number of lives lost, and relatively small property losses in least developed and developing countries. However, in the relatively developed countries where disaster prevention and mitigation measures are adequately

established, the loss of life is relatively small, but the damage to property is high. Losses may vary even within a country itself. The effect of natural hazards on the loss of human lives is directly related to the poverty levels in a country.

Another factor that exacerbates the effects of natural hazards is environmental degradation, which is taking place in many countries of the region. The damage caused by natural hazards is higher in countries where environmental degradation is rampant. Deforestation, erosion, overgrazing, or over-cultivation and incorrect agricultural practices and degradation of natural buffers amplify the effects of natural hazards. Coral reefs and mangroves are natural protection mechanisms against high-speed winds, which are fast eroding. Restoration of the same can restrict damage from disastrous events to a considerable extent (National Institute of Oceanography).

Requirements in Coastal Disaster Management

Disaster requirements would differ in case of each specific hazard the coastal areas are subject to, which have been referred briefly earlier. Major hazards are Cyclones, Tsunamis, Storm Surges, Coastal Pollution, Coastal Erosion, hazards related to climate change, besides Harmful Algae Blooms and Submarine Mudslides.

For curbing the hazard of *Tsunamis* and *Storm Surges*, the tide gauge data that has regularly monitored tides in the Indian Ocean would be studied to trace past tsunami events and storm surges. Tsunamis have escaped detection, perhaps because of their infrequent occurrence, implying, a long gap between two events, or because of their impact having been low, or because the usual practice of digitising these data at one-hour interval is not enough for capturing tsunamis, which have a smaller period. Hence, a closer analysis of tide gauge data would be attempted to track and possibly predict more vigorous events such as storm surges, cyclones and perhaps, Tsunamis.

Mangroves and forests along the coastlines act as natural buffers against strong winds and storms. These are being referred as bio-shields and their importance has been realised post, recent tsunami. It is, however, necessary to quantify the protection such natural buffer zones, now called bio-shields, provide to coastal habitation. For example, it is necessary to determine the thresholds beyond which they cease to be effective and the extent of protection they provide.

Coastal areas are subject to oil spills. Vulnerability mapping would be needed to identify sensitive ecological zones to plan for emergency and quick evacuation.

To control *coastal pollution*, which has increased with increasing industrialisation of these areas, compliance with EIA (Environmental Impact Assessment) would have to be strictly enforced. There is a need to integrate the results of the EIA studies to generate a national database, and to determine the “carrying capacity” of the coastal waters of India. A beginning towards determining the carrying capacity of Indian coastal waters has been made with the ICMAM (Integrated Coastal and Marine Area Management) and COMAPS (Coastal Ocean Monitoring And Prediction System) programmes, but there clearly is much that still needs to be done.

Eutrophication of waters caused by excessive nutrients, especially nitrogen, leads to potentially harmful algal blooms (HAB). They result in rapid growth of an algal species that contains toxins or causes a negative impact on natural resources or human beings. Though these are natural, pollution exacerbates them. Presently,

there is no database for systematic study of algae blooms, their causes, ways to curb them, etc.

With exploration for oil gaining momentum, offshore structural engineering is gaining importance. The potential threat to such structures from submarine mudslides necessitates engineering design solutions to mitigate the impact. Since poor quality of construction has been identified as one of the causes of higher fatalities due to natural hazards in India, quantification of these hazards must also lead to better regulations and viable building codes.

Besides these, considerable parts of India are multi-hazard prone, in that they might be visited by more than one natural hazard at a time, which poses significant challenge to disaster mitigation policy/strategy. For example, floods and droughts have also been affecting these communities on a regular basis. Floods are experienced almost every year in some state or the other. Major floods were experienced in 1990, 1991, 1993, and 1994. A large number of deaths also occur during summer months due to heat waves, particularly in states like Orissa, that had a drought during 1995-98, and a severe heat wave in 1999. This documentation however mainly covers cyclone disasters and accompanying floods and storm surges (*Ibid*).

Controlling the Cyclone Hazard

Over the warm water (sea surface temperature greater than 26°C) in the tropical ocean, little away from the equator within the belt of 30°N and 30°S, the occurrence of tropical cyclones is almost a worldwide phenomenon. However, their characteristics such as frequency, intensity and coastal impact vary from region to region. But these have been the deadliest when crossing the coast bordering the North Bay of Bengal (coastal areas of Andhra Pradesh, Orissa, West Bengal and Bangladesh), mainly because of the serious storm surge problem in this area.

On an average, about 5-6 tropical cyclones form in the Bay of Bengal and the Arabian Sea every year, out of which 2 or 3 may be severe. More cyclones form in the Bay of Bengal than in the Arabian Sea. The ratio is 4:1. There are two definite seasons of tropical cyclones in the North Indian Ocean. One is from May to June and the other from mid-September to mid-December. May, June, October and November are known for severe storms. The entire east coast is vulnerable to cyclones with varying frequency and intensity. Along the west coast, the Gujarat and Maharashtra coasts are more vulnerable compared to the southern part.

Indian scientists are seriously studying the El-Nino effect on weather and the outcomes of these studies will help in better communication of early warnings as well as preparedness planning.

3.6 TRENDS IN DISASTER MANAGEMENT

Preparedness

One of the many lessons learnt by victims of various natural disasters is that the aftermath of the disaster can be worse than the disaster event itself. Thus, there is a need to acknowledge the need for preparedness towards disaster reduction. However, people are often surprised by the concept of *reducing* disasters. How, it is often asked, can a natural disaster such as an earthquake or a cyclone be *reduced* or *prevented*?

Unfortunately, due to rapid population growth and development of human settlements in disaster prone areas, more and more people and their assets are vulnerable to natural hazards. The number of disasters was three times higher worldwide in the past ten years than in the 1960s, economic losses were eight times higher, exceeding US\$ 60 billion a year!

Natural occurrences such as floods, earthquakes, cyclones, etc. simply cannot be avoided altogether; they are a part of the environment we live in. What can be done, however, is to take preventive measures at various levels of society in order to minimise the impact of such natural hazards as much as possible for the people. The impact of a natural hazard can be *reduced*; its worst effects can be *prevented*.

A natural hazard turns into a disaster when it hits a community and disrupts its normal functioning and causes economic damage. Natural disasters hit all, rich and poor alike. But it is the poor who will be hurt most. Protecting the poor from disasters also contributes towards the alleviation of poverty.

The communities actively involved in working on prevention of natural disasters before they strike belong to all groups of society: international and regional organisations, national governments or private firms, local administrations or specialised associations and voluntary organisations.

What is important is to introduce a culture of prevention in all communities, at all levels: action to save lives must be taken before the disaster strikes.

Principles of Mitigation and Preparedness

Disaster mitigation and preparedness activities need to be carried out well in advance of any emergency, and are driven by the following principles:

- Risk assessment is a required step for the adoption of adequate and successful disaster reduction policies
- Disaster prevention and preparedness are of primary importance in reducing the need of disaster relief
- Disaster Prevention and preparedness should be considered integral part of the developmental policy and planning at national, regional, bilateral, multilateral and international stage.
- Early warning of impending disasters and their effective dissemination using telecommunication are the key factors to successful prevention and preparedness
- Preventive measures are most effective when they involve participation at all levels, from the local community to national level to the regional and international level.
- Vulnerability can be reduced by the application of proper design and patterns of development focused on target groups through appropriate education and training
- The international community accepts the need to share necessary technology to prevent, reduce and mitigate disasters, which should be made freely available and done in a timely manner as an integral part of technical cooperation.

Each country bears the primary responsibility of protecting its people, infrastructure and other national assets from the impact of natural disasters. The

international community should demonstrate strong political determination required to mobilise adequate and make efficient use of existing resources, including financial, scientific and technological means.

Preventive Planning

Long-term planning and preparedness for disaster mitigation is gradually being made part of the process of development planning in India. Science & technology inputs constitute its basic thrust, manifested in development of forecasting and warning systems, disaster resistant construction technologies and appropriate cropping systems.

A number of special programs are in operation over many years for mitigating the impact of natural disasters. As the country has been facing natural hazards over centuries, the local communities have developed their own indigenous coping mechanisms. The rich storehouse of this knowledge is our country's proud inheritance. In times of emergencies, spontaneous mobilisation of community action supported by non-government organisations adds strength to national capability towards disaster management.

Accepting the fact that the trend of losses is not indicative of any sign of improvement in spite of initiation of various disaster mitigation measures, the country is planning to lay more stress in some vital areas within this field in the coming years. These include linkage of disaster mitigation with development plans, effective communication system/ use of latest information technology, insurance, extensive public awareness and education campaigns particularly in the rural areas, involvement of private sector, and strengthening of institutional mechanism and international co-operation.

In recent years, the role of the community and of the voluntary sector comprising NGOs has gained significance. It is realised that the best and quickest response to disasters comes from the people on the ground, that is the community and the community based organisations. Preparation and mitigation efforts can, for the same reasons, also work best at community levels. It is for this reason that Community Based Disaster Management is emerging as the most appropriate way of responding to disasters and for preparing for and mitigating the same. Mitigation, prevention and preparedness shall be discussed in detail in subsequent Units.

3.7 CONCLUSION

Disasters have been increasing in their frequency and intensity in recent years. The primary reason for this is the fact that human settlements and activities are interfering with natural systems, and populations are being increasingly exposed to hazards. This can be seen clearly in the Himalayan, riverine and coastal regions of the country, where most of the disasters strike. The disaster management system in India is anchored at the Central Government level, with implementation mechanisms at state, district and local levels. Besides the government, the role of non-governmental organisations, community based organisations and the community are increasingly being recognised as very important.

3.8 KEY CONCEPTS

Eutrophication:

Eutrophication is a process whereby water bodies, such as lakes, estuaries, or slow-moving streams receive excess nutrients that stimulate excessive plant growth (algae, periphyton attached algae, and nuisance plants weeds). This enhanced plant growth, often called an algal bloom, reduces dissolved oxygen in the water when dead plant material decomposes and can cause other organisms to die. Nutrients can come from many sources, such as fertilizers applied to agricultural fields, golf courses, and suburban lawns; deposition of nitrogen from the atmosphere; erosion of soil containing nutrients; and sewage treatment plant discharges. Water with a low concentration of dissolved oxygen is called hypoxic (United States Geological Survey).

Storm Surges:

Storms form over warm seas (sea surface temperature should exceed 26 ° C in the Indian Ocean. The frequency of storms is highest in the Bay of Bengal. Though storms are tracked better today owing to satellite and radar remote sensing, there is need for improvement in modeling of storm track and intensity because this is today one of the weakest links in storm-surge prediction. The impact of a storm as it crosses a coast is caused by the surge due to strong winds and low atmospheric pressure, and the high waves riding over the surge.

Submarine mudslides:

As on land, mudslides can occur on the continental slopes; apart from the obvious risk they pose to offshore platforms, they can also trigger tsunami (National Institute of Oceanography).

Tsunamis:

A Tsunami is caused by vertical displacement of the water column owing to seabed earthquakes, volcanic eruptions, and submarine mudslides. Though they are almost undetectable in the open sea owing to their low amplitude, the tsunami waves can reach heights exceeding 10 m in the vicinity of a coast. The high impact they have on a coast is due to high water velocity and wave height. Tsunami is not as frequent as storm surges along the Indian coast.

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3.10 ACTIVITIES

- 1) Discuss with elders in your neighbourhood and list disasters or emergencies that have occurred in your vicinity in the past. Elaborate if there is any increase in such events in recent decades or years. If there is no increase, identify those factors that have kept your area safe.
- 2) Identify and list all government agencies and non-governmental organisations that have a role to play in disaster management in your city or village.

UNIT 4 DISASTER PREPAREDNESS: INDIAN CONTEXT

Structure

- 4.0 Learning Outcome
- 4.1 Introduction
- 4.2 International Approach to Disaster Management
- 4.3 Paradigm Shift
- 4.4 Disaster Preparedness in India
- 4.5 Issues involved in Disaster Preparedness
- 4.6 Capacity Building for Earthquake Vulnerability Reduction
- 4.7 External Linkages
- 4.8 Cyclones and Flood Hazard Mitigation
- 4.9 Conclusion
- 4.10 Key Concepts
- 4.11 References and Further Reading
- 4.12 Activities

4.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the approach of the United Nations towards preparedness and the response of the government at all levels in India;
- Analyse the culture of preparedness and quick response as well as organisational issues involved in preparedness in India; and
- Examine requirements in earthquake risk mitigation

4.1 INTRODUCTION

There has been a marked shift in the global approach to disasters in recent years, particularly since 1990, which marked the beginning of the International Decade for Natural Disaster Reduction. Preparedness is not a project driven agenda, and needs very deep, attitudinal changes in governance, as well as the institutional modalities of participation/ involvement of the civil society.

Hitherto, the approach towards coping with the effects of natural disasters has been post-disaster management, limited to problems such as law and order, evacuation and warnings, communications, search and rescue, fire-fighting, medical and psychiatric assistance, provision of relief and sheltering, etc. After the initial trauma of the natural disaster, which

lasts the first few days or weeks, the phase of recovery begins, involving the activities of reconstruction and economic, social and psychological rehabilitation. This engages local people initially, but is eventually taken up by the government authorities. Soon thereafter, the occurrence of the disaster is generally relegated to historic memory till the next one occurs, either in the same area or in some other part of the country.

It is not possible to do away with the devastation of natural hazards completely. However, experience has shown that destruction from natural hazards can be minimised by a well-functioning warning system, combined with preparedness on the part of the vulnerable community. Warning systems and preparedness measures reduce/ modify the scale of disasters. A community that is prepared to face disasters and has received, and understands the warnings of impending hazards, and has taken precautionary and mitigation measures, will be able to cope better and resume normal life sooner.

It is becoming increasingly evident now that a relatively smaller investment in disaster preparedness can save thousands of lives and vital economic assets, as well as reduce the cost of overall relief assistance.

4.2 INTERNATIONAL APPROACH TO DISASTER MANAGEMENT

International Decade for Natural Disaster Reduction (IDNDR)

Recognising the rapidly rising world-wide toll of human and economic losses due to natural disasters, the UN General Assembly in 1989 took a decision to launch a far reaching global undertaking during the nineties to save human lives and reduce the impacts of natural disasters. With this aim in mind, the decade 1990-2000 was declared as the International Decade for Natural Disaster Reduction (IDNDR).

The objective of the IDNDR was to reduce, through concerted international action, with focus on developing countries, the loss of life, property damage and social and economic disruption caused by natural disasters such as earthquakes, floods, cyclones, landslides, locust infestations, drought and desertification and other calamities of natural origin.

The aim of IDNDR was that all countries should have:

- a) Comprehensive national assessments of risks from natural hazards, with these assessments taking into account their impact on developmental plans,
- b) Mitigation plans at national and/or local levels, involving long term prevention and preparedness and community awareness, and
- c) Ready access to global, regional, national and local warning systems and widespread dissemination of such warnings.

A major conference of the IDNDR programme was held in Yokohama (Japan) in May 1994, where a plan of action for disaster reduction called the Yokohama Strategy was evolved. The Yokohama Strategy gave guidelines for Natural Disaster Prevention, Preparedness and Mitigation, shifting the focus and emphasis from disaster management to disaster prevention and preparedness.

The Yokohama Conference, based on the assessment of the progress accomplished during the first half of the decade, formulated a strategy for disaster reduction centred on the

objective of saving human lives and protecting property. The strategy called for an accelerated implementation of a Plan of Action to be based on certain variables such as development of a global culture of prevention as an essential component of an integrated approach to disaster reduction, policy of self-reliance in each vulnerable country and community comprising capacity building as well as allocation and efficient use of resources, community participation in the disaster reduction process, improved risk assessment, broader monitoring and communication of forecasts and early warnings.

During the remaining part of the decade, it called upon all countries to unequivocally give political commitment to reduce their vulnerability through appropriate means. Disaster prevention, mitigation and preparedness were given emphasis. At the end of IDNDR (1990-2000), the programme continues in the form of International Strategy for Disaster Reduction (ISDR).

The Hyogo Framework for Action for a Safer World

The World Conference on Disaster Reduction, held in the city of Kobe in the Hyogo region of Japan in 2005, brought the global disaster management community together once again to review the progress on the Yokohama strategy, and to plan a framework of action for the subsequent ten years. The result of the conference, the Hyogo Framework for Action, highlighted the following action agenda for the decade 2005-15:

- 1) Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation
- 2) Identify, assess and monitor disaster risks and enhance early warning systems
- 3) Use knowledge, innovation and education to build a culture of safety and resilience at all levels
- 4) Reduce the underlying risk factors
- 5) Strengthen disaster preparedness for effective response at all levels

The process started by the Yokohama Strategy and the Hyogo Framework for Action is the basis for a global shift in disaster management approach from response towards preparedness.

4.3 PARADIGM SHIFT

In line with the Yokohama message (1994), there is a distinct policy shift in India towards mitigation and preparedness from limited response and post- disaster relief. The Tenth Plan (2002-07) includes a full chapter on Disaster Management. Traditionally, disaster management had been treated as “calamity relief” expenditure, classified under non-plan expenditure head. Henceforth, there would be greater commitment of plan funds for disaster mitigation, even in existing schemes dealing with related subjects. There are various plan schemes in operation, such as, drinking water supply, sanitation, drought proofing, afforestation *et al* which are indirectly related to disaster management. External assistance for post- disaster reconstruction and streamlining of management structures assistance is also provided under plan head. There is currently, articulation for more commitment of Plan funds. Accordingly, the 11th Finance Commission and the High Powered Committee (2001) have advocated a proactive stance on the part of the Planning Commission for disaster mitigation and preparedness in sector plan heads. The

High Powered Committee has called for earmarking 10 per cent of plan funds at all levels for disaster mitigation, prevention and preparedness activities.

This follows successive high impact disasters such as the Gujarat earthquake (2001) and the Orissa Cyclone (1999), which adversely affected the economy, setting back development several years. Disasters affect businesses in that the investment climate in disaster-hit areas gets disturbed for long time owing to loss of infrastructure and apprehensions on the part of the business community regarding similar future losses. As articulated in the Tenth Plan, in 2001 alone, 12,000 crore worth of property was destroyed. Hence, plan schemes have to proceed, dovetailing disaster management with development objectives for abiding gains.

Recommendations of the 11th Finance Commission, were that, henceforth, works of a capital nature, which can prevent recurrence of calamities, should be met out of plan funds, besides expenditure on restoration of infrastructure and other capital assets, except those intrinsically connected with relief operations and connectivity with affected area and population should be met out of plan funds. The Tenth Plan will commit funds to disaster management R&D, besides undertaking initiatives towards community mobilisation, human resource development, establishment of control rooms, and forging international cooperation in the area of disaster management. Disaster Mitigation attempts would be taken through mandatory disaster mitigation analysis of project schemes in vulnerable areas. Environmental protection, afforestation programmes, pollution control, construction of earthquake resistant structures etc. would be given high priority in plans.

In exigent circumstances, funds need to be diverted from other schemes to disaster management. The Planning Commission is working out a methodology to make such decisions expeditious. Besides, state governments are advised to implement existing plan schemes related to disaster management with greater urgency. The watchword in the Tenth Plan is planning for “safe development”.

The Twelfth Finance Commission's terms of reference specifically mentioned *mitigation* and *preparedness* apart from *relief* and *rehabilitation as part of its mandate* (The Tenth Plan, 2002-07). The 12th Finance Commission has categorically stated that provision for disaster prevention and mitigation would be part of the state plan and not calamity relief. Definition of ‘calamity’ would include landslides, avalanches, cloudbursts and pest attacks. It had hitherto been limited to cyclone, drought, earthquake, fire, flood and hailstorm. There are two windows for meeting relief expenditures following natural disasters: the Calamity Relief Fund (CRF) and the National Calamity Contingency Fund (NCCF) following recommendations of the 11th Finance Commission. The latter supplements the former and caters only to immediate relief requirements. Long-term restorative works involving capital assets are to be made through diversions from plan funds. As per the Tenth Plan, there is need to specify arrangements in this regard.

4.4 DISASTER PREPAREDNESS IN INDIA

Significance of preparedness was realised during the Bhuj (Gujarat) Earthquake (2001), when logistics were found grossly inadequate to deal with the impact of the disaster. Professionally trained rescue teams were not available, other facilities were also lacking, like professionally trained dog squads and mobile hospitals. Though teams from foreign countries reached affected areas, there was precious time lost in saving lives. To make up for these inadequacies, the following steps are being taken by the Government of

India, as per the *Status Report of the Ministry of Home Affairs, Government of India, 2004*:

- Eight battalions of central paramilitary forces would be developed as specialist response teams, equipped with modern hardware and trained in the use of the same. They would have the capability to handle any kind of emergency in any situation. It is also proposed to group them together as National Emergency Response Force.
- All personnel of Central Paramilitary Forces would also be trained in search and rescue so that nearby battalions can be deployed before the army takes over. To that end, their training curriculum would be updated/modified.
- States have been asked to set up their own specialist teams. 10 per cent of the allocation from the CRF shall be committed to logistics for these search and rescue teams (SAR). Training would be provided in search and rescue to state armed police. Maharashtra, Orissa, Gujarat and Delhi had made the arrangements in this regard, till August 2004.
- Regional Response centres would be set up across the country. Relief supplies and other needed equipment would be kept in these centres. Specialist response teams would be stationed during crises.
- Mobile hospitals would be provided, attached to different hospitals in the country. These will reach the site of the disaster during crises.
- Hospital preparedness to deal with disasters would be improved. Medicos would be given training and the subject would be included in the undergraduate curriculum for medics.
- Incident Command System would be developed. The Lal Bahadur Shastri National Academy of Administration, Mussoorie, has the onus to develop capacity in this regard.
- To minimise response time, concerned departments would be asked to prepare preparedness plans, by way of emergency support plans in advance. They have been asked to constitute response teams and allocate resources in advance for disaster response. States have been asked to arrange for pre-contracts of relief items to avoid delays in procuring relief.
- India Disaster Response Network would be set up which would be a web database of inventory and controlling officers in charge of items. The database will be available at State District and National Level.
- States are being assisted with emergency operations centres schemes at state and district centers. Financial assistance would be provided under GoI-UNDP scheme and Modernisation of Police Force scheme. These would be composite control rooms to look after law and order and disaster management issues.

Disaster preparedness planning is a *sequential* and *continuous* process. Good planning requires correct diagnosis, resource evaluation and feedback of policy implementation. Because of the wide scope of disaster preparedness and the numerous actors involved, it is essential that a framework for coordination is accepted and provided for. Following awareness of the same, the government of India proposes to affect the shift from short-term relief to long-term mitigation, preparedness and prevention through:

- a) Institutional changes
- b) Policy
- c) Enunciation of legal and techno-legal framework
- d) Mainstreaming mitigation into development process
- e) Funding mechanism
- f) Specific schemes addressing mitigation
- g) Preparedness measures
- h) Capacity building
- i) Human resource development(HRD), and
- j) Above all, community participation.

Institutional and Policy Changes

The Government decided to enact a central legislation on disaster management in the aftermath of the tsunami disaster on 26th December 2004. *(The Bill has been passed by both the houses and received Presidential assent in February 2006)*. Keeping in view the federal polity, the Act has been enacted under the Entry 'Social Security and Social Insurance' in the Concurrent List of the Constitution of India, since it will have the advantage to allow the State Governments also to have their own legislation.

The salient features of the Act include, setting up of a National Disaster Management Authority under the Chairmanship of the Prime Minister; State Disaster Management Authorities in the States/Union Territories under the chairmanship of the Chief Minister or Lieutenant Governor or the Administrator, as the case may be; and the District Disaster Management Authority under the District Magistrate in each district. The National and State Authorities shall be responsible for laying down the policies, plans and guidelines for disaster management. The District Authority shall act as the district planning, coordination and implementing body for all disaster management related functions. These functions will include mitigation and preparedness measures, besides response, relief and rehabilitation.

These authorities have been constituted to address the multi-disciplinary character/requirement of/in disaster management. Hence, members from various ministries, viz. water resources, drinking water supply, environment and forests, urban development and rural development etc. would be on these bodies. Many States and Union Territories (10 till August, 2004 Tamil Nadu, Arunachal Pradesh, Uttaranchal, Orissa, Gujarat, Kerela, Nagaland, Delhi, Andaman and Nicobar administration and Chandigarh administration) had notified such authorities. Others were in the process of setting them up. The National Disaster Management Authority has also started functioning at the Centre with the Prime Minister as Chairman, a vice chairman of Cabinet Minister Rank and other members with the rank of Minister of State.

A key role has been assigned to the local authority for ensuring training of its officers and employees, maintenance of resources so that these are readily available for use in the event of a disaster and ensuring that all construction projects in their area of jurisdiction conform to the prescribed standards and specifications. The local authority shall also carry out relief, rehabilitation and re-construction activities in the affected areas.

The Act also seeks to constitute a National Institute of Disaster Management, which shall plan and promote training and research, documentation and development of national level information base relating to disaster management policies, prevention mechanism and mitigation measures. A National Disaster Response Force shall also be constituted for specialist response. The erstwhile National Centre for Disaster Management (NCDM) has been reconstituted as the National Institute of Disaster Management (NIDM) and is located in New Delhi.

The Act seeks to constitute Disaster Response Fund and Disaster Mitigation Fund at the National, State and District level. It mandates that there shall be no discrimination on the ground of sex, caste, community, descent or religion, while providing compensation and relief to the victims. The powers to issue directions to the government authorities, organisations and statutory bodies to facilitate and assist in disaster management have been vested in the Central government.

The Act seeks to make provision for punishment for obstructing response, making false claims, misappropriation of money or materials and issue of false warning. However, it provides immunity to government organisations and officers for action taken in good faith.

Besides, a National Emergency Management Authority is proposed, which would be designed as per the Secretariat -Directorate structure to make it an integral part of administration, at the same time, retaining the flexibility of a field organisation. It will have multi-disciplinary membership with representatives from the Ministries/Departments of Health, Water Resources, Environment and Forests, Agriculture, Railways, Atomic energy, Defence, Chemicals, Science and Technology, Telecommunication, Urban Employment & Poverty Alleviation, Rural Development and India Meteorological Department, under an officer of the rank of Secretary /Special Secretary, to the Government in the Ministry of Home Affairs. This authority would meet as often as required to review the status of mitigation and preparedness measures and warning systems in the country. When a disaster strikes, this authority would assist the states with macro management aspects, such as financial, technical and inventory support, coordination of resources and activities of all agencies involved in relief and rehabilitation, besides taking up any other work entrusted to it by the government.

State Relief Departments and District Coordination and Relief Committee would now be restructured to incorporate mitigation, preparedness and prevention aspects to their limited role of relief and rehabilitation. They would be re-designated, State Departments of Disaster Management, and District Disaster Management Committees respectively, which suggests their enhanced area of functioning.

There would be four functional groupings within the state disaster management department:

- Hazard Mitigation
- Preparedness and Capacity Building
- Relief and Response
- Administration and Finance

The changeover has already been reported in 11 states and UTs (reported till August 2004), in Andhra Pradesh, Arunachal Pradesh, Bihar, Himachal Pradesh, Rajasthan, Tamil Nadu, Uttaranchal, Nagaland, Andaman & Nicobar administration, Sikkim and Lakshadweep. It is underway in other states.

District Disaster Management Committees would invite membership from relevant departments and would prepare a long-term mitigation plan apart from continuing with the preparedness and response plans. Since, district heads of departments involved in mainstream development would be involved in it, there would be a natural dovetailing of district plan with disaster mitigation and preparedness plan. District Disaster Management Committee is already functional in 256 districts. Other districts in different states are in the process of following up.

(Note: With regard to administrative preparedness, students are advised to follow up latest developments through Government Notifications, newspaper records and periodicals).

State Disaster Management Authorities in Gujarat and Orissa

The existing administrative structure to deal with the ravages of the earthquake was not found satisfactory and hence the Gujarat Government constituted The Gujarat State Disaster Management Authority on 8th February 2001 with the Chief Minister as Chairperson and ten other members. The Resolution spoke of the need for a permanent arrangement to handle a calamity. It is therefore evident that the existing disaster management system at the State level is being improved.

The objectives of the Gujarat State Disaster Management Authority (GDMA) are the following: -

- 1) To undertake rehabilitation and reconstruction as also social and economic activities for restoration of the situation.
- 2) To make efforts to minimise the impact of natural disasters.
- 3) To make the best use of funds, grants, donations, assistance etc received from the government of India and other foreign countries or any other institution/persons for prevention of such natural calamities or handling the after-effects.

The jurisdiction of this authority will be the entire State and it will work as an autonomous body. It has been registered as a society under the Societies Registration Act, 1860. The Government of Gujarat has also created a separate Rehabilitation and Reconstruction Division under the General Administration Department of the State government and the work of the Gujarat State Disaster Management Authority has been transferred to the General Administration Department.

Further, the State Government constituted a taskforce to suggest effective measures for preparation of a long-term Disaster Management Plan, headed by the Chief Executive Officer (C.E.O.) of the Gujarat State Disaster Management Authority.

The Gujarat State Disaster Management Authority, constituted on the pattern of a similar authority formed in Orissa earlier, has a C.E.O and two Additional C.E.Os. It has six Directors and a Chief Engineer who look after different aspects of work relating to disaster management. The Chief Minister is the chairperson of GSMDA and it meets at least once a month. It has the powers of the State Cabinet.

Besides this, two committees have been constituted for redress of grievances; one at the district level, which is headed by the Minister in charge of the concerned district and the other at the village level headed by an officer not below the rank of the Deputy Collector or Mamlatdar.

District Collector with the help of Deputy Collector looks after the requirements of the urban areas and the District Development Officer looks after the rural areas. Reconstruction cell has been created in each affected district and in every line department chief coordinators have been designated to smoothen over the problems. It is also proposed to establish regional centres of and work on:

- 1) Search and rescue teams to be attached to the regional centres of GSDMA
- 2) Making inventory of resources.
- 3) Risk transfer through insurance cover.
- 4) To shift the focus from relief to reconstruction and disaster mitigation.
- 5) Disaster planning through creation of task force at the state level.

The setting up of the GSDMA followed the setting up of a similar authority, the OSDMA in Orissa following the 1999 super cyclone. Thus we see that with the establishment of the Gujarat and Orissa State Disaster Management Authorities, a nodal authority has been created at the State level that will take up social and economic activities for rehabilitation and resettlement of the affected people in the shortest possible time.

The most recent example is of the DMMC (Disaster Mitigation and Management Centre) established by the Government of Uttaranchal. This is a path breaking initiative as in contrast to the authorities set up in Orissa and Gujarat, this is an intervention made before a disaster strikes in a known vulnerable area. Uttaranchal is also the first State in the country to have a Ministry of Disaster Management.

Following situations such as the Orissa Super cyclone (October, 1999), the Gujarat Earthquake (January, 2001) and the South Asian Tsunami (December, 2004), the need for systems to respond at the earliest and in the most appropriate manner has been clearly highlighted.

Example of SUMA

At the level of the Central Government, the Ministries of Defence, Health, Agriculture, Railways, Surface Transport, Power and others have a critical role to play. All Armed Forces should also have a dedicated component of personnel and equipment at the Command level for disaster management. An appropriate organisational set up at the state level for expeditious response is also necessary. Such a set up could be formulated on the lines of the one presented by the SUMA (Supplies Management) model launched as the collective efforts of the Latin American Countries in order to improve the administration of supplies in the aftermath of a disaster situation. It provides a solution to the problems with the arrival of unsolicited supplies thus enabling speedier distribution of relief material and assistance as the situation warrants in reference to the SUMA Model. This too would be worked out and incorporated in the Disaster Management Plan in due course.

4.5 ISSUES INVOLVED IN DISASTER PREPAREDNESS

Disaster preparedness works on the assumption that disasters will happen, and that, given that, measures can be implemented to reduce the effect of the disaster. Community preparedness, which means actions taken by the community to mitigate the effects of potential disasters, is one of the most important aspects of Preparedness as the local community is the first responder to a disaster. Preparedness measures may include:

- Risk assessment (to point out which measures to implement)
- Early warning systems
- Life safeguarding equipment, for example, cyclone shelters
- Resources and emergency kits in anticipation of need
- Maintaining emergency rosters and evacuation plans
- Emergency information and communication systems
- Training to ensure adequate emergency response capacity (particularly amongst the local populace), maintenance of preparedness levels
- Public education and preparedness campaigns

Disaster Preparedness is given the following framework (Sharma, 1998).

Disaster Preparedness Framework		
Vulnerability Assessment	Planning	Institutional Framework
Information Systems	Resource Base	Warning Systems
Response Mechanisms	Public Education and Training	Rehearsals

Explanations regarding each variable, (ibid), are as follows:

Vulnerability assessment is the starting point of disaster preparedness efforts. Assessments give the vulnerability profile of the area in terms of possible loss of life and property in an area in the event of a disaster. Data collected gives information on two counts: physical vulnerability of structures and scale of damage likely from disasters of differing magnitudes regarding differential vulnerability of segments of population to different disasters residing in hazard prone areas of differing degrees of susceptibility and type of hazard. Other related data should also be incorporated. As explained by Sharma (1998), it will not suffice to declare an area hazard prone; migration patterns, activities pursued by inhabitants, grading of houses on the basis of vulnerability would be essential related information.

Planning is the central aspect of a disaster preparedness plan. According to Vinod K. Sharma (1998), the objective is to have agreed upon, implementable plans in place, for which commitment and resources are relatively assured. Planning for readiness includes working out agreements between people or agencies as to who will provide services in an emergency to ensure an effective, coordinated response. There are the following essential requirements of a workable disaster plan:

- Clearly stated objective or set of objectives
- Systematic sequence of activities in a logical and clear manner
- Specific tasks and responsibilities for involved agencies
- Integration of activities, tasks and responsibilities
- Integrate its activities, tasks and responsibilities to enable the overall objective or set of objectives to be achieved.

Disaster Contingency Plans do not address the entire disaster management continuum, comprising recovery, rehabilitation, preparedness, *et al* (explained as disaster management cycle in Unit 2), but explore the wherewithal to tackle specific hazards, such as a flood within a definite time period. Hence, there would be many contingency plans to tackle hazards, which would comprise the National Strategy to combat disasters. There are policy dilemmas involved in preparing disaster preparedness plans. For instance, should the plan be short-term or long-term? Long-term preparedness would demand consistent resource commitment, which could be difficult for hazard prone, but poor countries like Bangladesh. However, the extent of damage wrought each year due to floods would demand a long-term commitment. Besides the nature of hazards, a particular country/region is prone to, would also determine the character of the preparedness plan. For example, the hazard could be slow-onset, like drought or sudden/sporadic, like floods, which would demand different preparedness/mitigation, as considered apt strategies. In the final analysis, the choice of each country would depend on numerous factors, such as the nature of hazard, political priorities, risk perception, interest articulation/ lobby pressure in this regard, etc. The other dilemma is regarding participation in the planning process, regarding who all should be involved? Though much has been said in advocacy of local planning, it is fact that it is hard to implement. How should the local people be involved, how would logistics in this regard be engaged, to what extent would officials be receptive/tolerant to/of it?, remain some of the persistent questions; then, also whether centralised or decentralised mode of operation should be opted. The issue chiefly relates to decisions, and what level of autonomy should be afforded/allowed at the local or regional levels.

Regarding *institutional framework*, rationalisation of the administrative apparatus and coordination are essential requirements. Unnecessary proliferation of agencies should be avoided. As far as coordination is concerned, there is no 'one way' of instituting it. Each State has to work it out as per the facilities at hand, implying scope and the requirements regarding the same to produce the best possible state. A central coordinating agency providing for inter-ministerial coordination is a preferred provision in this regard.

Specific definition of roles and responsibilities should not be lost sight of in institutional delineation. They should be specific and adequate in that specialist competence should have been duly respected. Assigning functions to an agency lacking in technical know-how in that respect would be a self-defeating exercise. Similarly, it would be better to leave interest/need articulation to local leaders instead of assigning the task to a central government official.

Regarding *information systems*, information collation is the requirement since information comes from many sources such as, in the case of India, from the ministries of health and agriculture, regarding nutritional status and crop production and the meteorological offices regarding forecasts. There is need for a central coordinating agency in this respect for speedy response or/and timely mitigation action. Considering the source of such information and the requirement of constant updating of such information through periodic vulnerability and risk assessments, to noting changes if any, in vulnerable segments/area *et al* are other pertinent requirements. Usually early warning signs from local communities are ignored, which is perilous. Assessments should include information on available logistics and inventory such as transport facilities *et al* to know where additional capacity is required as per the plan, which is renewed from time to time to incorporate newer/added threats as anticipated/encountered so that when the disaster strikes, preparedness matches up to the requirements.

Regarding *resources*, written agreements should be solicited for surety. Critical issues involved in this regard, in the words of Sharma (1998), are “special arrangements for the acquisition and disbursements for funds; policies and arrangements for the acquisition and disbursements; policies and agreements for the use of other’s equipment and services; and emergency funding strategies.” A special emergency contingency fund would help, since all supplies cannot be stockpiled, or there could be unforeseen requirements, which had not been budgeted; insurance should be a necessary requirement/condition in loans for farmers for agricultural extension and developments, for example, to shield losses during disasters. There are administrative issues involved, in that aid from international and internal sources needs to be coordinated to ensure its timely and proper use and avoid wastage and lessen scope for irregularities.

Regarding *warning systems*, governments should look at alternate communication requirements such as police wireless, amateur radio, as normal communication is disrupted due to damage to poles, underground cables, etc. Indigenous knowledge regarding impending disasters, based on factors such as animal behavior, etc., should not be underestimated. Such knowledge should be built into disaster plans. Also, translation of warnings in user-friendly terms, preferably in local language is another requirement. Technical jargon is usually not comprehensible to the locals, who choose to ignore it. Public education and training in this regard in the sense of awareness of seriousness of official warnings issued with a view to compliant behavior is necessary. Forewarning is a crucial component in preparedness. The same should be ensured.

Regarding *response*, specific activities involved are:

- Evacuation Procedures
- Search and Rescue
- Security Affected Areas
- Assessment Teams
- Activating Special Installations, such as emergency hospital facilities.
- Preparing Emergency Reception Shelters
- Activating Emergency Programmes for Airports, Harbors and Land Transport.

A range of services is required, ranging from basic services like food and shelter, medical supplies, sanitation to special requirements of vulnerable segments like children to logistics such as tents, storage facilities, transport etc.

Activation of local governments is deemed an essential requirement for the purpose.

Public education has to cover schools, extension workers in villages and experts such as engineers and architects, etc. The role of the media is especially emphasised in generating awareness of disasters and how to deal with them among common people.

Rehearsals are absolutely necessary for effective preparedness. For example, as per news reports, in Japan, they are rehearsing catching wild animals and serpents that get out of zoos during earthquakes there. Such kinds of exercises are vital for dealing effectively with real life situations.

Some Problems

The problem areas in preparedness can be organisational and planning related issues, like inadequate policy direction, outdated plans and over concentration on recovery and response activities, which leads to low preparedness. Lack of resources or resource organisations and unclear allocation of these resources is also likely to create gaps or overlaps in the preparedness arrangements. Other problems like inadequate coordination and lack of cooperation at the policy making and implementation level, public awareness and suitable training for the disaster managers usually contribute significantly to poor disaster preparedness activities.

Towards Preparedness

Effective disaster preparedness is a dynamic commitment/requirement. It is very difficult to maintain adequate preparedness levels under circumstances where the disaster threat is low and/or very infrequent. Some aspects of preparedness are:

- *National Disaster Policy:* There is a need for a clear and comprehensive national disaster policy which covers all aspects of disaster management spectrum and which ensures that preparedness is given proper consideration and priority.
- *National Legislation:* Special disaster legislation may be necessary to ensure that preparedness aspects of national policy are adequately covered and implemented. Disaster legislation also helps to formalise a clear and workable organisational structure, so that levels of disaster preparedness are identified.
- *National Disaster Management Centre/Section:* As disaster preparedness is a dynamic requirement, therefore, there is a constant need of monitoring the preparedness activities. This can be done through a specialised agency and officers. The Disaster Management Act covers all aforesaid requirements.
- *Assessment of Preparedness Action:* Adequate arrangements for identifying, assessing and monitoring the disaster threat are also necessary. In turn, this enables a reasonable forecast to be made of the likely effects arising from the disaster. The effects may be like casualties, damage and destruction of property, disruption of services, damage to crops in case of a rural area, damage to national infrastructure, economic and livelihood loss etc.
- *Planning Framework:* Fully effective preparedness plans need to be applied at national, provincial/regional and local government levels. Planning needs to be systematic and stage wise. This also helps to ensure that the measure can be systematically monitored and kept up-to-date.
- *Utilisation of Resources:* If available resources have to be utilised to the optimum effect, there must be an accurate and up-to-date inventory of all resource organisations, clear allocation of the roles and responsibilities which resource organisations are required to do during an emergency; there should be suitable preparedness arrangements within the resource organisations so that they are able to fulfill their roles desirably and capacity of the resource organisations should be monitored time to time to ensure no problems during the emergency.
- *Operational Facilities and Systems:* Adequate preparedness of the various facilities and systems, which are required for response operation, is also very important. Such facilities and systems usually include emergency or stand-by communications, a warning system, a system to activate and initiate immediate action at the organisational level and at its resource organisations, emergency operation centres, system for damage and need assessment and emergency relief arrangements, etc.

- *Equipment and Supplies:* If stockpiles of emergency equipment and supplies are held, these need appropriate surveillance to ensure their serviceability and ready availability during a disaster situation. The equipment should be kept at the level where it is going to be used first. At the same time, a vendor list should be maintained in order to quickly procure material at the time of emergency. Also, if there are some resources within the community, which can be used, such resources should be identified well before.
- *Training:* Training is obviously the most important component of preparedness. If possible, a permanent training programme or system is desirable. This should cover the needs of both the government and non- governmental organisations. Also, training is required for persons who are a part of the Disaster Management Programme; they may be volunteers from within the community.
- *Public Awareness and Education:* An aware, alert and informed public is a most valuable asset for preparedness. Public awareness programmes can be presented in a variety of forms, to suit particular circumstances. Events such as National Disaster Preparedness Day are helpful in promoting and sustaining public awareness. Inclusion of Disaster awareness in school programmes usually has a long-term impact.

Resources likely to be involved for disaster prevention and preparedness at various levels of activities can be:

Activity	Resources
Identification and analysis of disaster threats	<ul style="list-style-type: none"> • Academic and Research Institutions • Technical Authorities • Government and private agencies having public responsibility (dealing with land, sea and transport systems) • Private sector authorities dealing with projects or production which may generate potential threat (chemical factories etc) • International Agencies
Need and possibilities for implementation	<ul style="list-style-type: none"> • Government Organisations • National Planning Authorities • Disaster Management Authorities • Specialised Agencies
Implementation	<ul style="list-style-type: none"> • Government Organisations • Non-Government Organisations • Military Forces • International Disaster Assisting Agencies • Disaster Management Authorities
Sustainability of the programme	<ul style="list-style-type: none"> • Non-Government Organisations • Public • Educational Authorities

4.6 CAPACITY BUILDING FOR EARTHQUAKE VULNERABILITY REDUCTION

A) NATIONAL PROGRAMME FOR CAPACITY BUILDING OF *ENGINEERS* IN EARTHQUAKE RISK MITIGATION, (NPCBEERM).

In view of the vulnerability of almost 55 per cent of the Indian landmass to earthquakes, the National Institute of Disaster Management, Ministry of Home Affairs with a view to instituting structural earthquake risk mitigation measures, has prepared a National Roadmap, which charts activities to be undertaken now. The Ministry of Home Affairs is the nodal ministry for disaster management in the country (except droughts). The transfer of the subject/responsibility from the Ministry of Agriculture to the Ministry of Home Affairs marks a shift of emphasis from a hitherto “reactive” relief to “proactive” mitigation and preparedness. In the last 15 years, India has suffered 6 earthquakes of moderate intensity, which have caused extensive damage to life and property in the affected regions. The devastation from the Latur Earthquake of 1993 and the Bhuj Earthquake of 2001 have once again driven home the point for mitigation policy planning with a view to controlling the impacts of disasters, particularly for disaster risk mitigation from earthquakes to prevent/minimise further extensive damages, which would otherwise be wrought, considering the frequency of tremors in seismic zones IV and V.

With a view to the objective, the following action areas have been identified:

- Institutional Structures
- Disaster Mitigation and Preparedness Projects
- Early Warning Systems
- Preparedness
- Quick Response and
- Human Resource Development

The chief problem/action area is Human Resource Development for earthquake engineering. Though the Bureau of Indian Standards (BIS) has laid down building standards for earthquake prone areas, implementation has suffered due to lack of manpower and technical competence with the State Public Works Departments (PWD) and municipal bodies.

Specific guidelines/instructions/ attempts with a view to reducing earthquake vulnerability include:

Setting up a National Resource Centre (engineering institute), to develop training modules and impart training to select faculty members from 2 or 3 engineering institutes at State/ UT level. Training would be imparted by the National Resource Institutes: The Indian Institutes of Technology, Mumbai, Kharagpur, Kanpur, Chennai, Roorkee and the Indian Institute of Science, Bangalore and a few other leading institutes for technical updating and developing expertise in earthquake engineering. The National Core Group on Earthquake Mitigation constituted under the Ministry of Home Affairs will designate the IITs and IIS Bangalore and few other leading institutes and colleges (total 10) as National Resource Institutes to provide training to the faculty of engineering colleges. The Centre shall advise

each State/UT to nominate (2-3) engineering colleges as State Resource Institutes. Manpower prepared would be used to train municipal and public works department (PWD) engineers and the private sector engineers in a phased manner and advise State governments and municipal urban local bodies on required amendments in state bye-laws for better compliance with BIS standards.

A Hazard Safety Cell will be constituted in each state to ensure compliance with building byelaws and safe construction practices and creation of a framework to conduct certification courses for engineers and architects, review building bye-laws, suggest necessary changes to incorporate in BIS codes in building bye laws and other related activities. Membership shall be drawn from members selected from state resource institutes/ retired senior engineers across the state and specialists in the subject matter under the chairmanship of the State Relief Commissioner. The Central government shall provide financial support for one non-official member in each state for two years.

State governments have been instructed to review, and if necessary, amend existing byelaws to incorporate BIS seismic codes and ensure that plans/designs of construction of government facilities incorporate the standards.

In municipal areas, State governments are required to make it mandatory for builders/buyers to submit building plans prepared by the structural engineers to get building construction permission and make structural engineers who have prepared the plan, responsible for adherence to BIS codes and building bye laws.

States have been advised to enact Disaster Management Acts to provide for adequate powers for authorities coordinating mitigation, preparedness and response as well as for mitigation and prevention measures required to be taken. State governments have also been advised to convert their relief codes into disaster management codes by building into it the process necessary for disaster management and mitigation plans as well as elements of preparedness apart from response and relief.

They have been asked to retrofit critical facilities on a priority basis; lay down mandates for private builders/developers to retrofit multiplexes, cinema halls etc.

There is proposed to be a gradual shift to a certification regime for civil engineers in the private sector for which advice from the trained personnel of State Resource Institutes would be sought.

Implementation of the Project

Implementation of the project will be under the aegis of the Ministry of Home Affairs, which shall be the nodal ministry for the implementation of the project. A Project Management Board will be constituted under the chairmanship of Secretary, Border Management to provide overall guidance to the programme. The project implementation will be overseen by a Steering Committee (SC) consisting of members of a core group on earthquake mitigation and representatives of various resource institutes across the country, under the Chairmanship of the joint secretary, NDM. The SC will meet quarterly to review the progress of the programme.

In each State/UT, a Steering Committee will be constituted out of selected members of resource institutes across the states and specialists in the subject matter under the chairmanship of the State Relief Commissioner to review the progress of the programme at the state level. The SC will meet quarterly to review the progress of the programme.

B) NATIONAL PROGRAMME FOR CAPACITY BUILDING OF ARCHITECTS IN EARTHQUAKE RISK MITIGATION- (NPCBAERM)

The architect prepares the design of the building. It is only thereafter, that the engineer supervises its implementation on the ground. Therefore, the role of the architect is crucial in securing a safe structure. Present constraint is that seismic design is not taught in architecture institutes at the undergraduate level. Though requisite modification in the syllabus is now being considered, practicing architects need to be trained in seismic safety. Hence, there is need to impart training to architects and gradually move towards a certification regime where, properly trained and educated architects are issued certificates to carry on their practice. Present regulatory infrastructure of architects in the country is the IIA or the Indian Institute of Architects, which is a voluntary organisation registered under the Societies Registration Act, and the Council of Architecture or CoA, which performs the statutory duty of registration. The IIA studies and promotes the best practices in architecture from aesthetic and scientific perspectives. It does not register architects though it is a primary organisation, represented in all major national and international committees. The CoA oversees the profession from the efficiency and the ethics perspectives. Anyone desirous of practicing the profession has to register with the CoA. Hence, in consultation with the CoA, it would be made mandatory for practicing architects to undergo a one-week training module and submit the certificate with the CoA.

The Project Framework is as follows:

The 110 institutes offering architecture will be networked and developed as training institutes for the proposed/mandated one-week course.

Faculty from these institutes will be trained at the National Resource Institutes, which would be about 10 in number, selected in consultation with IIA and the CoA and the Core Group on Earthquake Risk Mitigation.

Support will be provided to the National Resource Centres for library and laboratory facilities.

The Ministry of Home Affairs will be the nodal agency for the formulation and implementation of the project. Programme Management would be under the aegis of a Steering Committee (SC) consisting of the members of the core group on earthquake risk mitigation, IIA and the CoA, and various resource institutes across the country, under the chairmanship of the joint secretary, NDM. SC will meet quarterly to review the progress of the project.

At the State level, a steering committee will be formed out of the nominees of the Council of Architecture, selected members of the resource institutes in the states and specialists in the subject matter under the chairmanship of the State Relief Commissioner/Secretary Disaster Management to review the progress of the plan at the state level. It will meet quarterly to review the performance. Financial assistance shall be given to National Resource Institutes as grants under non-plan head since it is expenditure incurred on capacity building and not creation of assets.

4.7 EXTERNAL LINKAGES

Though the Government of India makes no formal requests, international organisations offer *suo moto* assistance, which is accepted. Linkages exist with the UN Office for Coordination of Humanitarian Affairs (UN OCHA), which has been made responsible for

all international disaster response; the UNDP, which is in charge of prevention and mitigation aspects; and, the UN Disaster Assistance and Coordination System (UNDAC), (Tenth Plan Document, GoI).

GoI-UNDP INITIATIVE

The following activities are underway as combined GoI- UNDP initiative to build resilience to earthquake disasters at the State, District and Local levels:

Construction and strengthening of existing Emergency Operations Centres (EOCs) with a view to providing multi-hazard resistant structures, equipped with latest communication equipments (provided by the UNDP).

Training of elected representatives of the people at local level, with a view to capacity enhancement, since they are the first responders to crisis events and also members of Disaster Management Committees.

Introduction of “Disaster Management” in school syllabi to establish base for development of subsequent education and training in the subject. CBSE has taken the lead in this regard by introducing the subject in standard VIII and IX. (it is proposed for standard X). Delhi, Gujarat, Tamil Nadu, Sikkim, Mizoram and Orissa have already complied with the requirement. National Council for Educational Research and Training (NCERT) is working on a teachers’ training programme to ensure safety, health and welfare (SHW) of school children.

Formulation of Village Disaster Management Plans and formation of Village Disaster Management Volunteer Teams as a priority measure would be undertaken. Volunteers will be imparted training by various line departments like fire brigade, police, civil defence, etc. States are being requested to dovetail disaster management plans with development plans. Many States have initiated the process of converting state relief codes into state disaster management codes.

Urban Earthquake Vulnerability Reduction Project

Under combined GoI-UNDP initiative, specifically for 38 cities in seismic zones 3,4, and 5, there is underway, a GoI-UNDP vulnerability reduction demonstration project (2002-07), which aims to develop capacities of communities, government functionaries, and all involved stakeholders in responding better to disasters.

Specific Objectives of the Programme are as follows:

- Development of State and District Disaster Management Plans
- Development of Disaster Risk Management and Response Plans at Village/Ward, Gram Panchayat, Block/Urban local body level.
- Constitution and training of Disaster Management Teams (DMTs), and Disaster Management Committees at all levels with adequate representation of women in all committees and teams at Village/Ward, Gram Panchayat, Block/Urban Local body, District and State. At the village level, the DMT is a number of village task forces on various aspects of disaster management.
- Capacity building of DMTs at all levels
- Special training for women in shelter management, rescue and evacuation, first aid, water and sanitation, etc.

- Capacity building in cyclone and earthquake resistant features for houses in disaster prone districts, training in retrofitting, and construction of technology demonstration units.
- Integration of disaster management plans with development plans of local self-governments.
- Mainstreaming of disaster management in training, capacity building and education curricula at all levels across the country.
- Thrust would be on involving specialist urban planning institutions in preparing plans and women.

Broadly, the objectives of the Programme are:

1) Awareness Generation

Create awareness among government functionaries, technical institutions, NGOs, CBOs, and communities about earthquake vulnerability and possible preventive actions. Information dissemination would be attempted through available media like the newspapers, television radio, and interactive sessions with stakeholders and civil society actors, engineers and architects, dissemination of print material among students, community members, advertisement campaigns etc., about earthquake resistant housing techniques, critical response activities such as shelter management, rescue and evacuation, etc., preferably/also in vernaculars.

2) Earthquake Preparedness Plan

Development and institutionalising of earthquake preparedness and response plans and practice these through mock drills; civil society institutions from the ward to the city level such as the Lions Club the Rotary Club, disaster management teams, involving state agencies, NCC and the NSS, etc., will be involved in such drills.

3) Developing a Techno-Legal framework

Development of regulatory framework (techno-legal regime) to promote safe construction and systems to ensure compliance with safe building norms. Emphasis would be on developing orientation of safe development practices among policy-makers. Provision of institutional mechanisms like city specific audit agencies for overseeing safe development practices, creating empowered community watchdog bodies to review zoning regulations in old and new city areas, revise building codes, oversee certification system for engineers and architects, consultation and partnerships with financial institutions and insurance agencies for disaster resistant features in new buildings and retrofitting in old ones. Providing for an institutional framework for National/ State level Ombudsman is essential to ensure compliance with safe building practices, and undertaking academic exercises like building databases regarding vulnerabilities and risks in specific areas as decision support and preparing training modules for architects and engineers in 'earthquake engineering'.

4) Capacity Building

Capacity building for certification by government functionaries and professionals (engineers and architects) is necessary. It would involve developing expertise in local academic institutions, training and orientation programmes for state level functionaries, NGOs, local government, private sector stakeholders, etc. (real estate firms, builders, contractors, etc.) in preparing vulnerability reduction plans, training of selected government engineers from

prominent engineering departments such as PWD, MES, Urban Development authorities on seismic resistant construction, code provisions, safety and evaluation techniques, retrofitting etc. in collaboration with the National Programme on Earthquake Engineering Education (NPEEE) a programme of the Ministry of Human Resource Development, sensitising and training community organisations like the Resident Welfare Associations (RWA) in earthquake preparedness and response plans, assisting with R&D in disaster resistant technology and vulnerability analysis at the National level, providing support for setting up resource centres in major cities for technology transfer.

5) **Networking**

Networking knowledge on best practices and tools for earthquake risk management, including creation of information systems containing inventory of resources for emergency operations.

The Government of India and the UNDP are engaged in an information technology (IT) based project for knowledge-networking across institutions involved in disaster management. A web based portal has been created for inter-city cooperation on earthquake vulnerability reduction initiatives to provide a forum for city representatives, project coordinators and National Advisers to share experiences and learning on urban earthquake risk and risk management for linking the practitioners involved in the programme. The web portal would also link various institutions engaged in different aspects of disaster management viz. prevention, preparedness, mitigation, social and scientific research, academic inquiry etc., for comprehensive and concerted effort towards disaster management. Presently, the effort is piecemeal and dispersed across institutions. Consequently, it becomes difficult to:

- Apply technology where needed because know-how is missing.
- Know about best practices in the subject area.
- Ensure comprehensive not piecemeal effort at disaster management.
- Retrieve knowledge where it is immediately needed since most knowledge is tacit or implicit, confined to the bearer, and needs to be codified as explicit knowledge. The catchword is Knowledge Management, explained as *all about getting the right knowledge, in the right place, at the right time.*

The intent is to network knowledge across institutions so that organisations collaborate for information sharing and collation of information hitherto unavailable and enhance their knowledge base. In the absence of such an approach/effort, institutions operate in their isolated modes/worlds and administration develops a self-defeating 'disjointed' character. Disaster management is a fast developing field. To keep abreast of latest developments and access the latest information on issues like, climate change, web connectivity is absolutely imperative.

The programme also intends to replicate successful experiments elsewhere without loss of reaction time. Otherwise information lies in a corner, when it is immediately required somewhere. Hence, reaction time should be minimum in the sense of accessibility of information. Accordingly, the intent is to keep a record of *best practices* in disaster management for quick replication, wherever needed. This would develop the coping capacity in regions where know-how is lacking.

Develop a data bank for ready access wherever required, regarding facts for decision making or access to best practices.

Hence, the portal provides information on Knowledge Collaboration Tools and incentive based tools such as:

- Moderated access and facilitation
- Programme monitoring and methodology sharing tools
- Members workspace for decentralised content management
- Powerful search engines
- Moderated discussion forum for problem solving
- Document management system
- Moderated intra-network e-mail

The portal links departments, statutory agencies, research organisations *et al* cross-country at National and State levels to provide comprehensive input for disaster risk reduction policy and best practices. In this programme, the UNDP would play a supportive role in that it would provide knowledge of best practices, orient administration at the National State and Local Levels towards disaster mitigation, specifically with regard to earthquake risk mitigation, empower communities to enable them to help themselves in times of crisis, before effective intervention.

Earthquake Vulnerability Reduction in Rural Areas

Seismically safe construction would be ensured under Indira Awas Yojana (IAY) and Sampooran Grameen Rojgar Yojana (SGRY). This would contribute to popularising hazard safe construction practices in rural areas. A programme to assist the States and Union Territories in training and certification of 5000 rural masons has been formulated in consultation with the Housing and Urban Development Corporation (HUDCO) and the Ministry of Rural Development. A Committee of Experts has prepared the Training Module, which would form part of vocational training programme in the Ministry of Human Resource Development.

4.8 CYCLONES AND FLOOD HAZARD MITIGATION

In order to respond effectively to floods, the Ministry of Home Affairs has initiated the National Disaster Risk Management Programme in all the flood hazard prone states. Assistance is being provided to the states in preparation of disaster management plans at the State, District, Block / Taluka and Village levels. Elected representatives are being trained in flood hazard mitigation programmes; besides, awareness campaigns targeted at all the stakeholders involved besides, community members. Bihar, Orissa, West Bengal, Assam and Uttar Pradesh are among the 17 states, where this programme is being implemented with assistance from the UNDP, USAID, and the European Commission. A National Core Group on Cyclone Monitoring and Mitigation has been constituted with experts from the India Meteorological Department, National Centre for Medium Range Weather Forecasting, Central Water Commission, National Remote Sensing Agency and Indian Space Research Organisation as members, besides administrators from the relevant ministries and departments and state governments vulnerable to cyclones. The Core Group would look after cyclone warning with a view to making it user friendly, and meet the requirements of technology up-gradation, coordination between involved agencies, official and non- official. Besides, Rs.1050 crore project has been sanctioned by the Planning

Commission, which would be implemented with the help of the World Bank. This would emphasise cyclone shelters, coastal green belts, strengthening warning system, training and education, etc., that help curb the cyclone hazard.

Likewise, National Core Group has been constituted for Landslide Hazard Mitigation. Secretary, Border Management will be the Chairman. It would comprise secretaries of departments of science and technology, road transport and highways, heads of Geological Survey of India (GSI) and National Remote Sensing Agency. The GSI is the nodal agency. Through remote sensing, mapping of landslide prone areas would be carried out. Information from various sources would be collated at the GSI and a landslide mitigation plan drawn up, accordingly.

4.9 CONCLUSION

It is not possible to do away with the devastation of natural hazards completely. However, experience has shown that destruction from natural hazards can be minimised by a well functioning warning system, combined with preparedness on the part of the vulnerable community. Warning systems and preparedness measures reduce and modify the scale of disasters. A community that is prepared to face disasters receives and understands warnings of impending hazards, and has taken precautionary and mitigation measures, will be able to cope better and resume their normal life sooner. This requires deep rooted and long-term changes in the approach of the government at all levels, of the civil society organisations and the community. The traditional view is that the more severe the force of the phenomena, the greater the losses. There is hence a need for concentration on disaster response, rather than prevention or preparedness. However, this position is only partially accurate as the scale of damage and destruction always depends on what might be affected. The size of the disaster therefore varies depending on the vulnerability, that is, the number of elements that can be damaged and their ability to withstand the forces of the phenomena.

It, therefore, becomes important for the global community to lay greater emphasis on ways and means of preventing and preparing for disasters. This proactive approach is far better than seeking to restore the community to its pre-disaster status and then waiting for history to repeat itself. There is a need to examine the relation between environmental degradation and vulnerability to disasters and their combined effects on both natural and man-made habitats. There is also a need to co-ordinate efforts to reduce vulnerability to disasters. While preventive measures will not halt earthquakes or cyclones, they will minimise the impact of such disasters on the environment. Accordingly, there is increasing mobilisation of efforts at the international level towards imparting a disaster management perspective to development. The emphasis has to be on preventing and mitigating disasters in order to minimise loss of development gains when they strike.

4.10 KEY CONCEPTS

Incident Command System : It is a system of organisational flexibility, which allows for expansion of an organisation as per need to handle the contingent situation best. Personnel on the ground are allowed flexibility to take quick on the spot decisions as per the demand of the situation. Another significant requirement is collation of all effort

under an umbrella organisation to attain desired coherence in functioning. This concept was developed in the US following inability of traditional organisational forms to handle frequent wild fires in California.

Plan and Non-Plan Expenditure

- : Expenditure that leads to *creation of assets* is classified plan expenditure; that pertaining to *capacity building* and other general maintenance is classified, non- plan expenditure.

Preparedness

- : The United Nations Disaster Relief Office (UNDRO) uses the following definition for Disaster Preparedness: “Disaster Preparedness may be described as (a series of) measures designed to organise and facilitate timely and effective rescue, relief and rehabilitation operations in cases of disaster.... Measures of preparedness include among others, setting up disaster relief machinery, formulation of emergency relief plans, training of specific groups (and vulnerable communities) to undertake rescue and relief, stockpiling supplies and earmarking funds for relief operations”.

Retrofitting

- : Retrofitting is the process of making existing buildings disaster resistant by incorporation of disaster resistant features in their structural and non-structural systems. Many people fear for existing buildings in the belief that disaster resistant features can only be incorporated in new buildings, but this is not so. These can be effectively and economically introduced in new buildings, depending on the construction material, technology and condition of the building. Retrofitting is most effective in earthquake and cyclone prone areas. The cost aspects of retrofitting and the long-range benefits that will be available by adopting retrofitting of existing unsafe buildings have been researched and documented the world over. It has been estimated that the cost of retrofitting would be around 5-10 per cent of the cost of new construction. Of course, the cost of retrofitting will vary according to the condition of the existing structure. In view of the huge losses suffered by the country in the earthquakes in the last fifteen (15) years, it has been strongly recommended that retrofitting of buildings and structures as a component of disaster management should be adopted as a point of policy of the Government of India as well as the State Governments and funding be earmarked for the purpose urgently.

4.11 REFERENCES AND FURTHER READING

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4.12 ACTIVITIES

- 1) Inquire from the local authorities in your area if there is any disaster preparedness plan for your district. If yes, study it and list things you should be doing in times of such crises. If no, make a table of key role-players and their responsibilities, as you understand them.
- 2) Make a disaster preparedness plan for your family. Identify the hazards within your house and its surroundings that can lead to injury or damage in the event of an earthquake, prepare a list of do's and don'ts for people living in your neighbourhood.

UNIT 5 DISASTER PREVENTION

Structure

- 5.0 Learning Outcome
- 5.1 Introduction
- 5.2 Significance of Disaster Prevention
- 5.3 Issues involved in Disaster Prevention
- 5.4 Hazard Mapping for Disaster Prevention
- 5.5 Planning for Disaster Prevention
- 5.6 Prevention Guidelines in case of Selected Hazards
- 5.7 Challenges for South Asia
- 5.8 Implications for Humanitarian & Development Agencies
- 5.9 Conclusion
- 5.10 Key Concepts
- 5.11 References and Further Reading
- 5.12 Activities

5.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the basic concepts related to Disaster Prevention;
- Learn preventive measures required at each level to minimise the loss of life and damage during an emergency; and
- Examine the implications for Humanitarian and Development Agencies.

5.1 INTRODUCTION

The United Nations International Strategy for Disaster Reduction (ISDR) defines disaster prevention as “activities to provide outright avoidance of the adverse impacts of hazards and means to minimise related environmental, technological, and biological disasters. Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified, particularly in areas frequently affected by disasters. In the context of public awareness and education, related to disaster risk reduction, changing attitudes and behaviour contribute to creating a “culture of prevention.”

Preparedness includes measures taken to ensure *readiness* of the administrative apparatus to respond quickly and efficiently to a disaster in order to minimise the loss to life and property. Disaster preparedness and prevention require policy and resources for the purpose. Pertinent questions to be asked in this regard include:

What is disaster prevention? What does it *mean* to us and should we *invest* effort in its application? If the answer is “yes”, then *what* needs to be done, and *how* is it to be translated into policy and action? In order to address these questions, the government would need to allocate resources for disaster management, which would envelop the aforesaid concerns.

5.2 SIGNIFICANCE OF DISASTER PREVENTION

The continued effects of disasters (man-made and natural) are all too evident to be overlooked. Recent events alone include the devastating effects of Hurricane Katrina in America, Tsunami destruction in South Asia and the recent Earthquake in Pakistan and India, as well as the so-called complex political emergencies (CPE) in Iraq, Afghanistan and Sudan. Such incidences command large-scale emergency response, the arena in which humanitarian agencies have the highest profile. Such events also raise retrospective questions, such as, whether anything could have been done to prevent or reduce the scale of such disasters. In the case of CPE, prevention requires the political will of all those directly involved and able to influence the course of events. For natural disasters, efforts can be directed at reducing the scale of lives lost and property destroyed.

In the last two decades, reducing risk through the implementation of disaster preparedness and prevention measures has been gaining ground. The UN named the decade of the 90's as the “International Decade for Natural Disaster Reduction (IDNDR).” Whilst the success of the IDNDR is believed by many to have been muted through lack of interest and limited funds, organisations including the European Union, World Bank, DFID, UN and USAID (OFDA) are all investing resources in disaster prevention. Regarding International NGOs; IFRC leads, assigning disaster preparedness delegates to several country teams. Several NGO networks also exist, including the La Red in Latin America, ADRRN in Asia and a new network funded by DFID in sub-saharan Africa. In addition, local NGOs and specialist centers such as SEEDS and ADRC are known for implementing DPP (Disaster Prevention Planning) training and research.

The message inherent in these initiatives is the growing acceptance and action towards the same by many key players in the international aid business that more can and must be done to prevent and/or mitigate the impact of disasters to reduce the risks to vulnerable communities.

To foster a common understanding of the concept of DPP, it is worth looking briefly at what disaster mitigation and preparedness are. A **disaster** happens when a “**hazard**” (earthquake, flood, drought, fighting, etc) coincides with a “**vulnerable**” situation (cities or villages in earthquake/flood prone zones, impoverished people, etc). This is often written as:

Disaster = Hazard + Vulnerability.

Without the coincidence of both these conditions, a disaster would not occur (a hurricane at sea affects nobody, volcanic activity in Hawaii is a tourist spectacle). What this means therefore, is that development actions need to be targeted at reducing vulnerabilities, which are social, physical and economic in nature, incident amongst the most vulnerable, which are the poorest communities in society.

Disaster prevention is analogous to preventive health care. Whilst most efforts are directed towards post-disaster relief, reconstruction and rehabilitation (where the need is all too visible), prevention is often the ignored stage of the cycle of

disaster (the ‘invisible’ side to disaster). There is often little interest or political will to take measures for preparation for a disaster that hasn’t happened yet. Yet of course failures to address this can result in enormous losses of life and livelihoods.

5.3 ISSUES INVOLVED IN DISASTER PREVENTION

Disaster Prevention therefore implies the protective and preventive actions taken prior to a disaster, directed towards the reduction of risk and the effects of the hazard, that is, the actions that impede the occurrence of a disaster event and prevent and reduce the harmful effects of the event on communities and key installations. Constructing a *dam* or a *levee* (embankment) to control floods is an example of a preventive measure. Preventive Measures may include:

- *Structural Measures*: Engineering or Technical Inputs
- *Non- Structural Measures*: Administrative and Managerial Inputs

According to Udono (2002), five types of information are necessary for any/both of the above-mentioned categories of disaster prevention:

What: What occurs, what kind of phenomenon occurs? For example, a heavy rain causes a flood, a landslide or a debris flow. A volcanic eruption ejects a pyroclastic flow.

Where: Where does such a phenomenon appear? How extensive is the range of damage?

How: How large is the scale of phenomenon? How intense is it? For example, there is a heavy rain of 500mm in one day, or lava flow of 3000 m.

How does the phenomenon develop or spread? How does it come up? For example, there is a scenario of volcanic eruption such as Earthquake → Ash → Pyroclastic flow → Lava flow.

When: When does a phenomenon occur or when is it likely to occur? What is the frequency or probability of occurrence? For example, there is a heavy rain that occurs once in 30 years, or a great volcanic eruption that occurs once in 200 years.

Who: Who suffers from a disaster? How high is the grade of disaster? How many deaths, building damage or collapse? How much is the total loss?

5.4 HAZARD MAPPING FOR DISASTER PREVENTION

Hazard mapping is explained as “the process of establishing geographically, where and to what extent, particular phenomena are likely to pose a threat to people, property, infrastructure, and economic activities. Hazard mapping represents the result of hazard assessment on a map, showing the frequency or probability of occurrences of various magnitudes or occurrences”(DMTP, 1994).

Two parameters are used in hazard maps, *event parameter* (intensity of the hazard), and *site parameter* (physical characteristics of the area), since the physical characteristics of the area with respect to that particular hazard determine the extent of losses that would be suffered in the event of an actual disaster. Event parameters give the *nature* of the hazard and site parameters give the *impact* that is likely in the event of a disaster.

As per Coburn Spence and Pomonis in DMTP, 1994, *event* and *site* parameters for prominent natural hazards are:

Natural Hazards	Event Parameters	Site Parameters
Flood	Area Flooded (Km ²) Volume of Water (m ³)	Depth of Water (meters)
Earthquake	Energy Release (Magnitude)	Intensity of Ground Shaking (modified Mercalli /MSK intensity) Peak Ground Acceleration.
Volcano	Eruption size and duration	Potential to be affected by ash coverage (m); lava; dust fallout; debris flow
Strong Winds	Wind velocity (Km/h) Area	Wind velocity (km/hr)
Landslide	Volume of material dislodged	Potential for ground failure; ground displacement (meters)
Tsunami	Height of wave crest	Depth of flood water (meters)
Drought	Area affected (Km ²)	Rainfall deficit (mm)

A *flood hazard map* will show the maximum impact of floods with *different return periods* superimposed on each other. This would give the probability of occurrence along with the likely impact in different geographical settings.

A *volcanic hazard map* will give areas of variable risk, though it is comparatively difficult to quantify volcanic hazard than other hazards. Areas closest to the summit are permanently prohibited for habitation. Areas around a certain diameter, for example, 20 km. are subject to *pyroclastic* (airborne volcanic debris) surges and *lahars* (lava flows), which are subject to evacuation during eruptions. Parts of lower slopes, which are possible mud flow paths; since satellite imagery has made it possible to trace mud- flow paths based on observation through remote sensing and past data analysis, are second danger areas.

The critical factor in the preparation of maps is availability of data pertaining to past events with a view to preparing databases. Knowledge regarding spatial distribution of some natural hazards, namely, earthquakes, floods and droughts is now so advanced that it has been possible to account for minor variations in involved variables like area or population ‘at risk’. Hence, it has been possible to prepare micro-zonation maps, which give detailed information about the susceptibility of different areas at risk from these hazards, even in case of multi-hazard vulnerability of a given area.

According to Odaka (2002), the objective of a hazard map is to provide residents with information about the range of possible damage and the disaster prevention

activities. It is important to provide residents with understandable, clear information. There are two types of hazard maps:

Resident Education type: This type of map has the main objective to inform the residents living within the damage forecast area of the risk of danger. The information on areas of danger or places of safety and the basic knowledge on disaster prevention are given to residents. Therefore, it is important that such information is presented in an understandable form.

Administrative Information type: This type of map is used to provide residents with information about the basic materials that the administrative agencies utilise to provide disaster prevention services. These hazard maps can be used to establish a warning system and the evacuation system as well as evidence for land use regulations. They may be used in preventive works also.

There are certain constraints however in hazard mapping. *One* is security. Detailed mapping with regard to information on transportation routes etc. are not considered feasible from the security point of view. *Second*, following information regarding vulnerability, there would be more pressure incident on administrative authorities regarding preventive measures.

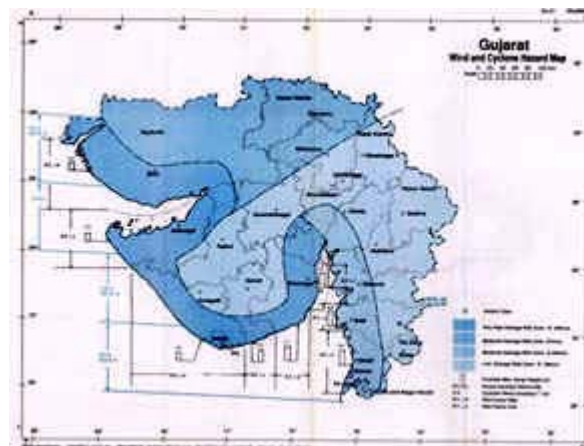
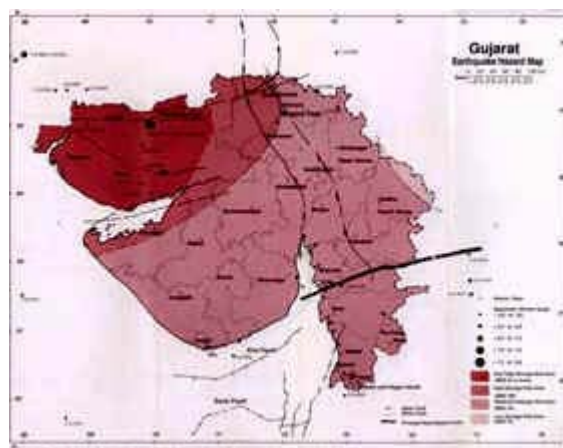
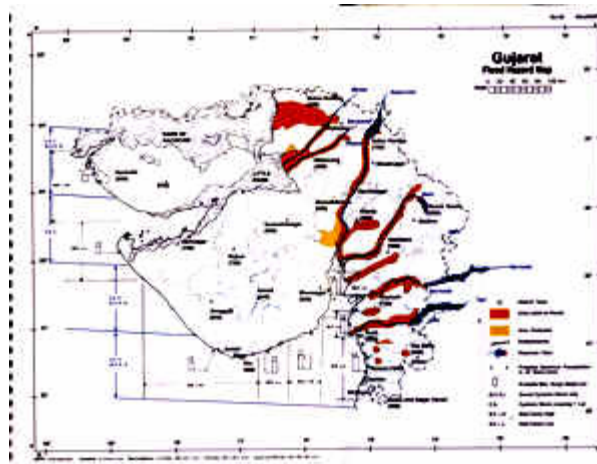
Post-Yokohama, India is committed to policy towards disaster prevention. The Ministry of Urban Development and Poverty Alleviation, Government of India (1994) constituted an Expert Group to study the following issues related to impact of natural hazards particularly with respect to housing and infrastructure:

- Need to identify vulnerable areas with reference to natural hazards such as earthquakes, cyclones, floods, etc., having a potential of damaging housing stock and related infrastructure.
- Preparation of a Vulnerability Atlas showing areas vulnerable to natural disasters and determination of risk levels of houses.
- Formulation of a strategy for setting up Techno-legal regimes for enforcing disaster resistant construction and planning practices in natural hazard prone human settlements.

Accordingly, a National Policy was chalked out declaring the following objectives:

- Creating Public Awareness about safety from Disasters
- Amending/Enacting legislation for safety from Hazards
- Planning development areas with safety from Hazards
- Protection of habitations from adverse hazard impacts
- Constructing new buildings safe from Hazards
- Retrofitting existing buildings for improving hazard resistance

Apart from a multi-hazard vulnerability map, detailed hazard maps for flood, cyclone and wind hazards have been prepared. State wise hazard maps have been prepared, which vividly describe the particular states' vulnerability to a hazard. For purpose of illustration, the following maps drawn from the Vulnerability Atlas (BMTPC, 1994) give the vulnerability of the state of Gujarat, to floods, earthquakes and cyclone hazards *in that order*.



5.4.1 Information Technology For Disaster Prevention

Apart from hazard mapping, science and technology has greatly facilitated disaster prevention planning. Information technology (IT) has revolutionized communication, which has significant implications for disaster management.

A. Decision Support and Public Awareness

The World Wide Web and the Internet have opened up possibilities of department specific web sites, which provide information in specialised branches of disaster management. Some of these web sites are openly accessible to people which disseminate valuable information for interest articulation and academic deliberation which lead to fruitful policy. There are specialised web sites on natural hazards such as earthquakes and cyclones that provide comprehensive information regarding specific natural hazards. Such web sites also form 'knowledge bases' in that a web site on earthquakes would present all information on the hazard and ways to deal with it. These serve as important decision support tools that facilitate *real time* knowledge transfer from the emergency site.

B. Information Sharing

The Information Communication Revolution has made possible the setting up of local area and wide area networks known as INTRANETS and EXTRANETS that link up institutions over distant regions and facilitate information sharing even on a global basis. The integration of information technology (IT) with telecommunication interface modalities have made possible facilities like *video teleconferencing*, which provide for direct interface between aid givers and official agencies at the emergency site during real time emergencies. These also provide for 'knowledge networking' across institutions, especially research institutions that facilitates building data base for disaster prevention for different regions during 'peace times'.

Another significant development has been the Geographical Information System (GIS), by which detailed spatial analysis of 'at risk' area is accomplished through satellite imagery. Comprehensive information is collected about the area, which can be displayed graphically, on a map. This helps in highlighting critical facilities and communities at risk, available communication infrastructure for aid provision etc. which guides immediate disaster response in the short run, and facilitates risk mapping, risk assessment, dissemination of information, public awareness etc. over the long run, which aid long term policy planning for disaster mitigation. The GIS has greatly facilitated response effort as strategies can be devised on the basis of scientific simulation studies and scenario analysis using information through remote sensing. The India Meteorological Department (IMD) has commissioned a satellite based communication system called Cyclone Warning Dissemination System for quick dissemination of cyclone warning in coastal areas in local languages.

C. Policy Planning

Information Technology has greatly aided planning for disaster response and preparedness. Information technology has made policy for disaster risk reduction more fact based and less judgemental / '*a priori*'. Even generally, policy making for traffic, transport, forest conservation, urban congestion etc is facilitated by spatial imagery through remote sensing.

5.5 PLANNING FOR DISASTER PREVENTION

There is increasing understanding of the fact that disasters may not be unforeseen events, as has been assumed until now. Advancements in technology now enable authorities to identify the hazards that threaten a community and to estimate the areas and the settlements that will be affected. One can then take steps to *prevent the disaster*, or prepare for the disaster and substantially reduce, or mitigate, its

impact. These actions are known as pre-disaster planning.

As read in Lesson 1 of the University of Wisconsin course on Disaster Prevention, Frederick Krimgold pioneered the early conceptualization of pre-disaster planning, which he describes as follows:

”Planning may be defined as the process of preparing a set of decisions for action in the future directed at achieving goals by optimal means. The stated goals of disaster relief are the reduction of human suffering, the improvement of material well-being, and the increase of personal security. It goes without saying that these goals are best served if disaster, in the first place, can be avoided or reduced. Thus, the primary goal of pre-disaster planning may be seen as the prevention or mitigation of disaster. If we refer to the definition of disaster in terms of the need for outside help, we may describe the goal of pre-disaster planning as the creation of self-sufficiency in dealing with natural phenomena. In those cases where prevention is not possible, the goal must be to plan for the effective application of aid...”

Planning follows *risk identification to secure a facility/area from likely risks*. A disaster plan is the result of a wide range of preliminary activities. Disaster planning is conducted both at the micro (at the level of an institution, involving instituting fire protection systems, electrical systems, plumbing, and protection against environmental hazards etc.) and the macro levels, the objectives of which are outlined as follows by Anil Sinha (2002):

- Forecasting, forewarning of disaster threat and providing the institutional and organisational setup and logistics, personnel, inventory, finances, etc., to achieve desired level of preparedness.
- Mobilisation of resources from internal and external sources.
- Taking organisational and administrative steps, including disaster action plans, regular and periodic updating of plans and projects securing institutional wherewithal to implement it, providing for a horizontal and vertical coordination through a network of official and non official agencies involved viz. government departments, civil defence military and paramilitary organisations running through the central, state and field levels.
- Placing on ground, well equipped modern forecasting and warning system and reliable fast communication system.
- Generating capabilities for prompt and rapid rescue, relief and rehabilitation work on the other.
- Proper planning for medical assistance and health cover would be a critical requirement.
- Providing for other miscellaneous needs like stocking and distribution, food, medicines, shelter, clothing, evacuation, transportation and long term resettlement and rehabilitation of affected communities.
- Securing water management practices since provision of clean water is often a problem and a necessity, post disasters.
- Government initiatives implying long term measures identified by the central government, instituting intensive Training programmes,

building data based on documentation of disasters and lessons to be learnt there from, and, dissemination of information.

- Integration of disaster management with overall development planning.
- Improving public awareness.
- Investment in R&D, use of modern technology, particularly information and remote sensing technologies.

Interventions Needed

- Evolve model integrated district/ institution wide disaster action plans that include all types of disasters, natural and man made, viz. land slides, accidents, earthquakes, etc., and cover all steps, namely preparedness, mitigation, risk mapping, relief and rehabilitation;
- Evolve a model state plan to ensure a degree of uniformity of approaches, actions and systems and their periodic updating, and,
- Training covering local industries and businesses to ensure better implementation through cooperation of the private corporate sector and the voluntary sector.

5.6 PREVENTION GUIDELINES IN CASE OF SELECTED HAZARDS

A. Landslides

According to R.S. Tolia, Rakesh Sharma, R.K. Pande, and J.K Pathak (2001), apart from natural causes like excessive rainfall, earthquakes, and changes in soil slope composition, in structure, hydrology or vegetation, *anthropogenic interferences* with the environment are also responsible for causing landslides. For example in Uttarakhand, major landslides occur because of blasting carried out for road cuttings. Other man- made factors are; construction of dams or reservoirs, housing schemes, roads, agricultural practices on steep slopes etc., implemented without proper *environmental impact assessments*. Deforestation also contributes to soil erosion. Even natural causes are not altogether beyond control, if right impetus is given to research and requisite authority and say granted to specialists. Preventive and remedial measures are studied within the purview of *environmental geomorphology*. To prevent water-induced land instability, the following measures are recommended (ESCAP IDNDR, 1999) as per the Bangkok Meeting of the ESCAP:

- Preventing or diverting runoff flows around critical sites;
- De-watering sites using drainage systems;
- Planting trees or shrubs which remove sub-surface water by transpiration;
- Planting deep-rooted vegetation to bind sub-soil material;
- Underpinning foundations to stable rock;
- Battering slopes to stable grades;
- Constructing retaining walls along the toes of critical slopes.

B. Cyclones

As per IDNDR ESCAP regional meeting (1999), the principal preventive measures employed to mitigate the destructive and injurious effects of tropical cyclones include the introduction of building design and construction standards aimed at improved resistance to the damaging effects of wind and water.

Preventive measures include both *structural measures* such as channel modifications, flood detention storages and levees or embankments which are designed to reduce the incidence or extent of flooding, and *non-structural measures* such as flood insurance, flood zoning restrictions, land-use management, economic incentives, public information and community education. To protect low-lying coastal areas, against damage from tidal inundation, principal structural measures involve the construction of embankments strong enough to withstand the anticipated storm surge heights and forces. Non-structural measures employ land-use zoning and controls over occupation in high hazard areas. Building controls are also imposed to restrict building on vulnerable areas. These controls require that flood heights be set at a safe elevation above a given datum.

Apart from warning systems, which are absolutely imperative, there is need for second line unconventional communication infrastructure, since mainline infrastructure is the first casualty in cyclones. Such facility is known as *Amateur Radio*, which has emerged as one of the most important second line communication systems during disasters. Though the facility as yet is not as commonly applied in India as it is in Japan and other western developed nations, the Andhra Pradesh government has taken considerable initiative in this regard. The National Institute of Amateur Radio (NIAR) has established HAM radio networks along the coastal belt of Andhra Pradesh. Other measures include providing cyclone shelters at regular distances to help save lives, natural coastal shelter belts like mangroves, trees like casuarinas, eucalyptus, tamarind, neem, etc., which act as natural buffers, building concrete houses to withstand strong winds and tidal waves, grains that do not shred easily in the face of strong winds, and securing cooperation of local folks like fishermen providing training and cooperation of community action groups, which is held imminent now for the success of any measure. The Andhra Pradesh government has implemented all these measures successfully. (Naidu, 2001)

C. Droughts

As per IDNDR ESCAP (1999), drought management measures can be considered in two categories: large-scale measures and small scale or on-farm measures. Large-scale surface-water conservation measures revolve around the provision of large water storage reservoirs for the regulation of natural stream-flow and the delivery of this water to critical areas, sometimes over considerable distances, through irrigation, stock or domestic water supply systems. Experience with large dam sites has not been particularly happy, especially in tropical countries, where adverse environmental and socio- economic consequences have resulted, such as waterlogging and salinity and large-scale displacement and loss of livelihoods for the poor. The recommendation emanating from the conference in this regard was that, where possible, large water storages should be designed and operated as multi-purpose structures, incorporating where possible and appropriate, irrigation, flood mitigation, power generation and recreational functions. These may not be mutually consistent, so that multi-purpose design requires a compromise solution based on the best overall net benefits to all potential users. Irrigation, stock and

domestic water supply delivery and distribution systems should also be consistent with ecological and cultural considerations in that proposed channel or pipeline routes may traverse areas of natural significance, wildlife habitat or historical or cultural value. Large agricultural tracts in the ESCAP region, in Australia, China, India, Pakistan and Thailand have been degraded because of water logging and salinity due to large irrigation projects. Hence, new irrigation areas need to be carefully sited and selected keeping in consideration factors such as soil type, nature of the underlying strata, quality of irrigation water to be used and provision for proper drainage and disposal system. Good drainage takes care of the problem of water logging and salinity. Drainage water may be too high in salinity for safe disposal into a major watercourse, in which case an effective disposal process, such as transpiration from an irrigated salt-tolerant woodland or evaporation from an evaporation basin, could provide an effective solution. Besides, efficient groundwater management is an urgent necessity. Problem of losses through seepage and evaporation can be taken care of by structural measures like proper control valves at vantage points, good pipeline delivery, temporary storage arrangement at the delivery end, recharge arrangements of excess surface water during floods etc. through permeable seepage arrangements.

Drought is a slow onset disaster. It can be controlled through timely action and proper monitoring of the drought prone area through remote sensing. Citing the report of the Central Soil and Water Conservation Research and Training Institute, Dehradun, Alka Dhameja (2001) feels that topsoil erosion and rapid deforestation is shrinking the supply of groundwater, leading to *hydrocide* or death of rivers. Soil erosion is part of a wider environmental problem of *desertification* which is explained as a “ a process of environmental degradation that leads to the abandonment of irrigated fields and pasture lands because of salinisation, water-logging or other forms of soil erosion. Dhameja recommends revival of traditional water storage and harvesting systems such as the *Kundis* (*saucer* shaped concrete structures used to store rainwater) of Rajasthan and the *Virdas* (shallow wells dug in low depressions or *jheels* to collect water) and the system of temple tanks, as was practiced widely in ancient times in South India and even now exists in many places there.

Other recommended measures include, planting drought resistant seed varieties, educating farmers in drought management and powers to the district magistrate (DM) to intervene at the right time to relieve distress of farmers. It is also felt that employment generation schemes should be formulated and run at the state level instead of being dictated and controlled by the Centre, such as the State Employment Guarantee Scheme in Maharashtra, since it would make timely intervention on the part of the District Collector possible. The said scheme has run successfully in Maharashtra.

D. Earthquakes

Though earthquakes cannot yet be predicted, drafting seismic codes, building regulations to ensure adoption of earthquake resistant technology, retrofitting of old structures that do not satisfactorily comply with safety regulations and regulation of informal settlements like ‘jhuggis’ in hazard prone areas are some of the preventive/mitigation measures that can be attempted. Proper town planning and effective enforcement of legislation and codes for mitigation can effectively prevent loss of life from earthquakes. For administrative preparedness for quick response, regular drills of paramilitary forces, simulation studies, data collection across quake-hit regions of the world with a view to diagnosing vulnerability can

minimize losses during earthquakes. Manpower planning would be required to create specialist manpower to plan for and implement safe building measures.

E. Floods

Structural measures for flood prevention include construction of levees and floodwalls. However, they create problems of drainage and seepage of water and are also susceptible to breaches. Hence, structural safeguards, such as periodic maintenance of levees, proper side slopes to minimise slumping, ample freeboard to reduce overtopping of levees are required for desired protection. Other structural measures are channel modifications to divert excess flow, permeable groynes and revetments, constructed of piling, rock, concrete, fencing materials, vegetation or other materials etc.

It is being realised that structural protection measures have unviable side effects and limited utility. Hence, undesirable side effects of *dams* and *embankments* have shifted focus to non-structural mitigation measures to prevent losses from disasters. While dams result in large-scale displacement of populations and environmental degradation of surrounding areas, embankments cause siltation and water logging problems, creating fresh opportunities of floods rather than preventing their occurrence. Floodwaters carry a heavy load of sediments, which rise the riverbed overtime, making it necessary to raise the embankments to contain the waters. Rainwater is also blocked from flowing into rivers naturally because of embankments. Seepage of water underneath creates water logging in adjoining areas (Kulshrestha, 2001). Experts now feel that total flood disaster prevention is almost impossible in case of floods since costs involved are prohibitive and information of all possible consequences difficult since engineering know how is limited. Hence the focus is now on non -structural measures which aim to reduce susceptibilities such as rehabilitation safeguarding public health, better crop planning to derive maximum benefit from fertile flood zones, regulation of construction in flood prone areas as per hazard assessment and feasibility studies, disaster resistant communication infrastructure, proper drainage in urban areas for flood mitigation, provision of flood insurance etc. (Rangachari, 2001).

In case of structural mitigation measures, the emphasis is now on inter-regional cooperation (for areas such as the Ganga –Brahmaputra- Meghna (GBM) Basin covers India, Nepal, Bhutan and Bangladesh which are low income countries and cannot afford disaster losses) in instituting early warning systems, sharing of hydro-meteorological data, especially in downstream areas regarding upstream water levels for better forecast of floods, warning, provision of drainage facilities for easy discharge of excess water from dams and reservoirs, water harvesting for dry seasons, water management through water storage in common river upstream areas, regular monitoring of dams for regulating water storage and periodic release of excess water; and statistical analysis for risk assessment and estimation of the intensity and hazard occurrence probability with respect to common hazard threats. To clarify further, as per Rangachari, the terrain of Nepal and Bhutan, as well as the upper reaches of the GBM basin in India offer excellent sites for possible storage of water. Bangladesh and the plains of India offer no such facilities. Similarly, when the rivers emerge into the terrain/plains from the hills, they spread out, spill and meander. Construction of embankments could create political controversy. From an engineering perspective as well, cooperation would be necessary between neighbouring countries for better dam and embankment facilities and their maintenance.

Some Problems

Some problem areas in prevention arise from the traditional outlooks towards natural disasters. There may be longstanding acceptance of hazards by governments and communities. For instance a nation may have lived for centuries with a recurring major flood problem. Therefore, the need for preventive measures is not recognised. Also cost of some of the preventive measures can be very high and thus these initiatives are completely ruled out. In addition there are other national priorities, which are given more attention. Thus Disaster Prevention may not receive importance in National Planning. Problems like political issues and no public pressure on the government to take preventive measures add to the lack of initiative at the national level in this regard.

Towards Prevention

The problem areas in disaster prevention tend to require various forms of counter measures. However, the nature of disaster prevention is such that the measures involved usually need to be implemented from the senior levels of government. The population of a single community or area is unlikely to be able to institute, for example, a, major flood prevention project (though such populations can produce pressure through action groups and other means). The possible approaches towards this therefore have to have these constraints in mind. Some of the approaches may be:

- *National Policy:* There is need for a clear and comprehensive national disaster policy, which addresses the total disaster management spectrum, including consideration of all aspects of prevention. Within this policy there must be willingness on the part of government to institute preventive measures regardless of their popularity or interest articulation in this regard.
- *Legislation:* If necessary, there should be resort to legislation to implement measures for prevention; for example, mandatory building codes.
- *Assessment and Monitoring:* There should be adequate assessment and monitoring of disaster hazards and vulnerability, so that the need for prevention is accurately identified and defined. This should lead to accurate evaluation of all reasonable disaster prevention projects. In this regard, it is especially important that sensible cost benefit comparisons are worked out; to know whether, by instituting preventive measures, the nation and community is going to gain more (bearing in mind project costs), as against the losses which may arise if nothing is done.

In this context, the establishment and maintenance of a permanent disaster prevention section or centre can play a vitally important part because on behalf of the government, the section/centre should keep a constant watch on disaster management. Thus, it is able to identify the need for preventive measures, whenever such need arises. It is then the responsibility of the section/centre to advise the government with regard to needs in the disaster prevention field, and the priorities, which should apply.

Furthermore, there should be insistence by the disaster prevention section/center (on behalf of the government) that an effective post- disaster

review is undertaken after all major disaster events. This review must include advice to government on whether, as a result of the particular disaster, further preventive measures are warranted.

- *Public Awareness and Education:* Public Awareness and Education Programmes should ensure, among other things, that disaster-prone communities are kept aware of risks and vulnerabilities, which may apply to them. In this way, communities are likely to support the need for sensible disaster prevention, if this becomes necessary.
- *International Assistance:* The maintenance of a continuous dialogue with international assistance agencies can also be of use. Such a dialogue helps to ensure that any proposals concerning disaster prevention can be evaluated and submitted to appropriate assistance agencies.

5.7 CHALLENGES FOR SOUTH ASIA

For long, the link between disasters and development had been overlooked. The consequence has been a spate of uncontrolled disasters worldwide. Disaster Prevention seeks to stress the significance of inbuilt strategies for disaster risk reduction in everyday planning for development, such as construction technology in hazard prone areas. Sahni and Ariyabandu (2003) outline the challenges in this regard especially for the South Asian Community, which is among the more vulnerable areas because of coupling of odds; physical vulnerability to natural hazards and widespread poverty of the masses and lack of disaster awareness among policy makers. There is a need to gradually integrate disaster risk analysis into development plans. The process should desirably be bottom up by way of infrastructure provision at the grass roots level such as water harvesting structures in drought prone areas, reviving traditional methods of water preservation, merging water shed management with forestry programmes, locally appropriate early warning systems, shelters, etc. with active involvement of local community based organisations coupled with generation of heightened awareness among communities to utilising the same as an active policy measure. The International Strategy for Disaster Reduction (ISDR) programme/ document entails the following stipulates by way of internationally agreed goals and objectives:

Goals

- Increase public awareness of the risks that natural, technological and environmental hazards pose to modern societies.
- Obtain commitment by public authorities to reduce risks to people, their livelihoods, and social and economic infrastructure and environmental resources.
- Engage public participation at all levels of implementation to create disaster resistant communities through increased partnership and expanded risk reduction networks at all levels.
- Reduce the economic and social losses of disasters as measured, for example, by Gross Domestic Product.

Objectives

- Stimulate research and application, provide knowledge, convey experience, build capabilities and allocate necessary resources for reducing or preventing severe and recurrent impacts of hazards, for those people who are most vulnerable.
- Increase opportunities for organisations and multi-disciplinary relationships to foster more scientific and technical contributions to the public decision-making process in matters of hazard, risk and disaster prevention.
- Develop a more proactive interface between management of natural resources and risk reduction practices.
- Form a global community dedicated to making risk and disaster prevention a public value.
- Link risk prevention and economic competitiveness issues to enhance opportunities for greater economic partnerships.
- Complete comprehensive risk assessments and integrate them with development plans.
- Develop and apply risk reduction strategies and mitigation measures with supporting arrangements and resources for disaster prevention at all levels of activity.
- Identify and engage designated authorities, professionals drawn from the widest possible range of expertise and community leaders to develop increased partnership activities.
- Establish risk monitoring capabilities, and early warning systems as integrated processes, with particular attention to emerging hazards with global implications such as those related to climate variation and change, at all levels of responsibility.
- Develop sustained programmes of public information and institutionalised educational components pertaining to hazards and their effects, risk management practices and disaster prevention activities for all ages.
- Establish internationally and professionally agreed standards/methodologies for the analysis and expression of the socio-economic impacts of disasters on societies.
- Seek innovative funding mechanisms dedicated to sustained risk and disaster prevention activities.

In this regard, controlling corruption in the implementation of well-meaning schemes is the key factor in controlling vulnerabilities through well-intentioned policy intervention on the part of the government. For instance as brought out by Janki Andharia (2003), in India vulnerability to disasters is high, especially as people lack basic facilities like safe/clean drinking water, adequate housing/shelter, schools, hospitals, roads et al. Existing vulnerability is exacerbated/turned to active risk by improprieties like illegally tapping electricity, which creates conditions for fire outbreaks, dumping radioactive and other hazardous waste in rivers against regulations, which creates active threat to peoples' lives and well being, and other such willful omissions and commissions on the part of people with or without connivance of official functionaries which result in malpractices potentially threatening life and

property over the impacted area/populace. Curbing malpractices would require proactive policy in this regard with active cooperation of the people. Citing Cernea (1992), Janki Andharia (2003) brings out the constraints in articulating the possibility. People centered development and top-down planning are mutually contradictory, in that they offer two opposing paradigms and hence, difficult choices. The paradox is explained by the following three factors or constraints in desired reconciliation between the government centered and people centered approaches as articulated by Andharia:

- The expanding role of the public sector in launching programmes which discourages popular participation since there is no commensurate effort to evolve mechanisms to involve people.
- The growth of international aid, which amplifies government programmes, while “increasing the distance between the programme’s center and periphery”;
- The recurrent failure in public programmes due to alienation of intended beneficiaries.

The challenge is to institutionalise people centered approaches in the ‘monopolistic environment’ where the government is the sole provider of public services generally, also, specifically for those related to disaster relief /mitigation. There is need for peoples’ involvement in disaster prevention activities, specifically, since people need to be aware of the vulnerabilities and also of what is being/needs to be done to ameliorate the situation with regard to susceptibilities, physical, economic and social to natural or man-made or any other hazard(s). To that end, right to information and social activism on the part of people or ‘organised volunteerism’ with regard to specific issues/concerns. For example, the foundations of buildings need to be elevated as a general rule in flood prone zones, and likewise, as per requirements with regard to other hazards in different areas. There has to be intense articulation in this regard and sufficient pressure/lobbying for concrete policy, which is unfortunately lacking in third world countries where people are found to be largely passive with regard to their rights and there is not enough activism on their behalf on the part of civil society since level of political development is low. Hence, active institutionalisation of social capital inherent in communities on the part of government can empower communities and give them the channel for articulating their grievances. There have been encouraging beginnings however, as, following the Latur Earthquake, the Government of Maharashtra launched the Maharashtra Emergency Earthquake Rehabilitation Programme (MEERP) in which one of the most progressive features was the importance given to community participation (MEERP Information Brochure, 1998).

Participation is desired, as per Cohen and Uphoff (1977) read in Andharia (2003), with regard to/ in:

- *Decision-making*, since policy has to ideally respond to articulated concerns, which involves, identifying problems, formulating alternatives, planning activities, allocating resources, etc.

- *Implementation* of programmes, carrying out activities with catalytic assistance from the state, managing and operating programmes, partaking of services etc.
- *Procuring/Deriving* benefits, individually and/or collectively.
- *Evaluating* the activity and its outcomes with bearing on the above stated preceding activities, viz. planning, implementation and availing benefits.

Hence project planning for rehabilitation and development must have the aforesaid built- in features and the onus for the same lies on the project planners and the politicians since political will to empower passive communities is a major factor/constraint as has been brought out in researches. Onus for the same is on project planners who are sometimes reluctant at delegating responsibility or parting with authority, more pertinently, and on politicians who are diffident for their own reasons about empowering people.

5.8 IMPLICATIONS FOR HUMANITARIAN & DEVELOPMENT AGENCIES

Five key reasons why disaster prevention and preparedness (DPP) is important for humanitarian and development agencies to address are:

1. Disaster risk reduction is one of the biggest neglected *development* issues. Since it falls between “emergency” and the “development”, it is ignored on both counts and misunderstood in both respects. Yet it serves both purposes, and can provide a powerful force for good governance.
2. Undertaking large development programmes without consideration of disasters is bad practice. In Bangladesh, reportedly, recent floods have destroyed ten years of development. The same holds true of the recent cyclone in Honduras. Smaller everyday disasters, example. fires in markets also contribute to mounting losses.
3. Humanitarian agencies and their donors have invested huge resources in emergency response and reconstruction. Why not invest more in prevention?
4. DPP provides a ‘bridge’ between relief and development. Probably the strongest argument for addressing DPP lies in this. The language of vulnerability and capacity is the same language of disaster as it is of development
5. New tools for existing problems. If the argument against DPP is that it is being done under other names, then the counter argument is that by focusing interventions according to DPP, new solutions may occur. For example, community interventions addressing a hazard, for example, a flood or fire, can provide a perceived *neutral* threat that all stakeholders mobilise around, which can lead to other development related spin offs.

5.9 CONCLUSION

Disaster Prevention and Preparedness is an *integrated approach*, which requires planned commitment on the part of governments. Prevention means measures designed to prevent natural phenomenon from causing or resulting in disaster or other related emergency situations. It concerns the formulation and implementation of long-range policies and programmes to prevent and eliminate the occurrence of disasters. On the basis of vulnerability analysis of all risks, prevention includes legislation and regulatory measures, principally in the fields of physical and urban planning, public works and building. Preparedness on the other hand means actions designed to minimize loss of life and damage to property, and to organize and facilitate timely and effectively rescue, relief and rehabilitation in case of an event. A well-planned, well-implemented and well-coordinated Disaster Prevention and Preparedness Plan can considerably reduce the damage and destruction due to disasters

5.10 KEY CONCEPTS

Disaster:	Disaster is defined as “a serious disruption of the functioning of a society causing widespread human, material, or environmental losses which exceed the ability of the affected society to cope using its own resources” (ISDR).
Disaster Prevention:	Disaster Prevention is understood as the process of surveying the work place, identifying areas or situations which might cause or contribute to a disaster, and taking action to eliminate or minimize the areas or situations (www.epa.gov/records/tools/toolkits/vital/b.htm).
Groynes:	Groynes protrude into the channel and are designed to divert flow away from the bank, whilst at the same time causing an accumulation of sediment along the toe of the bank and on the downstream side of the groyne structure (ESCAP IDNDR, 1999).
Hazard:	Hazard is “a phenomenon that poses a threat to people, structures or economic assets and which may cause a disaster. It could be either manmade or naturally occurring in our environment” (ISDR).
Preparedness:	<p>The United Nations Disaster Relief Office (UNDRO) uses the following definition for Disaster Preparedness:</p> <p>“Disaster Preparedness may be described as (a series of) measures designed to organise and facilitate timely and effective rescue, relief and rehabilitation operations in cases of disaster...Measures of Preparedness include, among others, setting up disaster relief machinery,</p>

formulation of emergency relief plans, 5 training of specific groups (and vulnerable communities) to undertake rescue and earmarking funds for relief operation” It therefore concerns immediate measures to reduce risk just before, during and after a disaster, and is defined as “*measures, which enable governments, organisations, communities and individuals to respond rapidly and effectively to disaster situations.*”

Revetments:

Revetments, on the other hand, are constructed along or parallel to the bank, where they serve to reduce the velocity of flow along the bank, thus reducing bank erosion and allowing the riverbank to stabilise (ESCAP IDNDR, 1999).

Risk Reduction:

Disaster Management Training Programme (DMTP, 1994) defines risk reduction as “long-term measures to reduce the scale and/or the duration of eventual adverse effects of unavoidable or unpreventable disaster hazards on a society which is ‘at- risk’ by reducing the vulnerability of its people, structures, and economic activities to the impact of known disaster hazards. Typical risk reduction measures include improved building standards, flood plain zoning and land use planning, crop diversification and planning windbreaks. The measures are frequently subdivided into structural and “non- structural,” active and passive measures”. Disaster Mitigation, Prevention and Risk Reduction have been used interchangeably, more or less to refer to similar activities.

Vulnerability:

Vulnerability is defined as “the extent to which a community, structure, service, or geographic area is likely to be damaged or disrupted by the impact of a particular hazard, on account of its nature, construction and proximity to hazardous terrain or a disaster prone area.” (ISDR).

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5.12 ACTIVITIES

1. List and discuss the possible damage that may happen in your city or village due to any natural disaster. Also suggest measures to prevent each of the damage.
2. Discuss how Disaster Prevention and Preparedness can be planned and implemented at local (city / village level), National and International level.

UNIT 6 VULNERABILITY ANALYSIS AND RISK ASSESSMENT

Structure

- 6.0 Learning Outcome
- 6.1 Introduction
- 6.2 Understanding Vulnerability
- 6.3 Vulnerability and Capacity
- 6.4 Vulnerability Analysis
- 6.5 Risk Assessment
- 6.6 Conducting Risk Assessment
- 6.7 Risk Mapping
- 6.8 Conclusion
- 6.9 Key Concepts
- 6.10 References and Further Reading
- 6.11 Activities

6.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Discuss the concepts of vulnerability and risk;
- Examine the principles of vulnerability analysis and risk assessment processes;
- Discuss the need and the means for carrying out rapid assessments; and
- Understand the processes from the point of view of development

6.1 INTRODUCTION

Vulnerability is the extent to which people or buildings are likely to suffer harm from a disaster, while risk is the likely quantified losses that would result considering the probability and intensity of a hazard. As such, risk also includes an element of hazard, the natural or man-made event that can lead to a disaster if there is high vulnerability. In order to initiate programmes for reducing risk in any community, it is necessary to understand specific vulnerabilities and to weigh the resilience against the threats present in the area. This involves a series of steps, the major ones being the assessment and analysis of vulnerability and risk. This should influence public policy for immediate and long-term preparedness, mitigation and vulnerability reduction. Vulnerability and risk assessments are both *science* and *art* since quantitative assessments of probability of risks and likely damage are attempted using mathematical techniques. Socio-economic study with a view to studying communities and specific factors that make them

vulnerable, is attempted using the insights provided by such assessments and effective transformation attempted through policy. It is especially important to recognise that this social vulnerability is much more than the likelihood of buildings collapsing or infrastructure getting damaged. It is about the characteristics of people, and the differential impacts of a disaster on people.

6.2 UNDERSTANDING VULNERABILITY

To conduct vulnerability analysis, we need a clear idea about what Vulnerability is. *Vulnerability* is defined in the United Nations Disaster Management Training Programme (1994) as the “degree of loss to a given element at risk (or set of elements) resulting from a given hazard and a given severity level.” The concept of vulnerability can be assessed at various levels and from diverse perspectives. Both physical scientists and social scientists are involved in conceptualising vulnerability. There has also been growing specialisation in the respective fields of *hazard* and *vulnerability* assessment. While specialisation is welcome, there is an inherent danger of increased isolation among respective specialists in physical science and social science streams and even across the two broad categorizations in that even within the broad specialisation of physical sciences and social sciences, perspectives are likely to differ with respect to emphasis areas as per super/sub specialisations. Hence an engineer or a scientist/researcher in related fields is likely to perceive vulnerability more in terms of Risk, while a climate scientist, in terms of the likelihood of occurrence and impacts of weather and climate related events. The *biophysical* concept of vulnerability is akin to the concept of ‘Risk’ while the *social science perspective* defines it more in terms of socio economic parameters. Experts from the following fields are involved in study and analyses of vulnerability; *climate science, policy development studies, economics, disaster management, health, and social sciences along with others*. According to Nick Brooks (2003), each of these relates only themselves to a partial understanding of vulnerability. There is a need to rise above specialisations and take an across- the- board, interdisciplinary and cross-cultural view of the issue of vulnerability to present a more complete and holistic analysis of vulnerability for meaningful interest articulation and policy formulation in the area. Physical vulnerability has also to be understood in the context of political conflict, issues of class struggle, unequal access to power and social backwardness to formulate comprehensive vulnerability reduction approach. The same should be attempted by integrating, through a conceptual model, through research, these different and diverse “traditions in a coherent yet flexible fashion.”

The attempt on the part of all involved specialists/academics is to get closer to the root causes of vulnerability. The closer the analysis gets to the fundamental causes rather than the symptomatic aspects of vulnerability, the more difficult and complex vulnerabilities get/are in fact to address. However, the more fundamental the vulnerability addressed, the more hazard-resistant the vulnerable group is likely to become as a result.

As per Terry Cannon (2000), Social vulnerability is the complex set of characteristics that include a person’s:

- *initial well-being* (nutritional status, physical and mental health, morale),
- *livelihood and resilience* (asset pattern and capitals, income and exchange options, qualifications,

- *self-protection* (the degree of protection afforded by capability and willingness to build safe home, use safe site),
- *social protection* (forms of hazard preparedness provided by society more generally, for example, building codes, mitigation measures, shelters, preparedness), and
- *social and political networks and institutions* (social capital, but also role of institutional environment in setting good conditions for hazard precautions, peoples' rights to express needs and of access to preparedness).

In most vulnerability analysis methods, there is a clear sense of *comparability* and *convergence* in the analysis of vulnerability factors (encompassing the different components of vulnerability discussed above). There is also a vivid realisation that vulnerability conditions are themselves determined by *processes* and *factors* that are apparently quite different from a hazard, which is mistakenly held singularly responsible for losses. These root causes, or institutional factors, or more general, political, economic and social processes and priorities are highlighted in much of the vulnerability analysis work that has been done. As peoples' livelihood and wider political and economic processes determine opportunities and their patterns of assets and incomes, vulnerability to disasters is also a function of this wider environment. All the vulnerability variables are inherently connected with peoples' livelihoods (lower vulnerability is likely when livelihoods are adequate and sustainable), and their innate resilience related with issues such as poverty (in most disasters) since, it is mostly the poor who are disproportionately more at risk than other groups, and much less capable of recovering easily.

Related concepts are *sensitivity*, *resilience* and *adaptive capacity*. Sensitivity refers to the degree of proneness of a particular 'element at risk' to a particular threat, such as climate risk, land degradation etc. Sensitivity would refer to the degree of change that would be brought about as response in one variable that is *correlated* to the other. Assessing *Sensitivity* would involve working out the correlation. Resilience is explained as fortitude in the face of a potential threat. In one word, it means resistance. Adaptive capacity refers to preparedness through an ancillary way in that it means how much *absorption* capacity is here or is needed by policy intervention in this regard, specifically what, in order to withstand natural changes and how to adapt to them. For example, retreat of glaciers in the Himalayas due to global warming, or changes in harvest seasons that could be possible (grain suffers due to early summer) would need to be tackled through adaptation measures such as resistant varieties of seeds, manures, innovative irrigation techniques, etc.

To understand *differential vulnerability* of different segments of population in a given area exposed in the same measure to a given hazard, it is important to inquire into the differential causes of vulnerability. It encompasses poverty, marginalisation, or other deprivations that accentuate the vulnerability to climate risks or specific biological hazards that affect particularly the sections of the population who are disadvantaged, 'at risk', or in other ways in need. Vulnerability involves a *predictive quality* since it is a way of conceptualising what may happen to an identifiable population under conditions of particular hazards. Precisely, because it should be predictive, vulnerability analysis (VA) should be capable of directing development aid interventions, as also public

policy interventions on the part of governments seeking ways to protect and enhance peoples' livelihoods, assist vulnerable people in their own attempts at self-protection, and support institutions in their role of disaster prevention.

6.3 VULNERABILITY AND CAPACITY

There appears to be two separate approaches to Vulnerability Analysis. The first conceives of them being the two ends of a spectrum, so that people who have a high degree of vulnerability are low in capacity and vice versa. In this approach, there is no 'separate set of factors' that should be considered as vulnerability factors or capacities or capabilities; there are simply scales on which high levels of capacity axiomatically indicate low level of vulnerability. The second perceives them as two distinct or only partly inter-related sets of factors since capacity might include institutional membership, group cohesion, or even literacy, which positions people better to cope with adverse conditions, in relation to others, vulnerabilities notwithstanding. The implication is that some capacities may not always be the opposite of vulnerabilities, in that being part of a particular network may be a capacity, or a denial of capacity to others, as is the case with cohesion norms based on caste behaviour in India. This is not to construe that the term vulnerability cannot imply capacities as scalar 'opposites'. Different conception is simply purported to facilitate conceptual understanding of vulnerability, not to confuse it in any way.

The use of the concept of *capabilities* emerged in response to the supposedly negative connotation of the term vulnerability, and has been especially stressed in the World Disasters Report, 2004. Instead of Vulnerability and Capacity Analysis, or VCAs, the term employed now is CVA or Capacity and Vulnerability Analysis, signifying the change in approach from vulnerability reduction to capacity enhancement, as policy focus/emphasis. It has been realised that a lot more effectiveness in disaster response and mitigation could be achieved if the emphasis shifted from tackling vulnerabilities singly, to reinforcing capacities that enable communities to fight disasters and recover after suffering losses from any such event. It was suggested that to speak of people as being vulnerable was to treat them as passive victims and ignore the many capacities that make them competent to resist hazards through self-help.

If we accept that measuring vulnerability includes any factor or process that can alter the 'exposure' of a person or household to risk, then capacities can also be considered as factors that lead to greater danger (vulnerability) when they are low, and reduced danger when they are high. As per Palakudiyil and Todd (2003), Vulnerability/Capacity could be physical/material, social/organisational/ or motivational/attitudinal.

Physical/Material Vulnerability and Capacity: The most visible area of vulnerability is physical/material deprivation. Variables include land, climate, environment, health, skills and labour, infrastructure, housing, finance and technologies to which the poor are denied access. Poor people suffer from crises more often than the rich because they have little or no savings, few income or production options, and limited resources. They are more vulnerable and also recover more slowly. To understand physical/material vulnerability, one has to ask what made the people affected by the disaster physically vulnerable, in that was it their economic activities (for example, farmers cannot plant because of

floods), or geographic location (for example. homes built in cyclone-prone areas) or lack of access to relief resources that made them suffer particularly.

Social/Organisational Vulnerability and Capacity: How society is organised, its internal conflicts and how it manages them are just as important as the physical/material aspects of vulnerability, though less visible and less well understood. This includes ‘formal political structures’ and the ‘informal systems’ through which people get politically empowered/ socially networked which is a capacity/vulnerability, however the case, which determines access to relief in disaster times and to livelihood means in general. For example, during the recent tsunami, it was realised that aid did not reach many because of caste seclusion. Hence, constitutional provisions/guarantees provided in the Constitution under articles, 14, 15, 16, 17, 21, that safeguard the rights of the socially marginalised would need to be invoked in future in such possibilities.

Poor societies that are well- organised and cohesive can withstand or recover from disasters better than those that are ill- organised or lacking in cohesion on some irrational principle as divisiveness on race, religion, and class or caste lines. To explore this aspect in depth with a view to inquiring into the causes of vulnerability, one has to ask what the social structure was before the disaster struck and how well it served the people in relief and recovery; one can also ask what *apocalyptic* impact disasters had on social organisation, since there has been evidence of attitudes changing or even new ‘permutations and combinations’ emerging in social alignments in post-disaster situations. This underscores the significance of research into social networks/attitudes and how improvements could be affected, possibly through policy interventions to reinforce/discourage behaviour as aforesaid

Motivational/Attitudinal Vulnerability and Capacity: This implies how people in society view themselves and their ability to protect themselves in the event of disasters. Groups that share strong ideologies or belief systems, or have experience in cooperating successfully, may be better able to help each other at times of disaster than groups without such shared beliefs or those who feel *fatalistic* or *dependent*. Crises can stimulate communities to make extraordinary efforts. Questions to be asked include; what people’s beliefs and motivations are how they affect their behaviour during disasters. The more pertinent question would be: what is the *general worldview*, implying culture, in that whether communities place reliance on some metaphysical regulation of life or believe in human action. Public policy intervention in this case would need to aim at changing attitudes within communities, since such attitudes could be counter-productive. Long-term measures in this respect would be education of the masses, through which cognitive development could be achieved.

6.4 VULNERABILITY ANALYSIS

Once knowledge is gained of the *threats* in existence, their expected severity and locations at risk, an understanding of what can be affected by these threats and to what degree, is required for ameliorative policy in this regard. This activity is termed vulnerability assessment and is defined as:

“The analysis of the vulnerability of various sectors that are exposed to the natural hazards identified in the hazard analysis exercises. The sectors include social, livelihoods, economic, physical assets, agriculture, political and administration.” (DMTP, 1994).

Vulnerability, as has been explained earlier, is the extent to which a community, structure, service or region is likely to be damaged or disrupted by the impact of a particular hazard. People’s lives and health are directly at risk from the destructive effects of hazards. Their incomes and livelihoods are at risk because of the destruction of buildings, crops, livestock or equipment, which they depend on. Even if physical loss is avoided, the effects on livelihood, etc. can last a long time, and often, previous levels of existence are not re-attained; for example, fire in an informal market may not kill anybody, yet may destroy goods and therefore livelihoods of market traders. Thus vulnerability assessment aims not just to recognise who is immediately affected but also who is most or least able to recover from disasters.

The objective of vulnerability assessment is in particular, to identify who is most /more vulnerable and why.

Vulnerability Analysis implies/reinforces the *political economy approach* to disaster management in that on the state is enjoined the responsibility to undertake as a vanguard, mobilising efforts for structural mitigation measures for hazard prevention and create the environment for non-structural mitigation measures through actions such as institutionalising/strengthening social capital to foster community self help etc. Tokyo, Japan, and Managua, Nicaragua, are prone to earthquakes. But the people of Tokyo are far less vulnerable to injury by earthquakes because Tokyo has strictly enforced building codes, zoning regulations and earthquake training and communications systems. In Managua, there are still many people living in top-heavy mud houses on hillsides. They are vulnerable.

Landslides or flooding disasters are closely linked to rapid and unchecked urbanisation that forces low-income families to settle on the slopes of steep hillsides or ravines, or along the banks of flood-prone rivers.

Famines can be closely linked to shortages of purchasing power caused by rural unemployment or a sudden influx of refugees into a country from a strife-torn neighbouring country.

High numbers of deaths accompanying earthquakes almost always result from structural collapse of poor, low-cost houses.

In other disasters, such as cyclones and tsunamis, humans can increase their vulnerability by removing bits of their natural environment that may act as buffers to these extreme natural forces. Such acts include destroying reefs, cutting natural windbreaks and clearing inland forests.

The poor countries that suffer the worst disasters are those in which environmental degradation is proceeding most rapidly. Countries with severe deforestation, erosion, over cultivation and overgrazing tend to be hardest hit by disasters.

Natural hazards are agents or trigger mechanisms that can come into contact with a vulnerable human condition to result in a disaster.

Process of Vulnerability Analysis

Each type of hazard puts a different/specific set of ‘elements’ at risk. Most of disaster mitigation work is focused on reducing vulnerability, and in order to do so, development planners need an understanding and indication of which elements are most at risk from the principal hazards, which have been identified. Vulnerability assessment to hazards usually takes place in the following two-stage sequence:

1. *Making an inventory of what is at risk:* Once the possibility of hazards in any location or area is known, it is necessary to find out what may be affected by them. Thus base line data is required on the following:

- Population; age, gender, health
- Livelihoods; types, locations
- Local economies
- Agriculture and fisheries
- Buildings
- Infrastructure
- Cultural assets (that is, libraries, museums, historic buildings etc.)
- Local institutions

2. *Assessing the vulnerability of elements at risk:* After an inventory has been prepared of the elements at risk, further examination is required as to how they will be affected by hazards to make accurate assessment of the risk. It should be noted that whilst a quantification of the elements existing in any location is relatively straightforward, an assessment of how they will be affected in a hazard event is harder to assess. It is important to note that it is often the case that the ‘intangible’ aspects of vulnerability will be as important as the quantifiable aspects. These should include the evaluation of socio-economic vulnerability and individual or societal "coping mechanisms" as well as support systems, which allow some people to cope with the impact of a hazard and recover from them comparatively faster.

Tangible and Intangible Vulnerable Elements

PRINCIPAL VULNERABLE ELEMENTS		
	Tangible	Intangible
Floods	Everything located in flood plains or tsunami areas. Crops, livestock, machinery, equipment, infrastructure Weak buildings	Social cohesion, community structures cohesion, cultural artifacts

Earthquakes	Weak buildings and occupants. Machinery and their equipment, infrastructure. Livestock. Contents of weak buildings	Social cohesion, community structures cohesion, cultural artifacts
Landslides	Anything located on or at base of steep slopes or cliff tops, roads and infrastructure, buildings on shallow foundations	Social cohesion, community structures cohesion, cultural artifacts
Strong winds	Lightweight buildings and roofs. Fences, trees, signs; fishing boats and coastal industries, Crops and livestock.	Community structures, social cohesion, cultural artifacts
Technological disasters	Lives and health of those involved or near the vicinity. Building, equipment, infrastructure, crops and livestock	Destruction of the environment. Cultural losses. Possible population disruption.

(Adapted from Primer on Natural Hazard Management, OFDA, 1991)

The most difficult vulnerabilities to address are based on exclusion from social, economic and political systems, which often decisively determine capacities/vulnerabilities of people, since these are rooted in the history and culture of the people. These vulnerabilities may reflect characteristics such as prejudices based on race, gender, religion, ethnicity, social class, age, etc. These most fundamental vulnerabilities limit people's access to resources, opportunities, services, information and ultimately deny people choice in control over their lives.

Vulnerability assessment is therefore another complex data collection process to determine what 'elements' are 'at risk'. These include social, economic and natural and physical factors. It is always a 'site-specific' process with a concern for unique characteristics of a local situation and will always require local expertise and experience.

6.5 RISK ASSESSMENT

The term 'risk' refers to the expected losses from a given hazard to a given element at risk, over a specified time period. Difference between the understanding of 'Risk' and 'Vulnerability' as explained in DMTP (1994) needs to be noted. Risk combines the *expected losses from all levels of hazard severity*, taking account also of their occurrence probability. Vulnerability is the loss to a given 'element at risk' resulting from a given hazard at a given severity level expressed as a percentage expressed as a percentage loss (or as value, 0 to 1) for a given hazard severity level. Expression would depend on the element at risk; accordingly, repair cost for physical infrastructure damaged, ratio in case of number killed to total 'at risk' population, or degree of physical damage on some

appropriate scale. For example, *average repair cost of 5% experiencing 130km/hr winds.*

Risk presentation is done in aggregate terms as, for example, *75% probability of economic losses to property experiencing heavy damage or destruction in the particular town within the next ten years.*

Risk assessment is defined as:

"A process of analysis to identify and measure risks from natural hazards that affect people, property and the environment. This process can also encompass the assessment of available resources to address the risks."

(Vulnerability and Risk Assessment, DMTP, UNDP, 1994)

Risk assessment forms a crucial early phase in the *disaster management planning cycle* and is essential in determining what disaster mitigation measures should be undertaken to reduce potential future losses. Any attempt to reduce the impact of a disaster requires an analysis that indicates what 'threats' exist, their expected severity, who, or what they may affect, and why. Knowledge of what makes a person or a community more vulnerable than another, added to the resources and capacities available, determine the steps we can take to reduce risk they are exposed to. Recognition of the need for this diagnostic process is contained in the first principle from the IDNDR, 1994 Yokohama "World Conference on Natural Disaster Reduction" which states:

"Risk assessment is a required step for the adoption of adequate and successful disaster reduction policies and measures" (*Outcome of the Conference, Document A/Conf.172/L.2, page 3, 1994*).

Risk assessment is carried out as a series of related activities, which builds up a picture of the hazards and vulnerabilities, which explain disaster losses. Information is first collected on the specific location, severity, duration and frequency of threats that are faced by a society. This is followed by an assessment of potential hazard impacts on the society's livelihoods, economy, infrastructure and key facilities, etc. The scale of these impacts will always be conditioned by those processes, which either increase or decrease vulnerability, which may be economic, social, political or environmental.

Risk assessment has two central components:

- 1) **Hazard Analysis:** understanding the scale, nature and characteristics of a hazard; and
- 2) **Vulnerability Analysis:** the measuring of the extent to which people or buildings are likely to suffer from a hazard occurrence.

Any change in either of these two components will correspondingly affect a change in the nature or size of the risk faced. Once data has been collected and analysed on both the 'threat' and what is/are 'at risk' to it, the information has to be passed on in an appropriate format to decision makers to determine the levels of 'acceptable risk' and what actions should be taken to reduce the risk(s). Decisions will then be made as to whether risk reduction measures should be initiated, implying, timing, what level of protection is required and whether there are other more pressing risks to address with the finite resources at hand. Understanding risk and taking decisions is therefore a two- part process, involving both risk evaluation and risk assessment.

- **Risk Assessment** refers to the scientific quantification of risk from data of past precedents regarding nature of hazards, intensity at which incident, degree of damage, likely changes if any in any of the factors involved/mentioned which gives complete understanding of hazard proneness of the region and the vulnerability of elements, identified as part of the exercise, to it.
- **Risk Evaluation** is the social and political judgment about the importance of various risks faced by individuals and communities, *as they perceive it*. It involves prioritising between risks, which are often political, since choices are involved between competing interests for resource allocation. It involves weighing risks and benefits in each case, which involves scientific judgments as also other factors and beliefs.

Risk assessment is therefore mainly a *scientific* and *quantitative* process, which provides input for/impacts public policy for risk mitigation and preparedness. The data is incorporated in disaster reduction policy/programmes, which depend on risk evaluation, which is the appraisal or perception of the risk in the context of other priorities, whether anything can be done to reduce that threat and qualitative assessment of disaster preparedness to combat the threat. It is therefore logical that the more accurate the diagnosis of the problem, more successful would be the strategy, and also cost- effective since resources available to meet it are limited, even in developed countries.

6.6 CONDUCTING RISK ASSESSMENT

In order to understand and to compare different risks, scientists and economists usually try to quantify them in terms of their probability of occurrence and the potential damage/ losses they might cause. This is done by using statistical analysis to predict the probability of future events by gathering data on the effects of various hazards in the past that have caused/exacerbated the particular risk. This identification of effects and the understanding of the processes of disaster occurrence constitute the first steps in establishing a relationship between hazard and vulnerability in order to specifically identify the risk.

By using past historical records and an analysis of scientific data estimates can be made of the likelihood of hazard occurrence and expected severity. When allied to estimates of what is vulnerable to various hazards, risk can be defined in terms of the *probability*, that is, the likelihood of losses and *estimation* of the proportion of the population or property, which will be affected.

The purpose of statistical analysis is to arrive at an appropriate statistical model that relates risk posed by a natural disaster to socio economic parameters. UNDP carried out an exercise to relate the risk posed by natural disasters such as earthquakes, tropical cyclones, floods and drought etc. to specific socio economic factors like HDI (Human Development Index), rate of urban growth etc. that create losses. The study was carried out under the aegis of the United Nations Development Programme (UNDP) using data for more than 90 countries over a period of 20 years.

Statistical analysis is based on two major assumptions; *one*, that risk can be measured in terms of the number of victims of past hazardous events, and second that the equation of risk follows a ‘multiplicative model,’ in that following risk identification in each case (taking into account the number of people killed) is arrived at by taking into account the relevant ‘factor’ values in each case, for

example, rate of urban growth was taken as the factor that would determine loss of life from earthquakes, and access to water supply in case of droughts, etc.

Methodology

The exercise has two key assumptions.

- The number of people killed by a natural disaster is a measure of Risk (physical exposure or PhExp)
- The equation of risk follows a multiplicative model where the number of people killed is related to socio economic factors and number of people exposed to the risk by the following equation

$$K = C. (PhExp)^{\alpha} . V_1^{\alpha_1} . V_2^{\alpha_2} \dots V_N^{\alpha_N}$$

Where,

K is the number of people killed by the disaster

C is a multiplicative constant

V_{1-N} , are socio economic parameters

α_{1-N} is the exponent of V_{1-N}

{Note: Taking logarithm of both sides transforms this into a linear equation. Empirical data of natural disasters is taken and relevant socio economic parameters and their exponents are estimated using linear regression (difference between actual and desired states)}

For example in case of earthquakes, the socio economic parameter is urban growth, in case of cyclones, percentage of arable land and human development index; in case of floods, local population density and gross domestic product; in case of droughts, percentage of population with access to improved water supply
{further read at,
<http://www.undp.org/bcpr/disred/documents/publications/rdr/english/ta/t5.pdf>. }

The process of risk assessment is usually conducted in the following sequence:

1. Hazard Analysis: Hazard information is needed on such matters as location, frequency, duration and severity of each hazard type. Risk assessment should be carried out, where possible, in relation to all the hazards in a given location. As explained in the Disaster Management Training Programme, (1994), like risk, hazard occurrence is expressed in terms of average expected rate of occurrence of the (specified type of) event or on a probabilistic basis regarding occurrence probability/possibility. Hazard maps present graphically, the annual probability and magnitude of the event following intensive geological analysis of the area, along with a study of past records, sometimes dating a century back or more, as in case of dormant volcanoes. Other corroborative evidence such as soil composition analysis to predict landslides or the NDVI (normalised drought vegetation index) to predict droughts may be used in case of inadequacy of temporal data to predict the recurrence of an event. Information gathered is collated and depicted on a hazard map for necessary correlations tracing causes and effects for the purpose of objective derivations of variables (independent and dependant) involved in the phenomena and their analysis (statistical methods discussed above). Information collation is relatively easier for events with relatively regular periodicity. Corroborative evidence can be gathered from geological 'hints' such as silt

deposit, high water marks, deposits in case of floods, and past fault lines in case of earthquakes, and, human records as the main source evidence regarding hazard probability in all cases. The latter are considered more important and are being stressed more as compared to geological records by scientists.

The level of severity of natural hazards can be quantified in terms of the magnitude of occurrence as a whole (event parameter) or in terms of the effect the occurrence would have at a particular location site (site parameter).

Like risk, hazard occurrence may be expressed in terms of average expected rate of occurrence of the specified type of event, or on a probabilistic basis. In either case, the annual occurrence rates are usually used. The inverse of an annual recurrence rate is a return period. Coburn, Spence and Pomonis, (1994) state that:

“There is an annual probability of .08 of an earthquake with a magnitude exceeding 7.0 in Eastern Turkey. "This is effectively the same thing as saying, "the average return period of an earthquake of $M=7.0$ in eastern Turkey is 12.5 years."

Rare events like volcanoes are hard to predict since adequate historical data is not available. It may be possible for geologists to analyse old lava flows and try to date the eruption frequency from that.

Smaller more frequent events can also be studied for indications of severity of future large-scale events.

Knowledge of the consequences of events will be helpful in planning for control of hazards during the design and operation of the facility by taking proper action to reduce hazard rate or minimise the consequences, as the case may be, or else the assessed risk may just be ignored. By evaluating the risk of various hazards to which the country is liable or potentially liable, it becomes practicable to formulate strategies to mitigate the impact of hazards in a cost-effective way. If a community is especially vulnerable to a particular type of disaster, severe risk treatment measures may be required to reduce the disaster risk to ‘acceptable levels’.

The other important function of risk analysis is to develop a comprehensive disaster preparedness plan by providing a clear understanding as to what hazards exist and what risk(s) they pose to the vulnerable neighboring communities.

2. Vulnerability Analysis: Vulnerability analysis, as has been explained earlier, starts with creating an inventory of all elements that are 'at risk' to the identified hazards such as social groups, buildings, infrastructure, economic assets, agriculture etc. This is followed by an assessment of their susceptibility and an estimation of damage and losses. Vulnerability analysis includes an assessment of resources or capacities to meet and recover from hazardous events.

Risk Evaluation and determining levels of Acceptable Risk

Once data on the nature of the hazards and vulnerability have been collected, synthesised and analysed in the categories noted above, it ideally has to be passed in an appropriate format to decision makers to enable them to determine levels of acceptable risk leading to levels of protection. These decisions will be made

according to risk perception, knowledge of possibilities to reduce the threat and other priorities. High level of risk perception determines the amount of money that would be spent for a flood dyke project or retrofitting of buildings, for example. If the risk is extreme something has to be done promptly. Acceptable risk implies the best that can be managed within constraints to protect lives and property to the maximum extent possible. For example, buildings could be hazard proof to the extent that they allow enough time for the occupants to escape. They might not be fully hazard resistant in that they may suffer damage but not totally give way under pressure. There are resource constraints, which are compelling. Hence, depending on the level of risk perception and acceptable risk among communities and policy makers, hazard proofing is attempted.

Following the exercise, **Risk Determination** involves:

- *Hazard occurrence probability*, which is the likelihood of a hazard striking an area;
- *Elements at risk*, that means the lives and property at risk, and,
- *Vulnerability of elements at risk*, that is the extent of damage estimated to be suffered.

Disaster preparedness follows risk determination, since in view of limited resources only targeted risk reduction has to be attempted. There are subparts of this exercise of determining risk. For example vulnerability of different elements at risk would depend on hazard intensity. Hence, preparedness has to take cognizance of differing levels of vulnerability to varying intensity of hazard. A windstorm would strike with varying intensity in different time periods. Risk estimation has to factor that.

6.7 RISK MAPPING

Risks can be vividly depicted through maps. Methods developed for near accurate estimations include f: N curves, scenario mapping, potential loss studies as explained by Coburn, Spence and Pomonis (1994) in the Disaster Management Training Programme, UNDP.

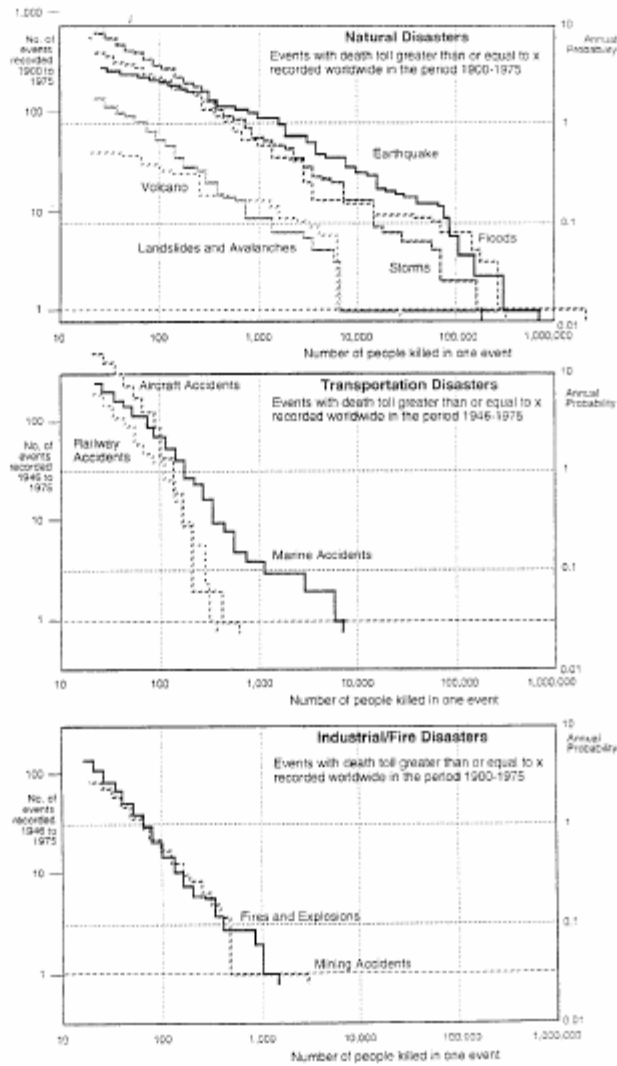
(a) f:N Curves: Here “f” stands for frequency of disaster event and “N” denotes the number of casualties. Data on the size and frequency of disaster occurrences for a particular country can be plotted as f: N curves. These involve plotting the frequency of events causing greater than a certain number of fatalities. Different numbers of casualties (or magnitude of losses expressed in some other way) are plotted for different frequency of occurrence on *x* and *y-axis* on a graph respectively. However such relationships always show aggregated losses for a large region over a period of time. They do not help identify the geographical distribution of damage, for which risk mapping is needed. In the diagram given below the first block gives disaster losses due to various natural disasters in the period 1900- 1975 the second block gives losses due to transportation disasters; the third block gives losses due to accidents like industrial fires. It is clear that losses from natural disasters far outnumber those due to man made calamities like transportation or fires.

Figure 4
f-N curves for various
disaster types (worldwide)

*It is clear that natural
disasters greatly
exceed technological
disasters caused by
industry or trans-
portation in their
capability to cause
massive loss of life*

ANSWER (from page 20)

The communities' resources and
exposure to the risk are greater
than that of the individual.
Therefore both motivation and
resources for mitigation activities
are higher for the community.

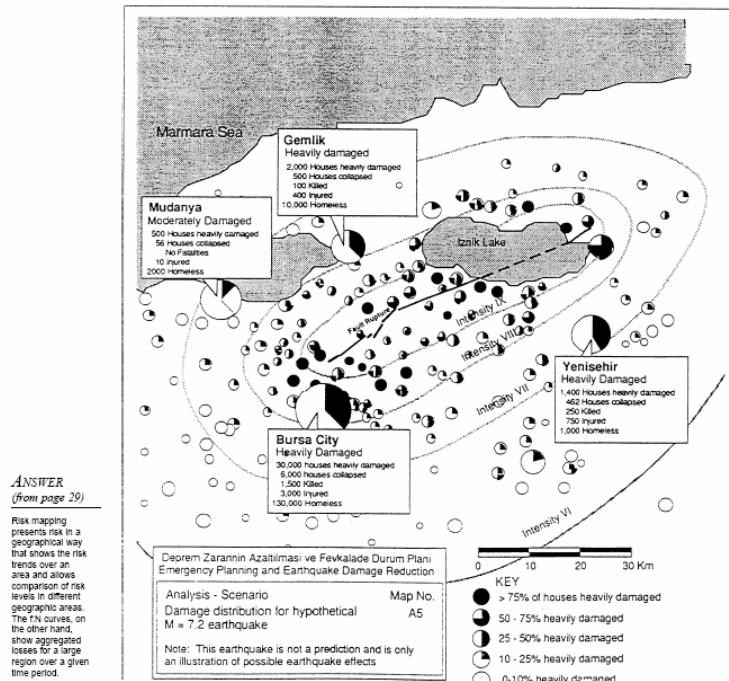


- (b) **Scenario Mapping:** In scenario mapping, the presentation of the impact of a single hazard is attempted. Circles and shaded regions on a map are used to depict settlements and building types, low density and high-density areas etc. to assess damage likely in particular locations, based on past experience and development since the last event for proper assessment in the changed scenario. Hence a scenario map can identify 'communities at risk' and regions at risk. Hot spots thus located are the foci of restorative and regenerative activities post disaster. Scenario mapping is used to estimate the resources likely to be needed to handle an emergency. The number of people killed and injured and the losses likely with respect to other 'elements' are estimated. From these can be assessed the resources needed for medical attention, accommodating the homeless and other measures to minimise the recovery period. For example assessing the state of the present infrastructure can aid damage assessment in the event of an earthquake. The diagram given below, adapted from DMTP (1994), describes a scenario of an earthquake of 7.2 magnitude hitting the Bursa Province in Turkey. It is not claimed to be predictive. The authors only claim to describe a situation in case of an earthquake.

This kind of exercise helps preparedness planning when an earthquake strikes. The top block, aside the Mamara Sea gives the Gemlik area (heavy damage), the left block gives the Mudanya area (moderate damage), the central block is the Bursa province (heavy damage) and the right block gives the Yenisehir area of heavy damage.

The following table accompanies the map.

TOTAL	VILLAGES	TOWNS	BURSA	CITY
	Villages	Towns	Bursa City	Total
Houses lightly damaged	34,000	21,000	50,000	105,000
Houses heavily damaged	15,000	9,000	30,000	54,000
Houses collapsed	4,000	2,000	6,000	12,000
People killed	2,000	800	1,500	4,300
People injured	6,000	2,500	4,500	13,000
People Homeless	73,000	36,000	13,000	122,000



Key: Complete Dark Circle: >75% of houses heavily damaged

Three-fourth Dark Circle: 50-75% heavily damaged

Half Dark Circle: 25-50% Heavily Damaged

Quarter Dark Circle: 10-25% Heavily Damaged

Empty Circle: 0-10% Heavily Damaged

- (c) **Potential Loss Studies:** Mapping the impact of expected hazard occurrence probability across a region or country shows the location of communities likely to suffer heavy losses. The effect of the hazard of each area is calculated for each of the communities within those areas to identify the communities most at risk. This shows for example which towns or villages likely to suffer heaviest losses, which should be priorities for loss reduction programs, and which are likely to suffer heaviest losses, which should be priorities for loss reduction programme and which are likely to need most aid or rescue assistance in the event of disaster of differing magnitudes.

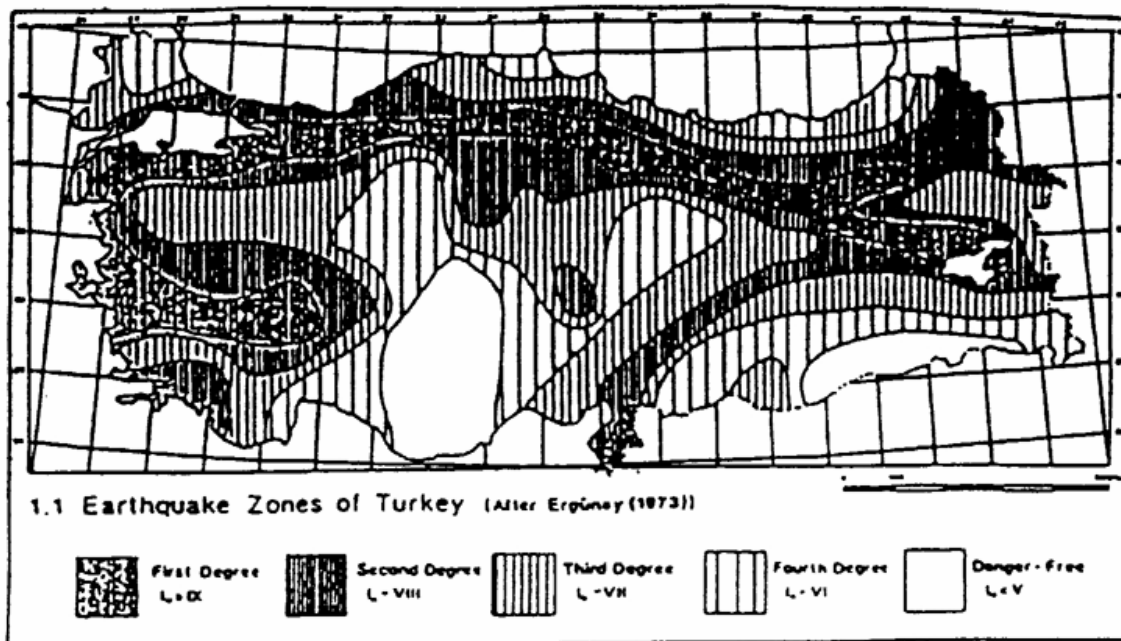
MAP 1 has been published by the Earthquake Research Institute of Turkey. It gives the degree of risk in different areas from differing intensity of earthquake.

MAP 2 gives the differential vulnerability of big and small towns. Big towns (over 25,000 population) are shown by circles surrounding dots and small towns (2000-25000) by simply depicting population density.

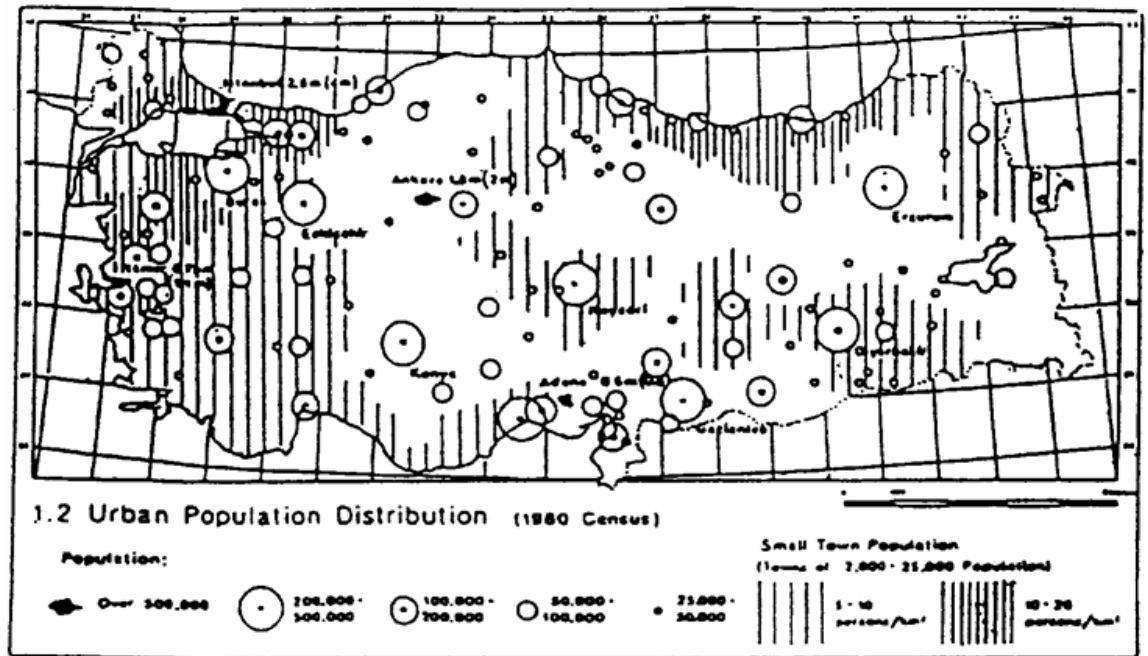
MAP 3 shows the physical vulnerability of buildings in the hazard prone zone. Towards the West are relatively safer concrete structures (complete dark circles) which is the affluent part of the region. The South East has weak structures (partly empty circles), which is inhabited by poor people.

MAP 4 gives complete analysis of three preceding maps. Combining information from map 2 and 3, we get the number of people living in each building type, which helps us determine exposure to risk, or likely casualties if an earthquake of a high enough magnitude were to strike.

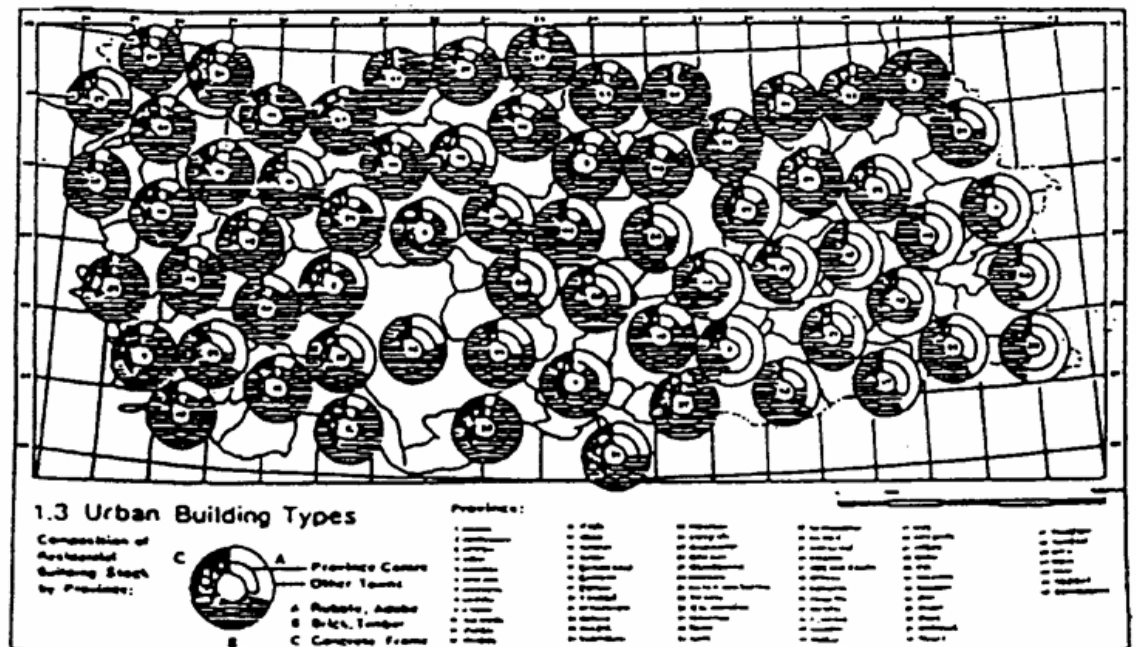
MAP 1-HAZARD



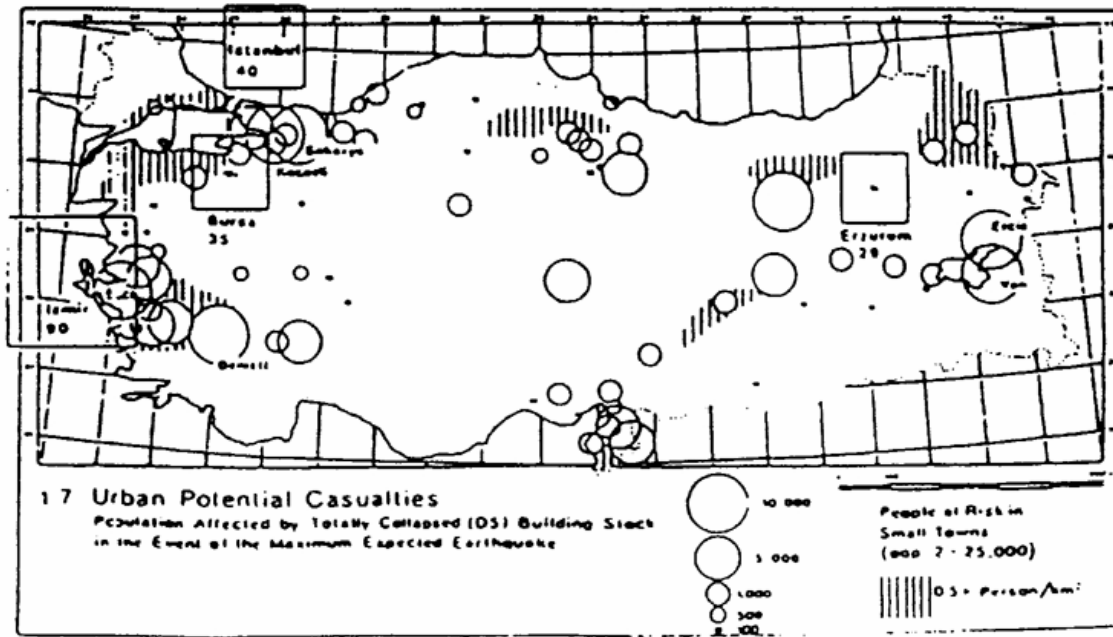
MAP 2 -ELEMENTS AT RISK



MAP 3- VULNERABILITY

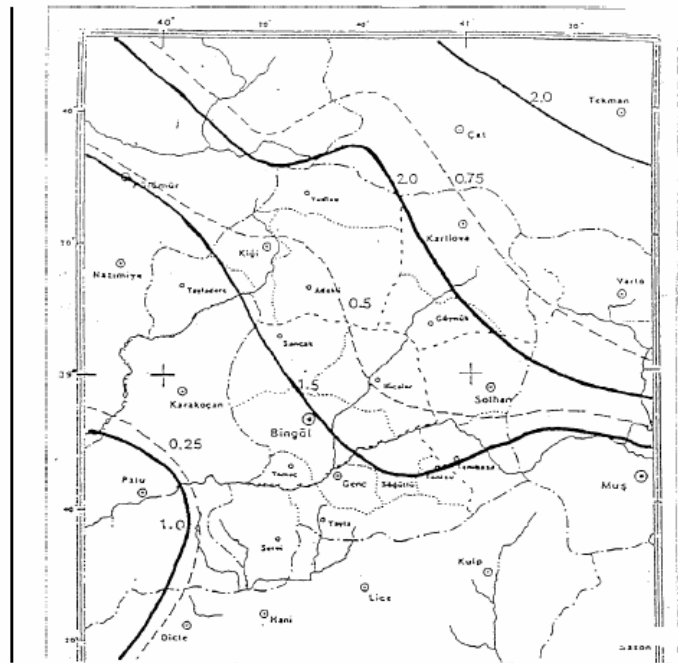


MAP-4- CASUALTY RISK



- (d) **Annualised Risk Mapping:** The annualised specific risk from any hazard at any location is the average expected total losses from all events over a time period. The probability of each level of hazard occurring within a unit time period is combined with the consequence of that level of hazard to generate the expected losses probable/expected in that time. Summing up the losses from all levels of hazards gives the total losses likely over a time period. Hence an annualised risk map gives the total losses over both time and space. Areas of concentration of damage over a year in a given area are depicted on the map. It is expressed as a proportion of the total value (or number) of the total population at risk. This could be better understood with reference to the following map, derived and adapted for this work from the UNDP Disaster Management Training Programme, 1994.

*Example 3—
Annualized risk —
% housing los per year
Bingöl Province,
Turkey*



Earthquake Risk: *The Dark lines give specific risk (% annual housing loss based on mean village performance): Dotted lines give specific risk exceeded by 75% of villages.*

As per DMTP (1994), tangible and intangible losses or *loss parameters* in disasters is represented in a tabular form as follows:

LOSS PARAMETERS FOR RISK ANALYSIS

Losses			
<i>Consequences</i>	<i>Measure</i>	<i>Tangible</i>	<i>Intangible</i>
<i>Deaths</i>	<i>Number of People</i>	<i>Loss of economically active individuals</i>	<i>Social and psychological consequences</i>
<i>Injuries</i>	<i>Number and injury severity</i>	<i>Medical treatment needs, temporary loss of employment activity by productive individuals</i>	<i>Social and psychological pain and recovery</i>
<i>Physical damage</i>	<i>Inventory of damage elements by number and damage level</i>	<i>Replacement and repair cost</i>	<i>Cultural losses</i>
<i>Emergency operations</i>	<i>Volume of manpower, man days employed, equipment and resources expended for relief</i>	<i>Mobilisation costs, investment and preparedness capability</i>	<i>Stress and overwork on relief participants</i>
<i>Disruption to economy</i>	<i>Number of working days lost, volume of production lost</i>	<i>Value of lost production</i>	<i>Opportunities, competitiveness reputation,</i>
<i>Social disruption</i>	<i>Number of displaced persons, homeless</i>	<i>Temporary housing relief, economic production</i>	<i>Psychological social contacts, cohesion, community morale</i>
<i>Environmental impact</i>	<i>Scale and severity</i>	<i>Clean-up costs, repair costs</i>	<i>Consequences of poorer environment, health risks, risk of future disaster</i>

Adapted from Coburn Spence, and Pomonis in Disaster Management Training Programme (1994)

6.8 CONCLUSION

Almost all communities live in situations that expose them to some hazard or the other. These hazards include natural ones such as earthquakes and cyclones, as well as man-made ones such as industrial accidents and pollution. Disadvantaged sections of communities are more vulnerable to the hazards. Vulnerability can be in terms of poverty, low financial resources, poorly built houses and so on. At the same time communities also have some inherent capacities, which could be in the form of strong social grouping, and local infrastructure such as strong buildings of religious or community places. Vulnerability analysis informs us of the extent and impact of vulnerability while risk assessment goes a step further to look at the

net probability of a disaster occurrence, given the status of hazards, vulnerability and capacity.

6.9 KEY CONCEPTS

Capacity:

The ISDR, UN, defines Capacity “as a combination of all the strengths and resources available within a community, society or organisation that can reduce the level of risk, or the effects of a disaster. *In general this involves managing resources, both in normal times as well as during crisis or adverse conditions. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and induced hazards.*”

Coping Capacity:

As per ISDR, in general this involves “managing resources, both in normal times as well as during crises or adverse conditions. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and human induced hazards.”

Capacity and Vulnerability Analysis (CVA):

Lately, the emphasis has been on capacities of people for self-help during disasters and strengthening of the same through policy in this regard. Earlier the emphasis had been on studying vulnerabilities and amelioration of the same through external measures like aid et al. It has been experienced that measures that strengthen innate capabilities of people to fight disasters and rebuild lives is better disaster response than humanitarian aid.

Elements at Risk:

Elements at risk refers to tangible and intangible targets such as people, structures, health, and livelihoods, likely to suffer harm from a hazard.

Resilience/Resilient:

The ISDR explains it as the capacity of a system, community or a society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organising itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.

Risk Assessment:

Risk assessment is a technical exercise to estimate the hazard potential of facility/project with a view to in-built provisioning of safeguard/protective measures. Risk assessment is a quantitative measure of likely losses in the eventuality of a disaster or if the apprehended catastrophe in case of any individual facility takes place such as nuclear plant.

Threat:

Threat is different from Risk. Threat is a more general concept, while Risk is specific in that a threat, such as terrorism, has to be broken down into specific risks and communicated to policy makers for policy in this regard, mitigation or preparedness. Threat is simply an apprehension, which will not give policy guidelines.

Vulnerability:

Vulnerability is susceptibility to suffer losses; in other words, weakened resilience to face the onslaught of a disaster. Socio economic vulnerability is owing to adverse social positioning due to poverty unemployment, living in hazard prone zones, or dilapidated structures. Physical vulnerability refers to engineering weaknesses which causes structures to give in easily to pressures during earthquakes, cyclones et al, causing heavy casualties.

Vulnerability Analysis:

As explained in the Disaster Management Training Programme, (1994), “in engineering terms, vulnerability is a *mathematical function* defined as the degree of loss to a given element at risk, or set of such elements, expected to result from the impact of a disaster hazard of a given magnitude. It is specific to a particular type of structure, and expressed on a scale of *no damage* to *total damage*. For more general socio-economic purposes and macro level analysis, vulnerability is a less-strictly defined concept. It incorporates considerations of both the intrinsic value of the elements concerned and their functional value in contributing to communal well being in general and to emergency response and post-disaster recovery in particular. In many cases, it is necessary to settle for a qualitative classification in terms of *high*, *medium* and *low* or explicit statements

concerning the disruption likely to be suffered.”

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6.11 ACTIVITIES

- 1) List the hazards that can affect your neighbourhood or village, and identify those facilities and people who are most likely to get affected. Explain why these are mostly likely to get affected, and thereby understand their vulnerability.
- 2) Create three lists – hazards that affect your locality, characteristics of local people and buildings that make them vulnerable, and qualities of local people and institutions that will be their capacities in dealing with

disasters. Relate the three lists to each other, and write a risk statement for your community.

UNIT 7 RESOURCE ANALYSIS AND MOBILISATION

Structure

- 7.0 Learning Outcome
- 7.1 Introduction
- 7.2 Types of Resources
- 7.3 New Directions for Resource Mobilisation: Local Sources
- 7.4 Corporate Social Responsibility: An Emerging Avenue
- 7.5 Building Resilience Through Risk Sharing and Transfer
- 7.6 Civil Society Initiative for Relief
- 7.7 Resource Analysis
- 7.8 Conclusion
- 7.9 Key Concepts
- 7.10 References and Further Reading
- 7.11 Activities

7.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Appreciate the need for consistent and sustained resource flows and the importance of systematic resource mobilisation efforts on the part of organisations; official and private;
- Understand how, based on such analysis, resource planning can be carried out and appropriate resource mobilisation done; and
- Understand traditional and modern innovative means of resource mobilisation being pursued by organisations.

7.1 INTRODUCTION

Resources are a basic requirement for any organisation. However, some organisations do not have systematic processes for analysing *resource requirements, flows* and *mobilisation options*. Such exercises are useful for making clear and sustainable work plans, which have to be based on planned and sustained resource flows. There are different kinds of resources, and various options for sourcing them. Traditionally, disaster management work has been based on government or donor funds. Currently, such resources are drying up and new avenues have to be explored. These include, *local resource mobilisation* and *corporate social responsibility*.

7.2 TYPES OF RESOURCES

There are various types of resources required for disaster management. *Financial* and *Human* resources are the primary ones. Financial resources, in fact, form the single largest concern of organisations as they in turn enable acquisition of other secondary resources required for operational purposes. Financial resources come from various sources, including, government grants, loans, institutional grants, and private donations, product and service charges and mobilisation on the part of communities. Government grants are based on thematic areas of work, for which different government departments have schemes for grant making. These include funding of NGOs and community based organisations through the rural development department, health department etc.. Loans come in the form of soft loans with low interest rates for purposes such as livelihood support to vulnerable and disaster affected communities.

Government Finance

Disaster relief programmes are run jointly by the State and Central governments. Disaster Management is primarily the responsibility of the States. Funds are available to the States from the Calamity Relief Fund (CRF) and the National Calamity Contingency Fund (NCCF). The Calamity Relief Fund was set up on the recommendations of the Ninth Finance Commission though subsequent Commissions have determined the funding pattern that establishes the relative share of the Centre and the State towards calamity relief. The break up presently is 75:25 per cent between Centre and States, respectively. The Eleventh Finance Commission recommended setting up the National Calamity Contingency Fund (NCCF) replacing the earlier National Fund for Calamity Relief (NFCR).

There have been several improvements in the new scheme. In comparison with the earlier existing Margin Money Scheme, the States now get a higher assistance from the Central Government for relief expenditure and the response of the State governments to natural calamities can potentially be quicker than before. The CRF scheme gives more autonomy, more responsibility and also assigns greater accountability for disaster response activities (Das and Jha, 2004).

The Twelfth Finance Commission has recommended continuing the scheme of Calamity Relief Fund (CRF) in its present form with contributions from the Centre and States in the ratio of 75:25. The size of the fund worked out at Rs. 21, 333 crore for the period 2005-10. The outgo from the fund is to be replenished by way of collection of National Calamity Contingent Duty and levy of surcharges. The definition of natural calamity is to include *landslides, avalanches, cloudbursts and pest attacks also*. Hence, now the CRF shall be used only for meeting the expenditure for providing immediate relief to the victims of cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloud burst and pest attack. Provision of disaster preparedness and mitigation is to be classified *plan expenditure* and not calamity relief.

As spelt out in the scheme for the constitution and administration of the Calamity Relief Fund, operative from the financial year 2005-06, the Calamity Relief Fund is constituted in the Public Account and classified under the head “8235-General and Other Reserve Funds-111 Calamity Relief Fund” in the accounts of the State Government concerned and is to be invested as per provisions laid down in this regard. The accretions to the Fund together with the income earned on the investment of the Fund shall, till contrary instructions are issued by Government of India, be invested in one or more of the

following instruments:

- a) Central Government dated Securities
- b) Auctioned Treasury Bills
- c) Interest earning deposits and certificates of deposits with Scheduled Commercial Banks;
- d) Interest earning deposits in Co-operative Banks;

The investment of the funds is carried out by the branch of the Reserve Bank of India (having Banking Department) at the headquarters of the State, or a Bank designated by the RBI. In the case of Jammu & Kashmir and Sikkim, their bankers shall carry out these functions. The Accountants General of India and the Comptroller and Auditor general of India do the accounting and auditing respectively (Ministry of Finance, 2005-06).

A State-level Committee (hereinafter referred to as 'the Committee') is constituted by the State Government to administer the CRF, by issue of a suitable notification in this behalf. A copy of the notification is furnished to the Ministry of Finance and Ministry of Home Affairs.

Composition of State Level Committees

The Chief Secretary to the State Government is the ex-officio Chairperson of the Committee. The Committee consists of officials who are normally connected with relief work and experts in various fields in the State affected by natural calamities.

Sub-Committee

The State Governments and/or the State level Committees may constitute sub-committees as may be considered necessary by them in connection with the work of the Committee.

Functions of the State Level Committee

The Committee is to decide on all matters connected with the financing of the relief expenditure from CRF.

The Committee will arrange to obtain the contributions from the concerned Governments, administer the CRF and invest the accretions to the CRF in accordance with the norms approved by the Government of India from time to time. The Committee is responsible to ensure that the money drawn from the Calamity Relief Fund is actually utilised for the purposes for which the CRF has been set up, and only on items of expenditure and as per norms contained in the guidelines issued by the Ministry of Home Affairs. The accretions to the CRF, together with the income earned on the investments of the Fund, are used by the Committee to meet items of expenditure covered by the norms contained in the guidelines. No further financial assistance (beyond the Central Government's yearly contribution to the CRF) is ordinarily available for the purpose.

All administrative and miscellaneous expenses of the Committee shall be borne by the State Government under its normal budgetary provisions and not from the CRF (Ministry of Finance, 2005-06: Scheme for Constitution and Administration of the Calamity Relief Fund).

It is being realised, however, that investments are required on a more sustained basis in infrastructure development to reduce expenditure on calamity relief. In other words, there

has to be a dovetailing of disaster mitigation with development planning. It is also true that the amount of resource available for disaster mitigation and preparedness work is far less than the amount available for relief and recovery. Since mitigation and preparedness are non-events, which means that if mitigation and preparedness are successful then there will be no visible disaster; there is less interest in these areas. It is widely recognised that a “stitch in time saves nine”, and that every rupee invested in disaster mitigation and preparedness saves many rupees in relief and rehabilitation. Still, there is very little media interest, public involvement, and political will towards disaster mitigation and preparedness. It is therefore difficult to mobilise resources for these activities. To counter this limitation, disaster mitigation and preparedness organisations are making increasing efforts to tap developmental resources on the plea of ‘safe development’ or ‘risk reduction’. However, it is still a difficult task and requires much effort.

The World Bank and the Inter-American Development Bank (IDB) have developed a proactive policy in this regard. The World Bank seeks to attain the objective through the following measures:

- Promote sustainable development policies to reduce losses from natural disasters;
- Encourage risk management in member countries as integral aspects of planning and budgeting;
- Encourage research in long-term consequences of disasters and how cost sharing and cost recovery affect mitigation;
- Raise awareness of the benefits of disaster mitigation and how constraints could be removed in its application; and
- Promote mitigation as a standard part of quality auditing process with the project cycle in each case. For this purpose the Prevention Unit has produced an information toolkit for World Bank personnel.

Out of efforts of the World Bank, a coalition of governments, international organisations, academic institutions, civil society and private sector has emerged. The *Provention Consortium* has taken upon itself the task/responsibility of promoting the aforesaid objectives. The mission is, supporting developing countries in understanding risks and instituting mitigation programmes, especially targeting vulnerabilities of poorest segments in these societies.

The Inter-American Development Bank (IDB) has also taken a proactive stance in this regard. As per the new policy announced/crafted in 1999, member states would be encouraged to provide for vulnerability reduction programmes as an essential requirement by the following means:

- Establish *new financial mechanisms* (loans or refundable or non-refundable technical cooperation services) to help countries undertake and strengthen disaster prevention and risk management actions;
- Engage in a *dialogue with member countries* on issues such as risk assessment, risk management strategies and the use of available IDB instruments for financing investments related to natural disasters;
- Incorporate *risk reduction in the project cycle*, including risk analysis and reduction in programming and in project identification, design, implementation and evaluation.

As part of this project, a series of sectoral checklists for disaster risk management are being developed to support the drafting of projects in various sectors;

- Identify *focal points for disaster management at the institutional level* in order to support countries in preparing risk reduction programmes and coordinating prevention and response activities; and
- Build *partnerships for the establishment of an integrated information and response network* that can assist in coordinating the preparation of pre-investment studies, as well as investing in prevention and reconstruction and establishing interagency response protocols.

Accordingly, the salient features of the disaster management policy adopted in India in the context of the ADB (2005) project report are:

- Recognition of linkages between disaster management and development;
- Connecting of specific programmes like the Drought Prone Area Programme (DPAP), the Desert Development Programme (DDP), and the Wasteland Development Programme for managing natural disasters;
- Emphasis on forecasting and warning using advanced technology;
- Contingency agricultural planning;
- Ensuring accessibility to food grains;
- Preparedness and Mitigation through specific plan programmes;
- Disaster Management as a continuous and integrated process;
- Setting up of National Centre for Disaster Management (NCDM);
- Setting up of disaster management faculties in states;
- Programmes for community participation and public awareness; and
- Observing natural disaster reduction day.

The Building Material and Technology Promotion Council (BMTPC) in India has come up with the following recommendations in this regard:

- The extra cost involved in disaster resistant measures provided in new constructions will automatically form part of the estimated costs, hence form part of development cost.
- The funding norms of financing institutions should recognise the need of disaster resistance and should cover the same in their funding packages with mandatory requirement of safety from disasters, as per the stipulation of standards.
- Upgrading the disaster resistance of buildings may actually require extra budgeting and will have to be recognised and included as a separate budget item under plan head of the Central and State governments.
- Since systematic efforts towards disaster preparedness and mitigation will reduce the need under the category of 'Relief' some percentage out of the crisis relief fund may be earmarked for creating awareness, conducting studies in building typologies,

retrofitting methodologies and cost-benefit analyses, carrying out demonstrative constructions and pilot projects in some selected districts, prone to earthquakes, floods and cyclones occurring individually as well as simultaneously.

Protection of Health Facilities

There is considerable stress today on protection of health facilities since it is a major *critical facility* in the aftermath of a disaster. Especially during Earthquakes, hospitals collapse due to the impact, which exacerbates losses manifold. It is estimated that mitigation investment towards ensuring structural integrity of a hospital would increase construction costs by no more than 1-2 per cent (PAHO/WHO, 2000). Structural protection also ensures protection of ‘non-structural’ elements, which is the functional part of a hospital, that is, power supply, water supply, gas supply, etc., which can prevent functional collapse of the critical facility that is dreaded in disaster times.

7.3 NEW DIRECTIONS FOR RESOURCE MOBILISATION: LOCAL SOURCES

The success that NGOs and other civil society organisations have been able to lay claim to in recent years does not include long-term financial sustainability. Well-endowed NGOs are few and far between, and many attribute any measure of financial security to the entrepreneurship of their leaders rather than a clear philosophy on development financing that is shared by the sector.

Indeed, a few organisations have ‘resource sustainability’ as a major component of their strategic orientation. Even fewer organisations, including those seeking to establish endowments, make specific mention of domestic resource mobilisation as a strategy and a basis for action. Not many civil society organisations seem to manage local sources of funding and other forms of support from local institutions.

In India, many corporates have set aside resources under their *corporate social responsibility* programmes but not many NGOs have taken advantage of this funding opportunity. It would seem that NGOs have not been motivated to look to local institutions, individuals or groups for resources; at least not in any serious or consistent fashion.

Both NGOs and donors ought to share responsibility for the limited understanding of resource mobilisation and consequently, for the current challenges that NGOs face with regard to financial sustainability. In the past, donors were happy to allow dependence to set in NGOs when resources were more readily available. This put them in control and made them indispensable. But, they were only doing their job by making funding available.

In some cases, the growth of NGOs was so closely associated with the availability of external funding that “doing well” was synonymous with the ability to attract external funding. Inevitably, NGOs invested their energies in developing their abilities to attract, not engage donors and sharpening skills to manage their organisations in order to keep the funds flowing. NGOs were made, directly/ otherwise, to believe that without external funding there is no future.

Donors and their representatives, regardless of whatever they may have perceived their roles, became “task masters”, whilst the NGOs saw their role as implementers whose basic responsibility was to continue churning out results to justify investments, and

continued funding. Implementing projects and meeting reporting deadlines became demanding tasks that left time for little else.

NGOs had neither the time to invest in nurturing strategic local relationships nor the space to reflect on local resource mobilisation and explore its full potential. This was the scenario a decade or more ago. Sadly, things haven't changed much since then.

Despite the strides that NGOs have made in almost all aspects of their work; despite the contribution they have obviously made in providing relief and rehabilitation, and in some cases, even disaster reduction assistance to their communities, a significant number of NGOs remain trapped in a mindset that emphasises all else except local resources. The quality and extent of local resources seem to be seriously underestimated and undervalued.

The pattern emerging from recent trends of resource mobilisation in India, Bangladesh, Nepal, Pakistan and Sri Lanka confirm the rather familiar picture of over dependence on external donor funding from the developed nations. Whilst recognising that the developed nations will continue to be an important source of funding for civil society organisations, there is worrying lack of effort in the search for alternative sources of funding. Donors have begun talking sustainability (some have started including it in the criteria for funding proposals) but they have yet to demonstrate willingness and commitment to diversifying the funding base and gradually reduce dependence over time, as sudden withdrawal is clearly not the way to go.

For their part, NGOs are increasingly beginning to accept the need to look to local alternatives as a basis for future financial sustainability. However, while accepted in principle as sensible and legitimate, local resource mobilisation as an approach and strategy remains undeveloped and consequently under exploited. It is hard to single out any one reason for this but perhaps the following perceptions can help us appreciate the complexity of the issue:

- Little empirical information is available on the size and potential of local philanthropy. Local governments and institutions give too little, making local fund raising demanding and expensive. Local institutions are reluctant to enter into long-term funding relationships. Local institutions are anxious to avoid funding sensitive initiatives (human rights, democracy and governance etc.). Donor agency funding is cheaper (a single proposal can bring in huge sums of money) and therefore more attractive. The absence of comprehensive research means that there is inadequate information about local resource mobilisation and philanthropic practice. There is no consolidated information on who is playing a significant role in local philanthropy in most countries in the region. Little is known about databases on local resource mobilisation if and where they exist.
- Equally, there is little research into creative strategies and innovative approaches in resource mobilisation. Traditional or indigenous forms of mobilising resources represent an area whose potential can only be fully exploited after in- depth analysis. Research could also yield useful information about the NGO sector, its size, impact and overall contribution to development in respective societies. This and related information could go a long way towards building a positive public image of the sector.
- The general impression among NGOs is that local institutions do not often commit large amounts when they decide to fund NGO programmes and activities. NGOs get less value for their investment of time and other resources. But why do local

institutions give so little? What is it that NGOs need to do to change this? Most local institutions such as corporates prefer one-off, event-based support. They are reluctant to enter into long-term relationships that would entail long-term commitments even during times when they might not be able or want to continue giving. Local institutions also avoid funding programmes or activities that are considered controversial, particularly when these are seen as challenging the status quo.

- By comparison, funding from international donors seems an easier option. In part, this is perhaps the best way NGOs know to mobilise resources. They have developed the relevant skills over time and have come to understand the donor community a lot better than they do those who own and manage local institutions. They have developed relationships, which they believe can open more doors and bring in more funds.
- Yet, the reality is that external funding can never be sustainable and, therefore, NGOs must begin to address the twin issues of local resource mobilisation and long-term financial sustainability today rather than tomorrow. Many NGOs recognise this and are prepared to commit and try out new approaches of resource mobilisation in the context of the current funding climate and indications of future trends.
- To achieve financial sustainability, NGOs will need more than commitment. Applying techniques, skills and knowledge developed in a different context, and with the international donor community in mind, to local situations and to domestic resource mobilisation is unlikely to meet with much success. While there is much that is useful in what NGOs have learned and mastered in dealing with external donors, there remains much they need to learn if they are to make any significant strides in increasing their capacities for local resource mobilisation. NGOs will need to make conscious efforts to deal with the assumptions and hold stereotypes in check. The perception that the life of an NGO is not guaranteed in the absence of external funding must be the first to be trashed.
- Shifts in attitudes and embracing new principles calls for new learning that must focus on all stakeholders. The learning will be ineffective if it targets NGOs only. To be effective, the public sector and state, the private sector and donors, NGOs (and specifically those responsible for mobilising resources) will all need to be targeted. Through education, training and other forms of capacity building, representatives of these stakeholder groups can gain new insights and a fresh appreciation and acquire the skills relevant to local resource mobilisation.
- The content of and approach to this rebuilding process should be based on research in resource mobilisation, which must constitute the first step towards a new, and more financially secure future for organisations working in the area of disaster management.

7.4 CORPORATE SOCIAL RESPONSIBILITY: AN EMERGING AVENUE

Simply put, Corporate Social Responsibility (CSR) means a company that complies with the laws of the land in which it operates is also being socially responsible. CSR initiatives have seen corporates being involved in funding and participating in social initiatives that benefit local communities. However, as rightly stated by Twigg (2001), CSR is a broad concept that is open to interpretations. It can be explained as follows:

“The social responsibility of the private sector goes beyond the sector’s day to day operation of producing a certain range of products and services in the most efficient and economical manner. The social responsibility of the private sector (also referred to as corporate social responsibility) concerns the relationship of a company not just with its clients, suppliers and employees, but also with other groups, and with the needs, values and goals of the society in which it operates. All these groups can be regarded as stakeholders in the company. Stakeholders can be identified as those individuals and groups of individuals that have an interest, or take an interest, in the behaviour of the company both within and outside its normal mode of operation. They therefore establish what the social responsibility of the company, entails or at least, how they perceive it to be.”

There are three essential elements in CSR (Nelson, 2000):

Compliance: Businesses should comply with national regulations; multinational companies should abide by laws as per terms and conditions laid out in the contract with the host nation and ensure that local practices abide by internationally agreed laws, standards and conventions.

Risk Minimisation: Business, especially hazardous units like chemical factories and nuclear plants should as a mandatory practice, factor risk management in decisions. Protection against potential hazards must be ensured.

Value Creation: Besides the above stated essential requirements, businesses should proactively engage in ameliorative activities through dialogue, expert advice, and assistance for disaster relief etc. for positive impact on society.

Reasons for corporate social responsibility can be categorised as per motive, into the following four types:

- 1) Purely philanthropic reasons.
- 2) Internal reasons like employee morale and customer and shareholder satisfaction.
- 3) External reasons like satisfying local communities, goodwill, and publicity and tax benefits.
- 4) Enlightened self-interest, wherein a stable social environment and increasing prosperity means a larger market and hence more profits in the long term.

As per Twigg (2001), types and characteristics of CSR involvement with other actors in disaster management are given in a tabular form (Table -1):

TABLE - 1

<i>Type of Involvement</i>	<i>General</i>	<i>Characteristics</i>
<i>Philanthropic/Charitable</i>	Donations and grants in cash or in kind (goods, services, facilities) to other organisations and groups, working in disaster reduction, or directly to beneficiaries.	<ul style="list-style-type: none"> ➤ Altruistic (although business may derive some other benefits; for example, good publicity, this is secondary) ➤ Business controls the agenda: it decides what to do, whom to assist, and how to assist. ➤ Typically, one to one relationship between business giver (non-profit, community) and receiver, other stakeholders not involved. ➤ May be formal (based on grant agreement or informal). ➤ Typically short term and one off interventions, but may be long term.
<i>Contractual</i>	Contracting other organisations or groups to carry out work for public benefit.	<ul style="list-style-type: none"> ➤ Business controls the agenda and manages the resources ➤ Altruistic ➤ Based on formal, legal contract for work ➤ Typically one to one relationships; other stakeholders not involved.
<i>Sponsored</i>	Sponsorship of other organisations or groups	<ul style="list-style-type: none"> ➤ Business controls agenda and manages resources ➤ Self-interested: business gains through publicity, provision of goods and services that meets its needs (any public benefits arising from the work are secondary). ➤ Based on formal, legal agreement ➤ Typically, one to one relationships

contd...

<i>Collaborative</i>	Working partnerships with other organisations and groups for public benefit.	<ul style="list-style-type: none"> ➤ Greater emphasis on dialogue, shared aims, mutual respect (the extent to which this happens in practice varies, ➤ More likely to involve a range of stakeholders ➤ Ideas can originate from any of the stakeholders ➤ Diversity of partnership arrangements (formal and informal). ➤ All stakeholders should benefit from partnership (“win-win” scenario but may not benefit equally). ➤ Control over resources can give some partners greater control over resources. ➤ Better opportunities for longer-term interventions.
<i>Adversarial</i>	Business response to lobbying about human and environmental impact about business activities	<ul style="list-style-type: none"> ➤ Responsive: driven by other organisations and groups ➤ Public relations more important than public benefits
<i>Unilateral</i>	Business undertakes its own commercial actions, independently of other actors.	<ul style="list-style-type: none"> ➤ More likely to be one off short- term initiatives driven by urgent need and compassion and emergency relief

Hence, the corporate sector is involved in two *contradictory ways* in disaster management. One way, a disaster is a great opportunity to do business, as is post-war reconstruction. Big houses vie for commercial contracts to build residential areas and commercial places in war/natural disaster devastated areas. Decisions influence the way international relations shape between competing countries, thenceforth. Another way, big industrial houses are expected to, and do come forward in philanthropic activities as adopting certain villages for reconstruction after a disaster and extending donations, technical/logistic help etc.

As per the *University of Wisconsin Disaster Management Centre Course on “Disaster Response”* (Lesson, 3, 1995), the private sector includes enterprises operating on widely differing scales, from the small artisan to the large corporation. Overall reconstruction policy determines who will receive relief resources and thus who in turn may prosper, and it is therefore important to recognise the encouragement that can be given to small or medium-scale enterprises by giving them priority. Evidence suggests that a major bottleneck in disaster recovery is the lack of “cash flow” to get goods moving. As a result of this constraint, rapid delivery of key building materials in some disasters has been the monopolistic practices of a few large stock suppliers and producers of building materials. Hence, governments have a key social role in the way they administer credit, grants or loans to the business sector.

Much of the CSR was initially focused on environment related issues and polluting corporations set out to do something to reduce the impact of its actions on the local environment and populations, and be seen as doing so. This area of work has been rapidly widening and more and more corporate entities are playing significant roles in social work. They make financial donations, in-kind contributions, and also volunteer staff skills and time for social work. Corporate-NGO partnerships are also on an increasing trend. Organisations such as the *Business Community Foundation* and *Partners in Change* work to promote such links and bring the corporate and social development sectors closer to each other.

In India, important CSR players such as TATA, Reliance, NTPC and others have been increasing their involvement in disaster response and preparedness related work. The larger organisations such as TATA also have separate resourceful entities such as their trusts that oversee their contributions to the social sector. International corporates such as GAP Inc., Microsoft and Nokia also have sizeable CSR initiatives that support disaster management related activities.

The corporate sector played a major role during the recent tsunami in relief disbursement in cooperation with the UN agencies. It used its supply chain logistics expertise in relief management. One such initiative is the *World Economic Forum's Disaster Resource Network (DRN)*, a Swiss non -profit private organisation network that serves as a point of contact for companies willing to contribute. During the tsunami, logistics providers such as DHL, Aramex, DNATA and TNT logistics, worked as part of *joint airport emergency teams*, which directed the unloading of aircraft, sorting and temporary storage of supplies and the onward transportation of those supplies to humanitarian agencies (The Economist, 2005).

Many NGOs working in disaster response and preparedness, have in the recent years, tapped into CSR pools to mobilise resources for their activities. This is a healthy and increasing trend that will open new opportunities for resource mobilisation for disaster management in the future.

However, outward philanthropy should not be counter affected by internal mismanagement such as non-compliance with safety precautions. It is important to note, that corporate social responsibility on the part of industrial houses results in gains for them, in the form of:

- Total Quality Management
- Competitive Edge
- ISO Certification
- Image and Marketing Benefits (SEEDS INDIA, 2002).

The significance of CSR will only grow in the coming years due to increasing stake of the private sector in business following the neo-liberal paradigm of governance and consequent dilution of the public sector (Sharma, Gupta, Gupta, 2002, SEEDS INDIA).

7.5 BUILDING RESILIENCE THROUGH RISK SHARING AND TRANSFER

Disasters divert important funds from development to disaster relief and rehabilitation. Tools need to be developed that help the poor to manage risks more effectively with

alternative sources of finance, such as Insurance. According to Smolka (2003), beyond financing future losses, more efforts need to be made towards a more proactive strategy to reduce and prevent losses. To that end, there is need for a more proactive collaboration between financial institutions, the state, industry and insured parties to actively promote risk reduction measures. The private insurance sector has made fewer inroads into the markets in developing countries, though they could significantly contribute to developing *micro finance options*. Even otherwise, the insurance sector has not had an active role to play in risk management, particular in developing countries, because of short-term financial perspectives (the time scale for possible positive outcome is too long). According to Smolka, insurance companies could make risk reduction a condition for providing insurance. The same was attempted in the United States with regard to earthquake proofing of establishments with considerable success. The state should also consider granting tax exemptions to catastrophe reserves of private insurers. Moreover, banks could set disaster reduction as a precondition for granting loans.

The Asian Development Bank (ADB) in response to a request from the government has initiated rural finance restructuring and development technical assistance (TA) in India. One of the issue areas taken up in the project is risk mitigation. The rural poor require fund assistance for relatively minor concerns such as illnesses but also for major losses such as from natural disasters like cyclones et al. While the former can be met out of occasional borrowings or private savings, latter requires outside support in the form of insurance pay offs or disaster relief. Insurance services have not been widespread in rural areas for a variety of reasons.

As per the ADB, the scope is enormous since at the aggregate level there are approximately 85 million rural borrowers as against 300 million rural savers including those who save at post offices. Rural finance system in India is predominantly state owned. Private players have had negligible existence, (predominant presence of LIC) and have had a subsidised window for implementing government schemes. Insurance also has low penetration among the rural masses. Of the estimated 235 million workers employed in agriculture only about 45 million, (19 per cent) are covered by group insurance schemes of the LIC and welfare schemes of the Central and State governments. As of September 2004, there were only 13 private insurance companies in the fray. India has since liberalised the insurance sector with the enactment of a legislation and setting up of the insurance regulatory development authority (IRDA) in 1999. The IRDA has come up with a regulation that casts an obligation on every insurer to address the rural market. The welcome entry of the private sector now is expected to improve the rural finance scenario considerably. Key recommendations of the TA group to improve the reach and extent of rural insurance and other risk mitigation services to the rural poor, women in particular on a sustained basis concern:

- Deepening life insurance coverage through group micro finance
- Improving health services through public- private partnerships
- Innovative products such as weather derivatives for crop insurance
- Expanding livestock coverage through daily cooperatives and lending institutions
- Rationalising payins and payouts for disaster relief
- Moving from subsidies to a contributory system for social security

- Continuing the directions of regulatory reforms already underway
- Activating and intimately involving peoples' organisations, cooperatives, self-help groups, community based organisations, trade unions etc. in developing and distributing insurance for members.

A study conducted by the World Bank revealed that though there was considerable awareness about life insurance among the rural poor and also willingness on their part to avail of the same, high premiums were the deterrent. Hence, focus has to be on offering low premium products, that is, products that do not have a high investment component. Certain procedural reforms would also be required in that age proofs are not easily underwritten in rural areas since there is lack of certainty. In case of uncertainty, community certification may be accepted. Records of births and deaths at Panchayats would make things easy in this regard. Insistence on FIRs for claims below Rs. 25000 may be reviewed, as these are generally not recorded as accidents in police stations. Also definition of accidents may need to be reviewed in that snakebite is not classified accident, when that is major hazard in case of disasters like floods.

A major area of concern is *crop insurance*. State initiatives have been unviable. A beginning was made in 1972, in the state of Gujarat, where insurance was introduced for a Hybrid-4 cotton variety in a few districts. It was an individual farmer based approach, and a uniform guaranteed yield was offered to the farmers. Problems arose in fixing the guaranteed yield and the *actuarially* fair premium rate for each farmer for each crop and loss adjustment. Ultimately, it proved too costly, hence unviable. A pilot scheme was introduced in 1979 but was limited to farmers who took short-term loans from financial institutions.

A Comprehensive Crop Insurance Scheme (CCIS) was introduced in India in 1985 with active participation of the state government. The scheme was however unsuccessful for the following reasons:

- 1) The scheme was voluntary, leaving it to the state governments to identify the crops and areas where/in relation to which the scheme would operate. This resulted in *adverse selection* of areas/states.
- 2) There was no uniformity in the basic unit area of operation (district/block /taluka) for determining the threshold yield and assessment of actual yield in calamity affected areas.
- 3) The scheme was too costly, hence not viable, with a premium to claim ratio of 1.5.7. The premium rates were unrealistic and incidence of natural calamities high.
- 4) The scheme did not include many crops and many farmers.

In crop insurance, besides heavy administration costs, computation processes are highly complicated. For example, whether individual farmers or an area should be the unit for assessing losses and premium rates. Area-based approach works out premiums based on *averages*. However, that would be difficult for many reasons because the nature of risk is different for each segment of the farmer population. For example, big farmers may face the problem of pests and marketability whereas poor farmers suffer mainly from lack of irrigation facilities. Cash flows of different segments and capacity to pay are also different; also whether cross subsidies should be granted by way of charging less risk areas higher; whether insurance should be based on multi-cropping since that would invite low

premiums to farmers since risk would be less etc. A new scheme, which is presently being administered by the Agricultural Insurance Company of India Limited, is the National Agricultural Insurance Scheme (NAIS) introduced in 1999. It is an Area Yield Index Based scheme. It covers both loanee and non-loane farmers, food grains and oil seeds but excludes horticulture crops. It remains to be seen to what extent it is able to succeed, given the complications involved.

Another continuing problem has been little scope for risk diversification due to non-inclusion of civil society and private players. Lack of data for correct estimations of harvest and possible losses were also major constraints. State owned schemes proved non-viable since they were too costly.

Notably, NGOs like the *Self-employed Women's Association* (SEWA) and the *Tribhuvandas Foundation* have done creditable work in the area of health insurance for poor families. They have developed innovative methodologies like integrating various risks in one single product, linking of insurance schemes with savings, and covering many services not provided in market based schemes such as maternity services, transportation costs in case of riots, floods etc. Even in western developed nations, viable insurances have developed out of non-profit initiatives. Similarly, *Association for Sarve Seva Farms* (ASSEFA) insures livestock, mostly buffaloes, cows and bullocks in Tamil Nadu. Cattle protection committees provide collateral services like de-worming, vaccinations and periodic checkup/treatment of cattle. Procedures are also simple. Hence, instead of a *state-owned approach*, a *state-led approach* is being considered more apt for insurance, which is a vital requirement in building disaster resilient communities. A real integrated partnership with peoples' organisations such as cooperatives, trade unions, and savings and credit societies is important (ADB, 2005).

7.6 CIVIL SOCIETY INITIATIVE FOR RELIEF

Various international as well as national NGOs and institutions make grants for disaster management related work. These include, institutions of foreign governments that operate usually through their embassies, such as the Japan International Cooperation Agency, Department for International Development of the British Government, and United States Agency for International Development. Besides these, international donor agencies, such as the Ford Foundation and national donor agencies such as the Tata Trusts give grants for such work. Some large international organisations such as CARE and OXFAM also make resources available to smaller local NGOs. Faith based organisations, such as *Christian Aid*, *Islamic Relief* and *Gayatri Parivar* also raise funds through private donations and make them available to smaller local organisations for their work. Many organisations raise funds through private donations from individuals, corporates and institutions. Such donation based fund raising is the oldest form of raising funds and still one of the most effective ones. Some organisations also use product and service charges for mobilising funds. Such initiatives include the sale of greeting cards by UNICEF and CRY, and sale of publications and giving advisory services by organisations such as Centre for Science and Environment, Development Alternatives and SEEDS, etc. Lastly, organisations also raise funds through membership charges.

7.7 RESOURCE ANALYSIS

Resource analysis forms the logical base for planning, mobilising and utilising resources, for all organisations, government or otherwise.

The following checklist from the *Source Book on District Disaster Management*, Ministry of Agriculture, Government of India, and Lal Bahadur Shastri National Academy of Administration, Mussoorie, can aid resource analysis efforts in organisations:

- Who coordinates resources within each organisation?
- Who is responsible for supplying resources beyond the normal capabilities of each organisation? Who records the costs of resources?
- Have arrangements been made with State or Military organisations for assistance in times of emergency?
- Is there agreed access to emergency funds?
- Who records the expenditure for future acquittal/repayment?
- What are the limits of expenditure for personnel?
- Unskilled volunteers can safely perform what tasks?
- Who coordinates this work?
- It is likely that some organisations will begin public appeals for donations for emergency affected persons?
- How can these appeals be coordinated?
- How does equitable disbursement of appeal money to be ensured?
- Who coordinates the requests for assistance for the community?
- What sort of assistance is likely to be required?
- Where is this assistance likely to come from?
- Is there an expected form that the request should take?
- Is the following information available to help outside assistance?
- Lists of organisations working in the country with information on their competence and capability to be involved in emergency response and recovery activities.
- Is the following information available?
- Lists of essential response and recovery items, with specifications of average costs and availability.
- Lists of local manufacturers and regional manufacturers and suppliers of response and recovery items, with information on quality, capacity and capability regarding delivery items and reliability.
- Information on essential response and recovery resources that will allow a rapid response, for example, water supply systems, sanitation systems, health networks, alternative shelter sites and Materials, Tarpaulins, Tents, Ports and Transport Networks.

The key steps in resource analysis are:

- 1) Assessment of current resource availability and utilisation patterns:

This includes an assessment of the current activities, resources available and how the resources are being used at present. The assessment should cover concerns like whether this is the best resource utilisation, and how it can be improved. It should match needs with availability, identify shortfalls, and assess resource management process to find areas of improvement.

2) Identification of potential new sources:

This activity involves research on traditional as well as innovative sources of tapping resources. It can be done by looking at the various activities being carried out in the region by other organisations and finding out about the interest areas of other resource agencies working in the area.

3) Assessment of growth trends and projection of resource requirements:

The assessment of current resource patterns needs to be topped up with the growth plans of the organisation for the near as well as long term future, so that resource planning actually takes into account future needs.

4) Criteria matching for purpose of tapping potential sources:

Once potential resource contributors are identified and future activity patterns and resource needs assessed, the process of criteria matching should be carried out to help focus on selected sources that best match the requirements in terms of interest areas.

5) Operationalisation of resource mobilisation process:

Finally, the resource mobilisation process needs to be operationalised, which too is fast becoming a professionalised area of work. It includes writing of proposals, preparation of work plans, logical frameworks and budgets. It also involves identification of parameters that will ensure sustainability of the initiatives, risks that may be present to the investments and efforts and how the risks are being covered. Indicators of success also need to be identified and monitoring and evaluation plans put in place.

7.8 CONCLUSION

There are various types of resources required to conduct disaster management activities; these include *financial*, *human*, *social* and *physical* resources. The first requirement is to understand the resource needs based on programme objectives and the situational context. This forms the primary part of resource analysis. Resource analysis also includes the identification of resource gaps and potential sources of support.

In general, it is seen that within the domain of disaster management, resources are more freely available for post-disaster activities such as relief and rehabilitation, since these are more visible and attract public, government, donors' and media attention. On the other hand, mitigation and preparedness activities find it very difficult to attract resources since successful mitigation and preparedness is a non-event, and it results in a no-disaster situation. Such a situation being less noticeable for the media, public and decision makers is less attractive for donors to invest in.

Governments generally use their plan and non-plan funds to support their disaster management activities. NGOs accumulate their funds from various sources, which include government sources but are largely focused on international donor agencies. This leads to a dependence syndrome, and is not a very sustainable way of working. It is being increasingly realised that there is a need to find new directions for resource mobilisation, with more focus on tapping local sources, such as corporate funding under corporate social responsibility and private funds through direct funding. Another model of financial resource mobilisation being adopted by some organisations is through chargeable product and service delivery, such as the funds raised through sale of greeting cards and

handicrafts, or through advisory services, handbooks and magazines. In addition to financial resources, organisations also tap into direct human resource bases through volunteer programmes, and physical resource bases through in-kind contribution programmes.

7.9 KEY CONCEPTS

- | | |
|-----------------------------------|---|
| BMTPC | : The Building Material and Technology Promotion Council (BMTPC) is an autonomous organisation under the Ministry of Urban Employment and Poverty Alleviation, which is engaged in propagation of cost-effective and disaster resistant building construction materials, technologies and techniques. BMTPC has developed and promoted 32 simple and affordable manufacturing machines for production of newer building materials and components with industrial waste as a major ingredient (fly-ash, red mud, gypsum etc.) The Council has also contributed significantly to the development of wood substitutes and composite based doors and window shutters. It has also brought out the Disaster Mitigation and Vulnerability Atlas of India. |
| Financial resources | : Taxes, borrowings, savings, credit, grants etc. are financial resources. Ways are being explored to augment resources for disaster mitigation through involvement of the private corporate sector and civil society and increasing the capacity of local governments in this regard through improved powers of borrowings and generating resources through the capital market etc. |
| Human and Social resources | : Precious human capital is lost during disasters, which is both social and financial loss. Vital social resource by way of kinship ties is lost due to loss of lives during disasters. Negative social capital emerges due to group cohesions based on the norms of exclusion, as caste, ethnicity etc. |
| Physical resources | : Physical infrastructure, both natural and man-made is impacted during disasters. Buildings collapse during earthquakes. The tsunami has altered the physical landscape in Sri Lanka, perhaps forever changing the economic profile of the region. |
| Resource analysis | : Understanding the needs and priorities as per available resources and working out modalities to avail alternate avenues, observing fiscal prudence in existing expenditure, all comes within resource analysis. |
| Resource base | : Resource base refers to physical, financial and human resources deployed during an emergency. Organisations with poor resource base struggle to cope. Logistics and inventory are crucial segments of resource base. |

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7.11 ACTIVITIES

- 1) Identify the major developmental initiatives being carried out by government or non-governmental organisations in your locality. Select those components that lead to reduction of disaster risks. Find out and list the sources of support for these initiatives. Comment on the sustainability of resources in this sector.
- 2) Identify gaps which need to be abridged to reduce disasters in your locality, but are not being addressed as of now. Conceptually, identify local resources that can be tapped to fill these gaps.

UNIT 8 DISASTER MITIGATION

Structure

- 8.0 Learning Outcome
- 8.1 Introduction
- 8.2 Concepts of Disaster Mitigation and Preparedness
- 8.3 Mitigation Measures
- 8.4 Problem Areas in Mitigation
- 8.5 Guiding Principles of Mitigation
- 8.6 Towards Mitigation
- 8.7 Resources Relevant to Mitigation
- 8.8 Contribution of United Nations Agencies in Disaster Mitigation
- 8.9 Conclusion
- 8.10 Key Concepts
- 8.11 References and Further Reading
- 8.12 Activities

8.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Outline the major considerations in Disaster Mitigation;
- Understand the concept of Disaster Mitigation, its relation with Preparedness and the need for systematic planning in this regard; and
- Get an overview of mitigation activities and problems faced while implementing mitigation projects.

8.1 INTRODUCTION

Disaster mitigation is defined as “Measures aimed at reducing the impact of natural or man-made disasters in a nation or community”(*Carter, 1991*).

The United Nations declared the decade of the 1990s as the International Decade for Natural Disaster Reduction. The aim behind such a move was to mobilise concerted efforts on the part of the international community with active participation from the UNDP and the UNDRO towards substantial reduction in disaster-related losses round the World. These agencies will encourage and assist national governments and non-governmental agencies to tackle disaster related issues, “through projects focused directly on reducing the impacts of hazards and through incorporation of risk awareness as part of the normal operation of development projects”(Sharma, 1998).

Disaster mitigation is an *evolving/ developing science*. Its rudimentary development could be traced back to the mid 19th century when governments undertook to eradicate the threat of epidemics like tuberculosis, typhoid, cholera, dysentery, small pox and other deadly diseases that were claiming lives in an endemic manner around the world. The subsequent campaigns of governments against diseases followed realisation of the fact that diseases were controllable and preventable, and 'sanitation' was a significant activity therein, in that it was crucial in controlling the spread of any disease or preventing its onslaught. What followed could be termed as a "sanitary revolution" in that considerable budgetary allocations were committed to specific activities, like cleaning, disposal of waste, public facilities etc., besides impetus to R&D in treatment and vaccination against these 'hazards.' It demanded considerable administrative reform along with resource commitment on the part of governments towards public health measures, in that governance thereafter had to proceed with a fresh perspective, *vis a vis* diseases and craft adequate policy responses to tackle the threats involved. Evidently, there has been considerable success achieved in that endeavour in that many dreaded diseases like plague, small pox, etc., have been eradicated; though countries still have to carry on with sustained efforts to achieve the same level of success with other diseases.

Notably, the change in approach was brought about by a *demystification* of diseases following *understanding* of the phenomena underlying epidemics. Similarly, natural hazards have hitherto been treated with a fatalistic approach. Currently, there is a revision of attitude/approach, as the 'mystery' of natural hazards is being increasingly unraveled through exploratory research. Accordingly, governments are increasingly investing in disaster mitigation, preparedness and prevention since there is growing belief that tangible gains can/will result from such investment. Scientific community as also social scientists are engaged in understanding hazards from both technocratic and social perspectives, which imparts a holistic understanding to the phenomena of disasters; hence the development of capability to tackle them through adequate policy responses (Sharma, 1998).

In India, distinct shift in policy responses towards mitigation and prevention is now evident. As per Dhar (2002), earlier the approach was geared towards crisis management. The famine codes, scarcity relief manuals and calamity action plans, wherever these existed, enabled administration to fight emergencies and provide relief, post occurrence of a disaster event. Policy shift towards pre-disaster preparedness planning began in the late seventies, and gradually thereafter, deliberate attempts on the part of the government towards an integrated approach towards disaster management has been discernible. It began with drought proofing wherein considerable success was achieved. The Central Water Commission evolved a model bill for flood plain zoning, though success in this regard was limited. The main reason was that State governments were lackadaisical or constrained in enacting the bill and complying with the requirements. Now with added emphasis, post-Yokohama, and regrettable experiences with disasters like the Bhuj Earthquake and Orissa Cyclone, renewed impetus has been provided to mitigation planning. The process is expected to proceed further along desirable lines in the future, which augurs well for disaster preparedness in particular and administrative reform/improvement in general which is imperative for disaster management. For instance, granting more say to specialists has been a much discussed reform issue over the years. Disaster management as also rural and urban development demand specialist competence, for which, organisational hierarchy would need to be reconsidered/reviewed.

8.2 CONCEPTS OF DISASTER MITIGATION AND PREPAREDNESS

Disaster mitigation embraces actions taken in advance of a disaster to reduce its effects on a community. When used in this sense, mitigation includes those actions, which are often categorised as being preparedness measures, which means, preparedness is a part of mitigation. However, a distinction is often made between mitigation and preparedness whereby:

Mitigation refers to long-term risk reduction measures, which are intended to minimise the effects of a hazard; for example, dam construction is considered an activity that mitigates the effects of droughts. Hence, “Mitigation involves not only saving lives and injury and reducing property losses, but also reducing the adverse consequences of natural hazards to economic activities and social institutions.”

Preparedness is concerned with measures taken immediately before and after a hazard event, for example, relating to evacuation plans, health and safety, search and rescue etc. Hence the crucial issue would be *logistics* for which advanced preparations are necessary. *Preparedness* assumes that certain groups of people or property will remain vulnerable and that preparedness would be necessary to address the consequences of a hazardous event’s occurrence.

This distinction between the two terms provides a useful division of actions because it helps to highlight mitigation as a *long-term process*, aimed at addressing the explanatory factors, which convert hazards to disasters. In comparison, preparedness does not aim to correct the causes of vulnerability, which place communities at risk in the first place, rather to tackle them through speedy and effective response; hence the emphasis on readiness in this regard.

According to Coburn Spence, Pomonis (1994 in the DMTP, UNDP), however, not much should be read into the distinction. Mitigation is defined as “a collective term used to encompass all activities undertaken in anticipation of the occurrence of a potentially disastrous event, including *long term preparedness and risk reduction measures*.... It has occasionally been defined to include post-disaster response, which makes it equivalent to disaster management.”

Significance of Mitigation

Effective measures for mitigation involve understanding of hazards and the likely damages in the event of a disaster. For example, in earthquakes most fatalities (almost 75 per cent) are caused due to building collapses, hence prevention would demand earthquake proofing of structures and retrofitting (engineering modifications) of existing ones. In floods, most deaths reportedly occur due to drowning in turbulent currents; hence, prevention strategy would require keeping people out of the track of potential water flows or by preventing the flows from occurring. Mitigation saves the economy from losses. Industry and agriculture suffer heavily from earthquakes (damaged infrastructure) and droughts, respectively. Besides, these are interdependent sectors, which means agro-based industries suffer if agricultural produce goes down and industries in general, if communications, power, labour supply *et al* get affected (Sharma, 1998).

Mitigation is usually not given the same level of priority as preparedness or recovery. This is because there is a tendency on the part of both economists and politicians to view

disasters and development in terms of “trade-offs,” with needed resources being diverted from development towards disaster mitigation. The attitude can be expressed as, “we are too concerned with day to day activities to worry about disaster problems that may not occur during our lifetime.” This is reinforced when the problems with mitigation elements are examined; when will the disaster occur? Do we know where it will be? What percentage of resources shall we spend? Therefore mitigation of disasters is often not perceived as important to the public or individual domain as other issues such as economic development, social advancement, health care systems, etc., are.

Yet, disasters undermine development efforts and waste resources, which have been allocated to different sectors. They interrupt ongoing programmes and divert resources from their intended use and beneficiaries. Hence, “*When disaster-proneness is well known, failure to factor it into planning represents a serious mismanagement of resources*” (Alceira Kremer, *Managing Natural Disasters and the Environment*, World Bank, 1991). Hence dovetailing of disaster mitigation into development planning saves *ad hoc measures*, which only results in less gain and much waste. Not only can mitigation protect these other important sectors, but also, if correctly carried out, can often be justified as being cost-effective in protecting other development gains.

Mitigation is therefore, a process justified and necessary for the protection it offers to a society’s development as a result of avoidance of damage and losses. It requires systematic and logical planning processes to ensure that resources allocated adequately reduce risk, and protect development. To do so, an understanding has to be reached with regard to what the effects of a disaster are likely to be and what level of protection is required. From an economic standpoint it appears logical that the amount of mitigation, which is warranted, is *that amount that can be bought for less than the expected costs of the losses*.

However, it is important to note that acceptance of this principle depends on properly identifying all the costs, *direct* (death, injuries, capital stock and inventories), *indirect* (lost income, employment and services from lost production) and *secondary* (decreases in economic growth, balance of trade deficits, etc.) and those associated with preparedness and emergency relief. Equally important but harder to assess are the immeasurable costs associated with the political, social and psychological effects of traumatic events and their conversion into real losses.

Although the initiation of mitigation should be before a disaster occurs, the major opportunity to develop and implement mitigation measures occurs as the “window of opportunity” after a major disaster has taken place as politicians and public officials, in light of public displeasure and the exigency of the situation are ready to allocate resources for the task. This is usually a short-lived period before interest and attention lessen. Therefore the opportunity should be rapidly taken up and optimised. For that, dovetailing of disaster planning with mainstream development planning is imperative.

The Need for Systematic Planning

This establishes the significance of disaster planning. (It has been briefly referred to in Unit 5). Disaster Planning, in the words of T.N. Dhar (2002), “ is an important area of disaster management that involves technical social, financial, organisational and administrative arrangements that need to be made in order to be well prepared for disasters...It involves timely execution of mitigation and prevention (as far as possible) measures. To an extent, mitigation can be achieved through measures like soil and water conservation, water

storages, protection structures, land use planning and regulation, introduction of building codes, hazard zoning, risk analysis, advance zoning and relief preparation, creation of public awareness and enlisting the participation of people. For social preparedness, there is need for training and motivation and mobilisation of NGOs, Voluntary Organisations and peoples' own institutions and sensitising the media..."

Planning for mitigation involves identifying the 'elements' at risk, or the physical infrastructure and people likely to suffer harm in the event of a disaster. If there were no habitations or buildings, an earthquake would be a harmless event. Hence, coincidence/simultaneity of a hazard in situations of vulnerability, physical and/or socio economic, result in disasters. Identification of vulnerable elements is a research exercise, which is undertaken as part of vulnerability analysis and risk assessment, wherein specialists from both physical and social sciences are involved, which can be vividly, depicted on/through a map. (Identification of elements at risk along with recommended mitigation measures has been attempted subsequently in table 1).

Under the initiative of the Ministry of Urban Development, a Vulnerability Atlas of India has been prepared for the period 1994-1997, in which earthquake, cyclone and flood hazard maps for every State and Union Territory (25 states and 7 Union territories) have been prepared on a scale of 1:2.5 million. In these maps the boundaries of the districts are clearly shown so that the areas of the districts prone to the various intensities of the hazards are clearly visible. Also, the vulnerability of the buildings, as per the census of housing 1991, had been brought out in a tabular form on separate sheets for each district. This information clearly highlights the risk to the buildings of various types in every district when subjected to different intensities of the three hazards, particularly. On a larger scale, state wise vulnerability atlases have also been prepared including an action plan that the state may adopt for achieving disaster reduction. State-of-the art technologies, such as Remote Sensing, Geographical Information System (GIS), Global Positioning System (GPS), Computer Modeling and Expert Systems, and Electronic Information Management Systems (collection, storage, retrieval and dissemination of information) are being emphasised. Efforts are on consistently to modernise disaster management control rooms in states. Database is also being prepared to keep track of past events for retrospective preparedness analysis, specific areas for mitigation planning, and estimation of the probability of future occurrence/repeat events (Sinha, 2002).

A High Powered Committee was set up in August 1999 by the Government of India to prepare a disaster management plan for the country comprising national, state and district level plans. It deliberated on thirty odd types of disasters including water and climate related disasters; geologically related disasters, chemical, industrial and nuclear related disasters, accident related disasters and biologically related disasters. Significantly, the distinction between natural and man-made disasters was academic, hence not in fact pertinent. It submitted its report in 2001. Some of the important recommendations for disaster mitigation, as per the committee, are as follows:

- Promoting and encouraging R&D through creating a network of national laboratories that can provide support for early diagnosis of infections during/following disasters and harness the expertise available. Networking of laboratories within the country, with other countries on bilateral basis was recommended.
- Upgrading of skills of professionals by providing state-of-the-art training and establishing a public health laboratory training programme.

- Dissemination of information to the general public and professionals was deemed necessary and desirable.
- Availability of safe drinking water was especially emphasised to control the situation in the aftermath of a disaster. Enforcement of preventive measures to ensure unadulterated and hygienic food was stressed. Establishment of a Control Room in National Institute of Communicable Diseases for information collation in related aspects was stressed.
- For effective surveillance and rapid response activities, establishment of a national high-level inter-sectoral committee, quick response medical teams, efficient functioning of surveillance machinery, developing more effective international surveillance networks were stressed.

8.3 MITIGATION MEASURES

Once decisions have been made concerning priorities the resources to be allocated to mitigation measures to protect vulnerable populations and infrastructure can be identified. Depending on their purpose mitigation measures can be categorised as being either “structural” or “non-structural” in nature.

Non-Structural Mitigation

Non-structural mitigation measures relate to those activities and decision-making systems, which provide the context within which disaster management and planning operates and is organised. They include measures such as:

- Training and education
- Public education
- Evacuation planning
- Institution building
- Warning systems

Structural Mitigation

However, efficient non-structural mitigation measures may be, they need to be complemented by structural measures for risk reduction to both engineered and non-engineered structures. These include, constructing or retrofitting buildings and infrastructure to suitable safety levels, using suitable materials and the incorporation of proper workmanship under correct supervision. Non-engineered structures are those built by their owners or by builders lacking formal training.

A typical structural measure is an earthquake resistant building whilst a typical non-structural element is a seismic building code, training and education, building safety codes, physical measures, land use planning, public awareness programmes, etc.

Both structural and non-structural mitigation measures may be termed either “Passive” or “Active”. “Active” measures are those, which rely on providing incentives for disaster reduction. They are often more effective than “Passive” measures based in restrictive laws and controls. For example, while codes and land use planning may provide a legal context for mitigation these tend to be ineffective unless rigorously enforced. Instead, measures which provide incentives such as government grants or subsidies, a lessening of insurance

premiums for safer construction, provision of technical advice provides a framework for more sustainable mitigation.

Examples of Mitigation Measures

Mitigation involves implementing long-term risk reduction measures. Measures range from large-scale flood protection measures (for example, Bangladesh, China) to income generation programmes, diversifying livelihoods, grain stores, etc., to tackle socio-economic vulnerabilities. For the purpose of illustration, some simple examples of mitigation measures are as follows:

- Strengthening buildings to render them more resistant against cyclones, floods or earthquakes.
- The incorporation of hazard resistance in structures or procedures to be followed in new development projects.
- Planning certain kinds or varieties of crops that are less affected by specific kinds of disasters.
- Changing crop cycles so that crops mature and are harvested before the onset of the flood or cyclone season.
- The adoption of land-use planning and controls to restrict activities in high-risk areas.
- Economic diversification to allow losses in one sector to be offset by increased output in other sectors.

These approaches can be categorised as development projects, but can serve more than one developmental aim if planned accordingly. Other intervention areas, which address disaster mitigation include:

- Policy concerning land regulation, low income housing schemes, environmental regulations, national food/grain security policies, etc.
- Training involving policy makers, NGO staff, etc.
- Identification of vulnerable groups.
- Public awareness amongst community members, civic groups retailers, etc.
- Information systems for monitoring, documentation, dissemination *et al.*
- Education in disciplines in construction, architecture, urban planning, agriculture, etc.
- Integrate local disaster management plan with technical and planning principles.

Modifying or removing the causes of the threat or reducing the effects of the threat, should it occur, can achieve mitigation measures for disaster reduction. The most effective mitigation measures address not only the nature of hazards but also the vulnerabilities.

The options available for mitigation include, the type of hazard faced, the perception of the scale of the risk as well as other factors. However, because of the difficulties in reducing the actual hazard threat itself, most mitigation measures are aimed at reducing the vulnerability of communities to hazard. It is hard to stop a volcano but it is easier not to build a house at the foot of one!

Elements at risk in case of each natural hazard and requirements in mitigation with regard to each are represented below in a tabular form, as per Prof. Sharma (1998) in the *Training Workshop and Vulnerability Preparedness Management Development Programme*)

Table - 1

Natural Hazards	Elements at Risk	Mitigation Strategies
Flood and Water Hazards	Anything sited in flood plains, Earth Buildings or Masonry with water soluble Mortar. Buildings with shallow foundations or weak resistance to lateral loads or impact. Basements or underground buildings. Utilities: sewerage, power, water supply. Machinery and electronics including industry and communications equipment. Food stocks. Cultural artifacts. Confined/penned livestock and agriculture. Fishing boats and other maritime industries.	Main Mitigation Strategies would control and locations planning to flood plain being the site of vulnerable Engineering of structures in flood plain flood forces and design for elevated Seepage resistant infrastructure.
Earthquakes	Dense groups of weak buildings with high occupancy. Non-engineered buildings constructed by the householder: earth, rubble stone and reinforced masonry buildings with heavy roofs. Older structures with little lateral strength, poor quality buildings or buildings with construction defects. Tall buildings from distant earthquakes and buildings built on loose soils.	Engineering structures to withstand seismic building codes. Enforcement with building code requirements and of higher standards of construction of important undertakings to high standards design. Strengthening of important buildings known to be vulnerable planning to reduce urban densities in areas known to amplify ground motion. Insurance. Seismic zonation and regulations.

Volcanic Eruptions	Anything close to the volcano. Combustible roofs of buildings. Water supplies vulnerable to dust fall out. Weak buildings may collapse, under ash loads. Crops and livestock are at risk.	Location planning to avoid areas c slopes being used for impor Avoidance of likely lava- flow chan of fire resistant structures. Engineeri to withstand additional weight of ash
Land Instabilities	Settlements built on steep slopes and softer soils or along cliff tops. Settlements built at the base of steep slopes, on alluvial outwash fans or at the mouth of streams emerging from mountain valleys. Roads and other communication lines through mountain areas. Roads and other communication lines through mountain areas. Masonry buildings. Buildings with weak foundations. Large structures without monolithic foundations. Buried utilities, brittle pipes.	Location planning to avoid hazard used for settlements or as sites structures. Relocation may be cons hazards where possible. Engineering withstand or accommodate po movement. Pile foundations to liquefaction. Monolithic foundati differential settlements, Flexible Relocation of existing settlements (may be considered.
Strong Winds	Light- weight structures and timber housing sectors and shanty settlements. Roofs and cladding. Loose or poorly attached building elements, sheets and boards. Trees, fences, signs etc. Telegraph poles and high-level cables. Fishing boats or other maritime industries.	Engineering of structures to withsta Wind load requirements in buildir safety requirements for non- struc Good construction practices. Micro- of key facilities; for example, tow hills. Planting of windbreaks, plan areas upwind towns. Provision (buildings (for example. strong vil community shelter in vulnerable sett

Technological Hazards	<p>Industrial plant or vehicle and its employees or crew; passengers or residents of nearby settlements; adjacent buildings; livestock/crops in the vicinity of the plant) up-to hundreds of kilometers in the case of large-scale release of airborne pollutants and radioactive materials); regional water supply and hydrology; fauna and flora.</p>	<p>Use of fire resistant materials, building smoke extraction; improving detection systems; preparedness planning for fighting and pollution dispersal; emergency relief and evacuation plans; employees and nearby settlements; passengers in the case of vehicles) and off site safety plans and coordination with local fire department capabilities of civil defense authorities. Limit or reduce storage of dangerous or flammable chemicals.</p>
Drought and Desertification	<p>Crops and Forests; human and animal health, all economic activities dependent on continuous water supply; entire human settlements if drought is prolonged.</p>	<p>Water rationing; conserving or restoring water supply by watershed management; harvesting, construction of dams and aqueducts; conserving soil and water; erosion rates by check dams, leveling; management; reducing firewood consumption; improved fuel stoves, introduction of improved cropping patterns; population education and training programmes.</p>

8.4 PROBLEM AREAS IN MITIGATION

From a practical disaster management viewpoint, certain problem areas affect mitigation adversely:

- There may be long-standing acceptance of hazards by governments and communities, who may feel that traditional measures (taken over many years) are sufficient. Also, for instance, a nation may have lived for centuries with a recurring major flood problem.
- Some mitigation measures can be costly; for example, enforcement of building codes is likely to increase the cost of buildings. Building dams is costly and takes time.
- In addition, there are other national priorities, which are given more attention. Thus measures of disaster mitigation may not receive importance in national planning. Problems like political issues and no public opinion for taking preventive measures add to the lack of initiative at the national level. There could be less interest articulation in this regard resulting from low level of risk perception among common people, particularly social action groups and public policy makers.
- Lack of technical expertise for applying mitigation measures such as retrofitting may be lacking.
- Resources could be scarce, which would result in inadequate attention given to disaster mitigation concerns.
- International cooperation, especially among regional groups regarding common vulnerabilities to hazards is necessary. The same could be impeded due to political tensions between neighbouring countries.
- Fatalistic perception of disasters precludes consideration of mitigation issues in development planning. Unless it is believed that disasters could be tackled effectively through public policy, not much effort is likely in this regard on the part of governments and communities.
- There could be organisational hurdles like lack of R&D in mitigation activities, or lack of proper placing of specialists in organisational hierarchy.

In view of resource constraints, certain questions need to be answered in appraising disaster mitigation options. These questions, as per Coburn, Spence and Pomonis in DMTP 1994, are:

- What is the appropriate level of hazard for which disaster mitigation measures should be designed?
- Which facilities should be strengthened and to what level?
- Should certain type of building development be prohibited in certain areas?
- How much should be invested in disaster mitigation or emergency planning measures?

No decision process model can be applied with regard to choices between aforesaid concerns, though addressing the questions would serve to assess the choices available and help arrive at a choice. However, it is realised that in the overall, disaster mitigation is a cost effective alternative. For example, while making a cutting road, steeper angle would be the cheaper option, but the road will give way easily during heavy rainfall or strong ground tremor. Cost cutting at the construction stage would ultimately prove costly.

Limitations of Cost- Benefit Analysis (CBA)

Cost- benefit analysis (CBA) is the most widely used method in computing losses and

gains from a proposed project. The important factor in these calculations is that present losses are borne if future gains are proposed from mitigation measures. Therefore, in computation of gains and losses a *social discount rate* is introduced which gives the society's preference for present benefits over future benefits. It is a standard rate applied uniformly in all project assessments. The alternative which scores better with regard to trade-offs between costs and benefits is preferred over others. However, there are serious limitations to using CBA. *Firstly*, there are very large uncertainties about the probable levels of future losses; *Secondly*, gainers and losers from such decisions are often not the same people, hence levying just taxes to arrange for costs is difficult. Thirdly, intangible costs or benefits are not quantifiable. The very idea of costing saved/saving human lives may appear to be unacceptable (DMTP, 1994).

Alternate approach is 'Goal- oriented Risk Reduction.' As per the level of acceptable risk, explained in Section 6.6 of Unit 6, the society decides how much resources are to be spent on disaster mitigation in each particular case/activity. Seismic codes adopted in California, as per the level of acceptable risk state explicitly that buildings designed according to the codes should:

- Resist minor earthquakes without damage,
- Resist moderate earthquakes without significant structural damage, but with some non- structural damage, and
- Resist major or severe earthquakes without major failure of the structural framework of the building or its equipment, and maintain life safety.

The crucial factor is how to determine acceptable level of risk. In this context, the concept of 'balanced risk criterion' and 'cost-effectiveness criterion' are discussed. In the former, risks are equalized in different activities, that is, accepting some basic minimum level of risk in all activities pursued in society. Another approach is balancing trade-offs between dangers and benefits, such as fertile soil in flood prone and near volcanic zones, or capital costs and (versus) saved lives.

The cost- effectiveness criterion attempts to evaluate the unit cost of saved lives in different protection mechanisms available and then taking the decision. Other attributes are computing benefits of saved lives separately, in total financial costs and benefits. Different considerations are weighed separately to make proper choices.

8.5 GUIDING PRINCIPLES OF MITIGATION

The following principles are widely recognised as providing a valuable guide to Disaster Mitigation:

- **Initiation**

- 1) Disasters offer unique opportunities to introduce mitigation measures.
- 2) Mitigation can be introduced within the three diverse contexts of reconstruction, new investment and the existing environment. Each presents different opportunities to introduce safety measures.

- **Management**

- 3) Mitigation measures are complex and interdependent, and they involve widespread responsibility. Therefore, effective leadership and coordination are essential to provide a focal point.
- 4) Mitigation will be most effective if safety measures are spread through a wide diversity of integrated activities.

- 5) 'Active' mitigation measures that rely on incentives are more effective than 'Passive' measures based on restrictive laws and controls.
- 6) Mitigation must not be isolated from related elements of disaster planning such as preparedness, relief and reconstruction.
- **Prioritisation**
- 7) Where resources are limited, priority should be given to the protection of key special groups, critical services and vital economic structures.
- **Monitoring and Evaluation**
- 8) Mitigation measures need to be continuously monitored and evaluated so as to respond to changing patterns of hazards, vulnerability and resources
- **Institutionalisation**
- 9) Mitigation measures should be sustainable so as to resist public apathy during the long periods between major disasters.
- 10) Political commitment is vital to the initiation and maintenance of mitigation.

8.6 TOWARDS MITIGATION

Effective mitigation requires a participatory approach, which involves senior levels of government and private sector as well as at the local levels of government and community based organisations. Such an approach facilitates identification of needs, the establishment of practical solutions and a combined sense of responsibility in programme implementation. Local communities also play a significant role in effective disaster mitigation through meaningful participation in planning and execution of schemes for the purpose.

Some of the actions/steps desirable towards mitigation are:

- A clear and comprehensive National Disaster Management Policy that addresses all aspects of disaster management and ensures that mitigation is given proper consideration and priority.
- Adequate assessment and monitoring of disaster hazards and vulnerabilities, in order that the need for mitigation measures is accurately identified and defined. Indeed, effective vulnerability analysis is a primary requisite for mitigation programmes.
- Adequate and accurate analysis of all reasonable mitigation projects. In this regard, it is especially important to achieve sensible gain/loss comparisons; for instance, whether by instituting mitigation measures programs, the nation and community are going to gain more (bearing in mind the cost and restrictions involved), as against the losses which might arise if nothing is done.
- A permanent Disaster Management Centre or Agency should be created. The existence of such a centre is vital for coordination and collation of activities and information respectively in overall disaster management activities.
- Insistence by the disaster management centre or agency that a post-disaster review is undertaken after each major disaster event. The review must include advice to the government on whether, as a result of a particular disaster, mitigation measures are adequate or additional mitigation measures are needed.
- Recognition that mitigation measures can originate from all levels of government, not only from national level. Since the local levels would be the first responders to any disaster, therefore mitigation measures are essential and more obvious at this level.
- Specialist programmes may assist large-scale mitigation measures, for example,

agricultural programmes to assist farmers.

- Adequate public awareness and educational programmes, in order assist communities in playing their appropriate part in mitigation measures.
- Regular monitoring and evaluation: Levels of vulnerability to hazards are constantly changing, as are the resources available to meet the threats. In some cases, the probability of hazard occurrence also varies depending on changes in the environment they occur. To remain effective mitigation actions have to be monitored, evaluated and if necessary improved against these changes in the risk to populations and societies

8.7 RESOURCES RELEVANT TO MITIGATION

The main resources, which are most relevant to mitigation measures and programmes, are given below:

Activity	Resources
Identification and Analysis of Disaster Risk, Hazards, Vulnerabilities and similar Aspects	<ul style="list-style-type: none"> • Academic and Research Institutions • Technical Authorities • Departments and Agencies concerned with hazards (for example, meteorological, seismological, hydrological) • Government and private agencies having public responsibility (dealing with land, sea and transport systems) • Private sector authorities dealing with projects or production which may generate potential threat (chemical factories etc.) • International Agencies
Need and possibilities for implementation	<ul style="list-style-type: none"> • Government Organisations • National Planning Authorities • Disaster Management Authorities • Specialised Agencies
Implementation	<ul style="list-style-type: none"> • Government Organisations • Non Government Organisations • Military Forces • International Disaster Assisting Agencies • Disaster Management Authorities
Sustainability of the programme	<ul style="list-style-type: none"> • Non Government Organisations • General Public • Educational & Training Authorities • Media

Special Considerations

Above discussed steps, resources and circumstances for formulating and implementing mitigation programmes are likely to differ in various countries. Therefore, in addition to the above, the following considerations are likely to have some general application:

- If possible, a simple broad strategy should be devised to cover foreseeable mitigation requirements. This strategy should contain component programs, with desirable priorities.
- The strategy should be interlocked, as far as possible, with national development planning, environmental considerations and other disaster management activities.
- A system for monitoring and reviewing the strategy should be introduced and applied.
- Responsibilities for overseeing and coordinating the mitigation activities should be clearly defined.
- There should be a requirement of an annual progress report covering mitigation activities; this should normally be embodied in an annual disaster management report.
- Mitigation programmes should not be regarded as, or be allowed to become a separate activity. They should be a part of an integrated national programme.

Sustainability

Mitigation measures should be sustainable so as to resist apathy during the often-long periods between major disasters. To affect this there needs to be strong level of political commitment. Measures taken also have to be explained to the public and standards set for planning etc. need to reflect the reality of normal public behaviour, perception and prioritisation. Mitigation and its associated costs will only be supported and incurred if the purpose is understood and it is a reasonable response to the scale of the threat posed. Should a gap exist between the actual risk faced and a society's perception of it, awareness generation based on the reality of the situation will be required. Ways to maintain mitigation include:

- An active public awareness programme
- Well documented success stories of risks that were reduced in a past disaster
- Institutionalising mitigation into normal government practice
- Updating of risk assessment and cost benefit analysis
- Maintaining commitment

Sustained commitment on the part of governments would result in a new culture in disaster management standing firmly, in the words of Anil Sinha (2002) on the four pillars of:

- Culture of Preparedness
- Culture of Quick Response
- Culture of Strategic Thinking; and
- Culture of Prevention

8.8 CONTRIBUTION OF UNITED NATIONS AGENCIES IN DISASTER MITIGATION

The significance of international cooperation in disaster mitigation could not be understated. Disasters know no national boundaries and cannot be pre-warned on most occasions. Concerted efforts alone could save the devastation wrought by the fury of natural disasters. International cooperation is needed in technical dissemination regarding hazard control technology, sharing of warning information, common craft of strategies, telling what works and what doesn't, which helps other countries facing similar subsequent events. For example, flood preparedness in Bangladesh would benefit a far off land like Brazil, solely through information sharing. The United Nations coordinates efforts in this regard. It has organised United Nations Disaster Management Teams (UN-DMT), in each country to act as support systems to national governments during times of crises. UN assistance extends from post disaster rehabilitation and relief to disaster preparedness and mitigation planning that is, involving all activities in the Disaster Management Cycle. Nature of contribution is advising governments, mobilising technical and material resources as per mandate and cooperate with UN Resident Representative or any other coordination mechanism in place. The following UN agencies are involved in the following ways:

United Nations Disaster Relief Organisation (UNDRO) promotes study of Risks and their reduction as well as information dissemination to promote disaster management and planning. It is entitled to utilise up to 50,000 \$, following request of assistance from the government and approval of the same by the UNDRO coordinator.

United Nations Development Programme (UNDP) promotes incorporation of disaster mitigation in development planning and funds technical assistance for all aspects of development planning. \$50,000 per occurrence is sanctioned for immediate relief and up to \$1.1 million for long- term rehabilitation and reconstruction programmes.

FAO (Food and Agriculture Organisation) focuses on agriculture, livestock, fisheries, and local food production. It monitors availability and possible shortages in the future. It is authorised to utilise up to \$20,000 for a project.

World Food Programme (WFP) provides targeted food aid for humanitarian relief and supports rehabilitation, reconstruction, and risk reduction development programmes. Fund allocations are to the tune of \$45 million per annum and allocations are made from the International Emergency Food Reserve and WFP general resources.

World Health Organisation (WHO) provides assistance and advice in all aspects of preventive and curative health care including the preparedness of health services for rapid disaster response.

United Nations High Commissioner for Refugees (UNHCR) seeks durable solutions for problem of refugees and seeks to assist them in the country of asylum.

United Nations Educational, Scientific and Cultural Organisation (UNESCO) contribute to the duty of geological and hydro-meteorological agencies in particular besides assessing and mitigating risks from natural hazards in general.

United Nations Center for Human Habitation (UNHCS) promotes incorporation of natural disaster mitigation concepts in urban planning and management. It attempts to develop innovative methodologies for hazard and vulnerability analysis.

United Nations International Children's Emergency Fund (UNICEF) assists in child health and nutrition especially in disaster prone areas.

Other UN agencies, specifically engaged in /for South East Asia are:

The Asian Disaster Reduction Center (ADRC), established in Kobe, Japan, collates information regarding disasters from different countries within the region and carries out research and dissemination work.

Asian Disaster Preparedness Center (ADPC) in Bangkok is a focal point in Asia and Pacific for promoting disaster awareness and developing local capabilities. It is a regional resource center for promoting best practices in disaster management. It is the regional focal point for the United Nations International Decade for Natural Disaster Reduction (UN-IDNDR) UN-ISDR for Asia and the Pacific.

Asia-Pacific Disaster Management Center, Manila, Philippines is a non- governmental agency actively involved in disaster management plans in India.

8.9 CONCLUSION

A successful strategy for risk reduction will eventually incorporate mitigation into development planning and hence, everyday practice. This also happens in other walks of life, for example, the requirement of road testing of vehicles to stay on the road, or the adherence to building codes for safe building in new (formal) construction. A further example is the way with which preventative medicine has now been accepted as a normal process of public health care. Pre-requisites to enable this are:

- The commitment to mitigation of key actors including communities, government, its agencies and NGOs.
- The integration of mitigation to all stages of the disaster cycle, including in particular the stages of disaster, relief, rehabilitation.
- After risk assessment has taken place there is a need to prioritise mitigation actions towards protecting key elements within a society. Measures taken will be either structural or non structural in nature.
- Active mitigation measures which promote rather than enforce risk reduction are more successful - those at risk need therefore to understand why mitigation is necessary, a process which can be achieved in part through training.
- Mitigation planning needs regular review and evaluation to meet the threats posed by ever changing hazard characteristics and vulnerability.
- The normalisation of mitigation within a society is the hallmark of strides towards effective risk reduction.

8.10 KEY CONCEPTS

Assessment	: Assessments are relevant to both pre and post-disaster situations. Post-disaster, it involves estimation of direct and indirect losses, short-term and long-term and how they could be curbed in future events. In the pre-disaster phase, it involves vulnerability analysis to different hazards. It is an inter-disciplinary exercise requiring involvement of experts from various fields, both science and social sciences, collation of knowledge
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- under a single umbrella organisations (preferably) and its communication to relevant decision centers.
- Geographical Information System** : Analysis that combine relational databases with spatial interpretation and outputs often in form of maps. A more elaborate definition is that of computer programmes for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced. This definition is attributed to the Asian Disaster Reduction Center.
- Global Positioning System** : It is a worldwide radio navigation system that was developed by the U.S. Department of Defense. It uses satellite signals to track the location or position of vehicles or vessels on earth. In addition to military purposes it is widely used in marine, terrestrial navigation and location based services. India is using GPS extensively for surveying, precision agriculture and environment monitoring.
- Mitigation** : Mitigation is the aim of all disaster reduction efforts. It refers to long-term measures taken towards reducing the impact of inevitable disasters, considering the hazard proneness and frequency of past events. Examples of mitigation measures include, flood plain zoning to avoid habitation in hazard prone zones, building codes to ensure hazard resistant structures.
- Remote Sensing** : Remote sensing is the science of deriving information about the earth's land and water areas from images acquired at a distance. It usually relies upon measurement of electromagnetic energy reflected or emitted from the features of interest. This understanding is attributed to Campbell (1987).
- Retrofitting** : Retrofitting refers to engineering modifications to make existing structures disaster proof. Retrofitting techniques include flood proofing, elevation, construction of small levees, and other modifications made to an existing building or its yard to protect it from flood damage. Access more information on retrofitting at www.msdlouky.org/programs/crssite/fpglossary.html.

8.11 REFERENCES AND FURTHER READING

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8.12 ACTIVITIES

- 1) Study and organise a group discussion on the case study given below. Note down all the comments and suggestions that come from the participants. Finally compile the recommendations that from the view of the students could have helped to implement the program more effectively.

Case Study

The experience of Tarun Bharat Sangh (TBS) in the past twenty years in Alwar region has been that the solution to the severe water crisis is in mobilisation of rural communities to use their rich tradition of water conservation by constructing water-harvesting structures and managing their natural resources. This region was going through an ecological breakdown with depletion of resources, forest and wildlife. However, during the last 18 years, TBS has put in concerted and free spirited efforts in mobilising the people of the villages to be flag bearers of their surrounding environment. The traditional water structures are a prime example of the ingenuity of inexpensive simple traditional technology that is quite remarkable in terms of recharging ground water of the entire region; Tarun Bharat Sangh has successfully accomplished this in Alwar with mobilization of the villagers, regenerating 6500 sq. km of land.

Amongst the various issues, the one aspect of this region that has a bearing on everything else is the water resource or the lack thereof. Taking this as their driving force, TBS has been responsible for mobilizing villages of Alwar district to build 4,500 johads, anicuts, check dams or water harvesting structures to collect rainwater in 1050 villages regenerating 6500 sq. km of land. The environment, which was deteriorating due to intensive and improper use of resources and mining activity, was revived. As farming activity resumed in hundreds of drought prone villages and self disciplinary codes were set by the villagers with regards various aspects like cutting trees and poaching, the revival of the traditional water harvesting structures revived five rivers Ruparel, Aravari, Sarsa, Bhagani and Jhajwali flowing again after remaining dry for decades. Nembi and the Sariska region, which were declared “dark zones”, have been converted into “white zones” thus rejuvenating the environment of the entire region.

- 2) Considering the disaster, which your area/village is prone to, try and prepare a disaster mitigation strategy/plan considering the resources and restraints. Assign roles to members of the community. Also, include the traditional mitigation measures from the elderly people in the community.

UNIT 9 COMMUNITY BASED DISASTER MANAGEMENT

Structure

- 9.0 Learning Outcome
- 9.1 Introduction
- 9.2 Concept of Community Based Disaster Management (CBDM)
- 9.3 Principles, Strategies and Challenges
- 9.4 Requirements in CBDM
- 9.5 CBDM: Approach and Direction
- 9.6 Features of CBDM: Understanding Through Case Studies
- 9.7 Examples in Resilience
- 9.8 Conclusion
- 9.9 Key Concepts
- 9.10 References and Further Reading
- 9.11 Activities

9.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the significance of community participation in disaster management, especially disaster planning and disaster response; and
- Understand the modalities for arranging for CBDM.

9.1 INTRODUCTION

The *World Disasters Report (2004)* has 'Building Community Resilience' as its central theme. It has been realised in experiences with recent disasters that enabling communities to fight disasters is a much better policy choice than ad-hoc ameliorative schemes for tackling short-term vulnerabilities. As per the report, the experience with community based disaster preparedness has been extremely encouraging in the Philippines. Filipinos are prone to frequent typhoons, floods and droughts, which have impacted the livelihoods of small farmers and agricultural labourers and adversely affected the economy of the country. Typhoons bring high winds and heavy rainfall, which destroy crops, livestock and property, eroding soils and littering farmland with silt and stones.

The Red Cross encouraged community based disaster preparedness by encouraging people to prepare *local preparedness plans* and undertake mitigation measures like mangrove protection and tree planting, seawall and river dyke construction, clearing irrigation channels, sand-bagging sections of rivers, and building evacuation centres. Initiatives were planned with the participation of community members and local government

units (LGUs). LGUs help meet the costs or technical requirements. However, the shortcomings of the approach were soon evident. *It was realised that it is not sufficient to invest in preparedness.* It was realised that shift towards vulnerability reduction with stress on livelihoods is inevitable for lasting impact on peoples' lives. It was necessary to provide for sustainable livelihoods which donor agencies were unwilling to commit for. For example, the donor to a project in Benguet province in the Philippines prematurely cut back support, after concluding that the project's income generation elements were not sufficiently focused on disaster mitigation. However, local participants considered these initiatives valid because they addressed wider aspects of vulnerability.

Hence, quoting from the report, "the challenge for humanitarian organisations is to avoid imposing on communities a pre-conceived agenda of physical mitigation measures, to be completed within donor-driven timelines. Only a *careful analysis* of both the hazards and the social, political and economic *reasons underlying resilience and vulnerability* can provide the basis for framing the right interventions. Such an analysis will raise far more problems (and expectations) than any single organisation can solve. So, humanitarian organisations must cooperate with other agents, from local to international levels, with expertise in different sectors (IRCRC, 2004)."

Vulnerability and Capacity Analysis (VCA)

It has been realised through past experience that specialist vulnerability and risk assessments do not provide all the needed information. It is necessary to supplement expert analysis, usually undertaken by economists and scientists, by a vulnerability and capacity analysis (VCA) conducted at the community level, involving community members in analyses and articulation of their own problems. *Vulnerabilities*, that is, factors that create the proneness or predisposition or susceptibilities to risk in the community should be studied in relation (in opposition) to *Capacities* (resilience, strengths) to find clues to augment the capacities and offset the vulnerabilities of communities. Hence, "assessment has to be a participatory process undertaken in phases, and involving on- the- spot collection of data, interpreting and analysing the same for information from various sources. It involves analysis of both scientific and empirical data."

Cross- categorisation to identify vulnerable communities besides simple categorisation of 'at risk' communities on the basis of gender, age, ethnicity, religion or caste has to be attempted. For example, women and children are vulnerable groups, cutting across caste and class categories, in disaster situations. Hence, disaster policy has to be sensitive to such differentiations especially in the matter of involving people in disaster policy and implementation of the same.

Rationale of Synergy

The concept of good governance demands that government must not only be representative but also responsive in that people should have a substantive role to participate in decision-making and implementation. Cohen and Uphoff (1980) regarded participation as "generally devoting the involvement of a significant number of persons in situations or actions which enhance their well being". Paul (1987) defined participation as; "in the context of development, community participation refers to an active process whereby beneficiaries influence the direction and execution of development projects rather than merely receive a share of project benefits". Disaster risk reduction through participation addresses four important questions:

- 1) Who is participating?
- 2) How is participation assured?
- 3) At which stage is participation occurring? And
- 4) How is participation facilitated?

To grasp all dimensions of participation in sufficient measure, one has to understand the concept of community, wherefrom participation emerges.

Concept of Community

A natural event becomes a disaster when it causes loss of lives and / or property. Since disasters affect people as *individuals*, and community as a *collective*, both are important to reduce the impacts of disasters. Community based disaster management, by its very definition, involves communities in identifying, assessing and acting jointly to reduce disaster risks. The impact of disasters is increasing in magnitude much beyond the management capacity of governments and traditional emergency responders. The usefulness of CBDM approach helps in reducing disaster impacts and calls for its greater recognition and institutionalisation within the disaster management framework.

“Community is defined as a feeling that members have of *belonging*, a feeling that members matter to one another and to the group and a *shared* faith that members’ needs will be met through their commitment to be together” (McMillan and Chavis, 1986). Many people define community in different ways; however, the aforesaid definition is preferred because it is inclusive. Thus community includes not only the people who live in a certain location, but also includes the local government, local business sector, local academic bodies and the NGOs.

Concept of Participation

There is considerable ambiguity about peoples’ participation in governance. What does it mean? How it is to be secured; in what manner; in which areas? According to Hickey and Mohan (2003), participation should not be understood as *imminent*, that is one off/ ad-hoc participation in some programmes but conceptualised in broader terms as part of the wider concept of citizenship which looks at participation as an *immanent* socio-historical process which runs as an undercurrent to all social, political and sociological processes. This calls for a review of the concept of citizenship itself. There is increasing talk of the limits of state action for mutual benefit; hence the imminence of responsible citizenship, which implies increasing *involvement* of people in governance related issues as a matter of *right*. A balanced conception of rights and duties is desired on the part of each stakeholder, citizen or otherwise, as an imperative for good governance. Accordingly, “Citizenship can be defined as that set of practices, which define a member as a competent member of a society, and which as a consequence shapes the flow of resources to persons and social groups” (Roberts 1992).

Hence, there is need for radical system change as per the theoretical formulation, which is referred as “critical modernism” by Hickey and Mohan, where initiatives come more from citizens rather than as one-way traffic from official institutions. To that end, government has to work proactively to promote such institutional mechanisms that make real such possibilities. People’ participation has to move a level up from *project* level to *policy* level which can lead to political empowerment of people, rather than adhoc involvement in some technical studies. Example can be given of *participatory rural*

appraisals (PRAs) being used currently in disaster mitigation and vulnerability studies, and *participatory poverty assessments*, and *social analysis* which inform policy for poverty reduction, initiated and promoted by the World Bank, following criticism of aid linked to conditionalities and being unrelated to actual needs (Blackburn and Holland, 1998). Hence, participation is not an ancillary but an essential/central concern in good/democratic governance. Civil society needs institutionalisation. Towards the same, catalytic intervention on the part of the government to institutionalise social capital in the form of neighbourhood and resident welfare associations would be necessary for consistent and relevant input for public policy.

As rightly articulated in the World Disasters Report, 2004, sometimes, outside intervention helps alleviate social tensions, since it acts as a catalyst in counter-effecting traditional/inherent negative social capital and promoting positive social capital as organising group meetings, catalysing interface between members of different communities, especially those with differences.

9.2 CONCEPT OF COMMUNITY BASED DISASTER MANAGEMENT (CBDM)

The term “Community-Based Disaster Management” received attention in the development field in the 1980’s, although community based disaster initiatives were already ongoing in different parts of the world in formal or informal ways.

Though CBDM has been a popular term in the last several years, in very few cases it has actually been incorporated into government policy. It has been a common notion that CBDM is the responsibility of grass root organisations and/or NGOs. There are two major aspects in this regard: *first*, the best practices of CBDM initiatives remain local initiatives and are not properly disseminated. It was observed that even though there have been good examples of CBDM in specific locations within a society, those lessons are not transferred to other parts of the country, neither do they reach the adjacent countries of the region. *Second*, due to lack of recognition of CBDM initiatives at the national level, there are often limited resources devoted to these activities. Thus, in most areas, CBDM is considered in isolation from national disaster management activities. It is also not included in the national development policies. Therefore, there is an increasing need to understand the basis of CBDM, and try to formulate a framework for incorporating CBDM into national policy issues with special focus on sustainability.

The Great Hanshin Awaji Earthquake of 1995 hit the city of Kobe and other parts of Hyogo prefecture in Japan causing serious loss of life and property. Immediately after the earthquake, the neighbours and relatives rescued many people from the debris. Statistics show that 85 per cent of the people were either self-evacuated or were rescued by neighbours. This indicates the importance of community and neighbourhood immediately after such an event.

The above case study from Japan indicates the importance of social capital inputs in communities and neighbourhoods during a disaster. It starts immediately after the disaster strikes, since the relief and rehabilitation programme incorporates both physical and social issues. *Hence, involvement of people in recovery process is the key to success.*

9.3 PRINCIPLES, STRATEGIES AND CHALLENGES

The above discussed cases, and many more from the region, point towards certain key concepts and lessons, which can be used to derive some basic principles of community, based disaster management. The basic principles on which CBDM stands are:

- Planning, implementation and management owned by community, led by local champions.
- Interventions start from locally available resources, capacities and partnerships.
- Community considers choices and takes decisions.
- Programmes focus on developing local coping capacities.
- Disaster preparedness approached from a development perspective.
- Sustainability considered as an underlying factor.
- Attention to special vulnerable groups.

These principles are translated into implementation strategies for creating the desired impact on the ground. Each situation merits a unique solution with a combination of inputs. However, the principles and the process structure remain universally applicable to all situations. Most commonly used strategies and actions are described below:

- *Public Awareness*

Public awareness is the first step towards marketing the concept of CBDM and creating a demand, locally, for disaster reduction efforts. Once the demand has been established, programme interventions create enabling environments and linkages with resources for fulfilling this demand. This could be understood as interest articulation and empowering the communities to voice their concerns for the same. Public awareness is carried out through community meetings, events, mass communication programmes organised by non-government organisations, and activity based awareness interventions on the part of the government. Almond and Verba (1963) has ascribed the task of political communication to the political elite. It implies informing the people about government policies and programmes being pursued/introduced by the government for their benefit and enabling/aiding them access the same since many programmes have been known to fail due to lack of awareness on the part of people and inability to access the right sources/power centers. Right to information is another significant facet of public awareness. Though the bill has been enacted and Information Commissions established at the Centre and in the States, its successful implementation would depend on activism on the part of civil society in this regard and the vigil exercised by the media.

There are standard restrictions on information relating to security, foreign policy, defence, law enforcement and public safety. But the Freedom of Information Bill also excludes Cabinet papers, including records of the council of ministers, secretaries and other officials, which effectively shields the whole process of decision-making from mandatory disclosure.

- *Research and Documentation*

Learning processes are critical to the *adaptive nature* of CBDM. Every situation demands specific intervention as per sensitivities which need to be periodically studied/monitored; hence, it is important to constantly document and reflect upon social processes

such as group cohesion based on caste, and other forms of ethnic identifications, and to draw suitable strategy for intervention for desired social chemistry based on lessons from past experiences in disaster response. For example, it was experienced in the recent tsunami, that aid did not reach the backward segments since group cohesion exhibited negative social capital based on caste considerations. Women and children are also generally known to lose out because of social biases. Understanding of social dynamics is crucial to understanding threat in each case. For example, in societies where elders are left alone, people are more at risk from heat waves, which is what happened in Europe in the summer of 2006. Hence, studies are needed to gain insights regarding these issues in case of each particular society.

Physical vulnerability of existing infrastructure needs to be periodically improved and mapped, which requires constant updating. Baseline surveys, community based monitoring and evaluation processes, and mapping studies have to go on in tandem. Participatory appraisals are most useful and also imperative/indispensable for the purpose. Such studies could give 'biased' results if carried out unilaterally by a central authority or an international organisation. It has to be a participatory exercise where vulnerable communities articulate their own concerns and also suggest measures, which need to be taken to improve their resilience/coping capacity. A key concern would be acceptance of any new measure(s) by the local community. A pilot study of any proposed new project would be the desired suggestion in this regard (Todd and Palakudiyil, 2004-05).

● *Capacity Building*

Capacity building implies upgrading the *reserve capacity* of the communities, which gives them more *staying power* during disasters. Local capacity building is a means of ensuring that reliance on external assistance will not perpetuate, and that communities will increasingly be able to take care of their recurrent needs. Capacity building is not only for better emergency response, but also for taking developmental actions that reduce the impact of future disasters. The World Disasters Report, 2004, rightly points out that "there is little analysis of how people survive disasters, and even less programming that builds on their coping strategies... in the field of disasters, most emphasis has remained on assessing needs, hazards and vulnerabilities at the expense of analysing the strengths, skills and resources available within communities."

The report recommends a paradigm shift from the traditional risk reduction approach, which starts with hazards and risks, then looks for linkages with development to the sustainable livelihoods approach, where disasters, including the capacity to resist their impact and bounce back, are part of a wider development framework. For example, small scale measures like social forestry, fish-farming, drought-resistant crops and rainwater harvesting can reduce the risk of environmental degradation and hence the threat from natural disasters like wildfires, droughts and floods

Micro-finance, cash aid and income generation projects are being explored as alternate strategy in post disaster relief, instead of simply distributing relief items. Rather than funding and implementing recovery projects themselves, many aid organisations now ensure affected villagers *access government compensation or soft loans* to help them rebuild their homes and lives after disaster. To endorse the argument, in India, local knowledge of indigenous, hardy seeds has helped farmers recover from the loss of cash crops devastated by drought and pests.

Capacity building is carried out primarily through skill upgrading exercises, both technical and management skill sets. Local warehousing for stockpiling supplies, generating alternate livelihood options for 'at risk' communities, would be other essential resilience measures. Means of sustainability that have been tested and found promising include formation of *local task forces*, adoption of an *entrepreneurial model* for operating community programmes, linking disaster reduction programmes with *livelihoods*, and establishment of *local contingency funds*.

Six conclusions, which could be treated/understood as policy prescriptions have been drawn in this regard in the World Disasters Report of 2004:

- Systematic assessment of what enables people to cope with, recover from and adapt to risks and adversities, at household and community level, is badly needed.
- Strengthening social capital should be the key objective of disaster interventions, whether in relief, recovery or risk reduction; rather than a by-product.
- People-centred approaches to development provide models that can improve humanitarian aid and disaster risk management.
- New institutional strategies and cross-sectoral coalitions are required to boost the resilience of local livelihoods in the face of multi-dimensional risks.
- Good governance is essential to create the environment, in which the more resilient communities can thrive.
- Scaling up strategies based on the aspirations and capacities of people 'at- risk' remains the greatest challenge.
- *Networking*

The central premise of social capital is that *social networks have tangible value*, which cannot be discounted in cost-benefit analyses or policy implementation and evaluation. Networking is the first step towards establishing partnerships. Partnerships enable communities to capitalise on directly and indirectly available resources. Partnerships open new avenues, reduce costs and increase benefits. Partnerships operate at various levels and with different kinds of stakeholders. Partnerships can be with other communities, local governments, higher governments, NGOs, academia, corporate entities and technical or resource groups. Social capital involves in all social ties; modalities are different, as, between people, between institutions, government and civil society, between region and countries and so on. The level used to analyse social capital differs widely in the studies selected. Some studies focus on the social capital of a small community (Kreuter, *et al.*, 1998), others compare a country's provinces or regions (Putnam, 2000), while others use countries as a unit of comparative analysis (Knack and Keefer, 1997). In Canada, Buckland and Rahman (1999) compared the reaction of three communities that experienced the Red River flooding in Manitoba in 1997. The research revealed that the two communities with a higher stock of social capital succeeded in organising themselves more rapidly and efficiently than the third, which had a lower stock of social capital. Studies conducted under the aegis of the World Bank indicate the following three indicators of social capital:

Trust: Two elements of this indicator are trust in *others* and trust in *institutions* (government, police, politicians, journalists, etc.). This is the *defining element* of social

capital.

Civic Engagement: Civic engagement is a measure of involvement of people in social and political matters. It implies *volunteerism* on the part of people and modalities (provisions) for the same in social and political matters.

Social Networks: Social networks are the third indicator that is frequently found in the research. They are formed by the person's immediate environment and by secondary networks. Networks centred on the individuals include immediate networks (i.e. the close family, friends and neighbours with whom the person has frequent contact and who provide support). The secondary networks include those formed through relationships that individuals establish, especially in the workplace and recreational environments, during community or religious activities.

- *Sustainability*

The final determinant of success in a programme is its sustainability *beyond the period of investment and aid*. Sustainability is viewed in terms of mainstreaming risk reduction, and developing a culture of prevention through public policy. A study indicates how, following the devastating Gujarat earthquake of 2001, villagers from Patanka in Gujarat state rebuilt their homes stronger than before, with the help of a partnership of local and international aid organisations. Farmers, left unemployed by three years of intense drought, were retrained as masons and helped build earthquake-resistant houses for every family in the village. Building on the success of this initiative, villagers were able to access government funds to create a new rainwater-harvesting system to improve both their health and crop yields. Another study conducted in the Samiapalli village in the disaster-prone state of Orissa, reveals how prioritising risk reduction before disaster strikes mitigates its impact considerably. During the 1990s, with the help of a local NGO, villagers embarked on a long process of development, one element of which was to construct disaster-proof homes. When the super cyclone of October 1999 struck the village, these houses saved both lives and livelihoods, while tens of thousands of people in weaker homes perished.

9.4 REQUIREMENTS IN CBDM

The World Health Organisation (WHO) in collaboration with the International Federation of Red Cross and Red Crescent Societies recommends the following activities for disaster preparedness of communities:

- Exercises in first aid: how to extricate, give first aid to, and transport injured persons, etc.
- Exercises in providing temporary shelter: organisation of camps for temporary shelter in event of a disaster.
- Sanitation exercises: Installation and management of water supply points and latrines, controlled refuse disposal etc.
- Guided visits to volcanoes, seismological observatories, dykes, civil protection centers (fire stations, forest warden posts etc.) factories, stores of dangerous materials, sites exposed to risks.
- Mock drills and practice alerts organised by the local authority.

- Strengthening of weak structures in accordance with the programmes of the local administration, groups of dwellings can be strengthened with the help of voluntary workers.
- Flood protection (various means of ensuring that a watercourse does not overflow its banks.
- Information (exhibitions of drawings, lectures, photographs, films on disaster preparedness).
- Training of groups of volunteers available to help the community emergency community in activities when a disaster strikes and afterwards.

Besides, show of camaraderie by means of persistent efforts towards community preparedness based on:

- Meetings, exchanges, the expression of needs, information and communication,
- Community discussion and action to gain an understanding of the causes of disasters and associated problems plan the most appropriate measures and put them jointly into effect,
- A feeling of belonging to the community by making proper use of local cultural values, forms of social life, resources and products,
- Combating the rejection or exclusion of the disabled, mentally ill, the handicapped and other persons in difficulty,
- The development of assistance and mutual aid, and
- Meetings with local authorities and collective discussions to resolve community problems.

Dissemination of warning regarding an impending disaster is vital. The issue in this regard is proper communication of warnings, avoiding technical jargon, which makes it unintelligible for the ordinary masses and the wherewithal of dissemination of such warning. An information management checklist has been provided in the Source Book on Disaster Management, Ministry of Agriculture, Government of India, and the Lal Bahadur Shastri National Academy of Administration, Mussoorie, as follows:

- Are maps prepared and available to the community (topographic, demographic, hazard and vulnerability)?
- Is a public information centre/control room designated as the official point of contact for the public and the media during an emergency?
- Are there provisions for releasing information to the public including appropriate protective actions and devised responses?
- Have agreements been reached with the media for disseminating public information and emergency warnings?
- Are contact details for all media outlets (radio, television, and newspapers) available?
- Who is responsible for providing information to the media?

- Who is responsible for authorising information there?
- Who is responsible for emergency assessment and to whom do they report? How is the information recorded and who relays the information to those concerned?
- Who is responsible for issuing public statements about emergencies?
- Do they have public credibility and adequate liaison with other organisations that may also issue warnings?
- Who is responsible for providing warnings for each likely type of emergency?
- To whom is the warning supplied?
- At which warning level is action initiated?
- What is the purpose of the warnings and what action is required of the public?
- Who will inform the public when the danger has passed?
- Is there a point of contact for members of the public wanting specific information, and is this point of contact publicly known? (Control room).
- Is there a referral service for directing people to the appropriate sources of information?
- Is there a registration and enquiry system for recording the whereabouts of displaced, injured, or dead persons?
- Is there a system for providing this information to bonafide inquiries?
- Does the community know how to contact the registration and inquiry system?
- Are there plans for establishing public information centers?
- Is the community aware of the existence of these centers?

Preparation of Local Health Personnel

Disease outbreak is a major problem in the immediate aftermath of disasters, as was seen during the 2005 Mumbai floods. Therefore, the role of local health personnel is crucial in both mitigation and preparedness as in prevention during normal times. Primary Health Care Centers (PHCs) are inadequately equipped and are also too few and far between to handle emergencies adequately. There is also lack of trained manpower. This is a policy issue, which requires concrete measures on the part of the government. Cooperation of non-government organisations could be elicited in this specific aspect of disaster preparedness at the local level (WHO, 1989) in that trained volunteers could be engaged in this task and specialist competence could be provided by non-government organisations. Over the long term however, the network of PHCs would have to be improved for capacity building to tackle disaster vulnerability. As per Alpana Sagar in the *Alternate Economic Survey, 2004-05*, Indian data reveal that there is shortfall of infrastructure and personnel in the rural areas. While the shortfall for primary health centers and sub-centres is about 7-8 percent; that for community health centers is about 40 per cent. The shortfall for specialists at the community health centers is anywhere between 90-95 per cent while there is rarely more than one doctor at the primary health centre though the ideal number is two. There is acute shortage of grassroots workers, from 20 per cent of female

workers to 50 per cent shortage of male workers. There is also a shortage of more than 50 per cent lab technicians. Subsequent to the eight five-year plan, there has been only marginal improvement in manpower and infrastructure for health.

As read in the *Economic Survey 2004-05*, keeping the requirements and the objectives of the National Health Policy, 2002 in view, allocations for AIDS control programme and schemes for control of communicable diseases have been raised during the year by about Rs. 280 crore. State Health System Development Projects are under implementation in the States of Karnataka, West Bengal, Punjab, Orissa, Maharashtra, Uttar Pradesh, and Uttaranchal with World Bank assistance. Up till now, health care administration has suffered for lack of inter- sector integration at the field level. Hence, there is an attempt now at convergence of schemes, which had operated hitherto, in isolation. A National Vector borne disease control programme has been started from 2003-04, through convergence of three ongoing programmes (Malaria, Kala-azar and Filariasis) and inclusion of Japanese encephalitis and dengue. The main objective of the programme is prevention and efficient control of vector borne diseases in pursuance of the goals laid out in the National Health Policy, 2002.

Empowerment of local institutions of self- government is also expected to go a long way in strengthening health service delivery, in the sense of bringing them under one umbrella, especially in rural areas, though there is a long way to go since many institutional adaptations would be required, which would depend on the political will and feasibility in different states.

Provision for Food Security and Nutrition

Despite the Green Revolution, deaths due to malnutrition are reported from different parts of India. Problems lie, chiefly, in the distribution mechanisms. The public distribution system (PDS) was set up to make food grains and other essential items available at affordable prices to the poor. However, its functioning has been plagued by corruption. There have been reported malpractices like buying kerosene at subsidised rates from the PDS and selling them at high prices in the open market, etc. Hence, the current challenges outlined in the tenth plan are:

- Continue to improve food grain production to meet the needs of the growing population;
- Increase production of coarse grains to meet the energy requirements of BPL families at a lower cost;
- Increase production of pulses and make them affordable to increase consumption; and
- Improve the availability of vegetables at an affordable cost throughout the year in urban and rural areas.

Hence, the Tenth Plan (2002-07) announces a paradigm shift from:

- Self-sufficiency in food grains to meet energy needs to *provide food items* needed for meeting *all the nutrition needs*.
- From production alone to *reduction in post harvest losses* and value addition through *appropriate processing*.
- From food security at the state level to nutrition security at the individual level.

9.5 CBDM: APPROACH AND DIRECTION

In order to make CBDM an accepted and recognised process for disaster management, intervention is needed in three broad areas:

1) Cooperation and Capacity Building

Experience shows that disaster management, being multi-disciplinary in nature, requires wide-ranging inputs from government, non-government, international agencies, universities and other specialised agencies. Recent examples of effective cooperation between India and elsewhere in Asia have led to remarkable results. Cooperation has not given just better results for the community but has also enabled institutions to build up their capacity based on the expertise and experience of the organisations they have partnered with. Cooperation and capacity building among various stakeholders working at the grass roots would provide the most effective mechanism for any policy that is formulated in this regard.

2) Sustainability and Up-scaling

There have now been many good practices that have taken place in the disaster vulnerable regions of the world. However, most of these good practices have remained confined to their local communities. Their potential in influencing attempts to reduce vulnerability in other parts of the world is enormous, especially since regions that face similar disasters have similar vulnerabilities and capacities. Lately, various documentation attempts by various international agencies including United Nations International Strategy for Disaster Reduction (UN-ISDR) have brought them on to the global centre stage. However, this is not enough. In order to replicate good practices widely, identifying factors that can make such practices sustainable and scalable are necessary. A discussion on sustainability and up scaling of good practices from various communities of Asia and other parts of the world is the core of the policy framework.

3) Integration of Policy Issues

In large countries such as India, recent disasters have strengthened the need to define a national policy on management of disasters in the country. Existing developmental policies are also being examined to incorporate disaster prevention and preparedness. However, there has been limited debate on the content and thrust of these policy initiatives. Incorporating grassroots experiences within the possible constraints would provide real substance to the national policy.

9.6 FEATURES OF CBDM: UNDERSTANDING THROUGH CASE STUDIES

A review of recent CBDM experiences in Asia reveals that central to each experience has been a well-understood and coordinated partnership aimed at common interests and goals. Stakeholders in these partnerships have included, local governments, civil society, corporate sector, universities and communities themselves.

In spite of the successes, possibilities of further enhancing the benefits of such partnerships have rarely been seriously considered. The trade-offs are also seldom deliberated upon. Partners ought to know each other's strengths and weaknesses. The whole intervention

should be arranged so that all partners get the most out of the cooperation by filling in each other's voids, and take constructive advantage of the accumulated force that emerges from a good partnership.

The CBDM approach attempts to address certain key questions on disaster management:

- How can communities live with disasters, rather than fighting them?
- What local measures can be taken to effectively mitigate the impact of disasters?
- How can preparedness initiatives be sustained over long time periods?

Well documented case studies help considerably in understanding these important aspects of CBDM. Hence, case studies should be encouraged and shared among the stakeholders not only in the same country but among neighbouring countries as well.

9.7 EXAMPLES IN RESILIENCE

The following sections discuss how community based disaster management can be:

- Self-driven,
- Led by local champions, and
- Based on partnerships.

Besides these three characteristics, there are many that can be discussed if one gets into greater details. These could include, among others, the attributes of being low-tech and easy to understand, affordable, easily replicable and up scalable, developmental and, most importantly, empowering.

I) Self-driven

CBDM has in a way existed from times immemorial. Communities have depended on their coping capacities, have developed these capacities over time, and have survived based on these. The basis of these capacities is that people have observed their environments, and the changes and reactions taking place therein, and from these they have learnt to adapt and change their actions so as to live better with nature. The following case is one such case from modern times where a community has learnt and acted to protect its environment for reducing disasters.

Chipko: from tree hugging to satellite images

The Uttarakhand region is constituted of Himalayan districts in North India. During the late sixties, a massive program to develop roads was undertaken in the region, which was part of Uttar Pradesh then. This brought employment opportunities for the local population. More importantly, it opened up gateways between the area and the outside world. Possibilities of flow of technology and materials from outside became real, as did the means for cashing their own asset, viz., timber. Tracts of forestland were given out on contracts for tree felling. Contractors employed local people for these operations. The stretches of the slopes above the road altitude were wiped clean of the trees. The economy looked up for the time being. Nobody, not even the locals, bothered that the unscientific clearing of the innumerable trees in a small region was heavily bruising the crust of the forest land and the ramming of rain water mixed with stones and pebbles was getting increased to a tremendous extent.

One monsoon night in 1970, the valley of the Alaknanda, a river traversing the state was the scene of an unprecedented flood. The entire village of Belakuchi was washed away by the swirling torrent of the Alaknanda, along with several bus loads of tourists. The flood affected an area spread over a length of 400 kilometres and washed away five major bridges, hundreds of heads of cattle and several million rupees worth of property. Those who saw the scene, cannot forget the night when the 'river was on fire'. The banging of huge boulders carried by the strong current created deafening thunderous sounds and huge sparks flew from the river.

Even those in the plains were not spared. The flash flood first washed away what came in its path, and then left the area heavily silted and boulder strewn. Major canal networks were clogged. Subsequent desilting operations took so much time that the farm output of the regions downstream nose-dived that year due to lack of water for irrigation.

It was evident to any local resident that once the forest cover disappeared, the economic hardships and the terror of man-eating tigers would be replaced by an even more awesome terror of floods, landslides, and drying up of previously perennial streams.

The Alaknanda tragedy left a deep impression on the hill folk and soon followed an appreciation of the role that forests play in their lives. They had also watched the slow replacement of broad-leafed forests by economically important species like the pine and had slowly felt the deleterious effects of this shift on their cultivation and water supply.

The reaction was spontaneous and simple. *Chipko* – hug the trees! This was the way chosen by the local community to save their trees from the saws of timber contractors. A major break-through for the movement came on March 26, 1974, when 27 women of Reni village in Chamoli district, under the leadership of Gaura Devi, an illiterate lady of 50, resorted to Chipko to save 2,451 trees of Reni forests. The women folk of village Reni got involved in a dramatic way. One day, when their men folk were away, and the Chipko workers and the students were detained at faraway Gopeshwar town to meet officials of the forest department, the contractor taking this as an opportune moment reached the village with his men to begin the felling. However, undaunted by the number of men, the women of Reni, led by Gaura Devi, barred the way to the forest and resorted to Chipko, singing "this forest is our mother's home, we will protect it with all our might." They did not allow a single tree to be felled.

The movement has come a long way since then. It gained much acclaim for being a totally community led initiative, without any involvement of outside agencies, not even NGOs. Tree felling has since been totally controlled, and afforestation drives have yielded some positive results in terms of regeneration of forests on the denuded slopes. However, more important than the achievements of the programme; are its *means*. *There are two highlighting features of this aspect:*

Van Panchayats (forest governing councils) are an innovative institutional instrument that has been very successful in its purpose. Van Panchayats are constituted on the pattern of the Panchayats or the rural local governments. The elected Van Panchayat is responsible for the maintenance of the village forestland. It monitors and controls all activities in the forest, including woodcutting and even grazing of cattle. An interesting fact is that over the years, the Van Panchayats have come to be totally dominated by women. This, they feel is very logical since the hardships of environmental degradation affect women the most since it is they who are responsible for getting firewood for cooking, fetching drinking water from faraway sources, and grazing the animals.

The Dasholi Gram Swarajya Mandal (DGSM) is a community based organisation that came up as a strong local institution after the Chipko movement, and has since been instrumental not only in promoting forest regeneration activities, but also in encouraging local resource based entrepreneurial development. It is interesting to note that the DGSM, comprising totally of local villagers, has been monitoring the success of its afforestation program through satellite imagery based remote sensing carried out by the Indian Space Research Organisation. DGSM propagates disaster prevention through safe development, and organises local campaigns on the theme. It is also the first responder in local disasters such as landslides, earthquakes and forest fires.

II) Led by Local Champions

CBDM cannot be put into effect through a government order, nor can it be implemented as a project by an NGO. It has to rise from the ground up; it has to have the communities in the driver seat; it has to enshrine processes that will make it locally owned and sustainable. The most appropriate catalysts for this are local champions, who arise from within the communities, motivate the masses, and lead them through the process of change from a state based to a community based development and disaster management approach. The following case is from a sustainable community initiative in the state of Gujarat, India, illustrating the role of local champions (GSDMA, 2005).

Examples from Gujarat, India

With a population of almost 50 million in Gujarat State in western India, a substantial proportion of which is at risk to one disaster or the other, it is huge task to reach out to each and every individual. How then can we create a scenario where the community as a whole can become resilient to disasters? How does one reach out to every individual? A viable strategy is to develop appropriate mechanisms for targeting communities through champions.

The GSDMA (Gujarat State Disaster Management Authority) supported project on Sustainable Community Initiative for Disaster Recovery and Preparedness in Ranavav Taluka, District Porbandar, made an attempt on this. The challenge of the project was to reach out to every village in the Taluka within a limited budget and time frame. The project implementation agency was SEEDS (Sustainable Environment and Ecological Development Society) in partnership with UNCRD (United Nations Centre for Regional Development) and NGOs, Kobe. It adopted an approach that would focus on building the capacity of local champions: *champion-individuals* and *champion-communities*. These individuals/communities were expected to sustain efforts initiated during the project for a longer period beyond the duration of the project. These individuals and groups championed various sectoral causes as described below.

Champions of Safe Construction

The 2001 earthquake had a partial impact on Porbandar, the western district of Gujarat where the project was piloted. Obviously, while wide consciousness prevailed, there was very little that the community knew about specific actions to be taken for reducing the risk from future earthquakes. As part of the strategy to push for safer construction practices, it was decided to build the capacity of existing masons in the region. Enter, Ramesh and Maganbhai Thakore, skilled masons from an earthquake affected area who, having experienced the earthquake and picking valuable skills during rehabilitation, knew exactly what they need to share with their counterparts in Porbandar!

An intensive process of identification, one-on-one meetings, and encouragement of prospects ensued. It generated enthusiasm among a small group of masons from Porbandar, who willingly agreed to enhance their skills. During the process of training, the main purpose was to build skills in disaster resistant technologies and quality construction practices. The training involved a combination of theoretical sessions, group interactions, exercises and demonstrations. The training also was to be a starting platform for a long-term pool of masons who, with help from SEEDS INDIA and the Government of Gujarat, would regularly interact through newsletters and meetings. Recently, these masons have registered themselves as a Mason Association for getting necessary certification for their skills under a Government of Gujarat programme.

● *Water Farmers*

Porbandar, like other parts of Saurashtra, has suffered repeated droughts in the recent past, seriously limiting the scope of the farmers to sustain themselves. With the ingress of salinity from the Arabian Sea further threatening their livelihoods, the need for increasing rainwater retention in their fields was felt very strongly.

During the first meeting with the farmers, the SEEDS team offered their ideas on various water harvesting options. The villagers were expected to partially contribute to the scheme. On-site training and awareness programmes were organised, clearly explaining the process of implementation. A reduced scale model of the village was developed and the water conservation as well as augmentation technique was visually demonstrated. After initial reluctance, a small group of farmers decided to take up the experiment. The catalyst to this process was Govindbhai, Headman of Valotra village. A farmer by profession, he is an excellent leader who takes interest in village development, and his Panchayat (village council) has won two awards.

Within a short span of time, this small group of farmers has become an active advocate of the well recharge system, taking out time to travel to nearby villages to convince fellow farmers about the benefits of the scheme. Govindbhai has been instrumental in the success of the water conservation movement. He now offers to carry out awareness programmes in his village and neighbouring areas for safe construction practices and also for water conservation. A champion in this group, he keeps regular touch with the SEEDS project team that in turn develops and adapts knowledge resources that can help the farmers by bringing in new technologies.

● *Cultural Ambassadors*

Performing arts and theatre have tremendous influence on local citizens. Tired after a hard day's work, the people settle down for cultural activities as a means to unwind and interact. Common cultural activities promote greater understanding and forge unity in the community. When these cultural activities carry with them important social messages, the impact is strong and direct.

Devraj Gadhavi, a folk singer, is the cultural champion of Porbandar. Known for his Dayro styoe of folk music not just in Upleta, the village he hails from, but the entire region, he is a fail-proof crowd puller. When he performs, he often has an important message to convey. When the project team met him and shared its ideas on promoting disaster mitigation, he readily agreed to get involved. During Community Fairs held in the area since then, he performs to a huge crowd and within his performance he urged people to volunteer for the sake of others. He said, "True happiness lies in serving

others". A few words of wisdom, when spoken by a person loved and revered, make a lasting impact on the lives of the people.

- *School Teachers: Agents of Change*

Mr. Joshi, the principal of Swaminarayan School, is a well-known teacher with many state and national awards to his credit. He is also the head of the Scouts and Guides Wing at Porbandar. He has been instrumental in arranging demonstrations and workshops in schools. The team led by Mr. Joshi includes his colleague Mr. Waghela, the scouts and guides, and the members of Junior Red Cross Society.

Mr. Joshi is now ready to share his learning with others. Today, as schools in the region are conducting rescue drills, children now understand what happens in an earthquake, cyclone or drought. They know their village environment and what they need to do to counter disasters.

- *Champion Communities*

Champions are not limited to individuals alone, communities too become champions. There are many such champion communities across the regions that have served as models for others. One such community is the village of Thoyana, where people come together to promote mitigation not just in their own village, but also with others through well thought out yet simple disaster resistant activities. These have included water harvesting, school safety programmes, mason trainings and women's group activities. For the project team, the meetings at Thoyana have always been good. Led by their village headman Vejabhai Odedara, and the teacher Pravinbhai Kasundara, the community at large is most cooperative and proactive. The women in the village have been active too. In Community Fairs, the villagers of Thoyana now participate most actively, making a positive impact on other communities in the vicinity. All sections of the community such as the village women, the masons, the leaders and the businessmen, have together become a model community for the region.

These are the local champions, prime movers of the community. They are the key to building long-term resilience at the community level. Gujarat needs many more such champions. All vulnerable regions of the country and the world need such champions. With the government and NGOs acting as facilitators, there is an opportunity for a lasting change. A change where people, motivated by their own champions, take wise decisions to bring about development that is sustainable and safe from disasters.

III) Based on Partnerships

The key to the success of community initiatives lies in partnerships. Partnerships between individuals, families, local groups, and communities make things happen and sustain them on the ground. Partnerships of communities with NGOs, corporate entities and governments create engines for development. They also create safety nets that make communities disaster resilient. The following case from Vietnam illustrates the strengths of such multi-sector partnerships (UNDP Vietnam, 2005).

Natural Disaster Mitigation Partnership, Vietnam

The Natural Disaster Mitigation Partnership (NDM-Partnership) is an association of voluntary members of Government, Donors and NGOs who have signed or expressed their commitment to work through the NDM-Partnership Memorandum of Agreement

ratified in June 2001 by the Consultant Group (CG) of donors to the Government of Vietnam.

Natural disasters that devastated Central Vietnam in 1999 led to the development of an institutionalised arrangement for coordinated efforts for disaster mitigation in Vietnam. In early 2000, a Fact-Finding Mission and in the mid 2000, a Multi-Donor-Mission was fielded to the disaster affected Central Vietnam. The data collected during these Missions provided the basis for developing the concept of the NDM-Partnership for Central Vietnam.

A Secretariat of the NDM-Partnership was set-up in May 2002 in Hanoi. A quarterly Newsletter of the Partnership was started in September 2002 for sharing information among Government agencies, Donors and the NGOs. The website provides updated information of the NDM-Partnership activities:

The institutional framework for implementing the NDM-Partnership for Central Vietnam and the partnership cooperation and coordination links to donor and government programs and projects is explained in the following figure (Natural Disaster Mitigation Partnership, UNDP, 2004, www.undp.org).

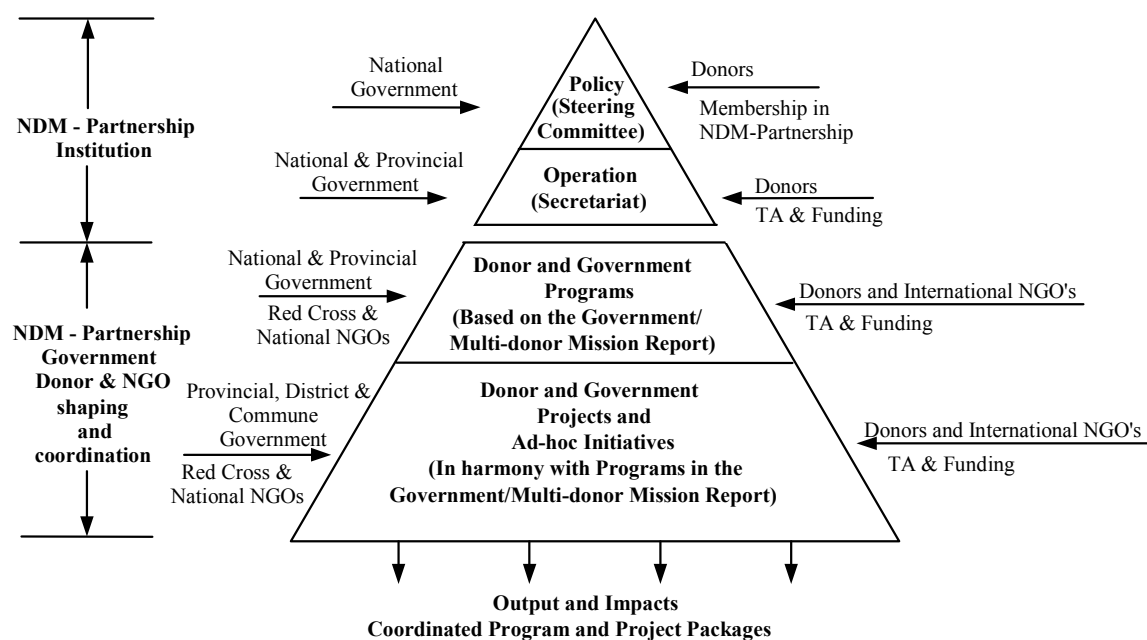


Figure: Institutional Framework of NDM Partnership, Vietnam

9.8 CONCLUSION

CBDM finds its roots in traditional community practices, and is based on local coping capacities of communities. Following the principles and strategies of CBDM in modern day programming is not without challenges. It requires balancing of stakeholder interests, optimisation of resource allocations, resolution of conflicts, and restraining aspirations within manageable limits. Continuation of a programme for a long term is one of the challenges where many interventions have failed. This has many linked issues, and needs to be addressed right from the stage of intervention conceptualisation. Within this aspect, an area of concern is the dynamics of new institutions that get established and individuals or groups that get empowered. The change in balance of power structures creates

potentially threatening situations, and careful handling and balancing is required. This holds true for community institutions and their links with other community groups, local political groups, local politicians and government officials, and even NGOs. Establishing a healthy partnership between government and non-governmental players is a crucial challenge in the CBDM process. Finally, it is a challenge to keep interventions from getting carried away into becoming fancy programmes for high-tech emergency management. What works best on the ground is a low-tech, people friendly developmental approach that would be operational on a day-to-day basis and will build local strengths. Simplicity of approach is a challenge in itself!

9.9 KEYCONCEPTS

- | | |
|--|---|
| Community | : Scholars differentiate between <i>society</i> and <i>community</i> as, the former is naturally ordered and is heterogeneous in character, whereas the latter is a result of deliberate networking on the part of people on some homogenous ground. Homogeneity could be on grounds of geographic contiguity, ethnicity, religion or caste etc. It is however, evolving and dynamic in nature, never static in the sense that configurations change over time. |
| Immanent | : Inherent or within something. |
| Imminent | : About to happen or threatening to happen. |
| Participatory Risk Assessment | : The idea behind participatory risk assessment is that all concerned stakeholders including/comprising vulnerable groups; civil society engaged in ameliorative works, corporate sector by way of both <i>private interest</i> (builders in case of vulnerable buildings) and <i>public interest</i> (corporate social responsibility) and the government to arrive at a consensus in identification of elements at risk and also the most vulnerable area, infrastructures and populace (“Development Planning and Administration”, 2003). Notable among techniques of participatory risk assessment are, Participatory Rural Appraisal (PRA) Participatory Learning and Action (PLA) and Social Analysis (SA). |
| Participatory Rural Appraisal : | PRA originally stood for Participatory Rural Appraisal, but its applications are in many other contexts besides rural and good practice is far more than just appraisal. It enables others to do their own appraisal, analysis, planning and action, to own the outcome and to share the knowledge. The target group could be local; rural or urban concerning people, women, men or old, or members of an organisation or group. |
- Three common elements, found all over the world, in a PRA approach, are:

- *Self-Aware Responsibility*: individual responsibility and judgement exercised by facilitators, with self-critical awareness, embracing error.
- *Equity and empowerment*: a commitment to equity, empowering those who are marginalised, excluded, and deprived, often specially women.
- *Diversity*: recognition and celebration of diversity.

Participatory Learning Action : PLA combines:
(PLA)

- A set of diagramming and visual techniques originally developed for livelihoods analysis and now widely used in Natural Resources departments in development agencies. They have since been adapted for use in other sectors including enterprise development; and,
- Underlying principles of grassroots participation from human rights activism, which involve rethinking power relations and partnerships between development agencies, experts and poor people. These are now being developed further to facilitate negotiations between different stakeholders in projects and policy dialogue.

The underlying principles of PLA, include: “embracing complexity; recognition of multiple realities; prioritising the realities of the poor and disadvantaged; grassroots empowerment; from assessment to sustainable learning; and relating learning to action”.

Social Analysis

- : Social Analysis is an attempt at incorporating participation and social analysis into the risk identification process. It is an attempt at understanding the social matrix and how it contributes to the vulnerability of segments such as women and children. From social analysis emerge guidelines for policy in this respect.

Social Capital

- : Social capital is an economic analogy for bonds of community cohesion, which can translate into tangible gains. “Social capital refers to the collective value of all social networks and the inclinations that arise from these networks to do things for each other; in other words, “norms of reciprocity”. The central premise of social capital is that social networks have tangible value, which cannot be discounted in cost benefit analyses or policy implementation and evaluation” (Putnam, 2005).

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9.11 ACTIVITIES

- 1) In the case studies in this unit, which community-level solutions have been applied for mitigating various disasters? Make a table of disasters and coping measures. For each measure, describe how this has been useful in reducing problems relating to disasters in each case. List down the key stakeholders involved in each case and what has been their contribution towards mitigating the disaster.
- 2) Collect one case study on effective mitigation for any risk in your area. Prepare a presentation and discuss possibilities of further improvement.

UNIT 10 SEARCH, RESCUE AND EVACUATION

Structure

- 10.0 Learning Outcome
- 10.1 Introduction
- 10.2 Significance of Search and Rescue (SAR)
- 10.3 Phases of SAR
- 10.4 Logistics and Methods
- 10.5 Behavioural Requirements
- 10.6 Conclusion
- 10.7 Key Concepts
- 10.8 References and Further Reading
- 10.9 Activities

10.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the concept of search, rescue and evacuation phases of SAR and various techniques for it; and
- Analyse the technical, organisational and behavioural requirements for SAR.

10.1 INTRODUCTION

Search, rescue and evacuation processes need to be carried out immediately after a disaster strikes a certain area or building. These are the most immediate critical operations that are usually performed by the local volunteers, voluntary organisations and the emergency agencies. *Light Search and Rescue* is a procedure carried out at primary stages, initially to find out persons with injuries in lightly damaged buildings, or even without any injuries and needing assistance, and to help them exit. If the condition worsens and the local groups are not able to control the situation, then the specialist groups within emergency agencies have to be called in for professional help, and at times even the Defence Forces including the Army, the Navy, the Air Force and the Coast Guard are called on for help.

Primarily, Search and Rescue Operations are undertaken to save the maximum possible number of victims who are trapped in an area affected by a disaster. The basic aim of all such operations is to ensure the survival of the maximum possible number of affected people. A plan is worked out with the help of local people through surveys and then appropriate steps are taken by the various teams involved to carry out the operations. Besides physical rescue, the aim is also a systematic and organised approach in a post-disaster situation riddled with chaos and confusion.

10.2 SIGNIFICANCE OF SEARCH AND RESCUE (SAR)

Search and rescue, often known by the acronym SAR, is the process of identifying the location of disaster victims who may be trapped or isolated, and bringing them to safety and providing them with medical attention after a disaster strikes.

Search and rescue generally involves the local people who are well versed with the local terrain and can be instrumental in searching and accessing the trapped victims. SAR teams rely on sniffer dogs that are specially trained to smell out human beings trapped under the rubble. Heavy machines such as cranes and earthmovers are used to remove heavy rubble; and special equipment to delicately remove fallen structural elements and reach out inside heaps of rubble with visual or sound equipment for locating survivors.

In case of floods and cyclones, boats and helicopters are used to carry out the search and rescue operations by forming teams and carrying out SAR operations in the entire area systematically, each team covering its assigned sectors.

After the search, rescue and evacuation, some important steps are required to be taken in order to provide relief to the evacuees.

Prime amongst these are:

- Medical Aid
- Water and food
- Shelter
- Temporary subsistence supplies
- Health and sanitation
- Information, and
- Security.

10.3 PHASES OF SAR

SAR is carried out for different categories of affected people depending on the complexities of the processes involved. This is illustrated as follows:

- 1) The immediate stage is searching and rescuing people with injuries among people trapped in the affected area that we see at first sight.
- 2) The second stage is the rescue of persons whom we are able to contact but are unable to reach. These are people who may be trapped under heaps of rubble from a collapsed building, or people stuck on trees or high-rise buildings, or trapped inside basements.
- 3) The third stage includes searching those areas where survivors are likely to be trapped generally. These are called *likely survival points*.
- 4) The fourth stage is the last stage in which debris leading to likely survival points is cleared.

10.4 LOGISTICS AND METHODS

Search and Rescue Kits

SAR kits should ideally be kept in central locations in areas of vulnerable buildings. Local trained personnel can make use of these kits should a disaster strike the area. A typical SAR kit will comprise the following items:

- Evacuation map of the building or area
- Hammer
- Screw driver (6" flat)
- Axe
- 24" Crow bar
- Spade
- Pickaxe
- 50-foot rope
- Torch
- Spare battery cells
- Hard shoes or Gum Boots
- Helmet
- Hand gloves
- Dust Mask

Simple Rescue Methods

Rescue can be carried out ideally by using rescue equipment but also by ordinary methods when equipment is not available.

For rescuing an affected individual, there are two types of methods: *Single Person Methods* and *Two Person Methods*.

A) Single Person Methods

- **Firemen's Lift**

This method is used when the affected person is unconscious and only one rescuer is available for carrying out rescue work. In this method, the rescuer first makes the affected person lie on his or her the abdomen. Then he uses both his hands to lift the affected person by his armpits. He holds the right hand of the affected person with his left hand and with his free hand he holds the affected person's right leg. Now the rescuer lifts the affected person with both his hands and positions him or her in such a manner that his or her waist lies just above the neck of rescuer.

- **Human Crutch**

This method is used when affected person has an injury in one of his/her leg. In this

method, the rescuer first ties the injured leg of the affected person with his opposite leg with a handkerchief. If the affected person's left leg is hurt, the rescuer will tie this leg with his own right leg. The rescuer holds the affected person's waist with his hand and then they both can walk slowly with the rescuer supporting the affected person's injured leg with his own leg.

- **Pick a back**

This method is used when the affected person has an injury in his or her leg and is not able to walk long distances, but can support himself or herself with his or her hand. In this method, the rescuer first gets down on one knee and allows the affected person to saddle on his back. The rescuer then holds the affected person at the thighs and the affected person encircles the rescuer's neck for support.

- **Staircase drag**

This method is used when one has to rescue an unconscious person from a floor higher than the ground floor. In this method, the affected person is laid down on his back and his hands and feet are tied with a handkerchief. The rescuer holds the casualty's armpits and slowly drags him or her down the stairs head, first.

- **Firemen's Crawl**

This method is used when the affected person is trapped inside a smoke filled area and is unconscious. The rescuer first ties the hands of the casualty and then goes astride the casualty. The rescuer inserts his head in the loop made by the casualty's hands. Then by pushing his hand and foot against the ground, he can drag the casualty to a safer place.

- **Tow Drag**

This method is used when the affected person is lying in such an area where there is very little space to carry out the rescue. The affected person may or may not be unconscious. In this rescue method, the rescuer inserts his feet into the casualty's armpits and then pulls the casualty out of the confinement area. After taking the casualty out, the rescuer can lift the casualty with any appropriate method.

B) Two Person Methods

- **Fore and Aft**

This method is used when the affected person is having an abdominal injury. For carrying out this method, two rescuers are required. In this method, the affected person is laid down flat on his/her back. One of the rescuers holds the casualty from the armpits while the second rescuer holds the legs. Then they both lift the casualty and in this way they can shift the casualty to a safer place.

- **Two Hand Seat**

This method is used when the affected person is injured in one leg. For carrying out this method two rescuers face each other on either side of the affected person. They both bend and place their inside arms under the casualty's back just below the shoulders, raise him and put their outside arms under his thighs, holding each other's hands with a hook grip. The affected person can place his/her hands around rescuers' necks.

- **Three Hand Seat Method**

This method is used when the rescuers need one hand free to support the affected person's injured leg. In this method, if the affected person's left leg is injured, the rescuer on the right grasps his own left wrist with his right hand & the other rescuer's left wrist with his left hand. The second rescuer will hold the right wrist of first rescuer keeping his left hand free to support the casualty's injured leg or any other medical equipment.

- **Four Hand Seat Method**

This method is used for an affected person who is heavy and who can support her/ his self with his/ her hand. In this case, each of the two rescuers grasps his left wrist with his right hand, grasping the other rescuer's right wrist with his left hand.

- **Carry Chair**

This method is useful to lift a handicapped or a very old person. The person to be lifted is placed on a chair, and then, the chair can be carried to a safer area.

- **Knots and Lines**

A rope is an important part of SAR operations. It can act as a guideline during searching; it can be used to lift equipment during rescue work or while carrying out fire fighting, and it can be used for rescuing people. Various knots and lines are used, which are mentioned below:

- **Over hand knot or thumb knot**

It is used as a stopper knot. Sometimes it is also known as first aid knot because it is used to tie the bandage.

- **Figure of Eight**

It is used to stop a line running through a sheave or a pulley.

- **Reep Knot**

It is used to join two ropes of the same diameter or thickness.

- **Chair Knot**

It is used to lower an unconscious casualty.

- **Half Hitch**

It is used to hoist round object.

- **Claw Hitch**

It is used to secure a line to a round object.

- **Timber Hitch**

It is a simple knot with several loops on it, which is used to hoist any odd heavy object.

- **Black Wall Hitch**

It is used to secure a line to the shank of a hook.

– **Draw Hitch**

It is used as temporary fastening when we require the knot to be released immediately.

– **Single Sheet Bend**

It is used to join two ropes of different thickness.

– **Double Sheet Bend**

It is similar to single sheet bend but with a double hitch round.

– **Carrick Bend**

It is used to join two lines without the knots forming an obstruction to pass round an object.

– **Sheep Shank**

It is used to shorten the length of a line or to avoid any damaged part of the line.

– **Single Bowline**

It is used for various miscellaneous purposes.

– **Round Turn and Two Half Hitch**

It is used to secure a line to round objects.

– **Cats Paw**

It can be used to hoist a hose or a similar object.

– **Running Bowline**

It consists of a bowline, with the standing line passing through the bight of the line, to form a running noose.

– **Bowline on Bight**

It is used to lower a stretcher or an unconscious person.

● **Rescue Using Chair Knot**

The following safety precautions need to be taken while lowering a casualty with a line:

- Always use a guideline to prevent the casualty from striking with building wall;
- The line should pass hand to hand, and not through hands;
- The line should run over a wooden block or some sack under the point of contact of line and building;
- Check the area for required space;
- Insert the shorter loop into casualty's armpits and longer loop into the casualty's knees;
- While lowering the casualty assign someone on watch below the casualty.

Search and Rescue Checklist

Finally, the following checklist, as per the *Source book on District Disaster Management, Ministry of Agriculture, Government of India, and National Academy of Administration, Mussourie* can help assess the level of preparedness of search and rescue operation plans.

- What rescue tasks may need to be performed?
- Who is responsible, who coordinates?
- Are there procedures for detecting and marking danger areas?
- How are search and rescue activities integrated with other emergency functions, particularly in health?

10.5 BEHAVIOURAL REQUIREMENTS

Qualities of a Good Rescuer

A good rescuer needs to be physically fit and trained/experienced to be able to effectively carry out rescue work. Incapable rescuers usually hinder the work on site, and often also cause more harm by aggravating the situation and causing further injuries to the persons to be rescued. The following key features are seen when selecting rescuers for a mission:

- Technical ability
- Common sense
- Directional sense
- Effective improvisation
- Proper judgment
- Physical and mental fitness

General Precautions while carrying out Search and Rescue

SAR is a process with high level of risk to the rescuers as well. It is important for the rescuers to take adequate precautions to keep themselves safe. The following actions are advised:

- Wearing necessary personal protective equipment
- Always working in pairs
- Before starting SAR, one should always note down alternative means of escape for oneself
- Using guidelines such as directions for rope use when you enter a confined place, smoke filled room or a dark place
- Carrying out thorough searches in toilets, storerooms, under tables, in lifts, etc.

Evacuation

Evacuation implies removing all people from a threatened area to a safer place, before, during or after an emergency. It has been observed that in most disaster events, like earthquakes, cyclones and fires, a large percentage of total deaths occur due to wrong evacuation practices or stampede. It is necessary to evacuate using short and safe exits. Generally, those areas should be avoided that make occupants more vulnerable.

Evacuation in Slow and Rapid Onset Disasters

Mass evacuations are carried out to move people out of impact areas in case of cyclones or floods, once the warnings have been received. People from expected areas of impact are moved to cyclone shelters or schools or other public buildings in nearby places that are designated, emergency shelters. Public vehicles are often organised to make such evacuation possible. The general public is warned of the coming disaster, and advised to evacuate themselves or take the help of the government or NGOs working in the area to move out.

Evacuation is more difficult in very rapid onset disasters such as earthquakes, fires or accidents. Mass evacuation is not possible in such cases since there is very little or no warning time available. In such cases people caught in the event can just follow preplanned evacuation systems and use exit signs, exit routes, meeting points etc. *Pre-planning* for evacuation is most critical for such situations. *Such planning is discussed in the following sections:*

Evacuation Planning

An Evacuation Plan is a plan that shows the shortest and safest exit routes and the location of first aid, fire fighting equipment and SAR equipment in a building or area. The evacuation plan should be prepared in non-disaster times, and should be kept updated. It should also be used in mock drills.

To check the level of preparedness provided for in evacuation planning, Evacuation Checklist has been provided in the *Source Book on Disaster Management, Ministry of Agriculture, and Lal Bahadur Shastri National Academy of Administration, Mussourie*.

Evacuation Checklist

- Does any person or organisation have the authority to evacuate people?
- Are there designated locations to which evacuees should travel?
- How many people may need to be evacuated?
- In what circumstances should they be evacuated?
- Who will tell people, that it will be safe to return? Who will trigger this?
- Are staging areas and pick -up points identified for evacuation?
- Are evacuees to be provided with information or where they are going and how they will be cared for?
- Is there security for evacuated areas?
- How are prisoners to be evacuated?
- How are the cultural and religious requirements of evacuees to be catered for?

- Who is responsible for traffic control during evacuation?
- How are evacuees to be registered?

The process of making an evacuation plan is as follows:

- First take the building or area plan as Base Map
- Make separate floor plans
- Remove the unnecessary text or dimension from the map
- Show the Exit Route by arrow signs from each room to the assembly point or points in easily accessible open spaces. Try to provide maximum number of exits.
- Put 'Emergency Exit' labels at the functional exits
- Show the locations of fire extinguishers
- Locate and highlight the site for SAR and First-Aid Equipment
- Mark safe open areas as assembly points
- Locate 'Danger Areas' and mark them with red signs with skeleton symbols
- Separately draw room exit plans and display them in individual rooms
- There should be a provision for at least two exits for each room. Locate room exits in opposite direction to the extent possible.

Importance of Exit Signs

Exit signs help in getting out of a building during an emergency. As we know, during emergencies people panic and some times forget the exit routes. During such times, exit signs help people get oriented and exit the danger areas. Getting out is not enough in itself; getting out safely is important. Often people get injured and stampedes are caused while getting out. Prominently visible exit signs help people out even when it is dark.

Pre-Planning for Evacuation

An order to evacuate could come at any moment. By planning ahead, individuals can evacuate quickly and safely without sacrificing life, limb and property. The goal should be to spend as little time as possible following an evacuation order.

Evacuation Activities

- Lock door and windows and turn off utilities like water taps, cooking gas and electricity.
- Shut off systems that draw outside air, such as fireplaces and air conditioners.
- If you can provide transportation for a neighbor who has none, do so. Try to help the aged, disabled and other people around you who may need special attention, such as women and children.
- In case of fire or earthquake, evacuate immediately. In case of cyclone or any other evacuation where there is a little time, carry essential items, such as:

- Medical supplies (prescriptions, first aid)
- Money (cash, credit cards, important documents)
- Personal hygiene items (washing, shaving, dental, eye-care, sanitary)
- Clothing, bedding
- Baby needs (food, diapers, favorite toys)
- Portable radio and batteries
- Miscellaneous useful items (matches, flashlights, plastic bags)
- Keep your radio tuned to a local station for emergency news updates.

10.6 CONCLUSION

Casualties happen in disasters because people are caught at the wrong place at the wrong time. Earthquakes kill when people get stuck inside weak buildings that get damaged or collapse, burying people beneath piles of debris. Cyclones kill people in their direct path, even if they are inside buildings if these buildings happen to be weak. Floods kill people in high inundation areas. It is therefore critical to evacuate people whenever there is the possibility of a high damage disaster in that area. Mass evacuations are possible before cyclones and floods, since there is ample warning. Evacuations are more difficult from buildings before fires and earthquakes, since the warning time is very short. Rapid evacuation methods have to be used in such cases.

Search and rescue has to be resorted to when there has already been some damage and people are trapped in affected buildings or areas. Trained search and rescue teams need to move around to find such people, and then help or carry them out to safety. If such persons are injured they also require immediate medical attention.

10.7 KEY CONCEPTS

- | | |
|--------------------------------|---|
| Emergency Agencies | : The army, police, fire, medical health professionals and the local municipality are the crucial emergency personnel/agencies in the immediate aftermath of disasters. Presently, there is certain ambiguity regarding the role of police in disaster management, in that, whether it should restrict itself to law and order or undertake more relief tasks required during response. |
| Evacuation Plan | : Simply explained, evacuation plan comprises rapid and safe way to move every person out of danger to a place of safety. Evacuation has to be preplanned on the basis of hazard maps. Evacuation Plan should clearly delineate the routes prepared through satellite imagery to know the routes which could be used, mode of transport required, strength of population, etc. |
| Light Search and Rescue | : Light search and rescue also requires preplanning. The team has to be updated regarding the strength of |

population in the neighbourhood, number of elderly, disabled, children etc. Secondary rescue follows, which involves use of heavy equipment to remove rubble and deployment of sniffer dogs to trace the dead and struggling in the debris.

Rescue Method : Rescue method depends on the kind of injury sustained by the victim, that is whether CPR is needed, what physical posture is best for the victim, what the first aid requirements are, etc.

10.8 REFERENCES AND FURTHER READING

Carter, W. N., 1992, *Disaster Management: A Disaster Manager's Handbook*, Asian Development Bank, Manila.

Cyclone Contingency Plan of Action, 1987, Government of Andhra Pradesh, Revenue Department, Hyderabad.

Institute of Civil Engineers for Overseas Development Authority, 1995, "Mega cities: reducing vulnerability to natural disasters", Thomas Telford, London.

South Asian Regional Report (Proceedings of the SAARC Workshop on Natural Disaster Reduction), March 1994, *Natural Disaster Reduction*.

Training Programme on Disaster Management, 2002, Department of Public Administration, University of Lucknow.

10.9 ACTIVITIES

- 1) Find out which disaster can strike your area. Prepare family and office evacuation plans.
- 2) List agencies that are responsible for search, rescue and evacuation during disasters in your area. Meet one of the agencies and prepare a report on how they carry out operations during emergencies.

UNIT 11 TEMPORARY SHELTER, WAREHOUSING AND STOCKPILING

Structure

- 11.0 Learning Outcome
- 11.1 Introduction
- 11.2 Requirements in Shelter Provision
- 11.3 Requirements in Warehousing and Stockpiling
- 11.4 Conclusion
- 11.5 Key Concepts
- 11.6 References and Further Reading
- 11.7 Activities

11.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Examine the concerns and issues related to temporary shelter and discuss the importance of community partnership while building shelters; and
- Analyse various types of measures that are required to be taken for maintaining effective and efficient warehousing and stockpiling facilities during disaster and non-disaster times.

11.1 INTRODUCTION

Disaster preparedness involves arranging for logistics and supply of essential commodities during times of crises. Temporary shelter provision is necessary to evacuate people to safe sites from disaster ravaged areas. Essential items include medical supplies apart from food and clothing, as disease outbreaks are very probable in the aftermath of disasters. Apart from physical illnesses that result from diseases like dengue, cholera, dysentery, respiratory infections and malaria, as these have been found to be most common, psychological shock also has to be dealt with. Shelter provision is both a response and a mitigation effort. For example, after the Orissa super cyclone, it was realised that concrete structures served as emergency shelter during the cyclone. Therefore, after the cyclone, once the immediate repair and restoration of thousands of damaged schools had been completed, steps were taken to undertake construction of newly designed school buildings in existing premises with a view to providing additional classroom space as well as making these structures double up as emergency community shelters during floods and cyclones in the coastal areas. Post-disaster situations also provide opportunities for addressing many long-standing needs and demands of the people and to pay attention to unfinished developmental tasks. For example, after the super cyclone in Orissa, about ninety go-downs were constructed for storing food grains in areas highly vulnerable to cyclones and floods. This was long over due, but their completion after the 1999 cyclone ensured that these were put to best use during the 2001 floods. This initiative was further amplified by building small go-downs at the gram ‘panchayat’ level. Again, this came in very handy during the 2003 floods. Pre-positioning of food-grains at district, block and gram ‘panchayat’ levels ensured timely relief during floods.

11.2 REQUIREMENTS IN SHELTER PROVISION

11.2.1 Temporary Shelter

Shelter means interim housing to meet basic immediate needs of disaster victims, through provision of tents or quickly assembled houses made of a range of materials including wood, plastic, tin, etc. It is the primary component of post-disaster rehabilitation.

Designated Shelters is another important term used, which means public building utilisation and use of any other existing safe facilities before or during disasters to protect people from destructive forces. These are also called community shelters.

The objective of a temporary shelter is to assure necessary shelter for families in order to safeguard peoples' lives from exposure and further sufferings when once a devastating disaster has snatched their homes from them.

Shelter is also a major requirement during major disaster situations such as wars or famines which create/exacerbate the refugee problem in significantly large proportions. The Asian Disaster Preparedness Centre (ADPC) has produced tools and resources for post disaster relief. As per ADPC, shelter provision has to cater to the following requirements:

PREVENTIVE SITE AND SHELTER MANAGEMENT GUIDELINES

PROBLEM	PREDICTIVE INDICATORS	PREVENTIVE STRATEGY
<i>Overcrowding</i>	High rate of influx into confined area.	For contingency planning, negotiate suitable sites with government before influx occurs or at early stage of refugee situation if possible, should have potential for expansion in order to avoid relocation or increased population density.
<i>Exposure</i>	<ul style="list-style-type: none"> • Historic or standard weather patterns of rainy or cold periods. • Lightweight tents or other un insulated structures in areas in area with seasonal cold patterns • Insufficient heaters/stoves/fuels 	<ul style="list-style-type: none"> • Provision of suitable shelter for example insulated or heatable tents or other structures; also distribute stoves, mattresses, warm clothing, blankets or sleeping bags • Stockpile additional blankets • Purchase additional heaters/stoves. • Fuel distribution system • Fuel stockpile, and/or consider alternative fuel sources to bridge gap. • Relocation of population to better-sheltered or warmer areas.

Contd...

<i>Domestic violence/Social disturbances</i>	<ul style="list-style-type: none"> • Overcrowding • Lack of privacy 	<ul style="list-style-type: none"> • Meet minimum space standards for site area and shelter, space requirements. • Provide at least visual privacy, especially for populations sheltered in communal buildings.
<i>Fire</i>	<ul style="list-style-type: none"> • Overcrowding • Site area too small for number of tents/structures, shelters are very close together or are touching • Dry windy weather conditions • Dry combustible shelter materials and individual open flame heating or cooking stoves or areas. 	<ul style="list-style-type: none"> • Provide adequate fire breaks between structures. • Provide fire extinguishers in strategic locations, for example stores/warehouses, admin, buildings etc. • Space structures apart to reduce risk of spread of fire • Public awareness campaign • Establish fire brigade • If possible, stoves/cooking areas should be protected from the wind (wind shields). This will also reduce amount of fuel required. • Indoor cooking/heating only with suitable heaters, open fires are to be avoided. • Organise and promote planting of trees and hedges to reduce wind spread. Also helps reduce dust and wind spread.
<i>Mud/Standing Water</i>	<ul style="list-style-type: none"> • Pattern of rainy weather • Flat low lying site • Flood plain location • No other existing structures in fixed assets in the area. 	<ul style="list-style-type: none"> • Select site with slight slope (2 percent) if possible, regardless of climate, rainy or arid. • Use culverts for drainage if roads are improved by raising the road surface. • Include drainage plan and ditching in initial site layout. • Special attention must be paid to drainage around water points.

Source: Compiled by DMC, 1992, UNHCR Emergency Tools Series draft#2, 1992, in ADPC, 2000.

The crux is that shelter rehabilitation concerns spread across the following aspects:

- **Socio-economic**

Shelter is meant for people. This fact governs the principle that shelter should be designed to meet the requirements of people without any detrimental impacts on their health, socio-economic status and lifestyles. This in turn requires that planning and implementation processes for shelter programmes should be participatory in nature. Participation does not

mean *consent*; rather it means *consultation*. Specific issues that need attention are, beneficiary participation, spatial relationships between families, involvement of women, and common activity spaces.

- **Physical and environmental**

Post-disaster shelter reconstruction is a particularly sensitive area of work, since it is usually carried out under severe time pressure, not providing/allowing enough room for normal planning processes to take shape. It therefore becomes more important to pay extra attention to physical impacts, both on the community as well as on the environment. Issues requiring attention are; relocation decisions, personal open spaces, infrastructure, and local environment.

- **Technical and Structural**

Structural compliance according to local hazards is of paramount importance for ensuring future safety of re-built houses. Poor construction or hazardous location can put people in such temporary shelter to risk of another disaster. Though this objective is given due importance in most shelter reconstruction programmes, the means are often not sensitive enough to the socio-economic and environmental concerns discussed above. Therefore, technical interpretations, adaptations, and translations gain critical importance. Specific issues of concern are structural safety, site and services planning, activity space planning, thermal comfort, protection, and socio-cultural compliance.

- **Shelter Location**

The first question that arises in a shelter reconstruction programme after a disaster is whether to rebuild at the same location or to relocate. This is an issue with not just physical, but also social and economic implications. A number of options have been tried in the past, and each one of them has its own merits and demerits. The three basic options are:

- 1) **Rebuilding at the Same Location**

This seems to have the greatest advantage. It does not involve issues of land acquisition, or of conflicts between relocated communities and host communities. Much of the rubble can also be recycled and used in the reconstruction work, saving on material costs, transportation costs, and time. This option cannot work when the land or resources at the original location are damaged or contaminated beyond repair, or if the original location has proved too vulnerable.

- 2) **Relocating the Entire Settlement**

Relocation of a settlement is usually a time consuming process involving land acquisition. If the community whose land is acquired is unhappy with the situation, it could turn hostile. While relocating, the entire settlement has to be planned from scratch, since similar other local sensitivities are involved such as local superstitions and religious/cultural proclivities. Relocation is a last resort option, and is best avoided as far as possible. However, if it has to be resorted to, it can provide an opportunity to fill those service gaps that existed in the old settlement.

An additional issue in relocation is, what happens to the original settlement. Many times it has been seen that the community continues to occupy and live in the old settlement. They patch up their damaged houses and live in them, while the new houses

are used for storage. This is highly undesirable because it not only leads to a wastage of resources, but also leaves the community still living in vulnerable shelters.

3) **Relocating Part of the Settlement**

The worst of the options, it has often been exercised when opinion within the community has been divided on the relocation issue. In one sweep, it destroys the social fabric built over generations. If the community is fractured, the issue first needs to be addressed through better engagement rather than breaking apart the community.

Ten-point Guideline for Shelter Provision

Numerous agencies are working in the affected areas for shelter provision. Different approaches are being adopted in different areas, with varying materials, sizes and processes. A ten-point guideline on temporary shelter provision prepared in the aftermath of the Kashmir Earthquake of 2005 by Prof. Ian Davis is as follows:

1) **Monitor what is going on**

Use this disaster to inform the coordination agencies about what goes on in this sector, at micro and macro levels, such as, who is deciding on shelter approaches; where is the expertise; what the popular wisdom on shelter is; what are the dilemmas and conflicts? etc.

2) **Tents**

The likelihood is that a wide variety of tents, with varied specifications will arrive, some very appropriate, while others are hopelessly unsuited for the climate or cultural conditions. Who adopts what specifications and, is there any quality control or standardised specification? If families tear their allocated tent to use the canvas in creative ways this can be highly effective, yet in some contexts, some 'tidy minded' officials have been known to banned this adaptive process.

3) **Standards**

Minimum standards of shelter provision are given under the *Sphere Project*, and are accepted around the world. These should be adhered to, and adapted where there is a need for modifications. The basic principles of the standards should be ensured in all temporary shelter programmes.

4) **Location of Tents**

Where possible, families should be allowed to take a tent and put it near their house rather than on a centralised campsite. Reasons for this are obvious; it would provide for better care of domestic animals in rural settings, protection of household belongings that may remain within their ruined dwellings and maintenance or recovery of livelihoods that may be linked to the home.

5) **Shelter Materials**

Probably, one of the best policies is to distribute shelter materials, such as blankets, roofing, sheeting, plastic sheeting, lengths of planed timber, building tools, wire, rope, nails, etc. Where possible, these can be sold where people have money to avoid dependency, but where people do not have resources, they can be donated. If the materials for

roofing, sheeting, etc., can come with expertise and the support of skilled volunteers to assist in building, this will enhance the process.

6) **Shelter for Families with Damaged Dwellings**

Aftershocks can bring down damaged, but standing houses. Therefore, such families need to be advised to sleep outside their homes in tents or improvised shelters even if they spend time in the day in their homes. The risks are very high when they are lying flat, sleeping and a damaged structure collapses. *Rapid damage surveys* need to check on this issue as a vital measure to avoid further losses of lives from aftershocks.

7) **Local Advice Centres**

Repairs begin immediately, regardless of whether or not the government seeks to stop the process until structural safety surveys have been undertaken. Small teams can be assembled, comprising volunteer engineers/ architects/ builders who can be assigned different areas to offer advice concerning shelters and repair and rebuilding options.

8) **Transition Housing**

An effective strategy is to seek to help families to create a transitional dwelling that will eventually develop into a permanent dwelling. This is a preferable approach to providing expensive rehabs that will later be replaced by another permanent home (In effect this a wasteful double reconstruction approach). The aim is to use the sheltering process to accomplish three things: provide shelter, strengthen local livelihoods and aid the psychosocial recovery process.

9) **Debris**

In many disaster situations there is often large-scale destruction of building debris during the clearing and recovery process. Vital timber and masonry debris is destroyed in the process. It is essential to collect useful building debris for recycling purposes.

10) **Shelter Units**

Each disaster will attract a community of intrepid inventors or commercial opportunists who seek to convince officials to place big orders for their novel creations made of cardboard, plastic, polyurethane, etc. Such designs are essentially innovative answers seeking a problem. They often cost far more than tents and shelter materials; they can be culturally and climatically inappropriate and can take ages to deliver. There are better alternatives available as noted above.

11.2.2 **Community Participation**

For an economically well-established person, it is obvious that he will get an architect to design her/his house as per her/his needs and lifestyle. However, for the poor, particularly in the aftermath of a disaster, this is usually not an option. Since the government or a donor agency is providing for him, he must accept whatever is handed out. This is why the rehabilitated arena is dotted with *row housing schemes* constructed as per a template designed by a far-away urban architect or designer. There are numerous examples where beneficiary communities refused to live in such houses provided to them.

Recent improvements in the process have been that the team does a survey and then designs a few alternate plans, which the community as a group is asked to choose from. This is still not good enough. *Consultations have to go beyond consent.*

It must be appreciated that the families receiving assistance still do have a right to decide what their house should be like, within the given resource constraints. The shelter provider's job is to ensure that the new houses and settlements are adequately disaster resistant.

True consultation often throws up those very small and basic needs that are often overlooked by remote designers. Though a qualified architect or engineer is surely competent to create a physically compliant shelter, these small local community based aspects of shelter are the ones that make it socially compliant.

The inference is that a shelter design is good only if it is acceptable to the families it is meant for. The way to ensure its acceptability is to design it with the community. There have been various well-documented examples of this, the world over. Action planning for housing is an accepted good practice, wherein community groups take part in needs assessments, prioritisation, consensus building, design, budget analysis, constraint based design modifications, construction planning, implementation and monitoring.

Participatory design process can be very effective. The role of the qualified designer is one of facilitation, while the community leads the process. It works well even with illiterate groups, using symbols, models and articles, around which group discussions and activities are organised.

As brought out in the World Disasters Report of 2002, people in southern Sri Lanka fought drought with self-help mitigation measures with assistance from an NGO. For two years, southern Sri Lanka suffered the worst drought in half a century. Crops failed for five consecutive seasons. Livestock died, water in wells dropped to dangerously low levels. Malnutrition rose to dangerous levels, school attendance dropped. An estimated 1.6 million people were affected. The drought-stricken community of Muthukandiya approached a local NGO about the problem. A mitigation initiative was launched, based on low-cost "rainwater harvesting" technology, which uses tanks to collect rain channeled by gutters and pipes as it runs off the roofs of houses. Villagers participated throughout the planning process. Two local masons received on-the-job training in building the 5,000-litre household storage tanks. Each system cost US\$ 195, equivalent to a month's family income. The community, in the form of materials and unskilled labour, provided half the cost. The NGO contributed the rest. Households learned how to maintain the tanks, and the whole community was trained to keep domestic water supplies clean. A village rainwater harvesting society was set up to run the project. Evaluations clearly show that the 37 households with storage tanks have considerably more water for domestic needs than households relying on wells and ponds and up to twice as much during the driest months.

11.2.3 Requirement of Dovetailing Response with Risk Reduction

It should be realised however that temporary arrangements like shelter provision, stockpiling or warehousing have limited utility if not integrated with the larger/more essential goal of *risk reduction*. As rightly articulated in the World Disasters Report of 2002, risk-blind development is one factor in increasing vulnerability. Another is the absence of effective disaster preparedness and mitigation measures (for example, flood-proof embankments, early warning systems, evacuation routes, shelters, relief stockpiles, disaster response teams, public awareness). Below are some of the barriers to more effective risk reduction, as brought out in the World Disaster Report of 2002:

- **Geopolitics:** conflicts of the 1990s dominated the humanitarian agenda, pushing aside the problem of vulnerability to natural hazards.
- **No coherent risk reduction “community”:** professionals trying to mitigate disaster impacts are fragmented along institutional boundaries.
- **Risk reduction is seen as a separate sector,** when it should be mainstreamed into development and humanitarian programming. As a result, risk reduction concerns are marginalised or forgotten.
- **Risk reduction** is viewed as a technical problem with technical solutions. But the underlying factors that compel people to live in insecure conditions are rarely addressed.
- **Lack of resources:** donors dedicate far fewer resources to risk reduction than to relief. The European Community’s Humanitarian Office (ECHO), for example, spent just 1.5 per cent of its aid budget on disaster preparedness on an average.
- **Invisibility of risk reduction spending:** development programmes may include mitigation, but it is rarely reported in donor accounts (Twigg and Ariyabandu, 2002).

11.2.4 Environment and Infrastructure

Sustainable development refers to the *Green Agenda and the Brown Agenda*. *Green agenda* deals with environmental issues related to clean air and water, a healthy and natural environment. *Brown agenda* deals with provision of services including water supply, sanitation, drainage and solid waste disposal.

Rehabilitation shelter needs to be brown and green too. While browning apparently happens well with most construction programmes visible in ensuring taps and toilets and drains, many rehabilitated villages look like models made of concrete blocks, with not a single tree or green patch in sight. Clean looking paved surfaces replace the earthy ground with grassy patches and the shade giving trees. The dying village pond finally gives way to the overpowering overhead water tank. Ambient temperature rises, and cool breezes turn hot. Things are definitely *not green*. Greening is the least expensive of the shelter construction components. Usually, it requires almost no expenditure.

It is said that the brown agenda also needs careful adaptation. Many a times it is seen that utilities and services are cut and paste from an urban setting. In such cases, users may not take to the technologies offered, or pour-flush systems may be too water intensive and unviable, or drainage systems may have too less water for self-cleansing velocity. While planning for utilities and services, it is important to use technologies appropriate to local environmental conditions. It is equally important to do a reality check with socio-cultural practices and acceptability. Sometimes, technical interventions may require a long run-up of social mobilisation and education.

The initiation of this entire process can happen from some universal principles laid down. The SPHERE project standards are for humanitarian assistance given for minimum standards of basic infrastructure provision, including those needed under various shelter programmes. Other factors can be taken from similar sources, or derived empirically.

One more consideration that can be kept in mind while doing this is incorporating disaster mitigation and preparedness aspects. Shelter and site planning components in themselves should be based on sound principles of structural mitigation. From this can emerge non-

structural mitigation elements such as selection and placement of infrastructure and furniture etc. The green agenda can incorporate elements of nature in ways that ensure sustainable and safe habitat.

11.3 REQUIREMENTS IN WAREHOUSING AND STOCKPILING

For effective relief distribution, it is essential that the relief material is procured, transported, stored and distributed efficiently. Based on the experience with the December 2004 tsunami in Thailand, the USAID recommended the use of strategic transit points as the Uthapao air base in Thailand for stockpiling of relief material. The USAID however criticised the government's decision to source needed supplies such as tents, blankets and high protein biscuits from existing aid stockpiles in Europe and the Middle East. Local on-demand purchase of these items would have been timelier. Most relief agencies have tie-ups with supply companies in this regard, which makes stockpiling redundant. However, certain goods are not easily transportable, like tarpaulins and tents; besides communication is disrupted which reiterates the benefit of stockpiling of certain goods (The Economist, 2005). Therefore, warehousing and stockpiling form a very important component during the relief phase.

Planning Stockpiling and Warehouse Requirements

Stockpiling and warehouse requirements should be worked out in detail and preferably in advance so that these can be adhered to right from the beginning. It is more difficult to organise a warehouse once the material has been dumped in it.

- A warehouse must provide proper secure storage in terms of capacity and the preservation of the quality and quantity of the items stores. Cool, dry storage facilities are optimal. Warmth and dampness encourage infestation and growth of microorganisms. Every effort should be made to prevent supplies from being exposed to sun, rain, humidity or high temperature.
- Open storage areas should not be used, except for very short periods for goods that will not be affected by exposure.
- The necessary capacity for a proposed warehouse depends upon the number of beneficiaries to be served and the quantity of goods to be stored and distributed. Make provision for anticipated reserve and buffer stocks, but avoid ordering and holding contingency supplies for indeterminate future needs. Consider consumption rates and shelf life, and request supplies in manageable quantities.
- Warehouse buildings should be conveniently located and provided protection from rain, flash floods, dampness, solar heating, rodents, insects and birds. A single large building is better than several small ones. The warehouse must be secure against theft, with adequate fencing, lighting, and security personnel. The area surrounding the warehouse should be cleared and made to provide good drainage and easy access. Provide a special storage area for small, high-value items, with parking and loading/unloading area adjacent to the warehouse.

Stockpiling Facilities

Storage facilities are located at key points. Significant losses can materialise due to poor planning. Most of the following damages can be minimised by proper storage:

- Spoilage caused by inadequate protection during inclement weather;
- Stockpiling at wrong locations, which also leads to loss of time in delivery;
- Poor warehousing practices and facilities;
- Lack of proper security and supervision; or
- Prolonged warehousing supplies.

Stockpiling Practices

Stockpiling is a scientific process. Best stockpiling practices are based on scientific principles that help in increasing the life of the material and in easier and more efficient handling:

- Each stockpiling facility requires a stockpiling plan to allocate sufficient space for goods before a consignment arrives. Ideally the floor of the warehouse is laid out in a *painted grid pattern*, and each item marked in chalk to designate the area for each stack. In addition, a chart is maintained of the stockpiling plan, to identify available space at a glance and to locate stored supplies and their date of receipt easily.
- Goods should never be stored directly against walls; pipes, pillars, roof trusses or partitions because stacks place unacceptable stress on them, become inaccessible and subject to dampness. Stacks should be separated using straight aisles, at least one meter wide, to provide access for inspection, cleaning and loading. Foodstuffs should be well separated from other supplies to avoid damage from contamination. Fuels, lubricants and other hazardous substances should be stored in a separate building or a designated, protected area outside the main warehouse.
- A cleaning plan for the warehouse should be prepared, laying down the tasks, timing and assigned duties of the staff. Specific cleaning duties should be included in the job description for each warehouse staff member, and follow ups should be done to ensure that the work is done thoroughly, as scheduled. All the dirt should be removed daily.
- Supplies and food commodities should be neatly piled on pallets placed on a clean floor. Pallets should never project beyond the bottoms of the stack. Different items, different packages and consignments arriving at different times should be kept in different stacks. Stacks should be built carefully to ensure stability, maximise available space and facilitate stocktaking. With rectangular bags or boxes, the simplest method to pile the stock is to orient layers in different directions. This will prevent the stack from falling over.
- Goods must be issued in the order in which they were received. This should be kept in mind when planning the stack layout, so that stacks placed earlier at the rear of the warehouse are easily accessible when the time comes to issue them.
- Stacks should be positioned so as to benefit them most from available light and ventilation. Good, natural or electrical lighting will make inspection easier. Ventilation and good air circulation is best for quality preservation, in hot, dry climates. Ventilators should not be obstructed.

- Stack height should be limited to prevent excessive floor loading or pressure damage to the packing or the contents. Packages can be crushed or split by compacting caused by the weight piled above.
- Individual stack dimensions at the floor should not exceed 6 mt. x 6 mt., to facilitate inspection and cleaning.
- Packages should be piled in their upright position.
- Damaged goods should be piled separately. Different types of damaged goods should not be stacked together. Repairing or repacking should be done if possible. These repacked or repaired goods should be issued first if they are usable.
- In tents or improvised shelters, stacks should never be allowed to touch the fabric of the tent or the walls or roof of the shelter. In open areas, stacks should be kept away from the perimeter fence.

Suitability of Available Warehouse

Warehouses are often not easily available in post -disaster situations. Many times, make-shift arrangements have to be made in existing buildings such as schools or in the open or under tents if no suitable building can be found. The following conditions need to be kept in mind while identifying a warehouse:

- Easy access by road, rail, or water to facilitate receiving and issuing supplies.
- Sufficient capacity to meet forecast requirements for temporary or transit storage, reserve and buffer stocks.
- Sufficient floor area to permit easy stock handling and access to all stacks for inspection, stocktaking and pest control.
- Sound construction and dry and well ventilated building. The construction should be leak proof and there should be no broken windows. Doors should close securely with no gaps. Walls should be clean and whitewashed.
- Office space for warehouse supervisor, staff and warehouse records.
- Garbage disposal facilities.
- Lighting inside and outside the building; and making security fence necessary, if isolated.

Receiving, Handling and Issuing Stocks

The process of receiving, handling and issuing material at a warehouse location is a complex one as it involves different processes and different personnel. If the warehouse itself is the location of distribution, the issuing stocks also involve the arrival of a large number of people who are not aware of the warehouse processes. The following aspects need to be kept in mind in such a situation:

- Ideally, larger warehouses should have separate doors and work areas for receiving and issuing supplies. This arrangement will eliminate any confusion and potential scheduling problems when these activities occur simultaneously.
- Every consignment arriving at the warehouse must be counted and inspected carefully as the goods are being unloaded. Damaged packaging or commodities, should be

checked for:

- Packs with holes, or split bags
 - Broken or partially open crates
 - Dented, buckled or leaking drums or cans
 - Signs of wetness or stains on the surface of bags or cartons
 - Signs of insect infestation or decay
-
- The quantities received should match with those listed on the waybill, stores requisition or packing list. Where tampering is evident, carefully check the contents of packages for missing items. Sample bags should be weighed of bulk commodities to confirm unit weights. Random samples of commodities should be taken to check for quality, when appropriate.
 - The number of units/weight of the goods received and any amount, which has been damaged or lost, should be recorded. Consignment receiving reports should be submitted to the appropriate authority or agent, noting damage, shortage, excess or non-conformance, quantities, conditions and any extenuating circumstances. Insurance claims and follow up on claims documentation should be initiated where necessary.
 - Proper instruction should be given and timely supervision of the porters handling goods in the warehouse should be done, to ensure that the goods are moved and stored efficiently with minimum damage. Loading or unloading should never be done in the rain. Provision of suitable equipment should be made with trained operators, for large or heavy consignments. Use of trolleys should be made if these are available. Goods must not be dragged along the floor, dropped or thrown. Porters should not be permitted to use hooks which damage packaging and bags.
 - Only authorised officials may sign a written release order to issue supplies from storage. On receipt of a release order, the chief storekeeper confirms that the supplies are on-hand and supervises their turnover to the receiver's agent taking delivery. Stored goods are issued on a first in first out (FIFO) basis, that is, the stores received first are issued first because they have been stored for the longest period. This rule is applied consistently, except for usable damaged goods, which are always issued first, regardless when they arrived. The issue is recorded in the warehouse records.
 - A Store Requisition/Issue Voucher is prepared in three copies for each release order, with the receiver's agent signing to acknowledge receipt of the goods. Two copies accompany the issued consignment to their destination, while the original is filed with the release order. The receiver's agent obtains the signature of the receiver at the destination, returning one copy to the warehouse for matching with the original Stores Requisition/Issue voucher to confirm final delivery.
 - In long-term warehouses, periodic physical inventory of all supplies and food aid should be conducted to verify that the quantities on hand agree with the quantities shown on the Store Card and Stack Record Cards. Any shortages should be reported to the senior official responsible for warehouse operations, and investigation for the reasons for these shortages should be carried out. Quantities from the store's records should not be deleted without proper authorities to do so.

Fire Protection and Safety

Proper fire protection measures should be taken up in the warehouse complex to ensure safety from possible fire accidents. The following tips may be adopted:

- Define in advance the responsibilities and actions to be taken by individual personnel in case of a fire outbreak.
- Ensure that fire-fighting equipment is readily accessible both inside and outside the building and also that these are in working condition.
- Provide water and sand buckets, plus foam extinguishers if fuel and oils are present. Instruct personnel in the use of extinguishers.
- Strictly control smoking by all personnel whenever they are in the warehouse premises.
- Never store flammable material in the main place. All combustible waste should be discarded in metal bins and they should be cleared out regularly.
- Insure the warehouse against possible fire outbreak.
- Ensure good electrical wiring within and outside the warehouse.

Recommended Warehouse Cleaning Plan

Cleaning of the warehouse is very important to maintain hygiene and to keep the material from being wasted due to decay or pest infestation.

Before using the warehouse:

- Thorough cleaning of floors, walls, ceilings partitions, support beams, windows, doors and frames should be done. Treatment with insecticide is advised.
- Clearing of weeds and rubbish in the area surroundings the warehouse building should be done, to remove potential food sources for rodents and to eliminate places where insects may breed.
- Prompt cleaning of any spillage, especially foodstuffs and oil is needed.
- Each day, sweeping of the floor and disposal of the sweepings should be done.
- At the end of each week, cleaning of the building walls and the sides of each stack should be done. Cleaning up of weeds and rubbish in the area surrounding the warehouse should also be done.
- In case of long term warehousing, at the end of each month cleaning of the entire warehouse thoroughly, from top to bottom, should be done.

Periodic cleaning can be scheduled for:

- Sweeping the walls, stacks, and floor, wall/floor joints and all corners
- Cleaning of the roof beams and tops of the walls
- Cleaning of doors, frames and door channels

- Cleaning in sequences, from top to bottom, and from the farthest point inside the warehouse towards the door(s)
- A logbook should be maintained for the periodic maintenance and cleaning activities.

Record Keeping Procedures

Since large volumes of material are being handled and many personnel may be involved in the process, good record keeping procedures are important for maintaining accountability and for efficiency in ensuring that stocks are available when required. The following procedures are advised:

- Use of Stock Control Ledgers, Store Cards and Stack Record Cards.
- Recording all receipts, issues and balance on hand. Retaining a copy of the receipt/issue voucher or waybill for verification.
- Recording all inspections and pest control treatments.
- Verifying records by conducting a physical stock count periodically.
- For any stocked item lost or disposed of, recording the quantity, and an explanation of the loss or the reasons for disposal and the method.
- Submitting a periodic summary to the senior official responsible for warehouse operations.

Stores Inspections: What to look for

Stores inspection is an important task for ensuring that systems are being followed and there are no losses or risks of losses to the material being stored. The following inspections should be carried out:

Building and Area Inspection, comprising;

- Roof leakage or signs of flooding
- Broken windows or ventilators
- Badly fitted or damaged doors
- Cracked walls or floors
- Dirty or dusty interior
- Signs of rodent entry
- Damaged fences
- Broken or burnt out lights
- Inoperative or missing equipment
- Presence of garbage, discarded items

Stores Inspection Activities

- Checking for spilled commodities;

- Inspection between bags or packages in the stack, along seams, for signs of insects (webs, cocoons, etc.) or rodent damage;
- Looking around the stack base and under pallets for signs of insects (webs, cocoons, etc.) or rodent damage;
- Looking around the stack base and under pallets for signs of insects or rodents (for example, nests, droppings);
- Looking for water damage, fungus, caking, discoloration, stained bags or packaging leaks;
- Examination of stacks for damaged items mixed in with regular stock. Checking that damaged goods are stacked separately in the warehouse;
- Checking expiry dates on items with limited shelf life;
- In stored grain stacks, by lifting the top bag and feeling the bag underneath for heating, which can indicate germination/infestation in the stacks;
- Looking for swelling or rusting cans;
- Looking for flying insects that are usually a sign of heavy infestation;
- Watching for signs of theft;
- Checking in dark places using a good flashlight.

11.4 CONCLUSION

While building temporary shelters, along with the expertise from specialised agencies, local wisdom and traditional coping mechanisms should be considered while planning for temporary shelters. It is quite probable that traditional systems for temporary shelters are available in the area. Also, using the traditional system will be cheaper than an external design altogether. In any case, it will be useful to consult the community.

For warehousing and stockpiling, proper selection, supervision and control of warehouse and storage facilities cannot be left to the storekeeper alone. All officials in the field or attached to the operation must assume an active role to ensure that the supplies stored are adequately protected until they reach the beneficiaries. Warehouse protocols should be scientifically laid down and implemented.

11.5 KEY CONCEPTS

- | | |
|---------------------------|---|
| Temporary Shelter | : In the immediate aftermath of a disaster, it may not be possible to evacuate people immediately to officially designated shelters since road communications may be severely disrupted, as during floods, cyclones and earthquakes. Temporary shelters have to be set up, in the form of tents. Since stockpiling may not be available, food and medical supplies are airdropped in case of events such as landslides. |
| Designated Shelter | : Many existing structures at safe sites or otherwise well constructed structures such as schools, religious |

institutions, and hospitals, etc. can double up as designated shelters. Using hazard maps, official shelters are also created as part of disaster prevention on safe sites, which could be at some distance from the hazard site. All essential requirements are provisioned at such shelters.

- Warehouse** : Warehouse refers to a large building where materials can be stored. The Indian equivalent of a warehouse is a 'go-down.' Both, however, mean the same.
- Stockpile** : Stockpile refers to the stock of essential commodities, comprising perishable and non-perishable items which are needed using an emergency. Though stockpiling is indispensable; alternate arrangements are being worked out, such as, companies and non-profit organisations engaged in disaster response in contract with suppliers who ensure timely delivery at call.
- Protocol** : Protocol refers to the formal procedure or the rules and regulations that govern daily administration of an organisation. Breach of protocol results in bad precedents and hence, undermining of the organisation itself.
- Inspection** : Inspections have to be carried out periodically regarding stockpiling in warehouses to check for safe practices. Perishable items should be replaced on time and fresh supplies requisitioned.

11.6 REFERENCES AND FURTHER READING

Manual on Disaster Response, a Handbook for Emergencies, Church's Auxiliary for Social Action (CASA) at <http://www.christian-aid.org.uk/indepth/0307stor/04stormappendices.pdf>

Ten-point guideline for shelter provision by Prof. Ian Davis, prepared in the aftermath of the Kashmir earthquake, 2005.

Twigg and Ariyabandu, 2002, *World Disasters Report*, International Red Cross and Red Crescent Societies, John Twigg and Madhavi Ariyabandu (Intermediate Technology Development Group, South Asia).

UNHCR Handout, "Tools and Resources for Post Disaster Relief", reproduced by Asian Disaster Preparedness Centre, 2000, at, <http://www.adpc.at.in>

World Disasters Report, 2002, Chapter 1- Principal contributors: John Twigg (Honorary Research Fellow, Benfield Greig Hazard Research Centre, University College London) and Charlotte Benson, an economist specialized in the economic aspects of natural disasters.

11.7 ACTIVITIES

- 1) Contact organisations or government departments who are key players for relief operations during any emergency in your area. Study their mechanisms of stock piling and warehousing. Make a visit to the warehouse and interview the in charge. Compile your observations and prepare a report. If there is no disaster warehouse in your area, you can visit any large material storage facility and compare their systems with those discussed in this unit.
- 2) Make a list of facilities and items a family like yours will need if it has to live in a temporary shelter away from home for a few days. Make sure you include items of need for each family member. Identify special need items for children, old people and women.

UNIT 12 DISTRIBUTION OF RELIEF MATERIAL

Structure

- 12.0 Learning Outcome
- 12.1 Introduction
- 12.2 Steps in Relief Distribution
- 12.3 Types of Programmes and Distribution Systems
- 12.4 Logistics
- 12.5 Problems in Relief Administration
- 12.6 Conclusion
- 12.7 Key Concepts
- 12.8 References and Further Reading
- 12.9 Activities

12.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Highlight the modalities of relief material management and distribution;
- Understand various types of relief activities and planning required for relief operations; and
- Explain the process of relief in detail, including issues like logistics.

12.1 INTRODUCTION

Relief means meeting the immediate needs for food, clothing, shelter and medical aid for disaster victims. It provides assistance to save lives and alleviate suffering in the hours, days and weeks following a disaster. For high impact rapid onset disasters like earthquakes, relief operations have to be launched at very short notice and at very large scale. For creeping disasters like droughts the relief period may prolong to months or even years. The two-dominant/critical issues in relief distribution are politicisation of relief and the problem of 'scarcity amidst plenty'. In this Unit, there shall be an endeavour to understand the two problems and explore ways to evolve a better mechanism of relief distribution/procurement by understanding of constraints in the present arrangements.

12.2 STEPS IN RELIEF DISTRIBUTION

- **Planning for Relief Distribution**

Keeping in mind the panic that arises during any disaster, it is essential to plan before hand to ensure that the distribution of relief material in the immediate aftermath of a disaster is efficient and effective. An effective relief operation is more realistic if correlated with an efficient disaster preparedness plan. Every major disaster's impact could be

contained effectively to a certain extent and the loss minimised if a good preparedness plan is in force. Given below are some of the steps that should be taken before the disaster.

1) Establishment of Early Warning Systems

Science and technology in India have advanced and developed considerably to a state whereby early warnings in case of disasters like floods and cyclones are a reality. All agencies involved in disaster relief operations should monitor the information discharged by the early warning system and should be in touch with the concerned government agencies at regular intervals for up-to-date information on the setting-in and the progress of disasters like cyclones and floods. This would facilitate relief agencies to get prepared and ready for effective disaster relief operations. Agencies working in the areas should monitor the updates from the forecasting and warning agencies and should pass the information on to the others.

2) Liaison at the District Administration Level

Liaison with the various concerned departments at the district level in the disaster-prone areas prior to the manifestation of the disaster would open up better opportunity for the coordination, preparedness and relief operations. Coordination with the local government agencies is very essential for an effective operation and for the related formalities. A healthy relation with the government departments would also ensure the possibility to avail the infrastructure back up available with them. Entry into a disaster zone, if declared prohibited due to some reasons, would be easy if a healthy and positive relation is maintained with the district administration and they are aware of the credentials and capabilities of the organisation.

3) Planning with the “population-at-risk”

Planning with the ‘population- at- risk’ is very important in disaster preparedness and relief activities. This would enable the identification of the local resources, capabilities and existing facilities of the target or hit-areas. An interaction with the ‘population- at- risk’ would also generate a confidence in them to play a positive role in the relief operations in the aftermath of a disaster. A positive attitude thus generated within the population itself would contribute towards the disaster preparedness. It would also enable the planning of an effective relief operation, should the need arise.

4) List of Contact Persons

List of contact persons is an important element of disaster relief preparedness. List of responsible people from various concerned fields of operation in the probable disaster zones will help the coordination of the post-disaster activities there. Most of the relief agencies that rush to the disaster areas find it difficult to establish themselves during the first few days. Local contacts will enable a smooth entry to the disaster zone. The list of contact persons may be drawn from local emergency organisations, nodal government officials, non-governmental and community based organisations, prominent citizens of the locality who are interested in the issue, or those who are employed or involved with educational, religious and social service organisations.

5) Pre-Stocking

Pre-stocking of relief materials is always useful in making relief operations effective immediately. Pre-stocking will avoid the last minute rush to procure the materials, which

invariably would be in short supply after a disaster and will require time to procure, pack and transport. Materials for pre-stocking may include food grains, blankets, basic medical supplies, clothing, utensils, tents and other back-up equipment.

6) Alternate Routes

Alternate routes for the movement of the relief materials from other parts of the district, state or country into the disaster zone should be well worked out in advance. There is a chance that the direct route linking the disaster site with the regional centres would be cut off or else choked with traffic of outbound survivors or inbound relief teams. Continuous supply chain of the relief materials to the field teams is very critical and must be ensured through back-up routes.

7) Training And Education

Training and education is a very important component for ensuring sound disaster relief preparedness that will help make relief operations efficient. Training and education is essential both for the population 'at-risk' and the implementing personnel. The training and education aspect will have to be of a continuing nature to keep the system operational at its most efficient level at all times by keeping people reminded of their roles and by training and educating any new people that join at any time.

8) Mapping

Mapping is useful for coordination as it provides spatial distribution of information items including hazards, vulnerabilities and capacities. Maps should be prepared and maintained in an updated state in advance, with the following information marked on them:

- Hazards
- Natural features
- Settlement details with housing and other activity areas
- Vulnerable areas (high density, poor buildings, low-lying, etc.)
- Availability of materials
- Communication routes: Road/Rail/Air/Water
- Alternate routes
- Areas for evacuation
- Locations for potential relief camp sites
- Source/alternate source for water/food
- Location for warehousing/facilities

The Maps may be prepared at the following levels:

- Village/neighbourhood level
- Taluk /mandal/ town level
- District level

- State level
- Zonal level
- National level
- Time Factor

Time factor is an important aspect to be considered in an immediate disaster relief operation. An effective relief operation should be launched within hours and may need to continue for up to a few weeks, depending on the intensity of the disaster. A speedy operation would be more beneficial to the disaster victims since their very life and survival is at stake after a disaster.

12.3 TYPES OF PROGRAMMES AND DISTRIBUTION SYSTEMS

I) Feeding Programmes

Feeding programmes aim to provide individuals with free food to make up the difference between supplies at hand and basic needs. Where feeding is considered necessary for particular population groups, it may be provided in the form of cooked meals or dry rations. In practice, if feeding is necessary at all, an integrated package of measures should be envisaged, which is appropriate to local socio-economic situation as well as observed nutritional needs. The very clear separation, which is often made between general, and supplementary feeding, may not always be appropriate. The feeding programme, either the distribution of dry ration or arrangements for the distribution of cooked food, should be limited to the shortest possible duration. The duration may be ten days to fifteen days after the onset of disasters like floods and cyclones. For drought, a different strategy may be adopted, whereby a long-term food support programme may be necessary.

There are three types of feeding:

- *General Feeding*: Basic food/meals are provided for all members of all households within particular population groups affected by the disaster. Locally available food and which is more acceptable is provided. General feeding can be of two types: (1) Distribution of dry ration, (2) Distribution of cooked food.
- *Supplementary Feeding*: Additional food is given to select nutritionally vulnerable individuals to compensate for specific deficiencies. Usually, supplementary feeding is given to children and expectant/lactating mothers. Supplementary feeding can be in the nature of distributing high-energy biscuits/cakes or powder mix. However, proper instructions for the consumption or dosage should be well explained to the beneficiaries before distributing the same.
- *Therapeutic Feeding*: This type of feeding is usually undertaken for nutritional rehabilitation. Special intensive feeding is provided under close medical supervision for severely mal-nourished persons, usually children and old persons.

II) Distribution of Dry Ration

Distribution of dry ration is suitable where the disaster victims can cook themselves. It is also good since it involves the beneficiaries and keeps them busy instead of their sitting

idle and thinking of their trauma. It is better that the distribution is limited to ten to fifteen days' ration. Taking the logistic considerations, it is advisable that the ration quantity for the whole intended period is given to the victims at a time.

The procedure for the distribution may be as follows:

- Survey door-to-door in the target area/village and distribute tokens to each household against their acknowledgement on the beneficiaries list;
- Seek the help of local level government and local leaders while surveying. This will help eliminate duplications and identify the genuine beneficiaries;
- Ask the beneficiaries to collect the ration against production of the token handed over to them, collectively from the distribution point at an appointed time and place;
- Ensure that the distribution is made in the presence of a local government worker deputed by the District Administration. This is to facilitate transparency with the community as well as government authorities;
- Enforce strict crowd management while distribution takes place. If necessary seek the assistance of police;
- Distribution sites may be a public institution in the area, centrally located or the base camp office.

III) **Distribution of Cooked Food**

Logistic and management problems are more while attempting the distribution of cooked food to the disaster victims. It is always a healthy practice if victims themselves can organise the cooking and distribution process for their community. Distribution of cooked food should be resorted to only when there is no capacity in the families to cook their food, and it should be continued for the shortest possible time. The procedure may be as follows:

A) *Where community cooking/feeding is possible:*

- Organise the disaster victims to formulate a committee and assess the food/cooking requirements for the community to be fed;
- Concentrate on simple diet consisting of food items that are easily available in the market or at least in the district headquarters;
- Assess the number of days for which food aid is necessary and supply the community with at least 5 to 7 days of food stock and cooking requirements at a time;
- Cooking vessels may be purchased and provided to the committee. The community may use these vessels in the future for common purposes;
- Enforce strict supervision in regard to hygiene during cooking of the food and its distribution. Enforce discipline and crowd management systems;
- Ensure availability of good drinking water and maintain all sanitary/hygiene aspects in the kitchens;
- Open the kitchen for feeding at pre-determined timings only; and

- Food to be cooked should be on a thorough calculation of the required quantity in order to avoid wastage.

B) *Where community cooking and feeding is not possible:*

- Cook the food in a central kitchen and transport the same to the community;
- Food may be transported in bulk in vessels and distributed to the victims in the vessels they bring;
- Ensure that the vessels used for transportation of the food are properly closed during the transportation to avoid contamination;
- Also ensure that the vessels the beneficiaries bring to collect the food are clean. If necessary, arrange a drum with water to wash them before collecting their food;
- The food may be packed into required packets and the packets transported to the community and distributed to each individual;
- Seek the assistance of the community representatives in the cooking, transportation and distribution process;
- Cooked food should be distributed at the earliest to the beneficiaries, to avoid spoilage and bacterial contamination. It should be ensured that the beneficiaries consume the food soon;
- If packed in individual packets, the packets should be of good quality material and packing done in very clean environment;
- Every food packet should have a uniform quantity of food, as per planned ration rate;
- It is always advisable to prepare one type of food, avoiding varieties in order to help easy management of cooking process. However, it should be a different type of food at the next distribution round;
- Records have to be maintained as to how many people benefited from the feeding; a beneficiary list may be developed.

IV) **Distribution of Standard Relief Material**

Post-disaster material distribution should be very appropriate and need based. Instead of doing many rounds and giving random items on ad-hoc basis, complete family kits should be prepared and distributed in one go. One standard relief set usually consists of the following materials:

- Clothes for adult male and female, appropriate to local climate and culture;
- Clothes for male and female children, appropriate to local climate and culture;
- Mats and blanket/bed-sheets depending on local weather;
- Basic utensils for cooking, storing and eating;
- Tent or tarpaulin if needed;
- Dry rations to last for two weeks;

- Essential commodities like torch, footwear, storage bags;
- Soap, and toiletries based on needs and local practices; locally appropriate materials for women's sanitary needs; and
- Special provisions for families with infants.

All the above items are packed into one set and handed over to each household. The distribution process may be as follows:

- All the affected families in the selected disaster area should be considered for the relief assistance, irrespective of caste, creed and religion.
- The distribution process should not be influenced by religious or political motivations.
- Staff and volunteers will do door-to-door survey of the area affected by the disaster.
- Assistance of the local officer and local leaders/elders should be sought while undertaking the survey. Identification of the beneficiaries along with the help of local leaders will eliminate possible duplications and identify the genuine victims. It will also avoid complaints of biases.
- If there are doubts or complaints, names of the beneficiaries should be verified with the latest voters-list or with the village/municipal list at the village/municipal/ district office.
- In cases where the group is very large or confusion is anticipated in the distribution process, a distribution token system should be used. After verification of the name of the beneficiary, her/his name should be written in the beneficiaries list with all the particulars required therein. Her/ his signature should be obtained in the list against her/ his name and a serially numbered token issued. The token should be countersigned by the issuing officer.
- The beneficiary should be requested to collect the relief packet from the distribution point at the pre-determined time against token issued to him/her.
- At the distribution point, the relief packet should be issued or released to the beneficiary against the token produced. The token may be collected and cancelled to avoid double distribution against one token.
- As a general policy, either all equally deserving victims at a distribution center should get relief, or none of them.

V) Distribution of Other Material

Materials, other than the standard relief packets also could be distributed, provided:

- Material or item to be distributed is identified as needed and vital for survival
- Materials are available in the market to avoid delay in supply
- Logistic arrangements are made for procurement, delivery and distribution within the shortest possible time frame.

The distribution procedures could be the same as in the distribution of the standard relief packets.

Distribution Procedures

Time

Relief distribution should be carried out at the earliest possible, after the disaster. The first seventy-two hours are most critical for the community to survive due to exposure, injuries etc. This is the time within which they may need material support to cope with the shock. However, there may also be some local resources like retrieved items and local aid that may support them with food and basic items for this duration, and these may run out after the first two or three days. Hence, essential commodities should reach immediately, and longer-term material aid should reach within seventy-two hours. When following the token system for distribution, material should be distributed to the beneficiaries within twenty-four hours of the distribution of the tokens to them. If there is too much of a time gap, the beneficiaries may lose their tokens. This is likely since they are living in ruins or make shift camps in times of crisis and confusion.

Point

The distribution point may be sited in a convenient location. It is always better to fix the distribution point at a public place like a school or a community centre. Distribution for one or more nearby villages or hamlets or urban neighbourhoods may be arranged in one place. This would avoid transportation of the materials to various centres and thus save considerable time and money. However, the selected place should be within walking distance from all target-settlements.

Process

At the completion of the survey, the number of sets that are to be distributed would be known. The supplier agency office is then informed about the requirement of the materials, the point of distribution and time, through a material requisition form. Once the distribution decision is finalised, the following tasks need to be carried out:

- At the appointed/ fixed time, the required quantity of relief materials should reach the distribution point. Logistics for the same are to be organised systematically when there is more than one distribution point;
- The token holders or the beneficiaries should queue up and collect the materials against production of the tokens at the distribution points;
- Material or the relief packet should be handed over to the beneficiaries against the collection of the token. The token is then cancelled to avoid reuse of the same to collect the relief packet again;
- The collected tokens should then be counted and verified against the beneficiaries list and the number of packets distributed;
- After the distribution is over, the beneficiaries list should be verified once again, and the distributing officer or staff and local elder or leader as a witness, sign over it, declaring that the materials have been distributed. The representative of the local government revenue department also signs as a witness of the process; and
- This list is then produced at the local government revenue office and a distribution/ utilisation certificate obtained from the officer-in-charge.

12.4 LOGISTICS

Logistics is the practical art of supplying material support to a defined group of beneficiaries. Supplies and food aid must be delivered to the beneficiaries who are often located in remote geographical areas. Local transportation and communication infrastructures may have to be reinforced and a process of control and information feedback must be introduced to ensure that the material supplies reach the beneficiaries at the destination in the quantity and quality provided/prescribed. The field logistics systems must deal with the linear flow of material assistance from the origin to the final destination. It involves the transportation of supplies and their storage at key transit points, with control throughout the system until they are finally distributed to the beneficiaries.

Components of Logistics System

The necessary hardware to move and store the goods, including transport fleet, rail wagons, boats, barges, airplanes or other transport units, warehouses and other storage facilities constitute the relief logistics system. In addition, the following things are also covered:

- Records and reports to control the flow of goods through the system, including dispatch challans, requisitions, release orders, issue vouchers, take over certificates, stock registers, stock control cards, receiving reports and distribution reports.
- Personnel to monitor the system by conducting checks and inspections to manage and supervise the operation at key control points, and adequate support staff.
- When material is obtained locally, suppliers should deliver them to the control point in the logistics system nearest the location where the goods will be needed. In this way, local supplies into the main logistics system can be controlled from the receiving point also.

Considerations in Logistics Planning

Development of a planning formula for estimating future overall supply is needed. The system may not be designed to react to only the immediate needs, so it should be known where the system would be needed and for how long. The following issues need to be kept in mind:

- Plan alternate routes for transportation in case of local disruption such as destruction or collapse of roads and bridges.
- The logistics system should be simplified in order to reduce transit time, to minimise the number of stops and transfers and to consolidate facilities.
- Locating warehouses centrally in the areas they intend to serve.
- Maintaining of buffer stocks. Enough supplies should be kept available to meet the needs when logistics operation cannot keep up with demand.
- Contingency plans should be made before the situation arises. Development of alternate routes and readiness should start using them as soon as the problem is evident on the primary route. It is imperative to have alternate routes planned in order to avoid disruption in the delivery.

Transport by Road

When moving supplies inland, trucks generally provide greater flexibility than rail wagons, water barges, boats or aircrafts in terms of capacities, scheduling and routing. Depending on whether destinations can be reached by road or track, appropriate vehicle selection is determined by:

- The condition of the terrain and weather that will be encountered *en route*;
- The nature and quantity of goods to be transported;
- The time-frame and frequency of each trip and the duration of the supply requirement at particular destination;
- The availability of fuel, spare parts and servicing facilities;

Drivers transporting supplies should check their load carefully to ensure that the quantities and condition of the cargo coincide exactly with the information in the dispatch -challan. Otherwise they may be held responsible for damage or shortage. The receiver of the shipment must sign the truck challan to acknowledge delivery. Any loss or damage should be noted on the challan, indicating that the carrier is held liable for such losses.

Transport by Rail

If an adequate rail network exists between the disaster site and the place of procurement, rail is usually the cheapest alternative, especially for transporting large bulky consignments such as food. Whereas trucking rates vary with changing market conditions, rail rates are usually fixed for the given period. However, rail terminals and depots are rarely located exactly where they are needed. Rail transportation usually also requires road transportation at both ends to pick the material from its origin and deliver it to the distribution point.

Transport by Water

Navigable waterways often go where there are no rail and road routes, and the only remaining option is expensive airlifting of supplies or moving beneficiaries to the more accessible location. Relief supplies to small islands mostly have to be transported by boats.

Selecting this mode of transport depends on:

- Existing practices and current use of waterways;
- Availability of cargo carrying boats, their number, capacity and state of condition;
- Availability of personnel to handle boats;
- Docking facilities and personnel at the point of departure and destination for mooring and for handling, storing and transporting the cargo;
- Documentation requirements and permits to carry the cargo;
- Constraints and seasonal considerations;
- Cost and contractual options; and
- Availability of necessary insurance coverage.

Transport by Air

Aircraft are the fastest, most reliable means of transport, but airlifting supplies is expensive, and should only be considered as a last resort, when supplies are urgently needed in a location where no other solution is feasible. Transport by air may be used to supplement land or water transportation where the disaster site is geographically vast and land routes or waterways are long. Air transport is used for movement of high priority personnel and high value, low-volume supplies. In emergencies, airlifting may be an initial response to the situation, but funds are better spent providing the means to move much larger quantities of supplies using other modes of transport.

12.5 PROBLEMS IN RELIEF ADMINISTRATION

Problem of Over-Response

Though recent trends show an increased availability of resources for disaster response, it is not so for all disasters and for all aspects of disaster management. The belief that there were increasing resources available for disaster management was based on the outpouring of resources in the immediate aftermath of the South Asian Tsunami of December 2004. In the following months, the resources that flowed from all parts of the world broke all previous records of funding for disaster response, and also for the first time, the amounts from private sources exceeded government funding for disaster relief. However, this was an exceptional event and thus it prompted exceptional response. In the following months, when hurricane Katrina, a devastating tropical cyclone, hit New Orleans or when a killer earthquake hit the Kashmir region, the extent of response from the world donor community was far less. It must thus be carefully considered that resources will normally be far less than required, and therefore, careful planning and execution is needed for mobilising and utilising them in the event of emergencies.

Disasters are generally understood as events, which occur in the face of inadequate coping/response activity on the part of the sufferers. There are five main reasons that explain the problem of over-response during disasters (Training programme, 2002, Lucknow):

- The resources surviving in the disaster stricken community are greater than expected.
- People react to disasters with a spirit of concern and generosity. Assuming that disasters are deficient and the community is incapacitated; outsiders send resources into the disasters area in large amounts even if they have not been specifically requested.
- The determination of responsibility and establishment of procedures for assessing the overall resources needed are often neglected.
- Because of lack of clearly defined contact points, absence of compatible radio frequencies, non-functional or overloaded telephone circuits, and communication overload, it is often difficult for those offering help to contact someone who can tell them whether or not they are needed. Assuming that it is almost certain that help is needed and that too many resources are better than too few, they choose in favour of responding.
- It is often difficult for the recipients of unsolicited response to refuse it.

Problem of Scarcity amidst Plenty

Well-targeted relief, however, can provide a secure platform from which the disaster-affected can begin the slow process of recovery. Most of the development relief is ill-directed and too much. There are instances of corruption as well. It is now felt that instead of unplanned relief, relief could be administered with long-term resilience in view, which mandates honest and transparent administration.

Red Cross 'developmental relief' in Orissa, for example, included distributing saline-resistant seeds (plus the tools, fertilizers and agricultural training needed to make them grow) and promoting disaster-resistant housing for the most vulnerable. Communities themselves selected who should receive a 'model' house and villagers were taught how to construct them by skilled local masons. Rather than courting donors and governments, humanitarian organisations must advise and inform them, lead them to where the need is greatest, argue the case for assistance, and mobilise public opinion simultaneously. If donor or host government interest is misguided, agencies must be honest and courageous enough to say so (Sparrow, 2001).

Plugging the leaks means paying for labour and resources locally, instead of buying in ready made replacement infrastructure, housing and services from outside contractors. Plans for disaster recovery need to be employment-rich and locally rooted, rather than relying on flying in aid from abroad. Small, locally-based enterprises will be at the heart of rebuilding infrastructure and services. They also help absorb and retain incoming financial assistance.

If all the aid going into a post-disaster region is spent on externally supplied goods, services and consultants, then new money will quickly leave the area. If it is spent on services that are locally supplied, then aid will continue to circulate in the local economy.

The International Federation of Red Cross and Red Crescent Societies (in The Economist, 2005) has made the following recommendations to donors, especially logistics companies to make relief a viable enterprise:

- The organisation structure of most agencies involved in disaster reduction efforts suggests that relief and development are two divorced activities. That should be suitably remedied to promote integration of the two functions/divisions.
- Innovation should be promoted in reporting and evaluation mechanisms, which speaks of a developmental approach.
- Local structures should be strengthened, promoted, and worked through, to avoid antipathy that might possibly arise in case of mismatch.
- Constant learning and development approach should be adopted by all relief agencies with a view to bettering organisational functioning through periodic reviews.

Politicisation of Aid

Commercial and philanthropic interests often clash, which are being exacerbated by globalisation. Impacts of globalisation and climate change are draining recovery resources. Deregulation of investment is making it harder for host countries to keep profits in the place they were created. The poorer and more risk-prone a country is, the higher is the rate of return demanded by investors – up to 30 per cent in Sub-Saharan Africa. Meanwhile, factors boosting disaster resilience (for example, strong health and education, diverse local economies) are undermined by the structural adjustment programmes that

poor nations are encouraged to pursue. These programmes squeeze social-sector resources and concentrate on economic specialisation and primary commodity exports (Simms, 2001).

Recent United Nations (UN) research suggests global warming could raise sea-level appreciably, thereby submerging or inundating many major cities. Poorest regions are most at risk, as agricultural yields drop and disasters increase. Estimates for the costs of weather-related disasters over the next 20 years range from US\$ 6 trillion to 10 trillion, ten times the likely aid flows. Meanwhile, aid to the world's least developed countries has fallen a third since 1991. The poorest are most exposed to disasters, yet their contributions to warming the atmosphere are negligible. Hence, pulling people out of the poverty spiral is the best safeguard against disaster. Since livelihoods are being threatened by the current tide of globalisation, deregulation and hence, unfair market competition, generating sustainable livelihoods by proactive action in this regard would be the viable answer to the problem. Sustainable livelihoods may even hold the key to peace in war-torn countries. The poorest can best recover from today's disasters and conflicts on the foundations of strong, inclusive and diverse local economies, rather than trusting to the vague promises of the global economy.

Problem of Volunteers

To quote a section from the *World Disasters Report of 2004 as per* Milligan (2004-05);

"Too much help made a mess here," explained one spontaneous helper who drove to Golcuk, Turkey, following the 1999's massive earthquake, which killed 17,000 people. Hoping to bring relief, thousands of 'volunteers' created a 20-mile traffic jam obstructing rescue vehicles and equipment. Four years earlier, an earthquake destroyed much of Kobe in Japan, killing 6,400. The quake prompted over one million Japanese to spontaneously volunteer. Kobe's volunteers organised themselves. But the flood of Turkish helpers overwhelmed emergency services. Coordinating volunteers is a key challenge in rapid-onset disasters.

Rita Chick of the American Red Cross (ARC) says it's essential to match these volunteers with needs in affected areas. Following Hurricane Mitch, some first-time foreign volunteers, lacking language skills or training, were a burden. Local students proved far more useful and saved many lives. Some local Red Cross volunteers responding to recent disasters in Latin America found themselves more vulnerable than those they were helping. Yet they were denied food and plastic sheeting for their homes. Says one delegate: "Because they are volunteers they are treated as second-class victims" (*Chapter 7, World Disasters Report, 2001*)."

This brings to light some of the problems faced with and by volunteers during disaster relief operations. Successful disaster response depends on good volunteer management systems, which include identification, recruitment, retention, involvement and recognition. There are three essential requirements in volunteer management: understand exactly why an organisation needs volunteers; design meaningful volunteer assignments; and elaborate a recruitment strategy. When the disaster is over, they leave. To retain volunteers, organisations must recruit them to other, more permanent tasks. Attracting volunteers means showing people a pressing need and how they can make a difference. Retaining them requires ongoing training, strong supervision, feedback and recognition.

12.6 CONCLUSION

Disasters strike with little or no warning. They leave destruction, suffering and turmoil in their wake. The survivors need immediate support in terms of physical assistance and relief material. For efficient relief distribution, advance planning and preparedness is a must. There should be early warning systems, liaison with the government, involvement of the community, local contact lists, identified alternate routes and basic training and education to the local support personnel or volunteers. Distribution can include feeding programmes, distribution of dry rations and distribution of cooked food. Under non-food items there are standard relief kits comprising essential commodities for families. If the need is felt for other items, these are also distributed depending on the capacity of the relief agencies. The relief distribution procedure has to take into account issues of timing, distribution methodology, and location. Relief logistics is a highly systematic process of ensuring smooth transportation of personnel and handling of relief material from its point of procurement to the point of distribution.

12.7 KEY CONCEPTS

- | | |
|---------------------------|--|
| Food distribution | : Food is an essential requirement in the immediate aftermath of disasters as home and essential requirements are all ‘under siege’, be it war or natural disasters. Maintaining uninterrupted food supply is the most important requirement in the post disaster situation, as on it depends the number of people who will survive the difficult time. |
| Logistics | : Logistics involves materials management, including procuring, supplying and distributing goods. Logistics is an essential aspect of disaster management. Two of the widely accepted definitions are given below:

“‘The organisation of any project or operation, including transportation and housing, for example, the warehousing of goods as they are being transferred from one country to another (www.scottish-enterprise.com/sedotcom_home/help/help-glossary.htm)’”.

“‘The management of both inbound and outbound materials, parts, supplies, and finished goods. Includes such activities as; production scheduling, forecasting, customer service, order entry, inventory control, and product allocation among customers’” (www.crowley.com/glossary/default.asp). |
| Non-food items | : Non-food items include, clothing, medical supplies and other essential items like blankets, heaters, and tents, etc., which are necessary for disasters resilience. |
| Population at risk | : Population at risk depends on vulnerable segments that are at relative greater risk due to physical or socio economic vulnerability. Certain segments may be |

more prone to suffer illnesses like malaria, dengue etc. because of their physical location and poor socio-economic status.

- Standard Relief Kits** : Standard relief kits contain certain minimum essential items requirements that are commonly applicable in case of any/every kind of disaster, for example, common drugs, such as antibiotics, pain killers, first aid equipment such as cotton wool ointments for dressing wounds, vaccines for inoculation against diseases etc.

12.8 REFERENCES AND FURTHER READING

“Resource Management”, *Training Programme on Disaster Management*, 2002, Department of Public Administration, University of Lucknow.

Church’s Auxiliary for Social Action (CASA), *Disaster Response: A Book for Emergencies*

Milligan, Jean, 2004-05, in *World Disasters Report*, IFRCRCS.

Simms, Andrew, et.al, 2001, “The Ecology of Disaster Recovery”, Chapter-2, *World Disaster Report*, 2001, International Federation of Red Cross and Red Crescent Societies, Geneva.

Sparrow, John, 2001, in *World Disasters Report*, International Red Cross and Red Crescent Societies.

The Economic Intelligence Unit Briefing Paper, Sponsored by DHL-Asia-Pacific, 2005 “Disaster Response Management: Going the Extra Mile: Thailand and Indonesia, ” *The Economist*.

12.9 ACTIVITIES

- 1) Considering that you have to plan a relief operation for an earthquake hit area with 50 families in one village, draw a flowchart of activities that will need to be done to complete a successful relief operation of two weeks duration. It must start from the initial assessment of the area up to the final distribution of relief material.
- 2) For your village or neighbourhood, prepare a map and put the following information on it:
 - Natural features
 - Vulnerable pockets (buildings and areas that are more likely to get affected in terms of building damage, water logging, fire, etc.)
 - Availability of relief materials (markets, places of worship, community centres)
 - Access routes from outside
 - Alternate routes
 - Possible locations for relief material storage sites
 - Possible locations for relief distribution sites.

UNIT 13 EMERGENCY OPERATIONS CENTRE

Structure

- 13.0 Learning Outcome
- 13.1 Introduction
- 13.2 Features of the Emergency Operations Centre (EOC)
- 13.3 The Incident Command System
- 13.4 Organisational Set-up of EOC
- 13.5 Non-Disaster Time Activities of the EOC
- 13.6 Problems with EOCs
- 13.7 The Multi-Agency Coordination System (MACS)
- 13.8 Conclusion
- 13.9 Key Concepts
- 13.10 References and Further Reading
- 13.11 Activities

13.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Know in detail, the organisation and operation of the EOCs, including facilities, decision support system and telecommunication features; and
- Discuss the Incident Command System and the Multi-agency Coordination System.

13.1 INTRODUCTION

An EOC is the physical location where an organisation comes together during an emergency to coordinate response and recovery actions and resources. These centres may be alternatively called *command centres*, *control rooms*, *situation rooms*, *crisis management centres*, or using other similar terms. Regardless of the term, this is where the coordination of information and resources takes place. The EOC is not an *incident command post*; rather, it is the *operations centre* where coordination and management are facilitated. Emergency Operations Centres are needed *in addition to command posts* in case of disasters with multiple site impacts and in case of large complex disasters that demand significant involvement/mobilisation at macro scales, that is, the Central and State levels. Unlike a command post, an EOC is established away from the disaster site, often near government offices, like the local government / district or state headquarters, depending on the scale of the response needed. The main tasks of the EOC are; establishing priorities for the distribution of resources among the various sites and handling other *off incident concerns*, such as interaction with off site facilities such as shelters; ordering of resources from distant jurisdictions or through state or central jurisdictions, and overall coordination and communication between agencies handling different aspects of

emergency response. The idea of EOC is originally, a civil defence concept, though it is now adopted for peacetime activities as well. It holds special significance for disaster response which is no less an exigent situation than war, as it warrants mobilisation of manpower and material on an equally large scale (Training Programme, Lucknow, 2002).

Requirements in a National EOC

An EOC is always maintained in a state of readiness for being operationalised instantly at the onset of an emergency situation. Once a warning or a First Information Report is received, the EOC will become fully operational. During an emergency situation, the EOC is operational round the clock. The EOC is under direct command of the head of the disaster management agency.

The EOC stays operational throughout the year in a *preparedness mode*, working to take care of the extended preparedness activities of data management, awareness and training, which is essential for the smooth functioning of the EOC during crisis situations. During an emergency, the EOC gets upgraded and representatives of all emergency stakeholders man it round the clock.

EOCs can be at various levels of operation: *National level, State level, District level* and at *Organisational level*. The set up and scope of activities for each of these may vary as per the strength and the context of the area of operation but the basic aim of these is the same.

Proposed National EOC shall be the hub of all the activities related with disaster response in the country. For the effective management of resources, disaster supplies and other response activities, nodal points or centres will have to be established. These points will have to be well networked starting from the centre to the state and finally, to the disaster site. EOCs at the Centre and the State and Field Coordination Systems at the disaster site are the designated *nodal points* that coordinate overall activities and the flow of relief supplies from the Centre.

13.2 FEATURES OF THE EMERGENCY OPERATIONS CENTRE (EOC)

Planning, Organising, Staffing, Directing, Coordinating, Reporting, Budgeting (POSDCoRB) activities including principles of organisation including authority and responsibility, unity of command govern the efficient management and operation of Emergency Operations Centres (EOC). The basic features in an EOC to make it fulfill its operational requirements are:

- **Flexibility:** There is need to plan operations and adapt operational space to meet the needs of hazard events. For example, it is essential have sufficient space, equipment, furniture, administrative supplies, telecommunications, computer support, etc., available to satisfy mission requirements.
- **Sustainability:** It should be able to support operations for extended duration; for example, could be 24 hours/seven days a week during all emergency situations without interruption; to the extent practicable, be located in a place that is not a high-risk area for known hazards such as flood zones, other natural hazards, nuclear power plant, hazardous material sites, etc.

- **Security:** It should be guarded against potential risks and its operations should be protected from unauthorised disclosure of sensitive information. There should be sufficient security and structural integrity to protect the facility, its occupants, communications equipment and systems from possible threats/ hazards.
- **Survivability:** It should be able to sustain the effects of a realised risk and continue operations from the EOC or a fully capable alternate location. This implies that there should be an alternate EOC that can be activated and used if the primary one is destroyed, damaged, or is not accessible for some reason.
- **Interoperability:** They should be able to share common principles of operations and exchange routine and time-sensitive information with other EOCs, that is, they should be able to communicate with local government EOCs and emergency response teams at or near an incident site from the State EOC. Hence communication modalities such as radio codes, web connectivity et al should be primarily considered.

Aim of the Emergency Operations Centre

The aim of the EOC at the National level is to provide centralised direction and control regarding any or all of the following functions:

- Emergency operations,
- Communications and warning,
- Requesting additional resources during the disaster phase from areas neighboring the affected area,
- Coordinating overseas support and aid, and
- Issuing emergency information and instructions specific to Central and State agencies, consolidation, analysis, and dissemination of damage assessment data and preparation of consolidated reports.

Location of the Emergency Operations Centre

The EOC is set up at a suitable location with the entire infrastructure according to the given layout.

- The Central or State government or its designee initiates the activation of emergency services of the EOC;
- Activation of the EOC should immediately follow the threat perception;
- The individual who declares the emergency announces the location of the EOC;
- The individuals staffing the EOC are responsible for establishing communications with their respective departments through radio and telephone etc.;
- The EOC Chief or designee will determine what staff he/she deems necessary to effectively operate the EOC apart from the prescribed staff; and
- The designated officers of the police provide security at the EOC.

13.3 THE INCIDENT COMMAND SYSTEM

The Incident Command System (ICS) provides a management structure and system for conducting emergency operations. It is applicable to small-scale daily operational activities

as well as major mobilisations. The ICS provides EOC and operational staff with a standardised operational structure and common terminology. Because of this, ICS provides a useful and flexible management system that is particularly adaptable to incidents involving *multi-jurisdictional* or *multi-disciplinary* responses. ICS provides the flexibility needed to rapidly activate and establish an organisational format around the functions that need to be performed. It uses the concept of 'modular organisation', that is an organisational structure that waxes and wanes as per changing/altering requirements. The concept of the Incident Command system originated in the USA, where traditional organisations could not tackle effectively, the California wild fires in the 1970s. It was part of the FIREScope programme that was conceptualised/ originated as a result. The other part of the programme was the MACS or the multi agency coordination system that would be discussed subsequently (Section 13.7 of this Unit).

The Incident Command operates on modern management concepts such as Management by Objectives (MBO) for multiple capabilities in that an organisation should be equipped to handle multiple/complex emergencies; in the specific case of disaster management, different kinds of disasters; fires floods, earthquakes, man made disasters *et al* through technical capability and trained manpower. *Principles of Organisation*, notably, are kept flexible, implying span of control, unity of command, line and staff, specialisation, functional division, organisational structuring, communication, planning, staffing, finance *et al*. This also refers to the concept of modular organisation, in that the organisation is facilitated in expanding as new work is added and can contract when an organisational unit or work function is no longer needed. This dispenses with organisational rigidity that impedes mobilisation and performance of traditional organisations during exigent times. Resource sharing between involved organisations is an important part of the Incident Command System. It is attempted under the aegis of an umbrella organisation. No activity suffers resource constraint at any point, which often determines success/failure (Irwin, 2002).

Back-up EOC

It is always desirable that an alternate EOC is also established. This EOC should be a mirror image of the primary EOC and serve as a back-up to handle any eventuality, should the main EOC be rendered in operational due to any accident, disaster or any other reason. The main EOC may be established at the nodal agency, which is responsible for emergency management in the state, since it is the focal agency. The backup EOC may be at another location and be used during non-disaster times as a training centre for main EOC operations.

Event Information Tracking

Managing response and recovery operations involves tremendous amount of information. The EOCs job is to collect this information and to manage and control event information, information collation and dispersion as per requirements and response activities. Typically, the information flow will look something like this:

- Incident occurs
- Notification is sent to the staff
- Status is evaluated by EOC managers
- EOC is activated

- Tasks are assigned according to plan
- Resource allocation is done
- Task performance is laid out in terms of stipulations
- Status briefings and updates to stakeholders

Information Management

All of the information received during an emergency response operation will need to be managed and documented. A strong information management system is thus a must at the EOC. Emergency managers need to provide a robust command, control, and monitoring function that will:

- Above all else, be easy and efficient to use;
- Collect failure information to allow rapid and early contingency response;
- Track multiple incidents and resources;
- Communicate activities across the system; and
- Provide documentation capability.

Good information management tools can greatly help contingency managers in creating and organising their plans as well as in exercising and executing them. While contingency plans often end up in binders or files, a good information management system can make plans and supportive materials easily available to managers, thereby making disaster response functional.

EOCs should be able to perform all of the following functions:

- Operate an alert network
- Incident logging
- Team tasking
- Resource deployment and monitoring
- Managing status notice boards
- Executive briefings
- Documentation

EOC Decision Making

Strong management is needed during EOC operations. EOCs should be activated as soon as possible to ensure rapid decision making. During the incident response phase, the real-time tracking of incidents and response resources is critical. Resources may be in short supply while multiple requests for services pile up. An *operations log* is needed to fulfill the requirements of documenting, tracking, and managing the response to an infinite number of concurrent incidents.

13.4 ORGANISATIONAL SET-UP OF EOC

EOC comprises the following:

1) *EOC In-charge*

The in-charge is the primary role-player in the EOC, and is responsible for the overall coordination and decision-making in the organisation. He also reports the status of the EOC operations and the disaster situation to the Central and State authorities/agencies.

2) *Operations Section*

The Operations Section ensures smooth and planned functioning of the EOC. It will fulfill the following functions:

- Handle requests for emergency personnel, equipment and other resources;
- Designate responsibilities and duties for management of the EOC;
- Manage storage, handling and set-up of incoming equipment and personnel;
- Ensure medical care, feeding and housing for EOC personnel;
- Maintain documentation of resource inventories, allocation and availability; and
- Manage finances for EOC operations.

3) *Representatives of Line Ministries*

Representatives of the following line ministries or departments normally need to be present at the EOC to take part in the operations and facilitate quick coordination between the EOC command and their parent organisations towards ensuring quick information availability and decision making for disaster response:

- Information and Communications
- Health
- Transport
- Public Works
- Home
- Defense
- Agriculture and Livestock
- Rural/Urban Development (depending on areas affected)
- Irrigation
- Environment
- Finance, and
- Others, depending on the nature and location of the disaster

Suggested EOC Staff

Besides the departmental representatives who will participate in the EOC, certain specific staff positions are needed to conduct the basic functions of the EOC. These include:

- Emergency Management Director
- Chief Executive (s)
- Public Information Officer
- Communication and Warning Officer
- Liaison Officer
- Radio Operators
- Telephone Attendants
- Disaster Assessment Officer
- Police Liaison
- Fire Liaison
- Hospital Liaison
- Shelter Operations Liaison
- Messengers
- Resource Officer
- Security Officer

EOC Layout and Design

A properly designed EOC should serve as an effective and efficient facility for coordinating emergency response efforts. An EOC may serve a number of uses including, operations, training, meetings, accommodation and other uses. The EOC can optimise communication and coordination by effective information management and presentation.

The EOC must be sized to handle the maximum anticipated staff that would be called in the event of a major disaster. A minimum of 5 square metres per person is essential/required (10 square metre preferred) including restrooms, etc. The EOC should have the following features in a user-friendly layout and disaster resistant building:

- Projection Systems and Screens
- Operations Section
- Dormitories
- Recreation Room and Canteen
- Toilets
- Communication and Power Backup Control Room
- Store

Equipment Requirements

The EOC will need to operate round the clock, and may itself be subjected to adverse conditions due to the impact of the disaster. It needs to be equipped with the following

hardware and software for its efficient functioning:

- Resource Inventories and Databank of maps and plans at District, State and National level on a GIS platform for quick retrieval and analysis,
- State-of-art communication equipment for staying linked with the head office, headquarters of line ministries, field teams, media, and national and international support agencies,
- A mobile command vehicle with communication equipment,
- Work stations and communication lines for all representatives of the line ministries,
- Radios and television sets tuned to different news channels,
- Video conferencing facility,
- Projection equipment and screens,
- Emergency power backup, and
- Stock of drinking water, food, medicines, bedding and essential items required for personnel manning the EOC for long time durations under stressful conditions.

Resource Inventories

Resource inventories are useful in quick retrieval of vital information regarding availability and sources of rescue and relief material and personnel during times of emergency. Resource inventories are essential elements of EOC operations. Such inventories need to be prepared and maintained through regular updating at the national and state levels. Inventories include the following basic elements, and other locally relevant information:

- *Contact details* of all personnel and organisations concerned with emergency management;
- *List* with specifications and availability procedures, of all equipment that may be useful for responding to an emergency. This will include communication equipment, transport vehicles, earth moving equipment, cranes, tools etc. that are available with agencies within the jurisdiction;
- *List* with specifications and rate schedules, of relief material that can be sourced from local aid agencies and markets. This will include dry rations, tents and beddings, clothing, utensils, first-aid items and other basic necessity items.

Field Coordination System

The state and local authorities have to play an efficient role at the local level to support the EOC's requirements for field information and coordination. The EOC also needs to field its own field teams and through them, establish a Field Coordination System. The system will comprise:

- Field command
- Field information collection
- Inter-agency coordination at field level

- Management of field operations, planning, logistics, finance and administration, and
- Rapid Assessment Teams and Quick Response Teams.

13.5 NON-DISASTER TIME ACTIVITIES OF THE EOC

Non-Disaster time activities of the EOC are very crucial for the efficiency of its response in a disaster situation. These activities include:

- Ensure through appropriate statutory instruments that the relevant Disaster Management Plans are operationalised;
- Ensure that standard operating procedures for various actors are operationalised;
- Ensure that funding mechanism for operationalisation of the plans are established;
- Encourage sub-units in jurisdiction to prepare their respective Disaster Management Plans;
- Carry out specific vulnerability studies;
- Identify and interact with research institutions to evolve mitigation strategies;
- Serve as a databank to all line departments, planning agencies and others with respect to risks and vulnerabilities;
- Upgrade and update the disaster management plan according to changing scenario in the region;
- Carry out post-disaster evaluation and update the disaster management plan accordingly;
- Disseminate the disaster management plan to all stakeholders;
- Prepare personnel and organisational directories as well as resource inventories and keep them updated;
- Monitor preparedness measures undertaken periodically, and specially before the onset of known disaster seasons;
- Monitor training imparted to government officials, NGOs and other stakeholders;
- Monitor public awareness campaigns on disaster mitigation and preparedness;
- Receive reports and documents, warnings, and first information reports and submit the same to the head office for appropriate action; and
- Ensure that warning and communication systems in EOC infrastructure are in good working condition.

EOC Activation Procedure

- 1) On receipt of a disaster warning or a first information report, and after verification that the situation merits activation of the EOC, a meeting is convened to plan immediate steps;
- 2) Based on the ratification of the group, further course of action is determined;

- 3) The EOC, till then operating in the preparedness mode, is upgraded to the emergency mode. Concerned line ministries and departments are informed to post their representatives at the EOC on a round-the-clock basis with immediate effect.

Rapid Assessment and Quick Response Teams

Quick response teams of specialised personnel will have to be sent for effective management of the disaster situation. Depending on the magnitude of the disaster, two different types of teams may be fielded by the EOC:

- Rapid Assessment Teams
- Quick Response Teams (Search and Rescue Teams)

Rapid Assessment Teams

The Rapid Assessment Teams are multi-disciplinary teams comprising of four or five members. They mainly comprise senior level specialised officers from the fields of health, engineering, search and rescue, communication and one who has knowledge of the disaster affected area, physical characteristic of the region, language etc. These officials should share a common interest and commitment. There should be clear allocation of responsibilities among team members.

Quick Response Teams

Deployment of search and rescue teams can help reduce significantly, the numbers of deaths that would otherwise accrue. A quick response to urgent needs must never be delayed because a comprehensive assessment has yet to be completed. The following teams must be sent to the disaster site or disaster affected area as early as possible:

- First Aid Team
- Search and Rescue Team
- Communication Teams
- Power Team
- Relief Teams
- Shelter Teams
- Water and Sanitation Teams, and
- Transport Team

All other nodal department will keep ready their response teams, which may be deployed after receiving the rapid assessment reports.

Reporting Systems

Representative of the affected community directly informs either the nearest district administration office or any government official or an NGO, who then informs the district administration. If the information comes directly to disaster management agency, then the incharge will verify information. The disaster management agency, would call the State head of the affected State and the neighboring states to verify the scale and intensity of the disaster. Based on the information available, the EOC activation process will be initiated if deemed required.

First Information Report

The main aim of the first information report (F.I.R.) is to confirm the occurrence of the disaster event. It specifies the perceived scale and magnitude of a disaster and its effect on the local area and the people. It also talks about the steps that have been taken by the local administration to control the situation, the type of relief that may be required and the resources and services required for immediate emergency measures.

Initial Assessment Reports

The clear and concise assessment of damages and needs in the aftermath of a disaster is a pre-requisite for effective planning and implementation of relief and recovery measures. The objectives of damage and needs assessment are to determine:

- The nature and extent of disaster
- Damage and secondary threats
- Needs of the population

Two types of assessments that may have to be carried out are:

- Initial Assessment
- Technical Assessment

Technical Assessment Report

Rapid Assessment Teams will carry out the Initial Assessment. Line ministries will send specialist teams and prepare the technical assessment report to assess the losses and restoration of services. The following aspects will be covered in most disaster situations, but these may be determined by the EOC in accordance with the situational requirements:

- Health
- Housing
- Social impacts
- Food and drinking water
- Power
- Agriculture and livestock
- Telecommunication
- Transport
- Environment
- Industries

Leading ministries directly concerned in the given situation will set up their emergency operating center and update the EOC with regard to their activities. After the initial report and the technical report stages, the EOC incharge will reassess the situation of the site for deciding on further action.

Emergency Support Functions

Emergency Support Functions (ESF) is a thematic emergency management node comprising various coordinating agencies, which manage and coordinate specific categories of assistance to an emergency management effort. Each ESF is headed by a lead organisation/ministry responsible for coordinating the delivery of goods and services to the disaster area, supported by numerous other organisations. These ESFs form an integral part of the EOC. Extension teams and workers of each ESF will be required to coordinate the response procedures at the affected site, and with the parent organisation while representing the ESF at the EOC.

Primary and Secondary Agencies

The designated primary agency, acting as the nodal agency will be assisted by one or more support agencies (secondary agencies) and will be responsible for managing the activities of the ESF and assisting the EOC in the rescue and relief activities and ensuring the mission is accomplished. The primary and secondary agencies have the authority to execute response operations to directly support the EOC.

13.6 PROBLEMS WITH EOCs

In most cases, EOCs have worked well. Even where/in which case an EOC has not been planned/provisioned for in disaster planning, one is likely to come up anyway/spontaneously in case of an emergency as a central hub of activity. Though a study of 180 local disasters has brought to light the high success rate of emergency operations centres, certain problems are inevitable (Training Programme, 2002, Lucknow).

The Number of EOCs

A number of EOCs are likely to emerge in different areas, which might make the disaster situation chaotic. Outside agencies, such as private business or civil society might not know whom to contact, where and when. Inter-organisational coordination might become an insurmountable problem. Therefore, if a disaster strikes some districts in one state, state would be the appropriate level for an EOC.

Alternative EOC Sites

Provision is seldom made for an alternative site in case the original facility could not be used or was abandoned due to damages from flooding or earthquake, etc. It has been estimated that in as many as one-fifth of disasters the necessity of moving the center became a problem. In at least three cases, it was due to flooding. Such possibilities should be explored, using floodplain maps.

Knowledge about EOC Location

Case studies have brought out incongruities as key people and organisations not being aware about Emergency Operations Centre, because, either, they did not figure in disaster management plans, or because its location was not specifically known as it did not even feature in disaster management drills.

EOC Management Responsibility

Responsibility regarding management should be specifically stated in the disaster plan itself. Often problems arise regarding what space or communications equipment should be

allocated to which organisation; that should be allowed access to the EOC, whether, VIPs, or the media, non-governmental organisations, etc.

Presence of those with Decision- making Authority

Manpower deployed in Emergency Operations Centres usually comes from the middle rungs of relevant/respective organisations. These personnel are oriented to following orders of their superiors strictly rather than exhibiting leadership, innovation and creativity, which are required during emergencies. Hence, it is opined that high-level personnel from involved/concerning organisations should be involved.

Organisations represented at an EOC

Certain crucial private sector organisations such as the Red Cross and private utility companies tend to get excluded from the EOCs. Hospitals are another crucial service not included in the EOCs. Certain non-local groups, operating at the state or regional/national level are also not included as by the time they approach, perhaps the initial response phase is over or the membership has already been decided.

Also, the phase in disaster management during a particular time period must be a factor in deciding membership; for example, in the pre- disaster phase, agencies responsible for rehabilitation and reconstruction may not need to be mandatory participants, rather those involved in warning, preventive, preemptive planning/activities may be engaged. Hence, the scope of activity and participation should be need based and therefore flexible.

13.7 THE MULTI-AGENCY COORDINATION SYSTEM (MACS)

The MACS and the Incident Command System originated in the FIREScope programme after traditionally managed fire services failed to control the wild fires in California in the 1970s, as explained earlier. (The Incident Command System has already been discussed earlier in Section 13.3 of this Unit).

While the Incident Command System (ICS) was designed primarily for on-scene coordination, the MACS were mandated with region wide functions, as:

- Information Management;
- Situation Assessment; and
- Resource Allocation.

The MACSs house computer databases, which connects them with the incident command post and all other agencies involved in fire control. It is administered through an operation coordination centre (OCC), which acts as the central resource and information coordination point.

For Situation Assessment, the following information is needed by the OCC:

- Geographic Information; including topography, fire risk, and man made structures
- Current usage and availability of fire fighting resources from the various agencies
- Current and predicted weather conditions

- Current and computer predicted wildfire involvement, including damages sustained; estimates of property threatened; and involved access, terrain and vegetation
- Current and predicted effectiveness of fire suppression activities.

Resource needs are assessed by involved organisations for separate operations at the incident command site. Resource allocation decisions are taken jointly at the OCC. The administration of the MACS and decision-making are organised in such a way that it does not usurp the functions/authority of other organisations; rather participants from various involved organisations run it.

13.8 CONCLUSION

Emergency Operations Centres are essential for effective direction, control, and coordination of emergency response efforts. They may operate at national, state, local or organisational levels, yet at each level, the basic purpose of an EOC is to coordinate the multi-sector, multi-agency, multi-level response activities during or immediately after an emergency.

An EOC has a clear command structure, with one-person in-charge and a team of technical support staff and external stakeholders. The line ministries and other departments that are responsible for functions critical to response are also represented at the EOC. These are in the form of Emergency Support Functions, under which again there may be a number of agencies involved as primary and secondary agencies.

The EOC needs to be in a physically strategic facility, with a disaster resistant building, and with all required facilities such as communications, power, security, meeting facilities, and support facilities for the staff manning the EOC.

13.9 KEY CONCEPTS

- Emergency Support Functions:** Transportation and communication, *et al*, which are secondary but nonetheless crucial, or delivery of mainline services, are termed support functions.
- First Information Report** : First Information Report is the official complaint filed with the police by the victim of threat to person or property or any other unlawful activity of which he may be a victim. The police commence investigations with the filing of the first information report.
- Initial Assessment Report** : The Initial Assessment Report will give the immediate picture about the damage scenario. The immediate first aid, search and rescue will depend on the initial assessment report. Since disaster involves many agencies, it would be a multi- disciplinary effort.
- Technical Assessment Report:** After the initial assessment report, detailed reporting would be attempted by various line ministries, through their specialist personnel, such as health and housing who would assess the situation from their perspectives.
- Rapid Assessment Team** : Rapid assessment teams carry out initial assessments. These comprise specialists from various technical

agencies such as health, engineering *et al* to communicate a quick review of the situation and the resource needs.

Quick Response Team : Quick Response Teams comprise trained personnel who are kept in a state of readiness to meet emergency situations. They are equipped with state-of-the-art technology. Their preparedness is kept updated with drills and exercises.

13.10 REFERENCES AND FURTHER READING

Government of India *Report of High Powered Committee* for Preparation of Disaster Management Plans, 2001, New Delhi

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13.11 ACTIVITIES

- 1) Imagine that there is an earthquake of high magnitude. Plan how the Emergency Operation Center will work, how the staff members will perform their duties and finally handle the situation successfully. List the primary Emergency Support Functions required in the EOC for responding to an earthquake situation.
- 2) Prepare a detailed flow diagram after doing the above exercise indicating how the information flows during emergency operation, and discuss the shortcomings in the operation of the EOC and how the performance of the EOC can be made better.

UNIT 14 DAMAGE ASSESSMENT

Structure

- 14.0 Learning Outcome
- 14.1 Introduction
- 14.2 Essential Features of Damage Assessment
- 14.3 Types of Damages
- 14.4 Damage Reports
- 14.5 Conclusion
- 14.6 Key Concepts
- 14.7 References and Further Reading
- 14.8 Activities

14.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the concept and significance of Damage Assessment; and
- Get an overview of the various levels and types of assessments, types of reports and reporting formats.

14.1 INTRODUCTION

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, or Union? Emergency response can be more effective, equipment and personnel can be better used, and help can be provided quicker if a thorough damage assessment is performed beforehand. The basic objectives of damage assessment could be summarised 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;
- To make a detailed assessment regarding requirements for long-term relief and rehabilitation planning; and
- To identify focus areas for the purpose of ‘retrofitting’ actions in similar future situations.

Damage Assessment is therefore *a prerequisite* for effective disaster response effort. For effective decisions, officials responsible for organising 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; minimise injury, damage and loss; prevent any further escalation; prevent secondary hazards and inform people who need to know. Well-organised response will also help in building confidence and enhancing the credibility of the administration.

Relief operations are essentially about *the management of information and resources*, which is based on assessments and reports carried out from time to time. Information is needed at all levels of administration but the nature of the information required varies from one level to another. Good assessment and reporting require forethought; hence, the assessment and reporting system should be established during the preparedness planning stage.

Damage assessment is also a multi-disciplinary exercise involving officials from a cross section of experts and administrators from police, fire, health, engineering, public works, social scientists, non-profit organisations, community *et al* to get a comprehensive account of losses for adequate future mitigation planning. Some of the data required is already available in the form of baseline data (maps, population statistic etc.), which however must also be supplemented by *real time* information regarding the extent/nature of on going damage during a disaster event, from the damage site (mostly in the form of incoming reports from various sources after the disaster, (from the disasters scene) as pre- disaster estimates, however accurate, may not provide sufficient information.

14.2 ESSENTIAL FEATURES OF DAMAGE ASSESSMENT

Flow of Information

There is a clearly defined sequence to managing information:

- Converting raw data to useful information;
- Information input;
- Sorting (grading, collating, discarding what is unreliable);
- Evaluation;
- Decision making;
- Information output (dissemination); and
- Action

For example, specific objectives for damage assessment in the aftermath of cyclones and droughts, as per the *University of Wisconsin Disaster Management Centre* (Cuny, 1995), would include:

- Identification of the extent of damage or loss
- Identification of the types of assistance needed
- Identification of crops that can be grown as an interim substitute

- Determination of the amount of seeds, fertilizer and tools needed, the resources available in the area, and the amount of supplies required from outside the affected area
- Identification of local institutions that could carry out the program and their capabilities
- Identification of the level of farming skills in the affected community
- Determination of technical assistance requirements
- Determination of the receptivity of local institutions and the public to proposed agricultural rehabilitation activities.

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. Also note agricultural land forms such as terraces or contour farming (or lack thereof).
- 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; droughts dry up aquifers; wave action can destroy irrigation channels and desert windstorms can erode or fill shallow irrigation channels in arid zones.
- Determination of supply needs meaning, a determination should be made whether additional seeds, tools, fertilizers, etc., or alternative seeds could be planted immediately. For example, replacing traditional varieties of rice with a fast-growing variety may be possible in some cases, yet this might require introduction of needed fertilizers.
- 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. The time needed to plant certain crops, the normal growing season, and information about seasonal availability or constraints to certain types of crops is vital. 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.
- Institutional preparedness, studying ministries/departments engaged in disaster management, whether, disaster plan, contingency funding, official maps are in place, etc.

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.
- Alternate supportive projects; also possibly for how long; leading to articulation of long-term strategy for generating sustainable livelihoods and therefore achieving risk reduction in the area.

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. From a long-term perspective, damage assessment scrutinises the mechanisms of failure that took place during the disaster. It is called *Detailed Damage Assessment*. These studies are very useful for all prevention and mitigation efforts for disasters in the future.

Rapid Damage Assessment

The official agency for reporting estimates of disaster damages is usually the Revenue and Relief Department of the state government, as they are also the authority for distributing relief to affected persons. As usual, 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. However, relief agencies including NGOs also have their own damage assessment systems and teams to carry out the assessments. The basic items covered in rapid assessment are:

- Name of the place
- The causative disasters
- Date and time of disaster strike
- Area affected
- Total number of villages or neighbourhoods 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.

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
- Rough estimate of the total financial loss in rupees

14.3 TYPES OF DAMAGES

In order to perform effective damage assessment, one must know various types of damages that are required to be taken into consideration. Among others, the important ones are mentioned below:

Damage to Buildings

The damage caused to buildings by the various disasters may be categorised as loss

under the following heads:

- The loss of the main building
- The loss due to failure of other components whose damage is attributed to the main building damage
- Area covered by the collapsed structure
- Death or injury to life due to building collapse
- Loss incurred in terms of debris removal and restoration
- Loss of revenue during the idle period

In addition to these, there would be socio-economic costs as a consequence of the disaster, which would add to the loss under the heads listed above. Building damages, on the wider scale, usually are most relevant in terms of damage to houses, more than other buildings. Damage to house property is estimated in terms of the number of households affected, reporting percentage damage, and estimated repair cost per household. This estimation is needed for all houses, but under classified categories of *Kutcha Houses*, *Pucca Houses*, and *Semi-pucca Houses*. This is required in order to carry out a value-based assessment.

Besides the house structure damage itself, there is also an aspect of household asset damage, which has to be taken into account. Damage to house structure can cause resultant damage to household goods, artisan assets and other productive assets stored in the house. These need to be accounted for in terms of average value of damage per household, in rupees.

Damage to Land

Damage to land due to disaster could be short-term damage, as in land rendered useless due to coverage by debris of silt, and loss of standing crops, or else it could be long-term damage as loss of productivity of land. The most important in the immediate post disaster scenario is the aspect of agricultural loss through land destabilisation.

Crop damage is assessed in terms of percentage of households reporting damage under the following heads:

- Area damaged per household (ha.)
- Production loss per hectare (quintals)
- Production loss per household (quintals)
- Value of production loss per hectare (Rs.)
- Value of production loss per household (Rs.)

Besides the damage to direct land attributes such as crops, there is also long-term impact on the productivity of the land itself, which is felt long after the disaster, mainly in case of floods, after the waters recede. The long-term impact on crop production could either be favourable or unfavourable. The favourable effect would be in the form of *deposit of silt* on land resulting in rise in the fertility of the soil, which manifests in crop yields. The unfavorable effects would be in the form of *sand castings* rendering the land unfit for

cultivation. This generally affects the production of Rabi crops after the floods. This effect can be assessed in terms of variation in production of the crop after floods, in terms of:

- Yield per hectare (quintals)
- Normal yield per hectare (quintals)
- Percentage variation in yield

Impact on Human Lives

The most disastrous and immediate impact on human lives is in terms of loss of lives by deaths that may occur due to the direct impact of the disaster, or through indirect impact as in the case of building collapses, fires etc. Injuries are the second level of impact of a disaster on human lives, and result from the same sources as deaths. The impact on lives in terms of deaths and injuries has to be estimated not only in numbers, but also in terms of the expenses incurred due to death or injury, as also the loss of productivity of the persons affected due to death, illnesses or disability, etc.

In a longer-term perspective, the impact of the disaster is also manifest as/in morbidity. Usually after a certain gestation period, which may be about two weeks after the disaster, diseases start to set in, due to unsanitary conditions resulting in contamination of drinking water and food. The affected persons, who may be housed in makeshift relief camps, might have no access to proper civic services, and as a result, vector borne diseases affect them, which may take the form of an epidemic if left unchecked.

Once again, the impact of the sickness due to disaster is felt in terms of expenditure on treatment and loss of employment during the sickness period. This may be assessed under the following heads:

- Total number of sample households
- Percentage of households reporting sickness, and the kind of sickness
- Average number of persons reporting sickness per household
- Average duration of sickness (days)
- Average expenditure on treatment per household (Rupees)
- Average employment lost per household (days)
- Average loss of income per household (Rupees)

Besides the physical impact of death, injury and morbidity, and their resultant financial implications, there is also a purely economic impact on human lives, which is in terms of loss of employment due to dislocation and disruption of routine activities due to the disaster. For assessment of this impact, it is necessary to first collect information on the total number of households, number of households reporting wage employment, and average number of wage earners per household in the affected area. An inventory has to be prepared enumerating the following factors:

- Average employment days per household
- Average earning per household (Rupees)
- Average earnings per earner (Rupees)

These factors have to be accounted for in the disaster scenario context, as actual figures in the post-disaster scenario, as well as in the situation in case there was no disaster. The comparison of these two scenarios would give a *gross loss in employment due to the disaster*.

The loss of employment can be further classified according to the *nature of employment*. In a typical regional setting, the classifications adopted could be:

- Agriculture
- Dairying
- Fisheries
- Non Agricultural Labour
- Artisans
- Business/Trade
- Service
- Others

Damage to Live Stock

The damage to livestock, namely cattle, other animals and poultry, which are a very important asset for rural households, is generally assessed in terms of the number of households reporting loss, and the per household value of livestock lost in terms of rupees. It is generally observed that loss of livestock takes place because they are not moved out at the time of disaster threat, or else because people flee the area, leaving their livestock tied up or enclosed, with no means of escape. In this light it has been observed that in case of the floods, the loss of livestock is usually low in areas with high flood zones, because the people expect a disaster, and move out their livestock in time. Losses are high in low flood zones where severe floods are not so frequent, and when they come, they take the people by surprise, and they are not able to move their livestock out in time.

14.4 DAMAGE REPORTS

There is a clearly defined sequence to the process of managing information. In this sequence, each step is as important because on it depends the effectiveness of the subsequent step. The information at various stages of the disaster assessment process is in the form of different reports. The reports vary in terms of their timing and detailing. *The Major Types of Reports are:*

Flash Report (sometimes called First Information Report or SOS Report)

Flash Report should be submitted very quickly. Its purpose is simply to confirm that the disaster has taken place and that steps are being taken to cope with it and to give a first indication of the sort of external relief that might be required, and to inform the sources that further reports would follow shortly.

Initial Report

Initial Report should follow the flash report as soon as possible (within a matter of hours).

Its purpose is to inform the recipients of the severity of the disaster and, more importantly, by relating the severity of the disaster to coping capacities, provide the information needed to start mobilising resources from outside the affected area for timely help. The report should therefore, briefly summarise:

- The severity of the disaster (without necessarily providing precise figures)
- Actions being taken locally
- Local coping capacities (including locally available resources)
- The immediate priorities for external relief, where it is required and in approximately what quantities
- The best logistical means of delivering that relief, and
- a forecast of possible future developments including new risks.

As per the situation, the needs and priorities will change over time. An assessment only describes the state of affairs at the time the assessment is made. An initial assessment should, therefore, also establish the system for subsequent reports.

Interim Report

Interim Report should build on earlier reports providing additional and more precise information. To begin with interim reports should be submitted every 24 hours at the same time every day (the time being determined by the recipient according to needs) and thereafter, at intervals decided by the recipient. As time goes by, the emphasis of interim reports shifts from the needs for relief to the needs for rehabilitation and reconstruction (for example, repairs to damaged structures, restoration of agriculture, animal husbandry, fisheries and industrial production). It is not necessary to repeat what has already been said in earlier reports unless the earlier details require updating. Interim reports should provide forecasts (with inputs from specialists and people who have experience of previous disasters) and highlight information, which may not otherwise be obvious to the recipients, for example:

- Potential problems
- Changes, patterns, trends and indicators
- Particulars of especially vulnerable groups, and any other special concerns.

Specialist or Technical Reports

They provide supplementary technical details by/for specialists (for example, engineers and officials responsible for emergency health care).

Final Report

This will be a summary of:

- What happened;
- How the response was managed; and
- The lessons learned

In preparing a report, the writer should put himself in the position of the people to whom he is reporting and ask himself, "What do they need to know in order to meet their responsibilities and to make the right decisions?" A report should not be packed with unnecessary data, nor should it be delayed because of insufficient information. It is better to say, "we do not have as much information as we would like but, on the basis of what we do know and our experience, in broad terms, the situation is as follows and we estimate the needs to be in the following range... we shall provide more details as soon as we can". The details provided in reports should be consistent. Conflicting reports from different sources can cause confusion. Desirably, reports from one level of administration to another should be in a consolidated form.

Reporting Formats

Given that reports will be received from many sources, it is essential that their formats be standardised so as to facilitate the process of analysis and collation. Likewise, there should be a common understanding of the terminology used. It is therefore better, that the recipients rather than the writers design the formats. This will ensure that the information is presented in the way that is most helpful to the people who have to act upon it. Reports should be a balance of narrative, data and graphics, and they should be formatted so that they can be transmitted electronically. Formats should be as simple as possible and should, like check lists, guide the reporter (who may be inexperienced in organising disaster response operations) through the sequence of stating the problem, identifying the current status of the response, identifying unmet needs (shortfalls or gaps) and decision-making.

To keep the formats simple it is better that they are presented in a series of separate parts. This will also make it easier for the recipient to distribute the parts for action by different desk officers. Suggested parts might include:

- Evacuation
- Search and rescue
- Protection
- Medical and Health
- Shelter and clothing
- Food (including cooking utensils and cooking fuel)
- Water
- Sanitation
- Lifeline systems (communications, power supplies, transport, etc).

The person responsible for completing each part should be clearly designated. Each part should indicate the need for relief workers, supplies and relevant logistical requirements. Unless otherwise stated, the provider should assume that the relief he supplies must be sufficient (for example food and accommodation for relief workers, transport and drivers, fuel, storage, maintenance, etc). It is often helpful to indicate what is not needed (which also shows that that particular item has not been overlooked).

Quantification of Needs

Needs should be communicated in as precise terms as possible, possibly quantified. As articulated in the Asian Disaster Preparedness Report on Damage Assessment Needs, (2000).

- X Search and Rescue Teams per Y missing people
- X items (plastic sheeting or cooking sets) per family
- Shelter for x percent of homeless people (on the assumption that many will have found their own shelter with neighbours or family members further a field)
- X grams of staple food per person for Y days
- X grams per child per day for Y days (for supplementary feeding)
- X litres per person for Y days.
- X tons/litres to create reserves.

The terminology used should be precise, for example, 'damaged' should refer to some predetermined criterion to describe the degree of destruction to a specific 'element; it should not be a generalised description that does not communicate the real damage.' For example, in terms of *usability*, it could be:

100 per cent damage: Structure is unusable; cannot be repaired.

- > 75: Major structural damage, Unsafe for use, Repairable within 1 month.
- > 50: Significant structural damage, hence, unsafe for use. Repairs will take more than one week.
- > 25: Some structural damage but safe for limited use, Repairable within 1 week.
- < 25: Minor structural damage: usable.

Correct estimations should be communicated to international donors so that right kind of assistance in requisite measure reaches the needy. Timing is important since procedural formalities such as customs clearance, etc. take in time. Officials carrying out assessments should be properly trained in the job.

Example from Aceh, Indonesia

The International Organisation of Migration and its partners conducted a damage assessment of 600 villages in 28 sub-districts at the request of the government of Indonesia in the aftermath of the December 2004 Tsunami. Select portions from the report are produced (IOM: 2005):

Housing and Settlement Areas

- Total Inspected Settlement Areas: 2976.49 hectares (15.8percent of which was totally destroyed and 14.6percent suffered major damage).
- Total Inspected Houses: 91,118 units (16.8percent destroyed and 21.3percent sustained major damage).

Public Buildings

- Total Inspected Health Facilities: 359 units (22.3percent destroyed and 26.5 per cent sustained major damage).
- Total Inspected School Buildings: 1,065 units (35.2percent destroyed and 36.2 per cent sustained major damage).
- Total Inspected Religious Buildings: 2,175 units (54.8percent totally destroyed, 22.1 per cent suffered major damage).
- Total Inspected Government Buildings: 468 units (22.9 per cent destroyed, 25 per cent sustained major damage).
- Total Inspected Markets: 196 units (53.6 per cent destroyed and 22.5 per cent sustained major damage).
- Total inspected shops: 1,013 units (48.3 per cent destroyed and 16.4 per cent sustained major damage).

14.5 CONCLUSION

Damage assessment is an important tool for information regarding the extent of a disaster's impact, and forms the basis for immediate rescue and relief operations, as well as long-term rehabilitation and recovery programmes. Rapid assessment techniques are applied for quick assessment and immediate relief. Detailed damage assessment is a follow up activity that is more elaborate and helps plan longer-term interventions. Damage is mainly in terms of *Human lives lost; Injuries, Disease, Livestock lost, Land* and its attributes such as crops and structures, *Infrastructure*, including buildings and roads etc. Assessment of damage is required in terms of area covered, intensity of damage, households affected, and finally all this has to be converted in terms of economic loss, and represented in terms of rupees lost and required for restorative activities. Damage assessment reports are prepared at various stages of the disaster response process, and provide various levels of details depending on the timing of assessment. It is always advisable to have advance preparedness of damage assessment and reporting systems, and to have consistency in the approach and the formats of the damage reports. This goes a long way in ensuring good information communication leading to rapid and efficient disaster response.

14.6 KEY CONCEPTS

- | | |
|--------------------------|---|
| Assessment report | : Assessment Report gives information about the nature and extent of damage to specific 'elements at risk', <i>animate</i> (human and livestock population), and <i>inanimate</i> (houses, buildings, infrastructure) to communicate precise requirements to the government and other national and international agencies involved in relief, and long term preparedness. |
| Damage scenario | : Description of the location of the impact of a disaster and description of the extent of damage from it, to each specified element at risk, involving physical |

infrastructure, people and livestock make up the damage scenario. Real time data regarding disasters is communicated from the site of impact which aids/forms the basis of subsequent disaster preparedness/planning.

- Detailed assessment** : Assessments are not attempted in terms of gross averages, rather in terms of detailed figures as, for example, the number of houses damaged; to what extent; repairs/replacement required; number of injured; kinds of injuries suffered; in exact figures; the medical assistance required accordingly, etc.
- Rapid assessment** : *Base line data (existing information)* on disasters is combined with *real time* information from the impact scene during disasters to communicate needs and procure supplies on time from different sources, national and international. Rapid assessment requires good logistics and expertise of personnel.
- Rehabilitation plan** : Based on needs articulation with active ‘consultation’ with communities, rehabilitation plans are prepared as per feasibility and practicability. Rehabilitation plan is important since vulnerability conditions need to be rectified, henceforth, and not reinforced as might happen in case of unplanned restoration, in settlement types and construction, site selection etc. Livelihoods have also to be arranged for. Hence, both physical and socio economic vulnerabilities are tackled in rehabilitation plans.
- Reporting format** : The sequence in which information in a report is communicated is called the *reporting format*. Format is significant because needs are to be arranged as per criticality and communicated to aid agencies, in order of priority such as: evacuation, search and rescue, medical, protection, if law and order were disturbed, shelter and clothing *et al.*
- Rescue and relief plan** : Based on real time data, subsequent rescue and relief plan can be organised. In case of lack of preparedness on the part of the administration, rescue and relief is a hastily arranged /unplanned undertaking. However in subsequent disasters, planning is imperative, to minimise loss of life at least, if not property.
- Silt** : Silt is fine dirt that is suspended in water. Siltation is the build-up of silt that is suspended in rivers or other bodies of water.
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14.7 REFERENCES AND FURTHER READING

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14.8 ACTIVITIES

- 1) With the guidelines given in the Unit, prepare a rapid and a detailed damage assessment form. List the skills required in the assessment team members to be able to carry out the assessment as per your forms.
- 2) Prepare specimens of *Flash*, *Initial*, *Interim* and *Final* report. Discuss how the depth of information increases with time, and how the teams need to get more specialised and require more resources for reporting.

UNIT 15 REHABILITATION AND RECONSTRUCTION

Structure

- 15.0 Learning Outcome
- 15.1 Introduction
- 15.2 Concepts of Rehabilitation and Reconstruction
- 15.3 Types of Rehabilitation
- 15.4 Guiding Principles of Rehabilitation and Reconstruction
- 15.5 Post-Disaster Story: The Tsunami Aftermath
- 15.6 Problem Areas in Disaster Recovery
- 15.7 Interlinkages between Recovery and Development
- 15.8 Conclusion
- 15.9 Key Concepts
- 15.10 References and Further Reading
- 15.11 Activities

15.0 LEARNING OUTCOME

After reading this Unit, you should be able to:

- Understand the concepts of rehabilitation and reconstruction;
- Explain the types of rehabilitation;
- Throw light on the progress of rehabilitation work in the Tsunami aftermath;
- Examine the problems underlying the process of long-term recovery;
- Discuss the guiding principles of rehabilitation and reconstruction; and
- Analyse the interlinkages between disaster recovery and development.

15.1 INTRODUCTION

Rehabilitation and reconstruction are at the heart of disaster recovery phase. The rehabilitation and reconstruction activities, which follow the disaster response stage, aim at achieving long-term recovery. Disaster recovery is a very significant stage in the disaster management cycle, as this is when the support of governmental and non-governmental agencies in the disaster aftermath usually starts receding and the affected community has to fend for itself. At this stage, the role of the community and self-help groups becomes paramount since they can make or mar the crucial link between disaster response and disaster recovery.

It also needs to be kept in view that the entire rehabilitation and reconstruction process has to be attuned towards developmental goals. Unless we understand the relationship between recovery and development, issues and challenges facing the rehabilitation and reconstruction process cannot be met. This Unit examines the pertinent issue of disasters and development. It throws light on the concept and principles of rehabilitation and reconstruction that must make way for larger disaster recovery process by examining the post-tsunami aftermath. It also analyses the problems faced by planners and implementers in the rehabilitation and reconstruction process.

15.2 CONCEPTS OF REHABILITATION AND RECONSTRUCTION

As we all know, the disaster recovery stage in the disaster management cycle falls between the disaster response phase and the overall development phase. Thus, it is necessary that vital interlinkages between all the three phases be established. This could be achieved through systematic planning and implementation of a long-term recovery programme in the disaster aftermath.

Rehabilitation and reconstruction operations are integral to disaster recovery. They provide a direct 'connect' between disaster response and long-term development. The two activities, however, do not have similar connotation. Rehabilitation involves restoring local services related to the provision of immediate needs. It implies a systematic return to pre-disaster status. It refers to actions taken in the aftermath of a disaster to enable basic services to resume functioning, assist victims' self-help efforts to repair physical damage, restore community facilities, revive economic activities and provide support for the psychological and social well-being of the survivors. It focuses on enabling the affected population to resume more or less normal patterns of life. It may be considered as a transitional phase between immediate relief and major long-term development.

Reconstruction, on the other hand, represents long-term development assistance, which could help people in the affected areas to rebuild their lives and meet their present and future needs. It takes into account reduction of future disaster risks. Rehabilitation may not necessarily restore the damaged structures and resources in their previous form or location. It may include the replacement of temporary arrangements established as part of emergency response or the upgradation of infrastructure and systems from pre-disaster status.

For instance, following a damaging hurricane, the rehabilitation of the power lines would aim to restore the system as rapidly as possible so that the essential services would continue to function, whereas, reconstruction of the power lines would aim to rebuild the rehabilitated system to a higher or safer standard than before, so that the future risks to the power lines from a similar damaging event could be reduced. Reconstruction must be fully integrated into long-term developmental plans, taking into account future disaster risks and possibilities to reduce them by incorporating appropriate measures. As we have mentioned before, the term recovery is used to embrace both the rehabilitation and reconstruction activities. Both the activities may be required in the aftermath of disaster. One does not essentially exclude the other.

It should also be remembered that rehabilitation and reconstruction do not always safeguard full recovery. In the disaster aftermath, it may take longer to return to 'normalcy' or in some situations, total recovery may never be possible. It is, therefore,

not possible to suggest a 'model' time frame for rehabilitation, reconstruction or recovery stages.

The distinction between rehabilitation and reconstruction is not watertight, but they have to be well-incorporated into a long-term disaster recovery plan. A comprehensive rehabilitation and reconstruction or a broad recovery plan should take into consideration both physical and non-physical requirements of the communities. Failing to address long-term recovery could have adverse consequences. For instance:

- i) It may simply result in large investment in infrastructure without the necessary inputs to help the victims to become psychologically fit, socially ready and economically self-sufficient; and
- ii) The necessary links between physical, social and psychological recovery may be ignored

Thus, we can say that processes of rehabilitation and reconstruction are essential for long-term disaster recovery, even though they need not always lead to recovery. Problems underlying rehabilitation and reconstruction can even go on to stall the recovery process. We will read about this aspect in Section 15.6 of this Unit. Suffice it to say over here that rehabilitation and reconstruction are complex processes that are determined by varied parameters. The nature of rehabilitation and reconstruction largely depends on the intensity of damage caused by a disaster in terms of losses to lives and infrastructure.

There are several factors that need to be taken into view while designing a long-term disaster recovery plan entailing rehabilitation and reconstruction. These are economic, social, political and cultural. While economic, social and cultural factors will become clear by reading the following Section, it is important to understand the political factor over here. Disasters, as we all know, are great electoral opportunities for political parties, especially when elections are round the corner. Politicians derive political mileage out of announcing huge sops and incentives through their recovery package. The recovery plan finds smooth execution if there is political will behind it. The political environment of the disaster aftermath, therefore, needs to be considered by planners of long-term recovery.

15.3 TYPES OF REHABILITATION

Since social, cultural, economic and political factors provide the contours of a thorough recovery plan, we could deduce that there are three major types of rehabilitation, namely, physical, social and psychological. Let us discuss them briefly:

Physical Rehabilitation

Physical rehabilitation is a very important facet of rehabilitation. It includes reconstruction of physical infrastructure, such as, houses, buildings, railways, roads, communication network, water supply, electricity etc. It also comprises short-term and long-term strategies towards watershed management, canal irrigation, social forestry, crop stabilisation, and alternative cropping techniques, job creation, employment generation and environmental protection. It involves policies for agricultural rehabilitation, rehabilitation of artisans and small businessmen as well as rehabilitation of animal husbandry.

The short-term and long-term physical rehabilitation measures should take into view: provision for subsidies, farm implements, fertilizers etc., establishment of seed banks, grain

banks and fodder banks, scope of employment generation, availability of livelihood generation and alternative technologies, along with development of houses and infrastructure. This type of rehabilitation is economic in nature and is broadly geared towards an alternative livelihood approach that can enable the communities to withstand the disaster aftermath.

Developmental measures involve expenditure. These relate to collection of information, hiring of specialist staff, implementation and evaluation of development programmes. However, these developmental costs should try to reduce the economic, social and political costs that are likely to be incurred in the event of a disaster. For a systematic physical rehabilitation plan, the economic environment of a disaster-affected area needs to be kept in view.

Attention needs to be given to disaster-resistant house construction. Earthquake resistant buildings must be planned on sites of hard bedrock. The sites chosen should not be steep, narrow and clayey. They should not be anywhere near loose sands and heavy faulting areas. Cyclone shelters should not be planned at low elevation land, which lacks natural outlet to discharge water. Land at the foot of slopes should also be avoided for cyclone resistant housing. To guard against landslides, recovery plan should include planning for houses that are stable and away from areas near quarrying activity. Flood resistant reconstruction planning must focus on areas that are not low lying. Wetlands, lagoon mouths, edges of island, lake, flood plains, downstream banks, and narrow gorges should be avoided.

Rehabilitation and reconstruction package must also incorporate acquisition of land for relocation sites, adherence of land use planning, flood plain zoning, retrofitting or strengthening of undamaged houses, and construction of model houses. Thus, disaster-resistant housing will have to be systematically included in physical rehabilitation plan. It should comprise identification of hazard prone areas, vulnerability and risk assessment of buildings, outlining of disaster scenarios, technical guidelines for hazard resistant construction and adoption of technical-legal regime.

Social Rehabilitation

Social rehabilitation is an important part of disaster recovery, but this dimension is often assumed to be a community function and neglected in most post-disaster programmes. As we are all aware, disasters can render some groups such as the elderly, orphans, single parents with young children, etc., much more vulnerable to disaster aftermath due to lack of adequate support. In the post-disaster phase, family support systems can break down due to physical and mental trauma resulting from losses of life and property, physical dislocation, and migration of some members of disaster affected communities.

These vulnerable groups would need special social support to survive the impact of disaster. Thus, construction of infrastructure such as community centres, day care centres, anganwadis, balwadis, old age homes, etc., is a vital part of social rehabilitation. There has to be an adequate provision for building this infrastructure wherever it is non-existent or has been destroyed by the disaster. A realistic recovery plan has to take note of this social dimension of the disaster-affected area.

Psychological Rehabilitation

The psychological trauma of losing relatives and friends, and the scars of overall shock of the disaster event can take much longer to heal than the stakeholders (planners,

governmental agencies, NGOs, international agencies, self-help groups, community) in disaster management often assume. It is, therefore, essential, that social welfare and psychological support programmes be considered immediately after a disaster event so that they could be made a vital part of recovery programmes.

No recovery plan can be successful if it does not take cognisance of the psycho-cultural milieu of the affected site. This means that it must give due respect to the tradition, values, norms, beliefs and practices of the disaster-affected people. The cultural dimension of recovery plan is most wanting in the area of housing and shelter. As we will read later in this Unit, the recovery plan is often drafted and executed with utter disregard to basic issues such as availability of water, access to toilets, health and hygiene, privacy of women folk, etc. Housing designs are imposed on the victims without taking into consideration their lifestyles, cultural mores and preferences. A good recovery plan must make a note of these factors.

For a proper rehabilitation of persons suffering from ill-health, there is a need for a systematic Epidemiological Surveillance and Nutrition Centred Health Assessment to monitor the spread of disease. A comprehensive health recovery plan should be in place to deal with the problems of psychological rehabilitation. Physical discomfort and illness could have multiple psychological repercussions. Besides, the chances of post-traumatic stress disorder are high in disaster aftermath. Efforts should be made to arrange for crisis intervention, psychological debriefing (semi-structured crisis intervention), trauma counselling and panic management.

The victims' response to a disaster passes through various stages, for example, 'impact'(disaster event phase); 'inventory' that follows immediately after the disaster event, 'response' and 'recovery'. Each stage evokes a different response. The disaster managers and rehabilitation workers must understand the psychology of victims at the recovery stage and respond accordingly. Priority needs to be accorded to utilising human resources from the affected area itself and only the expert help should be sought from external sources.

15.4 GUIDING PRINCIPLES OF REHABILITATION AND RECONSTRUCTION

In order to meet its objectives, rehabilitation and reconstruction programme needs to draw upon certain guiding principles. We can infer from our previous Sections some of the guiding principles that are part and parcel of an effective approach towards long-term disaster recovery. The broad priorities in a situation of disaster rehabilitation are:

- Provision of emergency relief to be operationalised by the way of mobilising human and material resources on a war footing, comprising food security, construction of temporary shelters and other basic needs
- Rehabilitation of all the displaced people, restoration of basic and alternative means of livelihood along with community-based infrastructure and institutions; and
- Initiation of long-term development interventions, which would lead to sustainable community-based actions (Medury and Dhameja, 2005).

Let us have a look at some of the guiding principles that reflect these priorities:

Treating Communities as Heterogeneous

A systematic rehabilitation plan must not regard the affected communities as a homogenous group. The needs and requirements of disaster affected community would vary from one group to the other within the community, and also from one individual to the other within the group. The requirements of affected farmers will be different from small traders or say professionals like teachers and government workers. Again, the requirements of children, women and elderly will be different from each other. A recovery plan has to prioritise the different requirements and set its objectives accordingly.

Striking a Balance between Economic, Social and Psychological Needs

Just as the needs and requirements of the affected community are largely dependent on what its various groups desire, the economic, social and psychological needs also vary from one group to the other within the affected community. These needs have to be carefully scrutinised. Satisfaction of one need or requirement does not automatically lead to the satisfaction of other needs. For instance, the loss of agricultural land due to a disaster, even though compensated in monetary terms and in terms of new occupational opportunities under rehabilitation, cannot fulfill the psychological loss of being a landowner in the victims. The nostalgia of the ancestral place also cannot be overcome easily.

This reality, is a part of the social status characteristic of traditional culture and people derive gratification from it. Established livelihood, social relations, social status, kinship etc., are sources of satisfaction. Any change or blockage, even though temporary, towards fulfillment of these needs results in varying degrees of tensions and stress in different people. A good recovery plan must not lose sight of this aspect. Recovery actions can be therapeutic in assisting the victims to rebuild their lives and livelihoods if they are contextual and rooted in local values. Likewise, they also need to strike a neat balance between the different types of requirements of victims.

Focusing on Key Issues

Minimising the adverse effects of disasters forms the key focus for achieving the efficacy of various objectives of rehabilitation projects. The success of these projects depends upon the way a disaster is managed and the way the affected population perceives the various rehabilitation programmes as appropriate means of meeting their requirements. This makes it imperative to plan, design and implement rehabilitation programmes to cope with specific aspects of a disaster at appropriate stages to meet the key issues.

These key issues pertain to assessment of damage, fixation of responsibility, prioritisation of requirements, execution of major mitigation strategies, monitoring of development process as well as evaluation and review of projects. It has to be seen that no affected group is left out of the rehabilitation operations in order to avoid social tensions. Disaster management should be addressed in a political, economic and social context, otherwise, the groups who cannot voice themselves may be left out of provisions of disaster recovery.

The focus on key issues makes for an effective rehabilitation and reconstruction plan. In order to realise these issues, attempt has to be made to institutionalise all recovery efforts. Rehabilitation measures cannot be sustainable if they are not institutionalised. Efforts have to be made to establish and sustain the local institutions that are involved in disaster recovery such as grain banks, fodder banks, day-care centres, 'anganwadis', 'bal mandals', 'mahila mandals', 'pani panchayats', etc.

Encouraging Flexibility and Adaptiveness

A recovery plan has to be adaptive in nature so that it can change as per the demands of a new situation. Flexibility norms in terms of structure, processes and finances need to be ingrained in the plan. Disaster management needs a strong political commitment for erecting an effective planning and coordination process at the governmental and societal levels. A process with a clearly defined authority as well as an appropriate budget to maintain an effective disaster plan is needed.

Disaster recovery plans should be comprehensive in scale and operational in style, as disaster management planning is a sequential and continuous process. Effective planning requires systematic diagnosis, resource evaluation, and continuous feedback towards fulfillment of the goals of disaster reduction. Since the scope of disaster management is quite wide and the actors involved in the process fairly numerous, it is essential that a legal and formal framework for coordination is accepted and provided for.

Management is needed at all stages of a disaster viz., the disaster preparedness and mitigation phase, the disaster event phase, the response phase, and the recovery phase comprising rehabilitation and reconstruction processes. Only a flexible and adaptive disaster management plan can achieve it. The recovery plan has to imbibe similar features.

Promoting Systematic Damage Assessment

Damage assessment is a precondition for effective disaster management. Unless we are clear about the nature, extent and intensity of damage in the aftermath of a disaster, we can never plan out, implement or evaluate the disaster management plans and strategies. Thus, the recovery plan can also be ill-conceived in the absence of systematic damage assessment. There is a need for a methodical damage assessment so that the strategies of livelihood creation and infrastructure development are incorporated in the recovery plan.

Damage assessment could take recourse to sample surveys (simple random, systematic, cluster, stratified), and make use of traditional means as well as modern technology damages. The concept of knowledge management is an emerging field, which is soon catching up as an important tool of assessment and recovery. India has its own space based Earth Observation Programme, and expertise is built up in a wide variety of Remote Sensing applications. Emerging information technologies in the area of Remote Sensing and Geographical Information Systems offer immense potential for efficient damage assessment that needs to be urgently harnessed.

Aerial Photography, as a form of Remote Sensing, is an important tool of damage assessment. It refers to the use of satellite with imaging systems that produce computer generated images. Possible uses of Aerial Photography include hazard mapping, vulnerability analysis, disaster assessment and reconstruction planning. Remote Sensing and Aerial Photography can provide an impression of a large area over a short period of time.

Another important step towards damage assessment and reconstruction of infrastructure is the 'feasibility study'. The basic objective of a 'feasibility study' is to generate the data necessary to have a complete plan for reconstruction vis-à-vis its economic viability. It also helps to complete the application of formalities for construction grant for 'infrastructure rehabilitation programme' after any disaster or even in normal times.

Risk management is another dimension of damage assessment. There are three different stages of managing risks: perception, assessment and mitigation of risks. Risk perception

is very important at all levels, that is, the local residents, the NGOs, the donors, should all have adequate perception of the risk. Risk assessment is more of a technical word and is rather the responsibility of the academicians or professionals to quantify the risk in that area or community, which aids in mapping its vulnerability. The last step is that of risk mitigation. It focuses on policy level decision-making, which is a collective effort. The community, government and NGOs have a collective responsibility based on co-operation and capacity building towards resource mapping and social mapping that are essential components of damage assessment. These aspects of assessment must go into the recovery planning stage for effective results.

Supporting Transparency, Efficiency and Effectiveness

The recovery plan must be clear, structured, objective, accessible, accountable and responsive. This is possible if transparency is maintained at each level of recovery plan. Continuous monitoring and evaluation (M&E) could ensure transparent, efficient and effective plans. The basic objective of an M&E exercise is to ensure whether the project is proceeding as originally intended. This is done using indicators.

In case of a post-disaster exercise, M & E could strive to check if all the rehabilitation needs of the affected victims are being met. It could follow the SMART (Specific, Measurable, Attainable, Relevant and Time-bound) tool of indicators, which have to be set at the planning for recovery stage itself. However, the constraints in the process that range from reluctance of project teams to expose themselves to evaluation, inability in understanding the process and impact indicators underlying the M & E, difficulties in collecting data, managing the complexity and extent of the M & E process, and most importantly, keeping objectivity in the process need to be addressed. Viability of a disaster recovery policy depends on responsible monitoring and review. A good recovery plan should strive towards this guiding principle.

Ensuring Financial Recovery

One of the most important components of rehabilitation and reconstruction is that of infrastructure development, which largely depends on financial support. Governments at the Central as well as state levels have specific schemes and strategies for providing funds for disaster management activities, be it relief, rehabilitation or reconstruction. The Calamity Relief Fund (CRF) is one such arrangement at the central level. Even though, the disbursement by the CRF is meant to supplement relief funds, a sizeable portion is earmarked for all phases of disaster management pertaining to six natural calamities namely cyclone, drought, earthquake, flood, fire and hailstorm.

Other financial arrangements include National Calamity Contingency Fund, Prime Minister's National Relief Fund and Member of Parliament Local Area District Scheme (MPLADS). Even the Insurance Schemes could be regarded as an important source for resource generation. Schemes such as Swarnajayanti Gram Swarozgar Yojna, National Agricultural Insurance, Seed Crop Insurance, Kisan Credit Card, etc., should be encouraged as practicable options of disaster mitigation. The Eleventh Finance Commission has recommended the extension of agricultural insurance to all crops, and the Twelfth Finance Commission has also emphasised on the need to link the developmental projects with disaster mitigation. This positive fillip should be sustained to strengthen financial recovery.

Some funds from government's developmental programmes such as Drought Prone Area Programme, Desert Development Programme, Integrated Afforestation Scheme, Eco-

development Scheme, Watershed Development Programme, Indira Awaas Yojna, Sampoorna Grameen Rozgar Yojna, etc., could be diverted towards disaster mitigation and recovery. There is a need to incorporate recovery planning into preparedness planning. In order to ensure smooth inflow of funds, the stakeholders should act swiftly and maintain the interest of the influence groups in disaster recovery.

The UN agencies: World Health Organisation (WHO), United Nations Children's Fund (UNICEF), United Nations Educational, Scientific and Cultural Organisation (UNESCO), World Food Programme (WFP), International Labour Organisation (ILO), United Nations Population Fund (UNFPA), and also the International Monetary Fund (IMF) as well as the World Bank working through International Development Association, International Finance Corporation, Multilateral Investment Guarantee Agency can also provide legitimacy to recovery process, and encourage donors to provide finances and seed capital for disaster recovery projects.

Developing Disaster-resistant Buildings

As we read in Section 15.3, physical rehabilitation calls for construction of disaster resistant structures and retrofitting of existing ones to make them disaster resilient. Different types of resistance components will have to go into earthquake-resistant, cyclone-resistant or flood-resistant structures. A recovery plan should have adequate provision for building disaster-resistant structures as a guiding principle.

Earthquakes are no strangers to India, as 55 per cent of the country is prone to seismic shocks. Several earthquake-prone regions in the country have traditionally built houses that minimise the damage to life and property, and stand up well in the wake of the quake. The traditional wisdom and attention to details can be applied to modern materials as well. These techniques are based on the use of traditional materials, for example, timber and bamboo for building houses. The structural system needs to be tensile and the material should be flexible, as is the case with timber, steel and bamboo. It also helps if the structure is constructed in a way that it vibrates as one unit and sways together.

The recovery plan has to lay emphasis on disaster resistant construction techniques as most new constructions with heavy roofs (slate tiles or Reinforced Concrete Cement or RCC) supported by weak walls (random rubble in mud mortar) have performed badly in the recent past. Older houses in mountain regions have roofs held together by timber and tie-bands, horizontal timber beams spanning across the entire building, connecting the entire structure and giving it the character of a cage. Such houses have suffered little damage despite their mud and stone masonry. These types of constructions need to be promoted.

Quake resistant houses should have tie-bands just above the level of the floor, the level of the doors and windows, and another at the roof level. Corners are the most vulnerable and thus ought to be strengthened. Elasticity of the structure can be enhanced with flexible steel rods or wood batons at corners. Doors and windows should be few, small and symmetrically placed away from the corners. In short, properties of symmetry, ductility, deformability, rectangularity and simplicity have to be followed to build disaster resistant houses.

The performance of earth or stone or brick buildings is generally very poor in earthquakes if tie bands and timber are not used. Wooden buildings perform better but most dangerous aspect of wooden buildings has been their poor fire resistance and therefore

a high danger of catching fire during earthquakes, due to short-circuiting of electric wiring. Even stone and brick buildings have not had a good track record. As far as flood-resistant housing is concerned, structures need to be erected on a higher elevation on best bearing soil and raised mounds using concrete cement and waterproofing. Building failure occurring due to cyclones is mainly confined to the roof. Cyclone resistant structures thus need to be sturdy, wind resistant and concrete in texture. Mangalore tiled and RCC roofs help in this regard. The guidelines for housing in a good recovery plan should make a note of all these aspects.

A good recovery plan should identify and promote them. The role of Building Authorities and Research Institutes such as National Building Construction Corporation (NBCC), Building Materials and Technology Promotion Council (BMTPC), Housing and Urban Development Corporation (HUDCO), Structural Engineering Research Centre, etc., is very important in this regard. Their activities have to be rightly networked in order to derive advantages from their work and experience in disaster-resistant construction.

Building Resilient Communities

No rehabilitation package, as we read earlier in this Unit, can succeed without taking into view the psychology of those affected by disasters. Human psyche comes into play at every stage of disaster management cycle, be it mitigation, rescue and relief or reconstruction and rehabilitation. A participatory disaster recovery programme that involves the local people, civil society organisations and grass roots agencies at decision-making and implementation stages would go a long way in shaping a more humane and feasible disaster rehabilitation programme. A good recovery plan must aim at building resilient communities. This can be ensured through four major strategies (i) Community Participation, (ii) Education and Training, (iii) Stress Management, and (iv) Positive Role of the Media. Let us discuss these now:

Long-term counter disaster planning should be based on building the resilience of victims. A number of Community Based Disaster Management (CBDM) projects are coming up in different parts of the world. Some of these have worked well, while others represent good examples towards making of success stories. Though, almost in all cases, the successes have been driven by external, international and national agencies.

The World Conference on Disaster Reduction held from 18 to 22 January 2005 in Kobe, Hyogo, Japan has adopted a Framework for Action (2005-2015) on “Building the Resilience of Nations and Communities to Disasters”. It is a positive step, as the Conference has provided a unique opportunity to promote a strategic and systematic approach to reducing risks and vulnerabilities to hazards.

There is certainly a need to give due importance to self-help and people’s participation in building resilient communities. A recovery plan should incorporate provisions of creating Village Task Force, Disaster Task Force and Pani Panchayats, etc. It would facilitate the process of capacity building as well as people’s resilience and self-sufficiency.

Education and training are means of learning, and play a significant role in building resilient communities. Education and training have an important role to play in planning and implementing disaster recovery strategies at both the pre-disaster and post-disaster stages. Sustenance of disaster education is dependent on well-formulated training and research strategies.

In fact, education and training are interdependent concepts. The foremost goal of all training and educational programmes should be to target the community. No disaster management programme can achieve its objectives unless the affected community participates in the formulation, implementation and evaluation of disaster related tasks. Adequate community participation is the key to effective disaster recovery. The entire approach to disaster education and training is dependent upon volunteers, social workers, functional specialists and the people at large. They should be assigned clear cut functions and responsibilities. Demarcation of stakeholders in disaster recovery must form a part of recovery plan.

Counseling for stress management is a continuous exercise. The process does not end with the first session of talking to the victims. Healing requires time, and the counsellor may be called upon time and again, sometimes to listen to what has been said before, sometimes to discuss specific problems, and at others to just offer reassurance and support. Stress management is a long drawn process. At every stage, the counsellors have to exhibit empathy and concern, care as well as caution. Dealing with victim's psychology is a very sensitive issue and must be dealt with in the same manner. The provisions for psychological rehabilitation have to be incorporated in a recovery plan.

Rehabilitation programmes should make use of available skills and talents and also focus upon providing new skills and competencies to the affected population to equip them to face the outer world. Efforts should be made to develop commitment to self-support and sustenance, to eliminate dependency syndrome at the onset itself through psychotherapeutic health programmes implemented in the form of family counselling and stress reducing exercises. Community programmes, and other socio-occupational programmes should form an essential component of rehabilitation package.

The media also play an important role in building disaster resistant communities. As an important channel of communication, they transmit facts from a disaster site to the general public and specific target groups. The relationship between the disaster recovery managers and media people could be proactive as well as reactive. Well-planned interactions with the media could be of critical importance in strengthening rehabilitation work and increasing the awareness of levels of affected community. In disasters, where warning is possible, accurate, timely and consistent information dissemination by the media could be a useful contributor to disaster recovery. Media can and should suppress rumours actively because rumours demoralise and reduce resilience.

Suitable policies are needed to incorporate the paradigm shift from crisis management to community-based preparedness at the recovery stage. This should include adequate provisions for education, awareness and training, people's participation at the decision-making and implementation levels, networking of NGOs and other relief organisations, and participative endeavours based on indigenous approaches of coping with disasters.

Upholding the Norms of Equity and Social Justice

Since disasters often hit the least developed areas and the most disadvantaged groups the hardest, rehabilitation and reconstruction programmes should aim to change the vulnerable conditions of the high-risk population through development programmes. There is a need for a more humane paradigm of disaster management. The goals of equity, justice and balanced development have to be ingrained in the disaster management policy right at the outset.

The United Nations Development Programme (UNDP) has a vision on human development, which treats development not merely in terms of mere rise or fall of national incomes. It envisages a space in which people can develop to their full potential and lead productive and creative lives in accordance with their needs and interests. This idea of human development has to be translated into action to uphold the values of equity and justice in the disaster recovery exercise. The guiding principles of rehabilitation, as we read earlier, speak of focus on key issues, vulnerable sections, and objective handling of needs of affected community. These factors define and seek to meet the objectives of equity and justice.

It is also important to introduce gender analysis into recovery planning in order to avoid further marginalisation of women and the other disadvantaged groups. A gender sensitive approach helps to identify differing vulnerabilities of men and women to crisis situations as well as their different capacities and coping strategies. Besides, social and economic costs of all development programmes need to be analysed and incorporated in the recovery plan so that the vulnerable are not affected negatively.

Respecting Traditional Wisdom

Even though, we have a tradition of living in harmony with nature, this balance is being disturbed in the present context. People have always followed traditional practices of coping with disasters, but are becoming too dependent on external agencies to withstand the disaster aftermath. Traditional practices of water conservation such as 'Kuhls' of Himachal Pradesh, 'Kundis' and 'Rapats' of Rajasthan and 'Palliyals' of Kerala have held people in good stead against low intensity droughts. 'Sumers' and 'Chaukhats' of Rajasthan are inimitable earthquake resistant structures from our rich heritage.

These traditional practices are being abandoned to make way for new technologies. At the time when we need a thoughtful amalgam of the 'old' and the 'new', we are slowly losing our traditional wisdom to a haphazard approach to modern technology. A systematic recovery plan should make way for a right mix of traditional practices, modern ways of living and technological development.

Disseminating Good Practices and Lessons Learned

Advancements in the field of Information and Communication Technology (ICT) have made the concept of global village a reality. A proper communication system can be of enormous use in effective disaster management. It can be instrumental in generation of awareness and dissemination of information during disaster preparedness and disaster recovery. The use of modern communication is of relevance not only to disaster managers but also at grass roots levels, though low-cost options such as HAM (amateur) radios, wireless, loudspeakers, folklore, nukkad nataks, market fares, posters are also effective. These must find a place in recovery plan for proper information dissemination on disasters.

Existing developmental policies are also being reexamined to incorporate disaster prevention and preparedness. However, there has been a limited debate on the content and thrust of these policy initiatives. The crucial question that needs to be addressed is: How can the public policy enable the transfer of good practices and research to the most threatened communities? The success stories of Ralegan Sidhi, greening of Arvari River in Alwar, rejuvenation of Sukhna Lake in Chandigarh, Mission Ground Water in Madhya Pradesh, and Build Your Own Check Dam in Suarashtra are waiting to be replicated. The

lessons from these case studies have to be woven coherently in order to build some kind of knowledge base on disaster recovery. Incorporating grass roots experiences, with its indigenous initiatives and constraints, into the developmental policies would provide real substance to the disaster recovery policy. Education and training could play an important role in this regard.

Protecting Environment

Disaster management and environmental protection should go hand in hand. As we all know, the frequency, intensity and impacts of disasters can be attributed to flawed environmental policies. Greenland's Glaciers are melting twice as fast as previously, pointing towards a scary reality. The Earth's oceans are rising fast and by 2050, cyclones, tsunamis, submerging islands would become headline news everywhere (Saxena, 2006).

The beaches of a third of the 200 islands of the Maldives are being swept away. A quarter of all species of plants and land animals could be driven to extinction. Sea ice in the Arctic Ocean has decreased by 10 per cent. Coastal areas of the US, China, Bangladesh and India are threatened. Globally, the Earth's climate is warmer today than it has been at any time in the past 140 years (*ibid.*). These are alarming statistics and their mitigation must form a part of disaster recovery.

There are many International Environmental Treaties such as Kyoto Protocol, United Nations Framework Convention on Climate Change, Basel Convention on Trans-boundary Movement of Hazardous Wastes, Convention on Biological Diversity, Convention to Combat Desertification, Convention on International Trade in Endangered Species (CITES), Convention on the Law of the Sea (LOS), and Montreal Protocol on Substances that Deplete the Ozone Layer. These Treaties and Conventions have set good and practicable guidelines for environmental protection. The relationship between environmental degradation and disasters thus needs to be clearly surveyed. The recovery plan must keep this aspect in view and assimilate environmental protection measures wherever required.

Endorsing Sustainable Development and Alternative Livelihood Strategies

In order to create long-term vulnerability reduction conditions, a 'sustainable livelihood framework' is urgently required. The livelihood approach advocates an increase in economic opportunities of work without degrading the natural environment. It seeks to understand the many factors influencing people's choices of livelihood strategies and reinforcing their constraints. Creation of livelihood options is a crucial component of community vulnerability reduction. It is an important step towards capacity building.

Sustainable development involves more than growth. It requires a change in the content of growth to make it more equitable in its impact. The main objective of sustainable development is to prevent acts of nature from becoming disasters. The main focus of sustainable development is to mitigate the conflict between development and environment. While at first glance, this may seem unrelated to disaster prevention, the truth is that they are intricately entwined (Dhameja, 2001).

A sustainable livelihood programme needs to analyse the existing socio-economic conditions prevailing in the area before the occurrence of a disaster, examine the occupational pattern in the affected area, survey the prevailing infrastructure facilities, adjudge the awareness levels of the people; and gauge the mindset of the people, their culture, attitudes, traditional beliefs and practices.

A sustainable livelihood framework needs to recognise the premise that the community's relationship with the environment is a basic unit for all planning and implementation activities. Self-reliance should be promoted and administrative interventions should follow a 'rights-based' approach, so that people are not treated as mere beneficiaries, but are integrated in the total development process. This kind of approach could be really beneficial in creating sustainable livelihood conditions and the recovery plan should make a note of this.

The United Nations (UN) commitment to promoting sustainable development and mitigating disaster losses, as we all know, is strong. The World Bank and the regional development banks have also begun to engage with issues surrounding the relationship between disaster risk reduction and economic development. The World Bank's Board of Executive Directors has endorsed viable Environment Strategy on July 17, 2001.

The Strategy has three interrelated objectives: improving people's quality of life, enhancing the prospects for quality of social and economic growth, protecting the quality of the regional and global environmental commons, rational and planned growth of agricultural, industrial and tertiary or services sectors of the economy, creating employment opportunities, programmes for the youth, women and physically handicapped, promoting alternative cropping patterns, irrigation and water harvesting techniques, social and farm forestry, and skilled labour. An effective recovery plan has to be sustainable and must therefore give credence to creation of sustainable livelihood opportunities and alternative technologies.

Integrating Recovery with the Larger Development Process

It is clear from our discussion in this Unit that disaster recovery has to be integrated into larger development process. The basic justification for Linking of Relief and Rehabilitation with Development (LRRD), the new approach to disasters and development, is quite simple. Disasters are costly in terms of both human life and resources; they disrupt economic and social development; they require long periods of rehabilitation; they lead to separate bureaucratic structures and procedures, which duplicate development efforts by the institutions involved.

At the same time, however, development policy also often ignores the risks of disasters and the need to protect vulnerable households by helping them to develop 'coping strategies'. If relief and development were to be linked, these deficiencies could be reduced. Better 'development' can reduce the need for emergency relief; better 'relief' can contribute to development; and better 'rehabilitation' can ease the transitional process between the two.

The "backward" and "forward" linkages between political, developmental, relief and rehabilitation operations constitute a complex network of relationships, which have to be examined within the global policy framework or strategic planning policy, which is a dynamic function of the specific situation of each country or region. In other words, the components of the LRRD and their design are highly situation specific, and should be considered in the light of the 'contextual' realities of the country or region concerned. A good recovery plan should keep into view the interlinkages between all the stages of disaster management, as well as the 'connect' between disaster rehabilitation, reconstruction and the larger developmental planning. The recovery plan has to, therefore, be holistic and comprehensive.

15.5 POST-DISASTER STORY: THE TSUNAMI AFTERMATH

There are many case studies on the rehabilitation work that have been undertaken by the governments, NGOs, self-help groups, international agencies in various parts of the country in the aftermath of different types of disasters such as the Latur Earthquake, Malpa Landslide, Orissa Cyclone, Bhuj Earthquake, Muzzafarabad Earthquake, etc. These Cases speak of the problems, issues and challenges of the rehabilitation phase. In this Unit, we will talk about the Tsunami aftermath in order to have an in-depth understanding of the complex problems involved in the process.

Tamil Nadu bore most of the wrath of the Tsunami that struck the Indian Peninsula on December 26, 2004. At least, 13 coastal districts of the State were devastated. Nagapattinam and Cuddalore were the worst hit. Around 7995 people and innumerable livestock were consumed by the killer waves. The relief and rehabilitation work was collectively carried out by the central and state governments, NGOs, international agencies and community groups.

The Joint Assessment Mission comprising the World Bank, the Asian Development Bank and the UN Organisations have put the damages and losses at \$838.32 million. This includes the losses in fisheries, agriculture and livestock, micro-enterprises, housing, rural and municipal infrastructure and so on. From day one, the State Government took speedy action to provide relief, which was completed by the end of January 2005. In the rehabilitation phase, which commenced soon after, the affected families were given a sustenance package consisting of cash, and other provisions to see them through the initial months.

By May-June 2005, most of the fishermen had gone back to the sea. The Government gave assistance for replacement and repair of boats and board motors, as well as for the purchase of nets. The central government gave 100 per cent subsidy for catamarans (that is., boats with twin hull in parallel), 50 per cent subsidy for Fibre Reinforced Plastic (FRP) boats and 35 per cent subsidy for mechanised boats. The NGOs also contributed substantially to the replacement of boats and other fishing implements.

Apart from fishermen, agriculturalists, agricultural labourers, small businessmen, small traders and several others having other occupations were affected. The government took note of the requirements of each of the sectors and provided different packages to suit their needs. Those owning small-scale industrial units also received assistance. Students who were affected received new textbooks, notebooks and uniforms. Assistance was given to agriculturalists to treat their lands that had become saline.

Tsunami Farmers' Self-help Groups (SHGs) were formed and they are still undertaking activities relating to recovery and reclamation of soil. Many women who were widowed have received the ex-gratia payment of Rs.1 lakh from the government, and 250 of these women who were eligible for the destitute widow pension have been granted pension. Children, adolescent girls and unmarried girls above 18 years of age who were orphaned, have been given a special package of assistance in the form of financial assistance, vocational training, capacity building and psychological support (Sridhar, 2006).

The State government had undertaken a Disaster Risk Management Programme in 2005 with the support of the United Nations Development Programme (UNDP). The Programme

has been implemented in six districts (Thiruvallur, Kancheepuram, Cuddalore, Nagapattinam, Kanyakumari and Nilgiris), and two cities (Chennai and Coimbatore). These areas have been identified because they are multi-hazard prone. After the Tsunami, the State Government has asked the Union Government to extend the programme to other coastal districts (*ibid.*).

Unlike Tamil Nadu, the fury of the Tsunami in Andhra Pradesh was diffused and coastal villages were soon able to return to normalcy. The Tsunami left 107 dead in Nellore, Prakasam, Guntur, Krishna, West Godavari and East Godavari districts, and damaged property worth lakhs of rupees. Reconstruction work by the State Government has since then mainly focused on Prakasam and Nellore districts, which bore the maximum brunt of Tsunami. The Central Government sanctioned Rs. 100 crores towards reconstruction. Official figures show that less than 7,500 out of 40,000 houses planned have been completed. Out of 34,000 fishing nets sanctioned, 27,000 have been procured by the fishermen. While 8,657 damaged boats have been repaired, getting new boats is a promise yet to be fulfilled. In short, rehabilitation has miles to go and Tsunami phobia still haunts the fishermen (Krishna Kumar, 2006).

Rehabilitation efforts were taken up in full swing in the Andaman and Nicobar Islands which were badly affected. Over there, in spite of the intensity of the disaster, the locals showed great resilience in bouncing back to life. Liberal contributions to the Lieutenant Governor's Relief Fund helped speed up relief and recovery efforts. NGOs took up a Livelihood Restoration Project in this region. The media played a very positive role in complementing the efforts of the administration in this region.

In Pondicherry, the State Government came out with a policy for permanent rehabilitation through Government-NGO participation. Agreements were reached with 12 NGOs and the Government of Maharashtra for construction of 4,947 houses. Though 78 NGOs had initially proposed to participate in the process, many withdrew after Government insisted they deposit 25 per cent of the Project costs. Except in the coastal villages in northern Pondicherry, land acquisition for rehabilitation was completed. A Committee was formed to facilitate the process. The construction of 500 houses in Pannithittu, Pudukkuppam and Mandapathur was completed. Another 2000 houses are in various stages of completion. The Government has formed a Project Implementation Agency to rebuild infrastructure using Rs. 4.2 crores, which is being given by the World Bank (Sridhar, *op.cit.*).

The Pondicherry Multipurpose Social Service Society (PMSSS) is the NGO that is building the houses in the Tsunami affected regions. It has distributed several Catamarans, FRP boats (some fitted with outboard engines) and nets, apart from repairing fishing equipment. PMSSS has conducted various activities not traditionally known to these communities, in order to enhance their earning capacity. For instance, school and college-going children have been taught to handle computers. About 160 women have been trained in tailoring and another 120 are undergoing training. Many of them are now supplying stitched fabric for a garment export unit based in Pondicherry (*ibid.*).

The NGO has also organised several self-help groups (SHGs) to make and trade products such as prawn pickles or to set up shops in the village. Women have also been increasingly active in the panchayats after the Tsunami. Thus, we can see that many sincere efforts have been made in the aftermath of Tsunami, which are gradually yielding results. A lot is being done in the area of physical and social aspects of rehabilitation, but much more can still be done. Psychological rehabilitation is an area that needs more attention. Plus, there are many other problem areas that need to be looked into. Let us

now discuss some of the major problems usually facing the rehabilitation and reconstruction process in the aftermath of a disaster.

15.6 PROBLEM AREAS IN DISASTER RECOVERY

Haphazard Planning

Adequate recovery plans are never laid down. Components such as planning for shelters, health recovery, financial provisions, and coordination amongst agencies involved, monitoring and evaluation are never systematised. Enumeration of affected families is not done properly. While rehabilitation help is extended, victims just keep trickling in. It has also been noticed that temporary structures are often not planned properly. As a result, core facilities of water, electricity, and food are never met adequately. The shelters in the disaster aftermath are sometimes not worth living. Food packets distributed are often stale and inconsumable. Even basic health and hygiene are not maintained. It has been seen that many a time the relief shelters become permanent dwellings of victims for want of reconstructed and retrofitted houses. Many a time, authorities do not even insist on strict enforcement of Coastal Regulation Zone and land use norms during reconstruction work.

Lack of Adherence to Legislative Controls

Non-adherence to building byelaws and similar legislation can be counter-productive. Even blindfolded adherence to archaic regulations could have an adverse impact on development planning. For several reasons (including ignorance, indifference and the 'nothing would happen' attitude), the municipalities and/or the local governments have been negligent in the enforcement of building design regulations and inspection of construction work in accordance with the stipulations. An effective control mechanism for adherence to the disaster resistant design rules has not been established.

Inadequate Transparency and Accountability

Generally, the recovery plan is not transparent enough for the victims to know what it has on offer for them. Lack of awareness makes it difficult for the stakeholders to point fingers at the loopholes. It becomes very tough to establish accountability of the agencies involved in disaster management. As a result, many organisations that have no credibility, take on the rehabilitation work. These agencies only work for their self-interest and are not responsive to the people.

The government and other stakeholders generally do not guard against unregistered NGOs and relief agencies, which have no standing. On top of it, we find that the government itself makes way for public-private partnerships, but the district administration is not given proper powers to monitor them. As a result, these organisations just jump into the rehabilitation scene to make a quick buck. All this makes accountability to people rather elusive.

Low Levels of People's Participation

Even though there have been Case Studies of people's participation in disaster management, for example., Gujarat State Disaster Management Authority's initiatives, Livelihood and Employment Restoration Programme in Orissa, Educational Rehabilitation in Kutch etc., their spread is quite patchy. Lack of people's involvement in disaster recovery is a major problem. There have been many cases where people have just been passive beneficiaries of disaster management programmes.

In case of Tsunami-affected Tamil Nadu, the Government came up with Rajiv Gandhi Rehabilitation Package with a separate component for the restoration of livelihood. But the catch was that it involved the beneficiary going to the bank, securing a grant-cum-loan and also insuring the vessel. A majority of the fishermen rejected the scheme and turned instead to the non-governmental organisations, which were working in the affected districts. Such instances bring out the growing passivity of the affected community, and their dependence on external agencies for aid and relief.

Lack of Sensitivity

Displacement in the post-disaster phase forces the victims to change the pattern of social relationships. The victims have to undergo an entire process of resocialisation and adjustments in a new social milieu. This leads to loss of existing social relationships. A recovery plan does not take into view the psychology of victims. In post-tsunami rehabilitation phase, women have complained about lack of privacy. The heat radiated by the asbestos roof was unbearable for the victims. Women feared for their safety and that of their grown up daughters. In most cases, the common toilets were situated quite a distance away from the shelters and some were in a dilapidated state and even without proper lighting. Many women in Kanyakumari District protested that they were not consulted on the nature of relief that they needed or on issues of sanitation, privacy, land or personal security (Krishna Kumar, *op.cit.*).

There have often been complaints that certain categories of people such as Dalits, elderly and disabled have been left out of rehabilitation concessions. Development and rehabilitation efforts depend on the target groups, their perception and awareness of the situation, fear and apprehensions on the possible problems to be faced, acceptability of the proposals etc. These types of issues are never looked into. The fear of changing of sources of livelihood leads to 'occupational disruption, which subsequently leads to low to high degree of 'occupational redundancy'.

Psycho-social consequences of displacement, unfortunately, do not form a part of recovery plan. Specialised techniques such as debriefing and stress management are carried out by local people or NGO workers who may not be equipped to handle the intricacies of clinical psychology. Rehabilitation programmes often lack specific components of the aspects of mental health of people. There is no evidence of discussion of mental health problems and their implications for assessing costs and benefits of disaster projects.

Local Area Problems

Rehabilitation can run into rough weather if it encounters local area problems. In the aftermath of Muzzafarabad Earthquake, relief and rehabilitation agencies had difficulties in accessing the quake-affected interior regions such as Uri. Besides the hilly terrain and freezing weather conditions, other local problems like terrorist infiltration hampered the relief work. In the post-tsunami phase, sharp divisions among fishing communities on the question of relocation were encountered. Some were afraid of another monster wave and wanted to move out; others were fiercely adamant that moving further inshore would threaten their livelihood. There were also worries about the government displacing them from the coast to favour land sharks and tourism developers. It shows that if the victims feel that their source of livelihood is threatened, many problems surface.

In Andamans, many victims took to alcohol consumption in a big way. In some villages in Tamil Nadu, people started building shrines as small memorials in the memory of the

victims of the Tsunami. The people even started leaving sweets and food items at these shrines. These developments appear to be innocuous in the first instance, but could become problematic if not handled sensitively. During the reconstruction phase, majority of the problems that need to be addressed sometimes pertain to mere availability of resources in the affected area and people's opinion of rehabilitation work. The local context (economic, social and political) leads to problems of enforcement of recovery plan. These may have nothing to do with the nature of aftermath as such.

Duplicity of Tasks and Inadequate Coordination

There are many organisations: national (central, state, local), international, NGOs, interest groups, community groups working in the area of disaster recovery. The multiplicity of organisations leads to duplicity of tasks and coordination problems. Red tapism and bureaucratic delays come in the way of many recovery projects. Efforts are not made to use the existent organisational structure for reconstruction, rather for every activity, new specific organisations are envisaged.

What has generally been noticed is that government itself leaves the doors open for various kinds of actors to work in the field of disaster recovery. There are, as it is, many government ministries and departments that are already involved in disaster management. Plus, there are innumerable national and international relief agencies, community and self-help groups that are doing their bit in disaster management. All this creates an Octopus like set up with just one head and several tentacles performing almost similar tasks.

Lack of Education, Training and Awareness

The community is generally not aware of its basic capabilities to withstand disasters. Relevant information on disaster resistant housing, retrofitting, land use zoning, drought proofing, water conservation, alternative technologies, insurance schemes etc., is unavailable. Recovery plan often lacks the essential component on creation of awareness through formal and non-formal education and training. Vocational training programmes are conducted randomly and building of social infrastructure like schools, colleges and technical institutes is generally neglected. The recovery programme always encounters the problem of shortage of skilled labour.

Absence of Monitoring and Evaluation

Monitoring of the recovery project is always the last of the priorities of the planners. In the post-tsunami phase, there have been instances of leaking boats being dumped at the fishermen's doors in the name of new boats. Absence of monitoring hampers the quality of tasks involved in the recovery process. Inadequate feedback also comes in the way of building theories and testing their relevance. The process for monitoring and evaluation (M & E) faces a number of problems, such as reluctance of project teams to expose themselves to evaluation, difficulties in collecting data and managing the complexity of the process. M & E exercise is generally subjective and ill-designed. Lack of knowledge or epistemological base in disaster management is thus a problem, which emanates from faulty M & E process. With a narrow knowledge base emanating from poor feedback and research anomalies, the scope for weaving the good practices and success stories into a databank becomes narrow.

15.7 INTERLINKAGES BETWEEN RECOVERY AND DEVELOPMENT

The 'oughts' and 'shoulds' in disaster recovery planning make for a good reading, but in reality we do not even have anything that can be remotely referred to as a disaster recovery plan. There is no systematic disaster management plan at the central, state and local levels. We all know by now that the real solutions to the problems of rehabilitation and reconstruction lie in the establishment of interlinkages between disasters and development. The relationship between disasters and development is, however, not that of straight cause and effect. There are many intricacies in its backward and forward linkages and the underlying network of relationships.

Disasters can seriously degrade a country's long-term potential for sustained development and cause governments to substantially modify their economic and social priorities, as well as developmental programmes. Disasters often force the otherwise stable, sedentary population to move away from their established places of work, and creates psychological stress leading to many dysfunctional consequences. Yet, they do highlight high-risk areas where action must be taken before another disaster strikes.

In the present context, disasters can no longer be viewed as random occurrences caused by nature's wrath. The distinction between natural and man-made disasters is getting blurred with time. The frequency and intensity of disasters have recorded an all time high, as the harmonious balance between human beings and nature has been disturbed to almost irreparable proportions. Faulty urbanisation, population explosion, civil strife, unbalanced industrial growth are the reasons attributed to environmental degradation characterised by global warming, deforestation, desertification, soil erosion and so on. Environmental degradation and mismanagement may aggravate the frequency, severity and predictability of hazards. It could be behind the increased instances of disasters. Disaster management has to thus be placed in the context of the development challenges that the country faces as a whole. There is a significant relationship in the way that disasters and development affect one another.

While disasters are catastrophic events, lessons learnt and incorporated into long-term development planning may serve to reduce future vulnerability. The destruction of unsafe infrastructure and buildings can provide an opportunity for rebuilding with better standards, or relocation to a better place if the present site is found specifically vulnerable. Particularly damaging disasters will also focus on relief aid and rehabilitation investment, thus, providing developmental opportunities that were previously unavailable. Damaged buildings may highlight structural weaknesses, which could be rectified and may serve to improve building and planning regulations.

The 'connect' between population growth, poverty and development is strong and complex. When assessed in terms of the Gross Domestic Product (GDP) in the context of our large population we are far behind many of the countries of the world. Conditions of poverty, as we have mentioned, often contribute to greater vulnerability of some sections of a population to an environmental disaster. Food insecurity, lack of means of livelihood and capacity to access resources characterise their lives even in normal times. While the challenge is equally present in rural and urban areas, it is worse in the case of the latter.

Adequate linkages between disasters and development can, for example, reduce the vulnerability of coastal communities to natural hazards by establishing a regional early warning system; applying construction setbacks, greenbelts and other no-build areas; promote early resettlement with provision for safe housing; debris clearance; potable water, sanitation and drainage services and access to sustainable livelihood options; enhance the ability of the natural system to act as a bioshield to protect people and restoring wetlands, mangroves, spawning areas, sea grass beds and coral reefs, and by seeking alternative building design that is cost-effective, appropriate and consistent.

It has to be seen as to how the interlinkages between disasters and development could be incorporated in the disaster recovery plan. Rehabilitation and reconstruction phase, as we have mentioned earlier in the Unit, is the most opportune time to rebuild infrastructure, resources and communities. Recovery plan should encompass the issues related to negative impact of disasters on socio-economic system and the ways and means through which these challenges could be converted into developmental opportunities. We have moved on from post-disaster assistance to pre-disaster preparedness; from readiness to mitigation; from individual aid to restoration of services; and from relief to rehabilitation. A broad disaster recovery plan should include comprehensive sub-plans on:

- i) Health and Medical Care;
- ii) Creation of Livelihood Options;
- iii) Environmental Protection; and
- iv) Rehabilitation and Reconstruction.

Many endeavours to strengthen the process of recovery need to be taken note of over here. These aim at using modern technology, community participation and assistance from national and international agencies in disaster recovery. The National Institute of Oceanography (NIO) in Goa has developed a real-time reporting and Internet-accessible coastal sea-level monitoring system. It has been operational at Verem Jetty on the Mandovi River in Goa since September 24, 2005. The gauge uses a cellular modem to put on the Internet real-time sea-level data, which can be accessed by authorised personnel. By using a cellular phone network, coastal sea-level changes are continuously updated on to a web-server. The sea-level gauge website can be made available to television channels to broadcast real-time visualisation of the coastal sea level (Prabhudesai and Joseph, 2006).

An improved Seismographic Network, a network of real-time sea-level gauges in the Indian Ocean and deep-sea pressure sensors has been proposed, along with National Tsunami Warning Centres (NTWCs), for a reliable warning and mitigation network for the region. While satellite communication is expensive, wireless communication infrastructure and the presence of cellular phones have made cellular communication affordable. The sea-level network in the Indian Ocean has been upgraded with the establishment of 23 real-time stations, which form a part of the Global Sea Level Observation System (GLOSS) set up in 1985 and transmit data every hour through the Global Telecommunication System (GTS) of the World Meteorological Organisation (WMO).

Deep-ocean Assessment and Reporting of Tsunamis (DART) is another effort. It is a second-generation DART system (DART-II) that is under development. It will allow bi-directional communication, which would enable transmission of tsunami data on demand. This would ensure the measurement and reporting of tsunamis with wave amplitude below

the automatic reporting threshold (Prabhudesai and Joseph, *op.cit.*). After the Tsunami, the India Meteorological Department (IMD) has upgraded the existing seismological observatory at Port Blair with a state-of-the-art broadband seismograph system. A network of five temporary field observatories has been established. Permanent observatories have also been planned for some areas. Setting up bio-shields, knowledge centres and agronomic rehabilitation have been called for (Parsai, 2006).

The advancement in science and technology could be used with advantage for speedy long-term recovery. These efforts have been supplemented by international developments in terms of various environmental treaties, international consortiums, sustainable data forums and declarations such as ProVention Consortium, Fribourg Forum, Hemispheric Conference, South Asian Livelihood Options Project etc. The International Decade for Natural Disaster Reduction (IDNDR) helped raise the profile of discussions surrounding the social and economic causes of disasters and acknowledged the mitigation of losses through technological and engineering solutions. Yokohama Strategy in May 1994 endorsed these objectives and further underlined the link between disaster reduction and sustainable development.

The International Strategy for Disaster Risk Reduction aims at carrying the good work ahead. The Strategy aims at: increasing public awareness of the risks that natural, technological, and environmental hazards; obtaining commitment by public authorities to reduce risks to people, their livelihoods, social and economic infrastructure and environmental resources; engaging public participation at all levels of implementation to create disaster-resistant communities through increased partnership and expanded risk reduction networks at all levels; and reducing the economic and social losses of disasters as measured. The World Health Organisation (WHO) Meet in Bangkok in December 2005 aimed at identifying gaps in addressing response, preparedness and recovery for health needs of the affected. One of the major objectives of the Meet was to develop benchmarks and corresponding course of action (The *Hindu*, Dec.28, 2005).

Disaster management is acquiring a global connotation. Besides the United Nations and the World Bank, many international organisations such as Caritas India, Lutheran World Service, Asian Development Bank, Intermediate Technology Development Group (ITDG), Danish International Development Agency, Swedish International Development Agency, Cooperative for Assistance and Relief Everywhere (CARE), International Federation of Red Cross and Red Crescent Societies, Oxfam, etc., are doing substantial work in the area of disaster management.

Of late, the Narmada Bachao Andolan has been drawing attention to the travails of Project Affected People (PAPs), as a result of unthoughtful and insensitive development and rehabilitation policies of the governments. The Andolan has been focusing on issues such as non-compliance with rules, violation of human rights, hardship of the poor etc. One viewpoint is that those who equate development with huge shopping malls, big dams, vehicular proliferation, and global merchandise are never faulted for the negative consequences of development that ignores norms of equity, environmental protection and social justice (Iyer, 2006). We would though not like to go into the debate on utility of the mega projects over here. Yet, the issue to ponder over is that if in normal times, a development project can cause so much displacement and inadequate rehabilitation of PAPs, can we expect a comprehensive rehabilitation policy for natural disasters?

The Disaster Management Act 2005 has been passed in India. The Act aims at speedy handling of natural and man-made disasters. It makes way for the setting up of a National

Disaster Management Authority at the Central level and a State Disaster Management Authority at the State level. How far and how much it would achieve are questions only time will answer. Meanwhile, the National Disaster Management Authority is already functional and so also are the State Disaster Management Authorities in Orissa and Gujarat.

The Bureau of Indian Standards (BIS) has also initiated several pre-disaster mitigation projects to reduce the impact of natural disasters on life and property as well as bring down social vulnerabilities. It has undertaken standardisation efforts in the area of earthquake engineering. Some new earthquake-resistance techniques have been developed that can be kept in view. One of them is the Base Isolation Technology. It aims at reducing the forces transmitted to the building from the ground by placing the building atop a mechanical system of isolators, sliders and dampers called Base Isolation Technology. Such technologies along with Diagonal Bracing, disaster resistant pier systems, Welded Wire Fabric Reinforcement could help in disaster-resistant construction.

Disaster management has been incorporated in the training curricula of All India Services with effect from 2004-05. There is a separate Faculty for disaster management in 29 State Level Administrative Training Institutes. National Council for Educational Research and Training (NCERT) books now include a chapter on disaster management for school children. The All India Council for Technical Education has been advised to include engineering aspects of disaster management in engineering courses. This education and training impetus has to be sustained through informed people's participation. A simple philosophy for coping with disasters is one of government and people working together in a coordinated way, by means of a coherent disaster management system.

A Rehabilitation-Reconstruction-Tracking Matrix is being produced that provides salient information on the overall recovery effort. The Matrix brings together information from tsunami-affected countries on what work is being done and what is being planned, who is doing the work, what measurable results are expected, where the work is being done, when the work is expected to begin and end, and its current status, and the source, amount and status of financing etc. The Matrix is at three levels of resolution-regional overview, sector-level status by region and country, and project level status by country. It is expected to provide a comprehensive view of recovery. This Matrix could serve as the platform for coordination of work in the recovery process and its relationship with developmental goals.

There is also a need to strengthen the legal, organisational and procedural objects of disaster management. The Sustainable Disaster Network (SDN) could be a solution. It is a global network of organisations whose mission is to encourage policies, which allow individuals to pursue their goals without intervention. The SDN focuses on the institutional framework within which people act, to ensure that policies encourage individuals to make the best use of resources and protect the environment, while improving both theirs as well as others' well being.

There have been many instances where disasters have hindered development and many more where lopsided development process has led to disasters. Many seismologists now relate earthquakes with high-rise buildings. Dam-induced afflictions such as deforestation, soil erosion, water logging cannot be overlooked. Loss of mangrove plantation in coastal areas has been the cause behind the colossal loss of human lives and property in the intense Tsunami of 2004. The Chennai floods and the inundation of Mumbai in the year 2005 have been the result of faulty and shortsighted urban planning.

Disaster recovery is not a one-time isolated exercise. The objectives of recovery plan can only be achieved if the conception, execution and evaluation of disaster management programmes are clearly laid down. The interlinkages between all the stages of disaster management cycle as well as between disasters and development have to be recognised and assimilated in the disaster recovery plan. We will read more about it in our next Unit on disasters and development.

15.8 CONCLUSION

Disasters can delay development by leading to loss of resources, shifting of resources to meet the emergency, depressing the investment climate and affecting the formal and non-formal sectors. Thus, the development policies must make adequate provision for well-planned disaster management approach. The Rehabilitation plan necessarily needs to be designed according to the expectations of the affected population.

There are several erroneous assumptions made regarding post-disaster situations that affect rehabilitation. These are: political support will be available when needed, funding will last as long as required, all stakeholders in the process will think alike, all agencies conceived will be competent to carry out required tasks, physical recovery must precede economic and social recovery, there is no trade off between speed and quality of reconstruction, codes and controls will have to be rigidly followed, reconstruction is an isolated process from pre-disaster planning and so on.

There are dilemmas and alternatives which also face post-disaster planners: survey quickly or survey accurately, repair or rebuild, rebuild or relocate, respond quickly or invite wide participation, create new organisation or rely on existing ones, rely on public or private investment, pursue physical reconstruction or economic reconstruction, and use local resources or imported ones. All these extend over to the disaster recovery phase and these need to be systematically looked into. To sum up, we may reiterate an important observation, which is a kind of slogan for disaster management. “*Vikas aisa ho jo aafat se bachaaye, vikas aisa naa ho jo aafat ban jaaye*”. It means that development should be such that guards against calamities. Development process should not be such that leads to calamities.

This Unit examined several problem areas in disaster recovery. It highlighted the Tsunami aftermath and the physical and social rehabilitation that has taken place in the affected areas. There are certain guiding principles that need to be adhered to in order to make rehabilitation and reconstruction effective and sustainable. The Unit discussed the important principles in the light of the necessary interlinkages that need to be established between disasters and development.

15.9 KEY CONCEPTS

Base Isolation Technology : Reducing the forces transmitted to the building from the ground by placing the building atop a mechanical system of isolators, sliders and dampers is called ‘base isolation technology’. This dampens the violent movements of the earth during a seismic event. By using isolators and dampers, the building is ‘decoupled’ from the ground motion of any earthquake and the transmission of seismic energy to the building is dampened. This is done by lowering the vibrational

frequency, allowing the building to move or displace and also by lowering the shock acceleration of the seismic event; thus reducing the tendency for the upper floors to move faster than the lower floors.

‘Chaukhats’

- : The technology applied on the ‘Chaukhats’ is reminiscent of a machine stitch on a fabric that keeps a piece of cloth in shape. In like manner, the technology makes use of wood, like a thread and keeps the entire structure intact against the ravages of weather and geo-activity. Through-stones and flat-stones are used, and wood predominates the structures of whatever dimensions they are. Pairs of thick wooden logs, beginning from the base of any two opposite walls are used at every 30 inches alternately with heavy stones to raise the walls and run through the entire length of all the walls. At the right angle where any two walls meet, the edges of the pair of logs on one wall are placed on the edge of the logs of the other and they are joined together by hammering thick wooden nails through them. This has an effect of turning the structure into a single piece construction. Such technologies for building quake resistant houses are available in the Himalayan region in India.

Damageability

- : Damageability of a structure is the property, which refers to the ability of a structure to undergo substantial damage without partial or total collapse.

Deforestation

- : Deforestation is the permanent destruction of indigenous forests and woodlands. It could be brought about by various factors such as conversion of forests and woodlands to agricultural land, plantation of cash crops and cattle ranching, commercial logging, felling of trees for the purposes of firewood or building material. It can further lead to soil erosion, silting and desertification.

Deformability

- : The deformability is the ability of a structure to displace or deform substantially without collapsing. A deformability action is a must to achieve earthquake resistance.

Desertification

- : Desertification is becoming a major problem as more and more of the world’s land surface is turning into a desert. The new deserts, which are being created, are not necessarily hot, dry, sandy places, but are those areas where humans have mistreated the soil and rendered the land useless for agricultural purposes. Soils, in any case, are ruined easily in areas where seasonal rainfall is unreliable. Cutting down of forest and trees, over-cultivation of soil and overgrazing leads to desertification.

- Disaster Resistant Pier Systems and Diagonal Bracing** : A good foundation of the house is of immense help in making it disaster resistant. For manufactured homes, one option is a disaster resistant pier system, with stout members rigidly connecting the home's chassis to a slab, grade beam, or array of pads. Some systems incorporate lateral or diagonal bracing for greater resistance. Though often referred to as Earthquake Resistant Bracing (ERB) systems, these also resist high winds, frost heaves and floods. Not only are these systems cost-effective in reducing structural movement (compared to conventionally manufactured housing foundations), they can even save lives and property.
- DISKNET** : National Natural Disaster Knowledge Network (DISKNET) is a network that could aid and stimulate functions such as: assisting in implementation of national projects by establishing crosslinkages and appropriate alignments with other related projects, ensuring free flow of high quality information and on-line interaction; helping state governments and disaster related institutions in securing appropriate partnerships by matching the felt needs with available capacities; leveraging funding from Internet and external resources; matching specific needs with apt solutions in public or private domains; providing technical guidance to the stakeholders and beneficiaries at large; serving as a national clearing house of information on natural disasters; and promoting partnerships between the government, public and the private sectors.
- Ductility** : The ductility of a building is the ability to bend, sway and deform by large amounts without complete collapse.
- Epidemiological Surveillance** : Epidemiological surveillance is the collection and interpretation of data on the risk or actual occurrence of communicable diseases and other health problems. As an assessment tool, epidemiological surveillance is most important in slow-onset and continuing disasters, especially where changes in living patterns occur such as the relief camps of disaster victims. These changes rarely occur after rapid onset disasters. However, because fear of disease is always prevalent after any major disaster, health status assessment and disease surveillance should be carried out as a guide for planning and management of health interventions, especially as a tool for quality control, and as a means of controlling rumours and reassuring the victims.
- Faulting** : A fracture or crack in the earth's surface.
- Fribourg Forum** : The Fribourg Forum held in June 2000 in Switzerland

was convened by the UN Office for Coordination of Humanitarian Affairs to bring together ministers and representatives from 52 countries of Europe and Commonwealth Nations, international and national organisations and NGOs, etc. The purpose was to obtain the policy guidance, political support and commitment necessary to improve coordination and cooperation to reduce the negative impact of disasters.

- Geographic Information System (GIS)** : Software uses geography and computer-generated maps as an interface for integrating and accessing massive amounts of location-based information. This unique characteristic of GIS makes it an effective tool in the field of disaster response and preparedness. It can be used for scientific investigations, resource management, disaster and development planning.

- Global Warming** : The earth is getting warmer by the day. Human activities as well as natural processes have precipitated the rate of global warming by producing certain green house gases such as carbon dioxide, methane and chloro- fluoro carbons into the atmosphere. It is the people also who are causing the change in the climate by burning nature's vast stores of coal, oil and natural gas.

- Hemispheric Conference (2001)** : The Conference laid emphasis on: developing the capacity to forecast, prepare for and mitigate the potential impact of disasters; reducing the vulnerability of people through risk and damage assessment; promoting the exchange of information; strengthening partnerships with all relevant stakeholders; promoting exchange of knowledge and experiences; and building database of disaster mitigation agencies.

- Kyoto Protocol** : At the Earth Summit in 1992, the World representatives agreed to prevent 'dangerous' climate change. The first step was the 1997 Kyoto Protocol, which has come into force in 2005. Kyoto Protocol is an amendment to the United Nations Framework Convention on Climate Change (UNFCCC), an International Treaty on Global Warming. Countries, which ratify this Protocol, commit to reduce their emissions of carbon dioxide and other green house gases such as chloro-fluoro carbons. Around 153 countries are the signatories of Kyoto Protocol, which imposes cuts on emissions between 2008 and 2012.

- Lagoon** : A shallow lake formed at the mouth of a river or near the sea but separated from it by a sand mound.

- Land Use** : Land use refers to the range of uses of earth surface made by humans. Uses are classified as urban, rural,

agricultural, forested etc., with more specific sub-classification. It means the way the land is developed and used in terms of the kinds of activities allowed and the size of buildings and structures permitted in agricultural, residential and industrial areas.

- Nutrition Centred Health Assessment** : Nutrition Centred Health Assessment (NCHA) evaluates the health and nutritional status of children under age of five (that is, 12 months to 5 years) as the 'point of contact' to detect and assess a full range of health problems. The method is used for: initial assessment of health and nutritional status, long-term surveillance of disease, malnutrition and death as well as long-term monitoring of food supplies, logistics, water and food quality.
- Ozone Layer Depletion** : Ozone is a form of oxygen, but unlike oxygen, it is a harmful gas. The action of sunlight on oxygen constantly produces small amounts of ozone in the stratosphere. At the same time, natural processes are breaking down ozone. Till now, the total amount of ozone has usually stayed constant because its formation and destruction has occurred at about the same rate. Human activity has recently changed that natural balance. We are producing certain substances such as chloro-fluoro-carbons and hydro-chloro-fluro-carbons at a rate, which is destroying the stratospheric ozone much faster than it is formed.
- ProVention Consortium** : This Consortium, comprising 43 governments, international organisations, academic institutions, private sector and civil society organisations was launched in the year 2000. It aims at: promoting a culture of safety through education and training; supporting public policy that can reduce the risk of natural and technological disasters; encouraging pilot projects to disseminate information about the proven best practices to mitigate disasters; developing the abilities of governments to minimise disasters; and forging links between public and private sectors, between scientific community and policy makers, between victims and donors so that stakeholders in disaster risk reduction work together.
- Remote Sensing** : Remote sensing is the acquisition of information on disaster related subjects. Weather radar, weather satellite, seismographs and videotape are examples of remote sensing systems. Remote sensing information can be valuable in determining the extent of cataclysmic disasters and monitoring slow-onset disasters such as environmental degradation and droughts. These tools also offer the possibility of acquiring data over remote

regions or areas made inaccessible by disruption of normal transportation and communication systems. However, these tools require that ground studies (known as ground-truth studies) be carried out to verify and adjust and/or calibrate the data obtained from air or space and be made available in time for emergency responses.

Social Forestry

- : Growing of plantations for the use of villagers' basic needs preferably with their participation in the process.

'Sumers'

: The 'Sumers' are ascribed to the Rajput families of Rajasthan in India. Typical 'Sumers' stand 15-17 mts high from the ground level and have 5-6 floors with 4 rooms on each floor. The ground area covered by the Sumer is 86 sq.mt. A foundation trench 3 mts deep and 70 cms wide is first dug and then refilled with flat dressed stones. This foundation is then raised above the ground in the fashion of a rectangular platform, to the height of 2-3 mts with the help of flat stones, clay and stone fillings. To raise the walls, double wooden logs are placed horizontally on the edge of the two parallel sides of the platform, which are opposite to each other. The width of the logs determines the thickness of the walls, which is 70 cms. On the other two parallel sides, the wall is raised with well-dressed flat stones to the surface level of the logs placed on the other two sides. The walls are further raised by placing heavy, flat, dressed stones upon the wooden logs on the two sides and by placing another pair of wooden logs upon the stones on the other two opposite sides. The structure is further reinforced with the help of wooden beams fixed alternately that run from the middle of the walls of one side to the other, intersecting at the centre. This arrangement divides the 'Sumer' into 4 equal parts from within and provides for joists supporting the floorboards in each floor of the building.

Sustainable Development

- : The United Nations Conference on Environment and Development (UNCED) also called Earth Summit, 1992, defines "sustainable development as the right to development which must be fulfilled so as to equitably meet development and environment needs of the present and future generations". UNCED's objectives emphasise that in order to achieve sustainable development, environment protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

Vulnerability Analysis

- : Vulnerability Analysis is the process of estimating the vulnerability of specified elements at risk to potential disaster hazards. Disaster mitigation and emergency

plans are based on the systematic knowledge of the system's vulnerability in terms of deficiencies in its capacity to provide services, physical weaknesses of the components to external forces and organisational shortcomings in responding to emergencies. Vulnerability analysis identifies and quantifies these weaknesses, thereby defining the expected performance of the system and its organisation.

Watershed

- : We all live in a vast watershed and we all contribute to the health of the lakes, rivers and groundwater in our watershed and beyond. A watershed is the area across or under which water flows on its way to lakes, rivers, streams and groundwater. Any area of land is made up of overlapping basins. Water flows to the lowest point in each of these basins; usually a lake, stream, pond or river. This basin is a watershed, and can come in many different shapes and sizes. The Mississippi River Watershed, for example, is composed of hundreds of smaller watersheds.

Welded Wire Fabric

- : Currently, the most widely accepted form of reinforcement is Welded Wire Fabric (WWF). It is a mesh of thick steel wires that is placed in concrete. However, synthetic-fibre reinforcement avoids the increased labour costs and difficulty in placement that are associated with WWF. Small diameter synthetic fibres (nylon and polypropylene) are now being added to concrete in order to reduce shrinkage and cracking by more than 80 per cent according to certain independent laboratory tests.

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15.11 ACTIVITIES

- 1) Browse the Internet and make a list of Websites that deal with rehabilitation and reconstruction.
- 2) Go through the newspapers and magazines, and scan their write-ups and articles for any recent disaster. Prepare a list of rehabilitation activities that these write-ups deal with.
- 3) Make a list of the guiding principles of rehabilitation and reconstruction
- 4) Make a note on the nature of problem areas in long-term disaster recovery.

UNIT 16 DISASTERS AND DEVELOPMENT

Structure

- 16.0 Learning Outcome
- 16.1 Introduction
- 16.2 Disasters and Development Processes
- 16.3 Need for a New Paradigm
- 16.4 Conclusion
- 16.5 Key Concepts
- 16.6 References and Further Reading
- 16.7 Activities

16.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the interconnection between disaster and development in both positive and negative senses;
- Bring out the deficiencies in development planning in this regard; and
- Look at the vision for the future.

16.1 INTRODUCTION

Disaster reduction and coping with disasters touch many areas of human life and society constituting a core task for sustainable development. Major UN Conferences on Environment and Development (Rio de Janeiro, 1992) and on the Reduction of Natural Disasters (Yokohama, 1994) have stressed that natural disasters cannot be attributed solely to natural causes; they are as much a result of incorrect *human conduct*. The IDNDR articulates the prime ones as: *irresponsible approach to the environment, the proneness of mega cities to grow out of control and population growth* (Sinha, 2003).

Over the past few years, there has been an apparent increase in the number of natural disasters, and with it, increasing losses on account of urbanisation and population growth. Clearly, the perspective on development has been one-dimensional, that is, cognisance has been taken exclusively of the growth aspect, without an eye on sustainability. As a result, the impact of natural disasters is now felt to a greater extent. According to the *United Nations*, in 2001 alone, natural disasters of medium to high range caused at least 25,000 deaths around the world, which is more than double the previous year and economic losses of around US\$ 36 billion. These figures would be much higher, if the consequences of the many small and unrecorded disasters that cause significant destruction at the local community level were to be taken into account. Some 75 per cent of the world's population lives in areas affected at least once by earthquake, tropical cyclone, flood or drought between 1980 and 2000.

However, a purely antithetical understanding of the relation between disasters and development may not give the true picture. Before we move any further with the discussion, it may be pertinent to elucidate the meaning of the two terms that will be frequently referred in this text, that is, '**Disasters**' and '**Development**'. '**Disaster**' can be defined as "*any serious disruption in the functioning of the society, caused by a hazard having wide spread human, material, environmental and other losses which exceed the ability of the affected society to cope using its own resources.*" On the other hand '**Development**' is a *comprehensive social, economical and political process that aims at the constant improvement of the well being of the population and all individuals.*

It is not development *per se*, but the character of development that is in question in regard to sustainable development; the question being: Is development welfare driven or is it spurred by purely commercial considerations? This can be understood by the damage suffered in different countries in Asia from the 2004 tsunami disaster. While Maldives, Sri Lanka, and Thailand suffered from non-ecologically sustainable *over-development* in coastal areas; India, Sumatra and North East Sri Lanka, suffered because affected pockets were inaccessible due to *underdevelopment* and impoverishment of the people, which compounded the death toll to tremendous proportions.

Development has to continue, but with due concern for environment protection. Science and technology can be fruitfully employed to control disasters, such as environmentally sustainable disposal of nuclear and radioactive waste, development of non-conventional energy sources, such as bio fuel, which reduces dependence on less sustainable options such as dams and nuclear energy. Such alternatives are generated by research and development in science and technology, which needs to be fervently promoted as a development strategy. There is much emphasis currently on science and technology, especially information communication technology for better understanding of disasters and better reach of disaster response efforts.

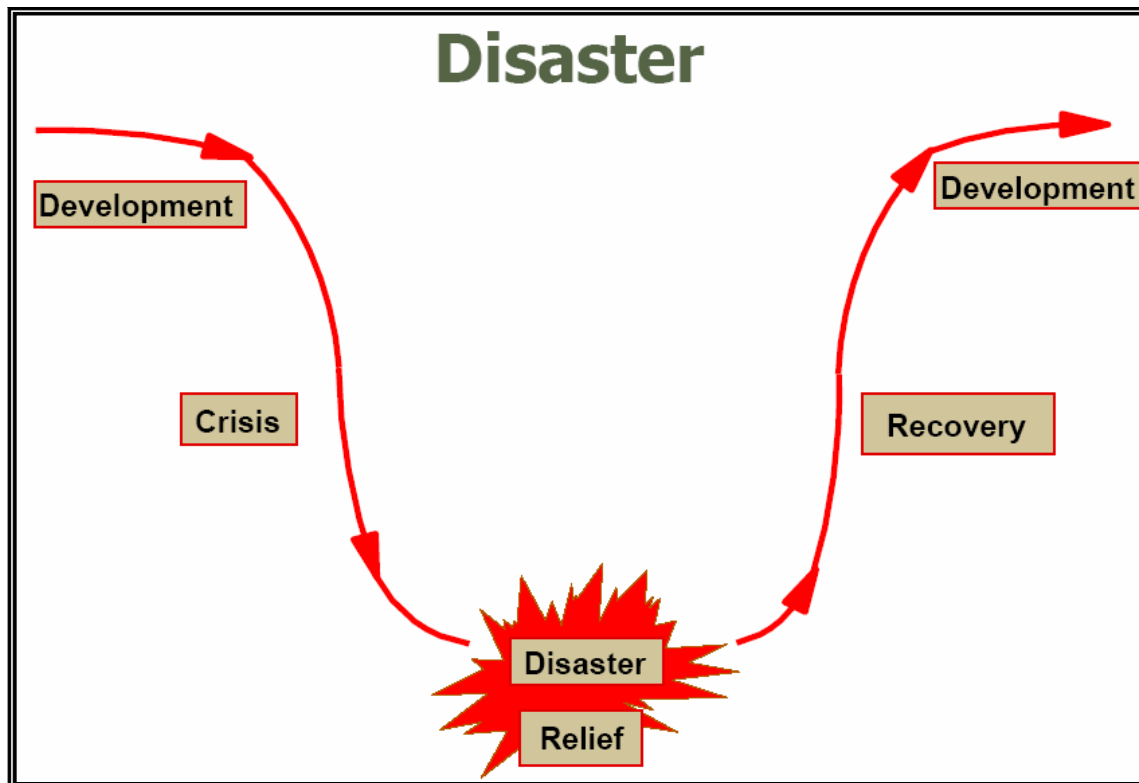
As per UNDP, there is need for proactive resource commitment on the part of Governments world-wide to understand the underlying causes behind natural calamities and inquire into the *nature* of correlation (whether positive or negative) between these causes and development which has been propelled significantly over the past few decades by globalisation. As per the World Bank and the US Geological Survey estimates, reported in White, Phillip *et al* (2004), economic losses worldwide from natural disasters during the 1990s could have been reduced by US\$280 billion worldwide if US\$ 40 billion were invested in mitigation and preparedness. In Darbhanga district in North Bihar, a cost-benefit analysis of mitigation and preparedness suggest that for every Indian rupee spent, the benefits amounted to 3.76 rupee. These researches are attributed to Twigg (2002), World Bank (2004) and Tearfund International (2004). The UNDP catalogues some of these correlations as: *rapid urbanisation* with impoverished settlements increasingly located in ravines, on steep slopes, along flood plains, on unprotected coastlines, along tectonic fault lines, or near dangerous industrial facilities; *environmental degradation* caused by harmful agricultural and industrial practices; climate change leading to rising seas, coral reef deterioration; increases in cyclones and droughts; *economic trends* that are forcing the rural poor to focus on monoculture practices and seek to cultivate marginal land; and *violent conflict* which has led to the destruction of forests and wetlands, poisoning of the environment, and dislocation of peoples. Two factors quite clearly, played major part in causing the tsunami disaster. Those two factors stem directly from

globalisation: increased global tourism, which has led to a chain of hotels coming up in vulnerable areas, particularly along the coasts and the consequent destruction of natural mangroves and forests. As has been explained in Unit 1, a hazard *turns to* disaster, when natural phenomenon interfaces with populations and settlements without adequate capacity to cope with inherent threats.

The Disaster Cycle

Disasters and Development are interrelated, both in positive and negative ways. Skewed choices in development planning result in adverse consequences for the environment and people; however, if the same choices are made ‘rationally’ on the basis of hazard evaluation and risk assessment exercises with an eye on disaster prevention, development becomes a boon, not a bane, as alleged in every case. The following model (Figure-1) of Disaster Cycle demonstrates the interconnection between disasters and development. Development could lead to crisis and disaster. Post disasters, lessons learnt and factored in subsequent decisions result in ‘sustainable development.’

The concept of a disaster management cycle has emerged which emphasises the interconnection between the three phases of response, recovery and prevention. Learners have been apprised of the concept in Unit-2 of this course. Relief, rehabilitation, reconstruction comprise the recovery phase and inspire subsequent development policy towards disaster prevention. Hence, they should be studied, not as isolated events but as integrated, along a linear continuum. The Disaster Cycle, however, has been criticised for oversimplifying the disaster situation. This is because even though it views the stages as integrally connected, it still visualises them as occurring along a linear continuum, where policy returns to the pre -disaster stage of preparedness, if the apprehended disaster does not occur, when actually, the situation carries the germ/potential of a disaster. Hence, instead of a disaster cycle, a *risk management cycle* is considered more appropriate, to tackle inherent hazards and not just manifest disaster (White, Phillip et al, 2004). The diagram, Figure-1, of disaster cycle represents disasters and development as integrally linked, in that they operate as causes and affects of/to the other variable. The concept of disaster management cycle has significant implications for developing countries like India. In India the distinction between disaster management and development was clear-cut as the latter appeared as a non-plan item of expenditure, under “calamity relief.” This was obviously a misconstruing of the problem, as was soon learnt after a spate of disasters, when the Orissa Super Cyclone of 1999, Gujarat earthquake and floods in different states in 2001 set back development a number of years. Hence, the Tenth Plan announced a paradigm shift in that disaster management would now be appreciated or perceived with/from a development perspective, and be factored into plan schemes under relevant sectors. This is in keeping with the concept of disaster management cycle.



(Source: <http://ocw.jhsph.edu/courses/RefugeeHealthCare/PDFs/Lecture17.pdf>)

Fig. 16.1: Model of a Disaster Cycle

The interconnection between disasters and development is also brought out by the fact that public policy has been deficient in many respects. This has resulted in vulnerabilities that have exacerbated disaster losses that would otherwise not have accrued. For example, as rightly pointed out by the Sustainable development Network (2005), in poor countries, planning regulations are such that residents do not have secure tenure to their properties and are therefore dissuaded from carrying out much needed repairs, which make the structures weak overtime. Instead of going in for substantial investments which would provide them safe dwellings, poor residents prefer to live in ramshackle tin huts which provide little or no resistance to strong currents or wind storms. Besides, since legal procedures are often time consuming and weak, contracts and other property rights cannot be enforced, which means financial institutions cannot provide insurance. The current planning regulations give the bureaucrats too many powers of interjection and direct interface with the public, which increases the probability of corruption. This lacuna was made evident by the recent tsunami of 2004. Many such homes were swept away, even though construction technologies have been developed that can ward off such threats from the sea to some extent.

Hence, securing property rights, ensuring freedom of contract and unflinching application of the rule of law are the three basic requirements of a liberal economy, which India is embarking upon presently. It also has significant implications for disaster management. Good governance is another eminent requirement. Corruption stalls effective implementation of poverty alleviation programmes as also disaster relief and response programmes. While good governance may be hard to define in precise terms, broadly it is conceived as a government which is transparent with regard to its working and where bureaucrats are accountable for omissions/commissions. As per the Sustainable Development Network, "poverty and corruption seem to occur jointly". Wealthiest countries, as per the Corruptions

Perception Index (2004), such as Finland, New Zealand, Denmark and Iceland, Singapore, Sweden, Switzerland; Norway, Australia, United Kingdom, Canada, US along with Ireland and Belgium, are also the most well governed, implying more corruption free, and the poorest, Angola, Democratic Republic of Congo, Cote d'Ivoire, Georgia, Indonesia, Tajikistan and Turkmenistan, Azerbaijan, Paraguay, Chad, Myanmar, Nigeria, Bangladesh and Haiti are the poorest and also the most corruption ridden.

There is a positive correlation between wealth and resilience to disasters. While the rich can secure lives and property by accessing insurance, and retrofitting structures, the poor cannot access such means. More the economic inequality, greater is the vulnerability of large masses of people to disasters. Given the negative correlation between economic development and disaster damage, governments in developing countries could not be excused for inadequate effort in this regard. Every week, 120,000 people, especially children would die from preventable diseases, like Malaria, indoor air pollution, malnutrition, lack of clean water and poor sanitation. These happen exclusively in poor countries due to lack of economic development and access to technology.

Desideratum of the discussion /arguments stated above, is, that “ only through institutions of a free society can poor people move from the vicious cycle of poverty and oppression to a virtuous cycle of empowerment and development” (Ibid).

Public Policy for development of telecommunications and broadcasting infrastructure at the local level is a critical requirement in disaster response. The same was realised during the 2004 Tsunami, when information about sea surges from affected areas did not reach the Centre even after 48 hours with the result that aid could not reach these areas in time. Another factor, which again concerns ‘mainstream’ development, is communication infrastructure, which was found weak at the field level during the recent tsunami. Since the information network was highly centralised, information from many affected areas did not reach the centre in time, which resulted in avoidable catastrophe. The National Disaster Management Policy enunciated after the Gujarat earthquake in India focused on early warning and information sharing between agencies that are timely and accurate. As per Sinha (2003), emphasis areas were: Increase of networking, Resource and knowledge sharing, Blending science and technology with the ongoing development process, efficient linkages with other Disaster Management Systems, Adoption of multi-hazard approach within the paradigm of prevention, mitigation and reduction.

The United Nations has been advocating proactive policy, especially for developing countries, to preempt/prevent disasters and/or towards mitigating their impact(s) if/when they strike. Accordingly, the decade of 1990 was declared the International Decade for Natural Disasters Reduction. The plan of action chalked out in pursuit of the objective was outlined in the Yokohama Conference of 1994. The strategy is to urge nations to share technology and expertise between them; the onus clearly is on the developed world, which has to generate awareness in this regard among poor nations where disasters risk reduction is still not a priority agenda. Since resource is the prime constraint, United Nations and other international agencies such as the UNDP, UNIDO, and World Wide Fund for Nature *et al* have committed fund assistance for projects to developing countries. At the same time, developing countries are being prompted to invest more in disaster prevention and mitigation activities, than relying on foreign aid, which is not the panacea as has been brought out in experience with recent calamitous events. The United Nations has declared a five point agenda in their *Draft Programme Document* in this regard:

- Ensure that disaster reduction is a national and local priority, with a strong institutional basis for implementation

- Identify, assess and monitor disaster risks and enhance early warning
- Use knowledge, innovation and education to build a culture of safety and resilience
- Reduce the underlying risk factors
- Strengthen disaster preparedness for early response

16.2 DISASTERS AND DEVELOPMENT PROCESSES

There is an old saying, ‘*an ounce of prevention is worth a pound of cure*’. Prevention is possible only when mitigation aspects are incorporated in the development planning process. Disasters resulting from natural hazards, such as flood, cyclone, drought, earthquake, fire and many more impact development in several ways. Disasters damage infrastructures, lifeline and critical facilities resulting in human, financial and environmental losses. Thus, natural disaster risk is intimately connected to the processes of development (see box ‘a’).

The following are some of the notable success stories of disasters prevention, as read from different sources:

- In China investment of US\$3.15 billion in flood control measures over 40 years is believed to have averted potential losses of US\$12 billion.
- In Vietnam, 12,000 hectares of land of mangroves planted by the Red Cross protect 110 km of sea dykes. While planting and protection cost US\$ 1.1 million, the cost of dyke maintenance was brought down by US \$ 7.3 million per year and the mangroves have protected 7, 750 families living behind the dyke.
- According to Oxfam, the value of cattle saved on a flood shelter of 4 acres in Bangladesh during the 1998 floods was as much as \$150,000 against a construction cost of only \$8.650.

The Evolution of Natural Disaster as a Development Concern

Both researchers and practitioners have been providing compelling evidences for many years that natural disasters are something more than just acts of God. While this is a broad generalisation of a very complex and heterogeneous process, one can say that until the 1970s a dominant view prevailed that natural disasters were synonymous with natural events such as earthquakes, volcanic eruption etc. From the 1970's onwards, technical professionals such as engineers, architects, began to focus on the fact that the same natural hazards had a varying impact on different kind of structures. The characteristics of a disaster became more associated with its physical impact than with the natural hazard. Interest grew in the design and implementation of ways to mitigate losses through physical and structural measures to reduce hazard or to increase the resistance of structures. Unfortunately, the cost of physical mitigation meant that in many of the countries efforts to reduce risk by these means have been minimal.

Also since 1970s, but with the increased emphasis in the 1980s and 1990s, research from social sciences and humanities have argued that the impact of a natural hazard depends not only on the physical resistance of a structure, but on the capacity of the people to absorb the impact and recover from loss or damage. The focus of attention shifted to social and economic vulnerability. The casual factors of disasters thus shifted from the natural event towards the development process that generated different levels of vulnerability. Vulnerability reduction began to be advanced as a key strategy for reducing disaster impact.

By the end of the 1990s, it was clear that development processes were not only gathering different patterns of vulnerability, but were also altering and magnifying patterns of hazard – an augment that has gained increasing currency as evidence mounts regarding the impact of global climate change. Risk management and reduction has been advanced as an integral paradigm that builds on and incorporates all the previous strategies from the perspective that all development activities have the potential to increase or reduce risk.

Source: A Global Report: Reducing Disaster Risk- A Challenge for Development.

box ‘a’

In order to clarify the ways in which disasters and development interact, it is helpful to distinguish between economic and social elements of development. These social and economic development work directly or indirectly to decrease or increase disaster risk. The table below outlines the relation between social and economical development with disasters.

Disaster-Development		
	<i>Economic Development</i>	<i>Social Development</i>
<i>Disaster limits development</i>	Destruction of fixed assets. Damage to transport, communication, infrastructure. Erosion of livelihood.	Destruction of health or education infrastructure and personnel. Death, migration of key social actors leading to an erosion of social capital.
<i>Development causes disaster risk</i>	Unstable development practices that create wealth for some at the expense of unsafe working or living conditions for others or degrade the environment.	Development path generating cultural norms that promote social isolation or political exclusion.
<i>Development reduces disaster risk</i>	Access to adequate drinking water, food, waste management and a secure dwelling increases people's resilience. Trade and technology can reduce poverty. Investing in financial mechanisms and social security can cushion against vulnerability.	Building community cohesion, recognising excluded individuals or social groups, and providing opportunities for greater involvement in decision-making, enhanced educational and health capacity increases resilience.

Looking at the relationship between disasters and development one can identify 'four' different dimensions to this relation:

- 1) Disasters can set back development
- 2) Disasters can provide development opportunities
- 3) Development can increase vulnerability and
- 4) Development can reduce vulnerability

The whole relationship between disaster and development depends on the development choice made by the individual, community and the nation who implement the development programmes. Let us now try to understand these 'four' different dimensions mentioned above with suitable examples for a better understanding.

- 1) ***Disasters can set back Development:*** Disasters wipe out decades of *economic* and *social* development, which has taken place over a period of time. In 1982, hurricane Isaac destroyed 22 per cent of the housing stock in the Togan archipelago. Reconstruction cost to improve damage to water and sanitation, energy, telecommunications, roads and railway infrastructure, from flooding in Mozambique in 2000, cost US\$ 165.3 million.

- 2) These accounts are dramatic, but the constant drain of resources because of frequent disasters limits development potential of million of people around the world. In

The 2001 earthquakes in El Salvador and in Seattle in the United States resulted in losses of around US\$ 2 billion each. While this scale of loss was easily absorbed by the U.S economy, it represented 15 per cent of El Salvador's GDP for that year.

Vietnam, in "normal" years, flooding destroys on an average of 300,000 tonnes of food. In addition, unplanned budgetary allocation to disaster recovery can hamper development interventions and lead to unmet development targets. Thus, disasters can significantly impede the effectiveness of development resource allocation. The damage due to disasters is done in many ways and the impacts can be as complex as the economy itself.

Countries that are normally affected by disasters have also to face the brunt of reduced human capital, as a large number of populace is affected and are not able to carry out the routine work. Disasters also reduce availability of new investment, further constricting the growth of the region. Besides, additional pressure may be imposed on the finances of the government through investments in relief and rehabilitation work. The increase in the cost and the frequency of disaster is the direct result of human action. Not only will the size of a nation's economy, but also the proportion of its land area exposed to the hazard determine disaster risk. Almost three quarter of the island of Montserrat was uninhabitable by the volcanic eruption in 2001. Today 36 per cent of the pre-disaster population remains and is supported by the United Kingdom.

Disasters can also limit social development. A population that has been weakened and depleted by natural disaster, particularly when this coincides with losses from HIV/AIDS, malnutrition or armed conflict, will be less likely to have the organisational capacity to maintain irrigation works, bunds in the field for water harvesting etc. Without these social assets, communities become more vulnerable. Women suffer additional stresses in disaster situations and also bear a disproportionate burden of the additional domestic and income generating work necessary for survival after a disaster event. When women are exposed to these additional stresses, the level of social development is reduced. However, over the long run, it is possible that there is an increase in their economic and political participation, generating an increase in social development. The exclusion of women from local decision-making circles in Bangladesh led to women and girls being unwilling to use cyclone shelters. Currently, inclusions in the decision-making process have improved the social position of women and encouraging greater use among women has reformed the management of cyclone shelters there. Disasters are thwarting attempts on the part of governments to achieve the Millennium Development Goals (MDGs), particularly, eradication of extreme poverty and hunger. In Ecuador, the Climate effects of El Nino, in 1997-98, in combination with an oil shock, increased the headcount poverty rate from 34percent in 1995, to 46 per cent in 1998. In Honduras, where there was widespread loss in agricultural output following Hurricane Mitch in 1998, the poverty rate increased from 43 per cent to 46 per cent but more so for rural households. In the Dominican Republic, headcount poverty increased from 36 to 40 per cent after a combination of drought and terms of trade shocks in 1990. In larger developing countries, however, such impacts on MDGs may not be wholly visible since overall national performance may obfuscate pockets of high impact, where the MDGs were intensely affected. There is therefore need to develop decentralised arrangements for impact assessments regarding MDGs following a disaster. Besides, time factor is important since effects of floods or droughts can be

assessed over a longer time frame, while that of earthquakes or hurricanes require shorter time frame. More reliable indices are expected to emerge with regard to progress in achievement of MDGs by 2015.

Disasters exacerbate poverty manifold through a range of macroeconomic mechanisms in that following short-term losses like loss of assets, the more intense long-term impacts follow from cuts in social spending and post disaster inflation, especially in food prices following flood or drought. In Zimbabwe, the 1991/92 droughts led to a jump in inflation to 46 per cent and food price inflation to 72 per cent by the end of 1992. Besides, disasters cause reallocation of funds and also donor assistance from development to relief and rehabilitation which usually mean cuts on capital expenditure. This sets up a vicious cycle of retardation in development and consequent income erosion, which affects the poor, disproportionately more. Repeat events successively erode the coping capacity of the poor, initially, selling jewellery or taking loans, to selling productive assets (livestock, land, housing rights) to survive, and finally, to destitution and distress migration. HIV AIDS or protracted conflicts as a result of dislocation and loss of social capital owing to competition for scarce means and loss of social solidarity are known to take over at this stage. These have set in motion a pernicious cycle in Africa, where destitution combines with poor governance and disaster risk to create misery that is never ending since the wherewithal to cope have been nearly annihilated (White, Phillip *et al*, 2004).

2) ***Disasters can provide development opportunities***: Disaster events often give a fillip to development, especially in the period immediately following a disaster. They provide a spur to development policy in the aftermath period. Stephenson and DuFrane (2002) opine that disasters can elevate the *development potential* of a society 'at-risk' for damage from a hazard. The political impact of damage and disruption can actually be a catalyst for change. A lot of reconstruction and social development schemes are taken up which would otherwise have not been paid attention to. Examples include, housing improvements, land reform, social forestry, restructuring of the economic base due to resource transfer from other areas, infrastructure development as contingent requirements etc.

There could be enhanced investments in upgrading administrative capability and training of personnel involved, which serves long term development goals. Development is also imparted 'direction' in that pockets of underdevelopment, where damage is disproportionate to the impact of the disaster, get highlighted during such events, which provides guidelines for future policy in this regard. The *Recovery* phase gives important indications for development planning. Reforestation programmes usually follow landslides and flash floods to check soil erosion, which have spin off effects on other sectors, such as improved air quality, better flora and fauna, health and longevity for people, etc., which improve outcomes from 'mainstream' development programmes in the form of more sources of income for the poor, enhanced employment opportunities, better animal husbandry, and better forest produce for people living in the adjoining areas. Changes in cropping patterns ameliorate erosion problems, and also losses due to floods and droughts. Programmes for soil conservation, water harvesting and on farm storage mitigate the effects of droughts. Hence, development is a variable in both the *input* and the *output* aspects of the disaster management cycle. In fact, it is central to disaster management.

At the request of the Government of India (GoI), The Asian Development Bank (ADB), the United Nations and the World Bank put together a Joint Assessment Mission (JAM) comprising experts from different disciplines and relevant vocations to assess the damage from the Tsunami in Andhra Pradesh, Tamil Nadu, Kerala and Pondicherry and make

suitable recommendations regarding Recovery, based on field surveys. The JAM recommended that national and state authorities treat the tsunami as a “wake up call to better evaluate vulnerability and improve risk management”. The Tsunami destroyed fisheries and to a lesser extent, agriculture which affected communities beyond the physical impact of the tsunami. The JAM recommended that, considering the crosscutting nature of the disaster’s impact, administrative approach in reconstruction should be participatory, flexible, decentralised, equitable and transparent, and cover concerns beyond livelihood restoration to better coastal management and risk management as continuous policy through realistic, short- term and medium -term goals. Effective hazard risk management in the future should be less dependent on relief and assistance, which draws valuable resources from other development goals. Instead there is a need to promote increased participation of the community in risk transfer insurance, community level risk management and disaster prevention while giving assistance to those affected. Before the tsunami, the government had chalked out a coastal regulation zone notification of 1991, which could not be implemented due to lack of an integrated approach and also understanding of the provisions of the act, which led to different interpretations by different departments. The notification required the coastal zone (500 mts. off the High Tide Line) to be classified into one of four categories and then regulate the type of activities and land uses permitted in each as per the vulnerability quotient. After a period of lackadaisical activity, the 2004 Tsunami created an opportunity to implement the act with more sense of purpose, since it has given impetus to studies and analyses into specific requirements in each demarcation and also the significance of integrated coastal zone management.

Forestry Project in Nepal Combines Development and Mitigation Strategies

The deforestation of Nepal has occurred at an alarming rate, with 50,000 hectares of forest cover (or 2 per cent of the total forest land) lost each year. This loss of soil protection has resulted in serious erosion in the mountainous region. There, population density has increased to more than 500 people per square kilometer of cultivated land. As estimated 80 per cent of Nepal’s energy used comes from fuel wood, and forests contribute more than 33 percent of the fodder needs. In addition, increasing numbers of livestock have led to overgrazing, which significantly contributes to environmental degradation.

During the 1980s, the Government of Nepal began the implementation of a community forestry programme to counteract these trends. This ongoing project is intended to stimulate increased production of such forest product as fuel wood, fodder and timber to simultaneously improve rural welfare and forest conditions. The strategy involves the decentralization of the existing Forestry Department’s control, and a transformation of its community Forestry and Afforestation Division from a custodial to a collaborative role, with communities assuming responsibility for planning and implementing their own forestry projects.

With deforestation, the dangers of environmental degradation, flooding and drought are increased. The Ministry of Forest and Soil Conservation, together with funding from United Nations Development Programme, is pursuing a project to increase community involvement in the conservation and disaster mitigation practices. Activities being promoted include fodder tree planting, land use management, training, inclusion of people at the local and district levels in the planning process, and coordination of forestry activities of all community projects.

By giving the rural farmers the commercial rights to forest products and providing them with information concerning forest conservation it is hoped that they will have more of an economic interest protecting forestland and increase its productivity. Special emphasis is placed on training and extension activities for women who perform most of the work related to forest products in Nepal.

Working at the grass roots level, Nepal’s community forestry programme is an innovative attempt to improve the productivity of the land and reduce potential disasters by linking increased production with protection of forest resources.

Source: Adapted from UNDP Project document # NEP/85/017/b/01/12- Project of Government of Nepal)

Development opportunities often are compromised because of excessive focus on relief assistance, which smothers independence and entrepreneurial effort on the part of people. Most of it is misdirected or channeled through weak local structures as a result of which funds get siphoned off. It has been noted that a lot of what is procured as relief could be locally purchased which endorses the rationale of extending assistance for long/medium term development (based on resources) through short-term relief instead of conceiving the latter as being sufficient in itself. Reconstruction management involving vulnerability reduction of particularly high-risk areas is a development challenge where hazard potential of repeat events could be substantially minimised. Information regarding physical and socio-economic vulnerability that is attained during disaster events can be factored into development strategy for the future. Here, the private corporate sector and the voluntary sector have significant contribution to make along with the government, especially in the context of the changing paradigm of public administration, where the government functions as a catalyst and promoter, and the civil society and private corporate sectors are engaged in actual service delivery. Since resources flow in from many sources, national and international, during emergencies, it is an opportune time to reinforce the financial sector by strengthening the banking structure, housing associations and cooperative credit societies by extending needed technical assistance and information. It is also time for in-house organisational reforms within the governmental system, concerning O&M (Organisation and Methods), involving financial procedures, reporting, monitoring systems, auditing and evaluation procedures (Stephenson, DuFrane, 2002).

Disasters can also be a major vehicle for carrying out major development programmes. Changes may occur in new land reforms, Acts and policies being developed, training of professionals, inducing disaster resilient technologies in the new constructions etc. On the other hand, development opportunities are missed or compromised because of lack of awareness and also resistance to accept and introduce new techniques while a new initiative is being taken up. This takes place because of lack of awareness of detailed risk factors among decision makers and planners at the national and community level and the related tendency for development options to be foreclosed when decisions are made quickly without having full information. A case study of forestry project in Nepal (see box 'b' above) reflects how development and mitigation strategies to reduce vulnerability can be related.

Information management is thus absolutely crucial for rational decision making in this regard. The significance of decentralised information communication network has already been highlighted earlier in the text. This leads us to research and development and use of science and technology *integrally* in development planning. Thus, there is a great need to guide and support the Government in developing strategic recovery programmes that mesh with national development goals and leads to substantial reduction in vulnerability. Interventions are effective especially when they focus on areas of particularly high risk, for example, low cost earthquake resistant houses being constructed in areas prone to earthquakes.

3) ***Development can increase vulnerability***: Social and economic development can increase the vulnerability of the community to disaster risks. There are many examples, which show that economic development increases disaster risk. The clearing of protective mangrove stands for shrimp farming in Bangladesh and Vietnam has increased damage due to storms and pollution. Widespread deforestation of hill slopes has increased vulnerability to landslides (White and Phillip, 2004). The massive forest fires in Indonesia in 1997 that

caused air pollution in neighboring Malaysia were partly caused by the uncontrolled use of fire by the farmers wishing to expand production of a major export crop for manufacturing palm oil. Another example that can be cited is tourism development that benefited Barbados, but which may inadvertently be adding to their own risk as waste water and recreational sports which contribute to the denudation of coral reefs, which act as a first line of sea defence against storm surges. Many urban disasters have been known to result, not from initial shock of the hazard, but from secondary releases from industrial units that store/use hazardous material. Metropolitan Calcutta and Vadodara are susceptible to such risks.

It is hard to imagine that increase in social development can increase the risk of disasters. The only possible situation that would actually place social development as a causal factor in disaster risk is one where people are forced to expose themselves or others to risk in order to fulfill their needs and desires. *Rapid urbanisation* has increased the vulnerability of the community. The growth of informal settlements and inner city slums normally inhabited by migrants have often led to development of settlements in vulnerable pockets like the low lying areas; on steep slopes; along flood plains or close to dangerous industrial sites. Over 600 million urban dwellers in Africa, Asia, Latin America and the Caribbean live in life and health threatening homes and neighborhoods as a result of poor quality housing and inadequate provision of basic needs. These developments impact the frequency and severity of disasters, exposing a growing proportion of the world's population to hazards. As reported in International Federation of Red Cross and Red Crescent Societies' (IFRCRCs's) World Disasters Report, 2004, "while the growth of mega-cities and mega-risks like earthquakes capture headlines, far more lives in urban areas are lost to everyday disasters caused by dirty drinking water and sanitation." In the last half century, human development has been characterised by rapid and unplanned urbanisation in the developing world like India. Between 1950 and 2000, the urban population in the developing countries increased from less than 18 per cent to more than 40 per cent. Nearly half the world lives in urban areas, and numbers are accelerating. Over the next two decades, 90 per cent of population growth in developing countries will be urban. Municipalities can't keep up. In Mumbai, 60 per cent of the city's 23 million inhabitants occupy 6 per cent of its total area; an average density of 2,000 people per hectare. In some slums, 50 families share a single toilet. The land where slum dwellers settle is often dangerously steep slopes, flood plains, near railway lines, industrial zones. As building activity spreads, rainwater cannot soak away. Monsoon floodwaters that remain a few days in well-serviced districts can stay for a month in slums. Since sewage cannot be controlled the municipalities leave it in the open, which leads to disease and death, especially reported among infants in Mumbai. Urban livelihoods are also less secure than their rural counterparts (World Disasters Report, 2004). Unplanned and ill-planned urbanisation has been the cause for environmental degradation (for example, deforestation), over exploitation of natural resources (for example, water), ecological disturbance (for example, pollution) and social destitution (for example, increase in poverty). These factors turn hazards into disasters. *Increased population* concentrations and *sub-standard construction* increase the vulnerability of the built environment and the fragility of socio-economic systems. Land use and urban development practices often do not take into account the susceptibility of natural hazards. United Nations statistics indicate that in the 1990s, close to 70 per cent of construction in the developing countries was built illegally. Hence, year after year, exposure to natural hazards increases as a result of unsustainable development.

Since 1991, two-third of the victims of natural disasters, were from developing countries, while just two per cent were from highly developed nations. Those living in developing countries and especially those with limited resources tend to be more adversely affected.

With the alarming rise in the natural disasters and vulnerability *per se*, the world community is strengthening its efforts to cope with it. Lack of access to education and information often has wider implications for vulnerability, since people may simply be unaware of the options open to them for vulnerability reduction. Poor people have far fewer assets to invest in resources, which may reduce their vulnerability. Poor people are less likely to be in a position to organise collectively to reduce risks, partially because poorer people have a high proportion of women, young children, the sick and the disabled. Furthermore, after a disaster, the effects of malnutrition and chronic illness put people at additional risk. Thus, natural disaster risk is intimately connected to the processes of human development.

Although in aggregate terms, development will usually contribute to a reduction in vulnerability to natural disasters; development activities within an area, might increase certain types of vulnerability, for example:

- Urban development often leads to an influx of relatively low income groups, with large scale settlement of marginal land or in high density, poor quality housing.
 - Marine and coastal zone development leads to population concentrations, exposed to possible storm surge, high wind, flash flood and landslide risks. Tsunami and tropical cyclones can destroy all the development gains.
 - Mechanisation of agriculture could be fraught with adverse environmental consequences. There have been numerous examples to endorse the argument. The rationale of the argument is that the change being introduced is 'exogenous', not based on indigenous adaptations, which makes it doubtful with regard to suitability/veracity. Endogenous practices are in consonance with the ecology of the area and the requirements of the people. Reportedly, long-standing agro-forestry systems in Pacific Islands are threatened by agricultural modernisation.
- 4) ***Development can reduce vulnerability:*** If development can act as an agent for increasing the vulnerability of the community; it can also sometimes reduce the vulnerability of the people. For economic development to proceed without increasing disaster risk, development planning needs to reconcile some potentially conflicting drivers for development. *First* the generation of wealth, that can raise the basic level of human development and *second* the distribution of wealth, which can enable the poorest to overcome human vulnerability. The mainstreaming of disaster risk assessment into the existing development instruments is critical in achieving economic development without generating new risk. This includes incorporating disaster resistant technologies in buildings that are being newly constructed. The Klang River Basin Flood Mitigation and Environment Management Project in Malaysia is a good example of development oriented towards risk reduction. The Klang River Basin is rapidly urbanising and its population is more than 3.6 million, with major proportions of urban land being converted for urban use. Frequent flooding and degradation of the environment has also been escalating as urbanisation continues. An Environmental Master Plan is planned to direct environmental management. The planning aims to improve river water quality and provide flood warning and protection.

Apart from economic development, social development too plays a key role in shaping governance regimes for disaster risk management set within a development agenda. To reduce disaster risk, governance must be sensitive to the needs of those who are at risk and able to facilitate timely assistance with appropriate measures. Social development would include awareness/education, and more importantly, health. Improved health and education status help reduce vulnerability and can limit human losses in a disaster. Following the direct impact of a disaster event, a better nourished healthier population, in which children have also been vaccinated will do much better in homes, shelter and camps set up for those displaced by disaster.

A literate and better-educated population, including women and girls, is better able to cope up effectively to any disaster. An educated community will also be in a position to respond immediately to early warning and other warnings of any disaster.

Impact of Globalisation

Development has progressed at a rapid pace in many developing countries, though dictated by globalisation, since tourism has grown considerably, and, as a result infrastructure has come up especially in coastal areas. This has increased considerably the damage potential of hazards if/when they strike. The developed world is equally at risk since development has meant more exposure of people and physical infrastructure. Also, many people have large disposable incomes travel for recreation is high on their agenda, which makes them vulnerable to unforeseen catastrophes. This has also induced more construction activity in attractive tourist destinations. Ironically, the most attractive tourist hotspots are also the most vulnerable to hazards such as floods, cyclones, storm surges, and volcanoes that mean disasters are almost inevitable. Globalisation undoubtedly has exposed more people and infrastructure to risks from hazards, besides disturbing the ecological balance of fragile ecosystems, such as small island states and regions around volcanoes. However, it would not be practicable to hope any of this would stop. Globalisation is an economic and political imperative, since the neo-liberal ideology dominates theory and practice in economics and political science. Rising prosperity in developing countries is providing newer fillip to the trend towards global integration.

It could be argued however, that increased travel and free trade between countries has led to economic gains to developing countries where employment opportunities have grown commensurate to growth in business in the economy. While that is accepted, it remains an incontestable fact that globalisation also has also widened income disparities within national boundaries. Opportunities have been availed by the educated elite, while the poor farmer has also been exposed to precocious competition in that while he is unable to access European markets, cheaper alternatives from other countries have pushed his goods out of the market. Reduced subsidies, dearer credit, and improper market access has put him at a clear disadvantage (Alternate Economic Survey, 2004-05). Globalisation places too much faith in unregulated markets, reduced state action, to create condition for human development. However, the balance is unfairly tilted in the favour of the rich developed nations. *Corporate Social Responsibility* hasn't made up for reduced state action as far as the welfare of the workers is concerned. Unchecked business also exacerbates environmental degradation and disaster risk through land alienations, unregulated extraction of primary products and rapid growth of urban slums. In post-cold war, there has been an increase in trade in arms, etc., which fuel conflicts. Armed conflicts and disasters are a deadly combination, which have destroyed communities such as in the Horn of Africa. Globalisation created a new class of deprived in Guyana, where people

lost jobs in the public sector. In the following floods they fell prey to diseases since they did not have the means to replace lost resources (White, Phillip et al, 2004).

16.3 NEED FOR A NEW PARADIGM

The frequency with which some countries experience natural disasters should certainly place disaster risk at the forefront of the development planners' agenda. Measures need to be taken to integrate disaster mitigation efforts at the local level with the general exercise of planning. Development programmes and projects need to be reviewed for their potential to reduce or aggravate vulnerability and hazard. Bringing disaster risk reduction and development concerns closer together requires three measures:

- a) The collection of basic data on disaster risk and the development of planning tools to track the relationship between development policy and disaster risk;
- b) The collection and dissemination of best practices in development planning and policy that reduce disaster risk; and
- c) The galvanising of political will to re-orient both the development and disaster management sector.

A future 'blue-print' for disaster management in India rests on the premise that in today's society, while hazards are inevitable, the disasters that follow need not be so and the society can be prepared to cope with them effectively whenever they occur. The need of the hour is to chalk out a multi-pronged strategy for total risk management, comprising prevention, preparedness, response and recovery on the one hand and initiate development efforts aimed at risk reduction and mitigation, on the other. Only then can we look forward to "sustainable development".

Changes in governance style can bring about the desired synergy between development and attainment of human development objectives. As highlighted in the tenth plan, the government would henceforth function more as a catalyst and a promoter, while the civil society and the private corporate sector would be engaged in actual service delivery. However, there are certain areas where government's role would actually expand. Infrastructure provision for rural development especially would demand increased public investment. The 73rd and the 74th amendments to the Constitution of India have provided for decentralised governance in India, where local democratic institutions would be engaged in development planning, enlisting peoples' participation in interest articulation and later, at the implementation stage. Certain indications emerge. Henceforth, the requirement of local infrastructure would be adequately met. Strengthening administration at the local level would mean ready response on the part of administration to disaster calls, better warning and information dissemination and better understanding of vulnerabilities since in a decentralised arrangement, people turn from passive beneficiaries to active participants in administration. Since the government would be providing most of the infrastructure, lessons learnt from past experiences would get duly incorporated in development planning.

16.4 CONCLUSION

Disaster management henceforth would be an integral aspect of public policy for development, which means, physical infrastructure has to be hazard resistant. Resettlement and rehabilitation of affected populations as a result of development, such as building

dams has to ensure that displaced poor are not exposed to newer vulnerabilities. Since disasters adversely affect progress in achieving the Millennium Development Goals, targeted risk reduction needs to be attempted, as per the specific vulnerability identified, such as, training teachers and students in emergency preparedness and building safer structures for schools in hazard prone areas, instituting health infrastructure and arranging for awareness and training in hazard prone areas and also promoting better maintenance of such infrastructure, promoting awareness of gender concerns and health issues like HIV, involving communities in such activities in a proactive way (White Phillip et al, 2004).

The aim in all such similar cases should be to minimise the adverse side effects of development projects if any/apprehended. In this context, siting decisions regarding projects have to be taken after due consideration, technically, risk assessment, of the hazard vulnerability of the area. Besides people vulnerability, adverse impact of the environment if any has to be duly accounted for. To that end, Environment Impact Assessments or EIA norms/stipulations should be duly complied with. All of these measures contribute greatly to minimising losses when eventually disasters strike. Development that proceeds without factoring sustainability concerns leads in time to crisis, and thence, disaster on encountering unavoidable hazards. Post disaster, after recovery gets underway, development is embarked upon again, hopefully, factoring vulnerability concerns. For instance, abiding by building codes and zoning regulations can mitigate future losses from similar events, such as earthquakes, floods and cyclones. Besides saving lives, such measures protect high value economic property, such as educational, medical hospitality, entertainment and industrial facilities.

While natural disasters could not be completely averted, damages accruing resultantly could be significantly minimised, if policy planners in the course of 'mainstream' development planning make the right choices. The onus is on the government, the international community and the people alike, since public policy towards disaster mitigation/preventive policy is an integral concern and depends on the Risk Perception among policy makers, and also the public for effective interest articulation on their part for public policy regarding sustainable development

16.5 KEY CONCEPTS

Sustainable Development : Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet present and the future needs. (Brundtland Commission, 1987)

Sustainable development is based on socio-cultural development, political stability and decorum, economic growth and ecosystem protection, which all relate to disaster risk reduction.

EIA : Environment Impact Assessment means assessing proposed project on the basis of likely impact on the

environment and people in nearby areas. In India an Environment Information Center (EIC) has been set up as clearinghouse of information since such assessments require data, which is presently a constraint in India. The Ministry of Environment and Forests conducts EIAs in India. The EIC stores data in GIS format.

Social Development

: Social development implies the level of coherence achieved in a society by institutional means. The more the social capital, and the more it is institutionalised/organised as committees/organisations the more is the level of social development.

O&M

: O&M or Organisation and Methods, is a technique of procedural reform that is closely related to scientific management precepts. It entails the study of procedures with a view to simplifying them, such as rationalising office work, which contributes economy and efficiency at work; the intent, is to find the “one best way” of “doing things.”

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16.7 ACTIVITIES

- 1) Explain with examples how development activities increase the vulnerability of the community towards natural hazards.
- 2) Do you think disaster resistant features need to be added in all the development activities carried out by the Government? Discuss.
- 3) Explain how urbanisation and population growth have accounted for a greater impact in case of a disaster.
- 4) How have disasters set back decades of development? Explain this with suitable examples.

UNIT 17 FIRST RESPONDERS

Structure

- 17.0 Learning Outcome
- 17.1 Introduction
 - 17.1.1 Rationale of First Response
 - 17.1.2 Concerns for First Responders
- 17.2 Who is a First Responder?: Understanding the Concept
- 17.3 People as First Responders
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- 17.5 Role of Community in Disaster Management
- 17.6 Conclusion
- 17.7 Key Concepts
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- 17.9 Activities

17.0 LEARNING OUTCOME

After studying this Unit, you should be able to,

- Understand the significance of ‘first response’ and identify the ‘first responders;’
- Appreciate the role of community in first response;
- Discuss the need to strengthen first response on the part of people and government agencies; and
- Discuss measures to strengthen first response.

17.1 INTRODUCTION

The past few decades indicate substantial increase in the frequency and impact of natural disasters worldwide. These unwelcome events have caused substantive human and material losses. Analyses of response to past disasters have highlighted the importance of reaching the victims within the initial crucial period during an emergency, as it is a major requirement in protecting people and assets. Though some time lag between the event and official response is unavoidable, yet majority of casualties occur during this time. Thus there is need for such a mechanism to be in place, whereby, the immediate or the first response is ensured to the extent possible. The objective of First Response is to build resilience in the affected communities to respond with greater fortitude in the event of disasters so as to resist losses before official help arrives.

However, First Response is complementary to official response. Disaster Response on the part of government is a long-term concern since it is dovetailed with development. Social and economic vulnerability greatly reduces the capacity of the poor to cope with adverse

conditions. First Response, on their part, in disaster situations, is therefore greatly inhibited. As a prerequisite, their coping capacity has to be enhanced by improving their material situation. This could be possible only through combined effort on the part of the administration, non-government organisations active in the area of disaster management and more generically/generally, particularly in developing countries, in development concerns, such as poverty alleviation, uplift of weaker sections etc.

Since disasters and development concerns are interlinked, building resilience of vulnerable communities would demand *more urgent efforts* at alleviating poverty and removing infrastructure bottlenecks that hinder income and employment generation in the villages. That would demand attending to all aspects in the entire *cycle of disaster management*, that is, prevention, mitigation and preparedness in reducing risk and linking it to the development planning process. In the past, disasters were looked upon as isolated events, responded to by the governments and various agencies without taking into account the social, economic causes and long-term implications of such events. However, since disasters retard development severely, attempts are required to build up the coping capacity of the affected communities as well as the local administration for combined/concerted effort to mitigate the human and material cost of disasters, which was rightly emphasised in the Tenth Plan in India (2002-07).

17.1.1 Rationale of First Response

To reiterate, since there is understandable time lag between a disaster event and the administrative machinery or even the organised voluntary groups to swing into action to redeem the damage, more importantly to save lives. *People* are the sufferers in disasters and the extent to which disaster casualty is incident/ minimised would depend on the extent of *readiness* on the part of the affected to respond to the exigency. Until now such effort on their part had been informal and unorganised. However, it is in the process of being recognised officially now, and brought in tandem with government response, since it has proven crucial in saving lives in the immediate aftermath of disasters experienced in the recent past.

Following the Mexico City earthquake untrained, spontaneous volunteers saved 800 people. However, reportedly, 100 people lost their lives while attempting to save others. This implies training has to be imparted to the first responders in disaster response for better response effort on their part. It has been observed that enlisting the services of volunteer first responders who come from a cross section of society greatly economises response effort in terms of both time and money. Future scenario in this regard therefore, is envisaged as, first responders functioning as an extension service/additions to official agencies, offering immediate help to victims till the time professional help arrives. There are numerous examples of such intent on the part of governments globally, particularly on the part of those that have suffered disasters in recent years. The Los Angeles Fire Department (LAFD) created the Disaster Preparedness Division in 1985 with the purpose of training citizens and private and government employees in tackling fire disasters. The Whittier Narrows earthquake in 1987 further prompted the authorities to take an area wide approach to curb future threats in adjoining areas of California.

That readiness however, is not simply to be expected on the part of the people but needs to be *inculcated* in them through proactive effort on the part of official agencies to equip the people with requisite knowledge in this regard and the logistics: gloves, goggles, mask and disaster supplies (bandages, flashlight and dressings) to put response into practice efficaciously. In the U.S., dissemination of information among people in this regard has

been entrusted to the Community Emergency Response Team members (CERT) who are required to undergo in addition to their regular training, CERT Train-the-Trainer (TTT) programme conducted by their State Training Office for Emergency Management or the Emergency Management Institute. The training includes understanding of the disaster (s) as per the vulnerability of the area. The education process gradually converts an *ordinary civilian* into a voluntary *disaster worker* who is equipped with the know-how to save himself and his family in the event of a disaster. Examples in this respect include, fire suppression through education in fire chemistry, hazardous materials, avoidance/safe keep, and ways to extinguish small fires, administration of first aid to sufferers in such (all) cases, search techniques, rescue techniques, and most important, rescuer safety. They are also apprised of all legal and organisational formalities/stipulations in these regards. The effort significantly is a sustained one in that periodic refresher courses are conducted to maintain the interest and involvement of people even during 'lull' times. Accordingly, following the September 11, 2001 attacks in the USA, the country is gearing up to tackle the threat of terrorism by harnessing the individual skills of people and organising them as *Citizen Corps*. As articulated in the Pierce County Circulation (1995-2006) First Response is even more significant today in view of the threat of terrorism, which could even be in the form of biological or chemical attack on unsuspecting civilians or in the form of sabotage. In such events, often the critical facilities such as government offices and hospitals are the prime targets, which leave the administrative machinery paralysed and the people, helpless. In such eventuality, self- help on the part of people is significant in that it is the most effective initial response to the hazard response that can prevent losses considerably. Since terrorism is unobtrusive warfare, official response may not immediately get activated due to plain inability to comprehend a certain event as a terrorist attack, as for instance, the anthrax incidents in America, post September 11. This could increase significantly the number of incident fatalities since the period of uncertainty may be disquietingly extended. To reduce the magnitude of losses from a disaster and save on precious time in response, people have to be aware of the possible threats in their lives and prepared with plans and materials to face up to such eventualities. Accordingly, people in America are being advised to brace up for possible biological warfare where they could be exposed to germs, which cause lung infections and other fatal conditions. Anti -pollution masks for instance, as per the U.S. Department of Homeland Security, usually available with chemicals or even simple cotton cloth worn on the nose could significantly reduce the threat of fatality from germ warfare. Simple preparedness measures such as these are advised on the part of people, both to brace up for terrorist events as also other natural disasters such as a volcanic eruption where deaths result from suffocation, or a chemical disaster where similar measures would be needed to save lives. Hence, general preparedness on the part of people greatly helps reduce harm from adverse events, both natural disasters and terrorism (Pierce County Circulation, 1996-2005).

In France, 'First Response' is a specialised service in that training in this respect is imparted strictly under the guidance of physicians. In France, the prehospital care is either performed by first responders from the fire department (*sapeurs-pompiers*, most emergency situations) or from a private ambulance company (relative emergency at home), or by a medical team that includes a physician, a nurse and an ambulance technician (called "smur"). This may be a more desirable practice in view of the inadequate response to the Meerut Fire Tragedy in India (2006), where medical practitioners, particularly plastic surgeons, who were in dire need, were conspicuous by their absence in the disaster response team. In France, the first responders activity is called *secourisme* ("rescuism")

or *prompt secours* (“fast aid”), to make the difference with the *premiers secours* (“first aid”) performed by the bystanders (although the name of the diploma course offered contains the words *premiers secours*...). Volunteers are trained by agencies such as the Red Cross, who are asked to assist the official agencies and take charge of only minor casualties in case of bad response time.

17.1.2 Concerns For First Responders

Concerns have been expressed over behaviour aberrations that set in in personnel involved in first response out of exposure to harrowing scenes of death and devastation. As the affected, they too are affected by post-traumatic stress for which behaviour therapy in the form of psychological counselling is recommended. Institutionally, Post September 11, significance of inter-agency cooperation such as between police and fire service personnel (where not integrated) is being realised./stressed for effective team work. Significance of positive social capital between inter-agency personnel for mutual help in combating stress is also being emphasised (APA Task Force).

International aid agencies like the WHO have taken up the responsibility of educating laymen in first response. Helpful as they are to the general public they also provide useful guidelines to official agencies involved by dispelling some prevalent myths. Illustratively, a Field Manual for First Responders has been published by the WHO (2006) which is aimed at facilitating proper identification of victims and preventing mass burials and cremations. The book dispels the widely held myth/misconception that dead bodies pose a serious health threat in the aftermath of disasters. Most infectious organisms do not survive beyond 48 hours in a dead body, and it is the surviving population that is more likely to spread disease. Misconceptions in this regard lead to practices such as mass burials that create legal problems later on relating to identification of the dead, exact figures of the dead, legal claims for compensation, etc. (PAHO, 2006).

Competence in medical care is undoubtedly a critical requirement for emergency management. As per the WHO (1989), likely problems requiring medical competence are:

- States of shock
- Skull injuries
- Fractures
- Dislocations
- Burns
- Exposure to toxic substances
- Electrocution
- Drownings
- Cases of accidental hypothermia
- Haemorrhages
- Cardiovascular failure
- Respiratory distress

Likely injuries also depend on the hazard that has struck. In cases of *earthquakes*, head injuries are more likely and fractures and burn injuries where gas cylinders burst. Infections of wounds follow.

In *volcanic eruptions*, there are mostly suffocation and burns due to intense mudflows and burning lava.

In *floods*, mortality is high only in the case of sudden flooding or flash floods, the collapse of dams or tidal waves. Fractures, bruises or burns may occur or hypothermia in cases of extremely cold conditions.

In *cyclones* and *hurricanes*, mortality is caused by storm surges or tidal waves if/when they occur. Destruction of physical infrastructure due to heavy winds and rain results in fractures, cuts, bruises and other injuries.

In *droughts*, people suffer from protein-calorie malnutrition (Marasmus, Kwashiorkor) and vitamin deficiencies (particularly Vitamin A deficiency leading to xerophthalmia and child blindness). In famine conditions, measles, respiratory infections, and diarrhoea accompanied by dehydration may bring about a massive increase in infant mortality. Due to congestion in rescue shelters, or where people migrate, communicable diseases strike, such as, diarrhoeas, tuberculosis, parasitic diseases and malaria (WHO, 1989).

The above discussion underscores the need for good health infrastructure and competent personnel, both of which are lacking presently in the country, especially at the rural local level. Primary Health Care Centers are poorly serviced. Medical personnel resent rural postings, infrastructure in the centers is poor, absenteeism is rampant and availability of personnel and facilities grossly inadequate, given the requirements in rural areas. The need for upgrading health care has been recognised by the government (Economic Survey of 2004-05) and reiterated in the Common Minimum programme of the UPA government. The allocation for control of AIDS and other communicable diseases has been increased by about Rs. 280 crore. The State Health System Development Projects are underway in the states of Karnataka, West Bengal, Punjab, Orissa, Maharashtra, Uttar Pradesh and Uttaranchal with the World Bank assistance. The focus is on strengthening the health care delivery system at the secondary level and integrating it with the primary health care delivery system for improving overall health care services. The Alternate Economic Survey Group (2004-05) emphasises the need for administrative reform in this respect and articulates the need for horizontal integration between agencies involved and convergence in/of health care related schemes at the field for better outcomes. Presently, individual departments function disjointedly, with little coordination between them, when health is an inclusive subject and cannot be viewed in isolation from other inter-related concerns such as persistent poverty, drinking water supply, malnutrition and unhygienic living conditions. Also, there needs to be convergence intra programmes, as between AIDS control and Tuberculosis programmes as the two are related, and likewise. The emphasis should be on prevention of communicable diseases. Accordingly, a National Vector Borne Disease Control Programme (NVBDCP) has been started from 2003-04 through convergence of three on going programmes (Malaria, Kala-Azar and Filariasis) and inclusion of Japanese Encephalitis and Dengue. Attempt would be on understanding and prevention of vector borne diseases. Health and Education are important and, as pointed by Amartya Sen (1990), these are fundamental prerequisites for development. Freedom from disease and illiteracy would enable people to seek better lives through better *entitlements*, in his words, for opportunities such as employment which would lead to better resilience during troubled times such as droughts.

Before proceeding any further with the discussion on the Indian situation, it would be advisable first, to understand further the concept of 'First Responder.'

17.2 WHO IS A 'FIRST RESPONDER'? : UNDERSTANDING THE CONCEPT

As per the *Wikipedia*, "a **certified first responder** is a person who has completed forty to sixty hours of training in providing care in/for medical emergencies. They have more skill than someone who is trained in first aid but are not emergency medical technicians...A certified first responder can be seen either as an advanced first aid provider, or as a somewhat limited provider of emergency services." *Traditional* First responders as per the *Wikipedia* are the **Police** and the **Fire Fighters**. Apart from the above mentioned traditional responders, *Non-traditional* responders have now been brought within the ambit of the concept/definition of 'First Responders'. Those are listed as per the *Wikipedia*, as:

- Lifeguards
- park rangers
- utility workers
- teachers, childcare workers and school bus drivers
- worker-volunteers in a large facility (industrial plant) or at a remote site (fish-packing plant, commercial vessel, oil rig)
- truck drivers
- security guards
- bodyguards
- general aviation pilots and commercial flight attendants
- sports coach

Notably, these are all specialites that can contribute to response in keeping with their respective domains. Potential first responders need to be identified and associated with relevant agency, preferably an Incident Command Agency to work on a sustained basis through mock drills and training sessions towards disaster response. It might be pertinent to add in this context that there is lack of role clarity among the police with regard to their role in disaster management. The question that needs to be clarified is: is their role confined to enforcing law and order in such situations, or does it extend to a service function in an *Incident Command* mode referred above? Their efforts also often come in conflict with other departments such as the public works and others that are involved in disaster management within their respective jurisdictions. Situation after a disaster is chaotic since there are too many agencies involved without perceptible unity of command. In this respect, there would be need to refurbish training as also job description in this regard (The Indian Police Journal, 2003).

17.3 PEOPLE AS FIRST RESPONDERS

The rationale of the concept of first responders as explained above is that the time lag

between disaster impact and official and non-official response has to be minimised to reduce the loss of life, if not so much, property. Population that suffers disaster impact is the obvious first responder; therefore empowering those with basic know-how is the recommended strategy to help vulnerable people help themselves better. Socialisation of the communities in disaster management has to start early since aware communities are empowered communities. For that purpose, disaster education is now being included in school curricula to create aware communities in the future generations. The Central Board for Secondary Education (CBSE) has already taken the step in the desired direction and included the subject in their curriculum. Others are expected to follow suit. The tenth plan has unequivocally laid out the government strategy to engage the volunteer organisations active in the disaster arena, in closer association with official agencies to gain the maximum in terms of their manpower and expertise. Also, village volunteers would be trained by official agencies, the Police in particular, in organising and executing response in the immediate aftermath of a disaster. Introduction of disaster education in school curriculum would further emphasise the cause of preparing volunteers among the young who have the required predisposition to respond rightly which education would create in them.

There is, however, need for proactive information dissemination among the general public regarding self-help tips in the event of emergencies. For example, in the United States, the American Red Cross (1998) is educating people in protecting themselves in the event of natural disasters, such as earthquakes, floods, hurricanes and others through user-friendly modes such as pamphlet distribution and websites. For illustrative purpose, the following are some of the *Do's* and *Don'ts* prescribed for people inhabiting earthquake prone areas:

- Every room should have safe places like sturdy tables under which to hide. Many people have escaped injuries hiding under such furniture.
- Children should be made to identify safe places such as interior wall ways, away from heavy furniture, and given practice in promptly getting to them in the event of a quake.
- Professional help should be taken in structural mitigation techniques (retrofitting) such as bolting the house to its foundation, attaching furniture, particularly critical items such as water heaters (geysers) to wall studs to keep it from falling.
- People should volunteer for training programmes conducted by the local Red Cross Chapter in fire extinguishing and first aid requirements.
- Contrary to popular practice, people are advised to stay indoors and protect their heads using pillows, stay in their cars or away from buildings if they are outdoors, until the shaking stops.
- Communication equipment should be arranged, such as battery powered radio, flashlights etc. in ample measure to make search and rescue easy.

In cases of floods, people are advised to listen to the radio or television for flood updates regarding their area. In case of imminent threat, mitigation measures should be immediately taken, such as, raising electrical appliances to safe heights, keeping insurance policies, valuables and other documents in a safe deposit box, moving to higher ground if outside the house, leaving the gutted car immediately, avoiding driving close to barricades on sharp turns and other essential requirements as: canned food, first aid kits with essential

medications, can opener, and communication equipment: battery powered lights, extra batteries, etc. enough water for everyone and written instructions from professionals regarding how and when to turn off electricity, gas and water. Citizen approach should be proactive in securing this information. As per the Pierce County Emergency Management Programme, people in vulnerable areas should approach the nearest Emergency Management Centre to secure information about local disaster plans, disaster signals, how to take care of animals as they are usually not allowed inside emergency management centers, and the disabled who require special care; also ask about organised community preparedness in this regard and how it can help.

People should also seek education in reading disaster warnings. For example, FLOOD WATCH means a flood is possible in the area, while FLOOD WARNING means flooding is already occurring or will soon occur in the area; likewise for flash floods. Instructions should be issued by the authorities in the form of booklets, or put on the Web, as per the popular mode of access in this regard.

Disaster Planning should be taken up both at the family and the community level. As per the Pierce County Directive, likely activities in a family plan would be: keeping an out-of- state family contact that acts as a liaison between relatives in case of disaster, fixing meeting venues; for instance, outside the house in case of sudden emergency like a fire and in the neighborhood if outside. Everyone must keep in touch over phone and on other contact addresses. Evacuation should be carefully planned, addressing issues such as how to care for pets, etc. Outside the immediate family, people should form self- help networks incorporating people in home, school, workplace and assign functions to each of the friends, co-workers and relatives, etc., in cases of emergencies. Help should arrive immediately as per a pre-plan when a disaster strikes. Inventory of requirements and contributions from each volunteer should be carefully prepared and adhered to for maximum safety in times of emergencies.

The Pierce County (1996-2005) gives the following checklist to families to check the level of their preparedness:

Checklist

- Purchase battery operated transistor Radio for emergency alerts.
- Post emergency telephone numbers by phones (fire, police, ambulance, etc.).
- Teach children how and when to call Police and/or fire services and display the emergency phone numbers of these services prominently at home and also at the work places.
- Show each family member how and when to turn off the utilities (water, gas, and electricity)
- Get training for each family member on how to use the fire extinguisher (ABC type), and show him or her where it's kept.
- Install smoke detectors on each level of your home, especially near bedrooms.
- Stock emergency supplies and assemble a Disaster Supplies Kit.
- Take a first aid and CPR class.

- Determine the best escape routes from your home. Find two ways out of each room.
- Find the safe places in your home for each type of disaster and learn shelter-in-place procedures.
- Practice and Maintain Your Plan
- Quiz your kids every six months or so.
- Conduct fire and emergency evacuations.
- Replace stored water and stored food every six months.
- Test and recharge your fire extinguisher(s) according to manufacturer's instructions.
- Test your smoke detectors monthly and change the batteries at least once a year.

17.4 ROLE OF GOVERNMENT IN FIRST RESPONSE

After the impacted populace, the government is the most significant first responder to a disaster event. Lack of preparedness results in catastrophes of the magnitude that were experienced following the Orissa Super Cyclone of 1999 when the state government was least prepared to meet the threat of the disaster. There was no single unified plan made for such an event. The state perspective was to receive a lot of relief material from various agencies. A Relief Coordination Centre was set up at Bhubneshwar with the operations starting from the Kalinga Stadium. The approach was totally agency driven and top-down with least participation/intervention of the people. Lessons were learnt albeit the hard way. Thereafter, a Disaster Emergency Committee (DEC), comprising national and international NGOs, namely Oxfam, Help Age India, World Vision, Care, Action Aid, Save the Children, International Federation of Red Cross and Red Crescent Societies, Tear Fund, Caritas, and Concern was constituted. The member organisations of DEC took a pro-active decision to carry out research on Community Based Disaster Preparedness (CBDP) in Orissa with special focus on cyclones. Subsequent to this effort, better preparedness arrangements are being put in place in the state to meet possible future threats (Sahni, 2000).

The strategy outlined and aforesaid, involved people proactively in that surveys were conducted and inputs procured therefrom were incorporated in official strategy for disaster preparedness. This underscores the need for voluntary organisations, representatives of the local governments and the official agencies involved to work in tandem for disaster response. For that fundamental change in governance *per se* would need to be affected, from a unilateral to a reciprocal mode where the interaction between the people and official agencies is maintained on a consistent basis, so are efforts for development of positive social capital in communities and institutions *inter-se*, such as police and revenue for effective total response.

Subsequently, institutional innovations have been introduced such as the State Disaster Management Authorities in States to better organise preparedness and response when a disaster strikes. The learners have been apprised of the developments in Unit-4 of this course.

It would be pertinent to discuss in detail here, the inputs in the District Contingency Plan that would henceforth be drawn up for better official response to disasters. The District Contingency Plan lists out the details regarding identification of the vulnerable areas in

case of specific natural hazards: earthquakes, cyclones, floods, and droughts and the requirements in preparation to mitigate involved threats. In case of earthquakes, for example, the administration is required to identify the hazard prone areas, and undertake advance preparatory action to mitigate the threats involved. Activities listed therein include:

- a) Preparation of Plans and skeleton organisation in advance,
- b) Training of Personnel,
- c) Establishment of alternative means of mobile communications,
- d) Mobilisation of Fire Services including auxiliary firemen,
- e) Plans of rescue of casualties trapped under-debris,
- f) Provision of hospital, medical and nursing staff,
- g) Medical plans for improvised first aid posts and emergency hospitals,
- h) Removal of Debris,
- i) Emergency sanitation, alternative supplies of water, salvage and custody of valuables, procurement, distribution, accounting of gift stores, care of animals, etc.
- j) Provision of welfare facilities for example of homeless, establishment of Games, information and guidance on essential matters, evacuation people, alternative of including food, clothing and shelter,
- k) Disposal of the dead after their identifications,
- l) Mobilisation of transport,
- m) Requisitioning of vehicles and issue of petrol, oil, lubricant, spare parts and repair facilities,
- n) Protection of properties including objects of art and things of cultural importance,
- o) Special measures for the protection/repair/restoration or essential service communications, industrial and vital plants,
- p) Publicity,
- q) Prevention of panic and upkeep of morale,
- r) Restoration of communications,
- s) Liaison, particularly with the Armed Forces,

Similarly, detailed list of tasks involved has been prepared for cyclones, droughts, and floods. To give a brief overview, to meet the cyclone threat, the district administration is required to keep adequate stock of grain and medicines and keep the vehicles and generators in a state of readiness. All Cinema Hall owners should be contacted and a list prepared of all available generators that can be called for in case of an emergency. Cyclone Stores should be opened to make available essential items such as tents, hooks etc. during such events. For more information on District Contingency Plan (see Appendix-1).

17.4.1 Building Resilience

As also mentioned earlier, Disaster Management is not an isolated event/activity. It has to be viewed in perspective of the wider developmental planning because vulnerability reduction is a mainstream development concern. The Tenth Plan (2002-07) recognised the interconnection between disaster and development; accordingly a separate chapter was incorporated on disaster management. Its practical implications are numerous. As read in the Economic Survey (2005-05), there are serious deficiencies with regard to storage facilities (godowns) for agricultural produce in rural areas in India. In 'normal' times it results in a raw deal for the farmer since he cannot store and market his produce at the opportune time. In cases of disasters, it severely compromises the resilience of communities to withstand the food shortage in the immediate aftermath of a disaster. The tenth plan points out that capital assets in irrigation and power have been insufficient. Public investment in agriculture has fallen which has caused deterioration in the quality of rural productive assets. While private investment is growing, that is hardly enough substitute by any measure, for public investment. Besides, even private efforts are thwarted due to infrastructural weaknesses in that while private investment in diesel run generating sets is increasing, operating capacity remains underutilised due to poor distribution and upkeep. The trend of declining public investment in agriculture as rightly conceded in the tenth plan would have to be reversed by increased investment in productive assets such as irrigation, power, credit and developing the rural infrastructure. In keeping with the revised paradigm of governance, as per the neo liberal philosophy, revival of farmer cooperatives is being strongly advocated to strengthen self-help on the part of people as a counterfoil to bureaucratic 'monopoly'. As announced in the tenth plan, the voluntary sector would henceforth be involved in to provide extension services in activities, such as, dissemination of new and environment friendly agricultural technology, research and education in animal husbandry and allied sectors, agricultural credit, social welfare services and development of weaker sections, particularly women and children and in tribal development. The voluntary sector and the private sector would be encouraged to provide extension services, both information and services including input supply and seed testing. The extension system would be revitalised and broad based through an inclusive network of Kisan Vikas Kendras (KVKs) functioning under the aegis of the Department of Agriculture and Cooperation, Non- government organisations, Farmers Organisations, Agri-business clinics/agri-business centers. To increase production, sustainable use of natural resources and development of water logged and wastelands for productive purposes would be taken up. The Rural Employment Guarantee Scheme currently underway (2006) is proposed to significantly improve the scenario with regard to rural employment and income generation. These are mainstream development concerns crafted for the twin objectives of development and environment protection. The difference now is that it would henceforth be development with a disaster management perspective which had been previously lacking. Hence, it would now be development that is sustainable, both environmentally and equitably across sections of society. In time it would serve to build both resilience and coping capacity in communities with a higher vulnerability quotient.

17.5 ROLE OF COMMUNITY IN DISASTER MANAGEMENT

Before understanding the role of a community in disaster management and how they normally act as '*first responders*', one needs to understand the basic concept of 'community'. 'Community' is a term difficult to define because of its usage, which includes the following:

-A community can be defined such as ***“a cluster of household, village or a township”***. Community can also be defined by shared experience: particular interest group, ethnic group, professional groups, language groups etc. Community can be defined by sector such as farmer, fisher folks etc.” But we define community as *‘a group having face - to - face contact, having a harmony of interest and aspirations, and bound by common values and objectives.’* This implies that the community is homogenous.

The ‘community based’ or the ‘bottom-up’ approach is not new. However, this is relatively a new concept in the discussion of disaster mitigation strategies. With the identification of the direct link between ‘development’ and ‘disaster’ the issue is now being given some attention. It is increasingly becoming evident that with appropriate support in skill development and infrastructure, communities can play a central role in disaster management, particularly in emergencies. The place and the role of the community in disaster preparedness and mitigation vary depending on the approach one takes.

The domain approach to deal with disasters offers no space for community based initiative, since it sees community/ victims as a part of the ‘problem’ for which solutions need to be worked out. Communities’ are considered ‘victims’ and ‘beneficiaries’ of intervention by outside ‘experts’. The alternative perspective that needs to be promoted is to see community as a part of the ‘solution,’ indeed, as an important part of it. A sustainable way of addressing disasters, disaster preparedness and emergency management lies in recognising the community as a ‘resource’. This approach makes it possible to find solutions within, and makes communities and victims less dependent on outside help and relief.

Communities/ victims are a resource because:

- They are knowledgeable about disasters happening in their own area/ environment, and are sometimes able to foresee them.
- They have the best estimate of the likely impact.
- They are rich in experience of coping, both in preparedness and in emergencies. Their coping methods practiced over time and derived from their own experience suit the local environment best. The richness and diversity of local people coping strategies is certainly a resource to be recognised.

Communities spend their real priorities in the context of all the constraints they face, including social, economic and political pressures, whereas outside experts are generally not aware of the complete picture.

By itself, community capacity is not sufficient for effective disaster mitigation. But it is a vital part of any integrated and sustainable disaster mitigation strategy. With the changing nature and the increasing intensity of the impact of disasters, community efforts needs to be particularly supported since there are a number of barriers to the full realisation of community efforts namely:

- Lack of resources
- Inadequate technologies

People have lived under threat of disaster in India for thousands of years. In that time they have developed their own ways of coping with crisis: for instance, traditional wooden buildings in parts of Himalayas are designed to withstand the earthquakes, and many communities have well established procedures for protecting their belongings in time of floods.

- Lack of capacity in community organisation
- Difficulties in negotiating with governments and other agencies
- Lack of control over structural factors (such as land and product market)

An effective disaster mitigation strategy should take action to remove these barriers to facilitate the full potential of community efforts by:

- Recognising their resourcefulness,
- Identifying the gaps in community coping methods and providing support;
- Acquiring the required skills;
- Improving the infrastructure (for example, information, warning system);
- Creating appropriate financial and human resources; and
- Strengthening community organisations.

17.5.1 Community Based Disaster Risk Reduction Process:

“The local community is taken as primary focus of attention (in disaster reduction) since that is the common unit which is affected by disaster and, more importantly responds to deal with the event. Disaster planning is seen as an ongoing social activity which needs to be incorporated into social life.....” Russell Dynes.

The paradigm shift in the understanding of disasters as social phenomena rather than ‘natural’ occurrences also shifts the stress from physical and technological solutions to those, which are social in nature. The emphasis on ‘social’ allows opportunities for proactive rather than reactive strategies, which are part of the development process. This means that people improve their level of adaptation to their environment and reduce further vulnerabilities. Dynes (1991) cites that among the various social units which are involved in disaster risk reduction planning and action- individual, household, group, organisation, community, society etc the local community level is where there is greatest potential for impact. Collectively, the community has greater resources to respond to the social disruption caused by disasters than do individuals, households, groups and organisations. In fact, local communities become involved in disaster response prior to the involvement of outsiders from the larger society in the international system.

The foundation of community-based disaster management is disaster risk reduction. While the community undertakes the broad range of disaster management activities, including emergency response as necessary, the emphasis is on reducing disaster risks. The disaster risk reduction process has the six sequential stages, namely Initiating the Process, Community Profiling, Community Risk Assessment, Risk Reduction Planning, Implementing and Monitoring, and Evaluation and Feedback, which can be operationalised before a disaster occurs (Dynes, 1991). These are discussed in the succeeding text:

1) ***Initiating the Process: Initial Awareness and Rapport Building:*** Various agencies both government and non-governmental bodies have come forward to carry out Community Based Disaster Risk Management. A minimum rapport needs to be built up with the vulnerable community through casual interactions. Government functionaries at the village level, namely the Block Development Officer, Extension Officer or the local Voluntary Organisations work for the preparation of the plan at the community level.

Existing youth clubs, self help groups, village committees, elected leaders etc. could be used as the entry point.

In many instances, a probable hazard event or disaster threat can be turned into an opportunity to start a community based disaster management programme. A recent disaster incident and the losses and risk involved could be discussed so that it generates interest among the members of the community. The discussion could be done through a participatory process by involving community members of various age groups. If the community does not have any recent disaster or event to recollect, then they can discuss a major event that had caused a huge damage in the nearby locality and in the process the potential hazards underlined in that could be highlighted.

Natural hazards are not new and people have been living with them for centuries. They have inevitably, devised their own methods for protecting themselves and their livelihoods. Indigenous knowledge is wide ranging. It includes technical expertise in seed collection to house building. These indigenous knowledge or the local coping mechanisms should not be therefore ignored in the process of discussion with the community. Awareness among the community can be generated by various means such as:

- mass meetings
- cultural activities
- audio/ visual aids
- street plays

These awareness campaigns will help the people to understand the need of the plan for any possible critical event (both natural and manmade). The plans prepared need not be sophisticated, very scientific, neither computer model, nor it needs to have a series of flow diagrams showing the process of plans. These should be kept simple and easy to understand and follow.

2) **Village profile/ Community profiling:** Community profiling involves building up a picture of the nature, needs and resources of a community with the active participation of the community. It is an important preliminary process in any planning process. It involves gathering basic information or the surfacing of the general community profiling. It leads to an understanding of the community's development position and the context upon which disasters will impact. Data pertaining to the following are reflected.

- Population
- Local resources (both human such as skilled manpower – health practitioners, ex-servicemen, etc., and material resources like boats, generators, cutting equipments etc.).
- Housing pattern in that locality (RCC, tiled, thatched, etc.).
- Cropping pattern

3) **Community Risk Assessment: Participatory Situational Analysis (Understanding the Risk of the locality).**

This step aims at taking a detailed stock of the existing situation.

Why situational Analysis?

The situational analysis is mainly to understand and assess jointly, the following factors along with other stakeholders, especially the community.

- People's perception of the risk
- Hazard assessment
- Vulnerability assessment
- Capacity assessment

Assessment needs to be built upon from the situational analysis in the form of an assessment towards possible risk and the opportunities and capacities that can be made to reduce the vulnerability and the risk.

How to do a Situational Analysis?

The situational analysis or the assessment can be done with the help of *various Participatory Rural Appraisal (PRA)* tools with the other members of the community. The steps below will give an idea of the type of information that needs to be generated and suggested PRA methods.

History of Disasters: A community plan should be based on the type of hazards that they are frequently affected with. This can be analyzed by taking into consideration 20 to 50 years of data and listing out the hazards that have affected the most in the years.

Seasonality calendar: While analysing the past experiences pertaining to various natural disasters, communities develop the seasonality calendar based on the occurrences of the disaster events. The calendar prepared by the community should show the month of occurrences of events and the months for preparedness and mock drill.

Mapping Exercise: One of the most important activities is the mapping of the risk, vulnerabilities and capacities of the village by the community itself because it is considered to be very simple, easy to understand and cost effective tool to collect ground level data. Four different types of maps are drawn namely:

Social Mapping: In this map, the following things are to be shown-

- Habitation in the village (total number of houses in each hamlet)
- Type of houses (kutcha, pucca, tiled / asbestos)
- Roads (kutcha / pucca)
- Embankments
- Bridges (concrete / temporary)
- Water sources (Ponds, wells, Tube wells, Lift irrigation points, canals, rivers)
- Community infrastructure (places of religious worship, club houses, cyclone shelters, schools, Post Office, Public Health Centers, etc.)

Resource Mapping: The map should show the available resources of the village

- Lands (forest, agricultural, grazing land)
- Tube wells, Ponds, irrigation facilities

- Grain bank, boats
- Government and Private institutions (Financial Institutions, Health Centers, rice processing mills, NGO, Office)
- Livelihood assets, etc.

Risk/Vulnerability Mapping: The maps should show the vulnerable populace, property and assets at risk. The map should focus on “*who is at risk*” and “*what is at risk*”.

- Vulnerable houses (partially broken or weak houses, thatched houses, etc.)
- People at risk like old, sick, pregnant women, physically or mentally challenged persons, single women & children below 5 years.
- Fishermen at sea, cattle and livestock etc.
- Vulnerable embankments
- Livelihood assets like nets, boats, etc.

Opportunity/ Safe Mapping/ Alternate Route Mapping: The map should show all the places within the village where the villagers can take shelter at the time of emergency and all others that reduce risk to life and property.

- Cyclone/flood shelters, high land or mounds, schools, community center, high embankments, etc.
- ‘Pucca’ houses on high land.
- All the alternate route system both roadways and water ways.
- Existing health, medical and sanitation facilities that can be used and strengthened at the time of any disaster.

4) Risk Reduction Planning: Formulation of Disaster Risk Reduction Plan:

After Preparedness and mitigation measures to reduce disaster risks are identified, various Disaster Management Teams / Task Forces are formed so as to take the lead in organising and carrying forward the tasks in pre, during and post disaster operations.

These DMT members have sectoral focus such as:

- Early warning
- Shelter management
- Evacuation, Search and Rescue Team
- Identification of the dead and their final rites
- Medical and First Aid
- Water and Sanitation
- Carcass Disposal
- Trauma Counseling
- Damage Assessment and

- Relief and Coordination

Willing and active men and women from the community can be members of the Disaster management teams. The DMTs/task force should also involve experienced and skilled people such as doctors, nurses, fire fighting personnel, ex-service men, police personnel, swimmers, and youth with Scout/NCC/NSS background, Civil Defence personnel's, *mahila samiti* members and others. It is ideal to have a team of 25 members per task force for a unit of 400-500 households. If the area/community is large, it is advised to increase the number of teams accordingly. It is necessary to allot and specify the responsibilities to the selected task forces in pre/during and post disaster operations. Based on the need assessment of the teams, specialized trainings could be provided to the members. The groups that need to be trained are as follows:

- 1) First Aid
- 2) Evacuation Search and Rescue
- 3) Water and Sanitation
- 4) Trauma Counseling

To train these task force members, one can take the help of the Fire services, Police personnel, Local Health Centers, Red Cross, and St. John's Ambulance Brigade, etc.

5) **Implementing and Monitoring: Mock Drill/ Rehearsal of the plan**

Mock drill is an integral part of the planning process, as it is the preparedness drill to keep the community alert. The drill are basically a series of actions according to the plan and are usually tried out as a dummy exercise by keeping the people informed of the exercises and seeking the cooperation in carrying out these drills. These mock drills are conducted in a village to active the DMTs/ Task Forces. In areas prone to floods and cyclones mock drills can be conducted twice a year, one immediately after the cyclone/ flood season and one after 6 months time. The plans prepared should be revised and updated every six months.

6) **Evaluation and Feedback: Identification of Hazard specific mitigation activities and integration of the same with the development plans:**

While developing the plan, the community needs to develop a mitigation plan for each hazard for long term planning. These could be coastal belt plantation, cyclone shelters in cyclone prone areas, and improved drainage system in low-lying areas. These plans need to integrate with the development plans of the area like the Food for Work, Poverty Alleviation Programme, Indira Aawas Yojana, Crop Insurance, and Water Shed Management Programmes etc.

17.6 CONCLUSION

In this Unit, we have learnt about the significance of first response. First response in the form of positive social capital and self-help on the part of people in the *interregnum* between the disaster strike and official response is critical to save lives as the official machinery takes time to gear into action. This has been realised from experiences in recent disasters. Voluntary effort on the part of people though has to be supplemented by proactive government support in this regard. Measures are already being taken in countries like the USA and France, to prepare people to face disaster onslaughts: be they

natural hazards or acts of terrorism. Education in Disaster Management creates the predisposition to act desirably when exigent circumstances present themselves. Hence, introduction of disaster management in school curriculum is a strategy towards the end. In addition, people in general are being educated in efficacious response through information dissemination in this regard. Popular modes are government websites, pamphlets and proactive citizen effort in this regard. In this Unit we have also learnt about the role of the community in organising and sustaining first response.

17.7 KEY CONCEPTS

- Bureaucratic ‘Monopoly’** : Monopoly is explained as a condition where there is only one provider of goods/services. Bureaucratic monopoly is a term borrowed from the public choice theory, which implies that in the absence of alternate providers of public goods and services (security, water, power etc.) bureaucrats enjoy virtual monopoly. There is little incentive to be efficient. They are also not sufficiently accountable.
- Socialisation** : Socialisation is a gradual process of internalisation of ideas and values that result in personality development in the family, school, the office and the general social environment. Socialisation results in development of perspectives that we carry through most part of our lives.
- Neo-Liberal** : As per the Wikipedia, the term neo-liberalism was coined by Conservative Republicans to describe a political-economic philosophy that had gained ground since the 1970s. It de-emphasises or rejects positive government intervention in the economy (that complements private initiative), which makes it anti Keynesian economics, focusing instead on achieving progress and even social justice by encouraging free-market methods and fewer restrictions on business operations. It legitimizes use of political bargaining powering international relations to make countries free up markets and remove all restrictions on trade.

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17.9 ACTIVITIES

- 1) Explain the six broad steps for carrying out Community Based Disaster Risk Management for your locality?
- 2) Identify five different ways of carrying out awareness campaigns for disaster management in your area.
- 3) Prepare a Disaster Management Plan for your locality, which lists out all the steps mentioned in the Unit (This could be taken up as a project work).
- 4) Visit a Primary Health Care Center in your immediate neighborhood and prepare a report on its working.

APPENDIX-I

DISTRICT CONTINGENCY PLAN

After an Earthquake

- 1) Instant reaction
- 2) Establishment of Control
- 3) Military Assistance
- 4) Corpse Disposal
- 5) Medical
- 6) Epidemics
- 7) Salvage
- 8) Development of Resources
- 9) Outsides Relief
- 10) Camp-work and Employment
- 11) Fire-Fighting
- 12) Information

CYCLONE: PRE-INCIDENCE MEASURES

- 1) *Action after the first warning*

The Collector should ensure-

- i) That sufficient stock of food grains, kerosene and other dry food commodities are available for distribution to the victims.
 - ii) That Medical and Veterinary Departments are fully equipped with required Drugs and Vaccines for taking preventive steps after cyclone and to arrest the spread of epidemics.
 - iii) That all the Government vehicles are kept in road-worthy condition for putting them to use in the emergency.
 - iv) That a list of generators available with the Cinema Theatres and other undertakings is maintained by the Officials of State Electricity Board and advance action taken immediately to use them when necessity arises.
 - v) That action is taken for opening of cyclone stores for providing the following materials
- 1) Hooks of the type available with the Fire Service Department for cleaning debris.
 - 2) Rubber tyres and tubes for using as floats in water.
 - 3) Tents

- 4) Kerosene lanterns.
 - 5) Large cooking vessels for use in relief camps.
 - 6) Identity slips to be issued to victims in relief camps.
 - 7) Copies of maps, etc.
 - 8) Ropes, wires, chains, lights, with wire fittings, lead wires, torches, etc.
 - 9) Spare Road Marker Stores Cells, Steel poles, Bamboos, G.C. Sheets, tarpaulin sheets and Slotted Stripes of metal (to be laid on churned up road surface for better transportation).
 - 10) Double handle shaws (for cutting fallen trees), Shovels, Candles, Hand Hailers, Hose pipes, first aid kits, cyclone duty sign Boards, Rods, Asbestos, Sheets, Torch lights, Ditty cans, empty oil drums, gunny bags and sand bags, polythene bags (for dropping supplies), buckets, V.H.F. sets with batteries for use
 - 11) Pumps for bailing out water along with hose, spades, crow bars, hand gloves, Eucalyptus oil, naphthalene balls, bamboo mats, phenyl slake lime, etc
- 2) *Action After Receipt of The Second Warning (Actual Threat)*
- i) Evaluation
 - ii) Relief to Stranded persons.
 - iii) Stoppage of traffic on National Highways
 - iv) Stock of food grains
 - v) Declaration of local holiday to the Educational institutions

POST-CYCLONE MEASURES

- i) Convening of the meetings of the Committees
- ii) Rescue Operations.
- iii) Removal of dead bodies and carcasses.
- iv) Health Measures.
- v) Restoration of traffic.
- vi) Adequate number of mobile squads shall also be made available by the Police Department for helping clearing the fallen trees, etc.
- vii) Electricity Board should clear the roads of fallen electric poles and restore power supply as quickly as possible.
- viii) The Public Relations Department must ensure to build up photographic record of the damage simultaneously, using services of the local Officers or by employing local man.
- ix) Immediately after the cyclone, the Divisional Revenue officers should form required number of teams to assess damage to the houses, crops, loss of human lives, livestock etc.

FLOOD: PRE-FLOOD ARRANGEMENTS

- i) Convening a meeting of the District Level Committee on Natural Disasters;
- ii) Functioning of the Control Rooms;
- iii) Closure of past breaches in river and canal embankments and guarding of weak points;
- iv) Rain recording and submission of rainfall reports.
- v) Communication of gauge-readings and preparation of maps and charts;
- vi) Assigning charge of flood Circles;
- vii) Dissemination of weather reports and flood bulletins issued by the meteorological Centres, Central Water Commission, Flood Forecasting Organisation;
- viii) Deployment of boats at strategic points;
- ix) Use of power boats;
- x) Installation of temporary Police Wireless Stations and temporary telephones in flood-prone areas;
- xi) Arrangement for keeping telephone and telegraph lines in order;
- xii) Storage of food in interior, vulnerable, strategic and key areas;
- xiii) Arrangements of dry food stuff and other necessities of life;
- xiv) Arrangements for keeping the drainage system desilted and properly maintained.
- xv) Agricultural measures;
- xvi) Health measures;
- xvii) Veterinary measures;
- xviii) Selection of flood shelters;
- xix) Advance arrangements for army assistance;
- xx) Training in flood relief work;
- xxi) Organisation of relief parties;
- xxiv) Other precautionary measures; and
- xxiii) Alternative drinking water supply arrangements.

ARRANGEMENTS DURING AND AFTER FLOODS

- Organising rescue operations.
- Organising shelter for the people in distress, in case the efforts of the civil authorities are considered inadequate, Army assistance should be requisitioned.
- Relief measures by non-official and voluntary organisations may be enlisted as far as possible.

- Organise relief camps.
- Provision of basic amenities like drinking water, sanitation and public health care and arrangements of cooked food in the relief camps.
- Making necessary arrangements for air dropping of food packets in the marooned villages through helicopters.
- Organising enough relief parties to the rescue of the marooned people within a reasonable time limit.
- Establish alternate communication links to have effective communication with marooned areas.
- Organising controlled kitchens to supply food initially at least for 3 days.
- Organising cattle camps, if necessary, and provide veterinary care, fodder and cattle feed to the affected animals.
- Grant of emergency relief to all the affected people.
- Submission of daily reports and dissemination of correct information through mass media to avoid rumors.
- Rehabilitation of homeless.
- Commencement of agricultural activities-desiltation, resowing.
- Repairs and reconstructions of infrastructural facilities such as roads, embankments, Resettlement of flood prone areas.
- Health measures.
- Relief for economic reconstruction.

DROUGHT: PRE-INCIDENCE MEASURES

- I) *Early Warning System*- Monitoring of rainfall in the pre-summer season and identification of water scarcity areas.
- II) *Contingency Planning For Agriculture*
 - 1) Crop life saving measures.
 - 2) The alternative cropping strategy.
 - 3) Compensatory Cropping Programme.
 - 4) Supply of Inputs.
 - 5) Provision for irrigation.
 - 6) Supply of Power.
- III) *Drinking Water*:
 - 1) A detailed contingency plan for supply of drinking water in rural areas to be formulated with technical help from the Central Ground Water Board (CGWB) and utilising if need be, the rigs and other capital equipment from the CGWB.
 - 2) Make adequate plans to supply drinking water in urban areas through bores, tanker special trains and other suitable measures.
 - 3) Monitor continuously rural and urban drinking water availability in drought affected areas.

Water Resources

- 1) Prepare a water budget for each irrigation reservoir covering drinking water, kharif and Rabi requirements and evaporation losses, after working out a trade-off between kharif and Rabi benefits from the available water.
- 2) Undertake repairs of tube wells to make all tube wells operational and install additional tube wells taking care at the same time to prevent over-exploitation of and damage to ground water regime.
- 3) Regulate supply to water-intensive industries, if necessary.
- 4) Minimise evaporation losses in tanks and small reservoirs by using chemical restorations subject to Health clearance.

IV) Employment Generation:

- 1) Adequate scarcity relief works to be taken up to generate the required employment.
- 2) The funds available under employment generation scheme like R.FOR EXAMPLES., J.R.Y., and scarcity relief etc. should be dovetailed and integrated.
- 3) Shelf of projects should be kept ready to be taken up for employment generation during drought.
- 4) Drought proofing schemes to be identified and to be given higher priority.

V) Public Health:

- 1) Disinfect drinking water sources to prevent the spread of water-borne diseases.
- 2) Draw up plans to cope with likely epidemics.
- 3) Constant surveillance of public health measures including immunisation to be undertaken.

VI) Women and Children

- 1) The nutritional requirements of all the children, expectant mothers and nursing mothers should be taken care of.

IV) Fodder:

- 1) Assess fodder requirement in drought-affected districts and locate areas where shortages are likely to occur and arrange for supplies from outside.
- 2) Monitoring the prices of fodder in selected places/markets.
- 3) Arrange to procure fodder from surplus States.
- 4) State Forest Departments to arrange for the cutting and bailing of grasses in the forests, wherever possible to meet the demand from fodder deficit districts.
- 5) Fodder cultivation to be encouraged wherever feasible.
- 6) Ensure supply of molasses to cattle feed plants.
- 7) Obtain from NDDB and other sources premixed feed and urea-molasses-bricks to the extent necessary.

Source: <http://www.ndmindia.nic.in>

UNIT 18 DISASTER MANAGER

Structure

- 18.0 Learning Outcome
- 18.1 Introduction
- 18.2 Disaster Manager: Role and Functions
- 18.3 Incident Command System: A Managerial Tool
- 18.4 Disaster Manager: Skills and Techniques
- 18.5 Key Lessons for Disaster Manager
- 18.6 Conclusion
- 18.7 Key Concepts
- 18.8 References and Further Reading
- 18.9 Activities

18.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Discuss the role and functions of the disaster manager;
- Highlight the significance of incident command system as a managerial tool;
- Appreciate the managerial skills and techniques required for disaster manager; and
- Analyse the key lessons for a disaster manager.

18.1 INTRODUCTION

Disasters, as we are aware, affect many critical resources and services. The negative effects, though cannot be prevented, the impact of disasters on communities, livestock and infrastructure can be mitigated. The scope of disaster management is quite wide and it extends over development, prevention, preparedness, response, relief and rehabilitation and mitigation. All these phases require discharge of key functions and assumption of certain roles. The roles at times can be primary, especially when a crisis takes place and certain other functions become secondary which become supportive to the primary functions. A disaster manager is one who is entrusted with the responsibility for planning and managing the pre, during and post-disaster activities. A disaster manager could be a specialist, belonging to, for example, public health department, engineering etc. A disaster manager can also be one handling the incident command system. As per the *Disaster Management, Act 2005*, in India, the District Collector can be considered a disaster manager as he/she coordinates all activities at the district level. A disaster manager is one who is entrusted with the responsibility for planning and managing pre, during and post-disaster activities. It can also be personnel functioning in a disaster management agency, ministries, departments, municipal and local governments. The international agencies also have specialised disaster management personnel. The NGOs too have disaster specialists who

play a key role. Irrespective of the nature of an organisation, any individual entrusted with managing disasters in pre, during and post-disaster scenarios is considered a disaster manager. Yet, as one in charge of overall management of disaster situations at any geographical area, she/he needs to discharge certain basic managerial functions. The disaster manager handles chaotic situations and this necessitates being equipped with certain key skills and techniques.

As learners of Masters Programme in Public Administration, you are familiar with certain basic concepts and techniques of the discipline. We have already discussed about these in our First Year Courses. In this Unit, we shall attempt to apply some of these concepts and principles to the disaster scenarios. We shall orient you with the functioning of disaster manager, the required managerial skills and lessons to be learnt by the disaster manager in the process of management of disasters.

18.2 DISASTER MANAGER: ROLE AND FUNCTIONS

The disaster management activity as you know is extending beyond post-disaster relief, assistance and rehabilitation encompassing pre-disaster planning, preparedness, response, information management, interpersonal relations, conflict management etc. The question that arises is why we have to apply management principles to disaster situations. Disasters disrupt the economies and have devastating consequences, create chaos that throw up certain serious issues to the disaster manager which, to a certain extent can be made amenable to solution through application of managerial concepts and principles. The disaster manager is often confronted with certain complex problems some of which are:

- Lack of assessment or clarity regarding the multiple consequences arising out of disasters
- Unavailable, unreliable, competing, and multiple types of information
- Limited and at times inaccessible resources (human, material and financial)
- Ambiguity regarding the nature of disaster, its repercussions, the extent of damage, ways of prioritising resources etc., and
- Indeterminate behaviour amongst the individuals working in the organisation and other stakeholders and community.

Disasters are chaotic situations that create confusion, instability and also call for prompt action on the part of the managers. Since the events move rapidly and are traumatic, they necessitate quick decisions. Often the managers might not even get a second chance to think and decide. Hence application or use of management principles facilitates the handling of situation and bringing the events under control. Managerial principles are said to:

- Provide a framework for decision-making which is essential for disaster situations
- Facilitate prompt and quick decision-making
- Help group activity that is needed for guiding proper utilisation of resources for accomplishing goals; and
- Formulate and implement a balanced disaster or crisis management action plan.

Management principles are required to be applied both in routine situations and crises. The time when disaster takes place, requiring emergency operations are the crisis situations. There are routine or non-crisis situations encompassing preventive, mitigation and rehabilitation phases. These also need routine or regular management activities. For example, any housing project in a disaster prone area is to adhere to or incorporate disaster-resistant construction technologies. This activity has to take cognisance of certain management principles from planning to implementation.

Disaster management as an identifiable profession is of a recent origin. It has multifaceted activities that are designed to control disaster and emergency situations, provide a framework for assisting those persons who are at risk to avoid or recover from the impact of disaster. In accordance with the changing nature of the field of disaster management, the role of disaster manager, which earlier was confined to relief provision, discharging certain specific adhoc activities during or after an emergency is presently undergoing a transformation. The entire approach to managing disasters, which hitherto was traditional, relief oriented, and reactive in nature, is becoming development-oriented. The disaster manager's tasks are to minimise people's vulnerabilities to hazards, cater to their needs and expectations, and accordingly embark upon positive response to meeting emergencies.

We have discussed in the First Year Courses of our Master's Programme about the concept of 'responsiveness'. Entrepreneurial, result-oriented and innovative practices are being experimented in managing disasters. The present day emphasis is on introducing broad-based networks in the provision of services. Disaster organisations are also moving towards responsive governance.

There is a distinct change in the values in managing disasters, which calls for more accountability on the part of disaster organisations. The disaster manager is expected to usher in more people-oriented values in service delivery. This is reflected in the table below:

Table - 18.1

Traditional	Contemporary
Emphasis on relief	Pre-and Post-disaster activities linked to development goals
Centralised decision making	Decentralised and participative decision making
Quantity of Relief	Quantity and quality of services
Reactive approach	Proactive approach

A disaster manager's role, in the light of this, centres on the following considerations:

- Identify the key issues involved in managing disasters
- Integrate disaster prevention and preparedness into development
- Protect the vulnerable
- Ensure the involvement of community

- Provide disaster assistance as far as possible in an equitable and consistent manner
- Establish transparency, commitment and involvement in implementing any ongoing disaster management programme
- Address or take cognisance of the local ecology
- Draw up an emergency or response or disaster management plan which is transparent flexible, efficient, effective, affordable and sustainable; and
- Make disaster management activity need oriented, multi-disciplinary and integrated.

These responsibilities envisage that a disaster manager be innovative, risk taking, catalytic, entrepreneurial and proactive. You are familiar with these concepts, as we had discussed the basic tenets of entrepreneurial government propounded by Osborne and Gaebler in the Unit on Entrepreneurial Government in MPA-011. These concepts are applicable in the present context to any organisation involved in service delivery. The performance of multifaceted activities calls for a broad base of knowledge in several areas and blending this into well-coordinated programmes. A disaster manager in fulfilling the assigned tasks addresses the following aspects on a continuous basis. These include:

- Disaster and its linkage with development
- Disaster Preparedness
- Disaster Mitigation
- Risk and Vulnerability assessment
- Logistics
- Rehabilitation and reconstruction

Let us now discuss the broad set of activities the disaster manager is to discharge in routine situations as well as crises.

Management of Risks

A disaster manager is to be fully equipped and prepared to manage the risks. This includes identifying the possible threats or hazards, assessing the probability of their occurrence, their impact on community and laying down measures to reduce the risks or threats. These can be managed by initiating appropriate development activities in addition to the immediate measures to tackle the crisis.

Management of Losses

In a disaster, as you know, the losses are manifold, encompassing human, livestock, infrastructure, property, etc. Efforts towards managing losses are addressed in pre, during and post-disaster phase encompass. Pre-disaster activities as we have been discussing in the earlier Units encompass:

- Providing appropriate information to the communities about the impending disaster
- Strengthening wherever possible the resistance of buildings and physical structures
- Arranging for the safety of the people residing in threatened areas; and
- Making use of social networking mechanisms to mobilise people in the vulnerable areas.

The post-disaster loss management activities aim at improving the response and widening the support to the community. This includes devising prompt relief and recovery activities and a host of rehabilitation and reconstruction efforts. These have already been discussed at length in the earlier Units of this Course.

Control of Events

This is a very important activity as the situation that is likely to arise or the crisis that has occurred need to be controlled and managed through several measures such as:

- Determining or gauging the cause and effect relationship generated by each event
- Reducing the scope of disaster
- Collecting information and assessing it to prioritise actions and guide response
- Developing an appropriate mix or a combination of responses for meeting disaster needs
- Taking appropriate action on identifying the problem and selecting response strategy
- Providing a lead to the various activities as well as the personnel. Appropriate and effective leadership enables good public response and encourages people to take action for themselves in meeting their needs
- Fostering discipline in all activities and disaster management systems to enable orderly and precise functioning; and
- Providing assistance in an equitable and fair manner to enable disaster victims receive fair treatment and adequate access to the resources.

Resource Management

Resources are of various types. They include financial, organisational, personnel, logistics, information, and so on. These need to be managed with the help of managerial techniques to facilitate the disaster manager's functioning. Also, innovative practices are being introduced in present times in the management of resources. For example, the disaster manager can mobilise the communities to contribute either in the form of cash, kind or labour in mitigation activities in reducing their risks to disasters. Presently, micro-finance is being used to enable the community to act and invest in preventive measures such as check dams, drainage systems etc.

These are some of the broad functions the disaster manager is expected to perform. With this overview, let us now analyse the role of the disaster manager. This can be done under the following three broad categories.

- Managing Organisations
- Managing Operations
- Managing People

Managing Organisations

The process of managing organisations involves discharge of POSDCoRB (Planning, Organising, Staffing, Directing, Coordinating, Reporting and Budgeting) activities, resource management, monitoring and evaluation. You are familiar with these POSDCoRB functions, which are the basic managerial functions discharged in an organisation, as discussed in MPA-012. Let us now elaborate these:

Planning: It implies determining in advance the objectives and activities to be carried out, the methods to be adopted to achieve the purposes. Planning with reference to managing disasters includes strategic planning, contingency planning and forward planning.

Strategic Planning: This involves preparing for disaster threats from the long-term perspective that is those, which are not to occur immediately, but could take place in future.

Contingency Planning: It implies planning for a crisis. According to the Disaster Management Training Programme, it is a forward planning process in a state of uncertainty in which scenarios and objectives are agreed, managerial and technical actions defined and response systems put in order to prevent, or better respond to an emergency or critical situation.

Forward Planning: This is resorted to in situations where disaster is going to occur and the manager takes adequate precautions.

Organising: It involves establishing the formal structure of authority through which the work is subdivided, arranged and coordinated. Organising implies laying down the activities to be performed to implement the strategies that have been chosen as the part of the planning process, division of activities and their assignment to individuals and groups, the type of authority and responsibility to be assigned, control and coordination mechanisms.

Disaster management activities are to be supported by an organisation in which these are to be carried out. Organising involves establishment of clear-cut functions and responsibilities for prevention, preparedness, response and recovery. The roles and responsibilities of all concerned are to be specified. This involves inter-agency and inter-departmental arrangements to support planning, control and coordination.

Staffing: This encompasses hiring personnel at various levels, training, team building, motivation and morale etc.

Directing: This is concerned with making of decisions and providing necessary directions to guide the organisational efforts. It involves command and control activities wherein prior to the occurrence of any disaster, the responsibility for overall control of the situation and of each organisational element needs to be clearly laid down.

Coordinating: This relates to bringing or putting together the efforts of various units and personnel to work towards the laid down goals. For example in a disaster management organisation, there can be top management, middle and field management along with other specialists handling areas such as finance, logistics etc. Disaster operations require appropriate pooling and assembling of resources. As the organisation becomes complex and diversified, a chain of command and coordination running across several levels is established.

Reporting: Each level in the organisation reports to the next higher level. For example in government, the top management reports to the political executive and thereby to the Parliament.

Budgeting: This involves fiscal planning, budgeting and accounting.

These are the basic managerial functions to be discharged by any organisation. Each specialised functioning area has its own processes and techniques. A combination of

general principles with specialised tools makes disaster management effective.

Managing People

Managing people involves organisation of tasks and assignment of functions and responsibilities to people, establishing lines of communication, performance evaluation, motivation and morale of the people, leadership and conflict resolution. We shall be discussing some of these aspects in detail in the section 18.4 of the Unit.

Managing Operations

This includes managing the various operations pertaining to several phases of disasters. It deals with the management of logistics/materials, emergency operations, information, along with formulating an action plan for handling crisis, operationalising the plan etc. It is also concerned with creation of an appropriate disaster information system.

Let us now briefly examine a few of these facets.

Logistics Management

Management of logistics is critical in any disaster situation. It reflects the disaster manager's ability to identify the resources required at the disaster site which could be equipment, commodities etc. Logistics is concerned with getting the desired materials and services and it provides a framework for management of materials, services and information. Logistics is concerned with operations and coordination of activities involved in movement of materials and storage. During disasters, there is a huge demand for procurement and distribution of relief commodities such as food, clothes and medicines. The holistic approach towards logistics management aims at integrating the procurement, preparation and physical distribution into a simple logistical process.

Inventory control is very important in logistics management and the disaster manager needs to install a proper inventory control system. It is the system through which any material of right quantity and quality is procured and made available at the right time and right place. The disaster manager needs to determine the right quantity and type to be kept as stock, which are specially required in pre-disaster and disaster situations. There are certain types of materials which are required in large quantities during disasters such as food grains, medicines etc. Use of inventory control techniques such as ABC (Always Better Control) and VED (Vital, Essential and Desirable) analysis can facilitate the task of inventory control. For example, items such as chlorine tablets, band-aid and cotton are required in large quantities during disasters. Similarly there are vital items such as milk powder, medicines and water. ABC analysis helps in determining high consumption, medium consumption and low consumption value items.

A disaster manager needs to catalogue, categorise and record the logistic requirements for pre, during and post-disaster situations. This can include making an inventory of

- Commodities likely to be needed
- Sources of supply (government, NGOs, international agencies, etc)
- Storage facilities (warehouses, temporary storage facilities, etc)
- Sources of transport (road, railways, air, etc.)

A disaster manager needs to undertake a general assessment of logistics requirements

capability. For example, if a flood is going to occur, an assessment is to be made of the

- Areas likely to be accessible or inaccessible for providing relief
- Time period for which the situation is likely to continue
- Commodities required to be given to the people residing in the cyclone or temporary shelters due to evacuation
- Measures for preserving the commodities including the location of warehouse buildings and the condition of the building so that food grains are protected from insects, rodents, birds, etc.

The following aspects need to form part of a logistics management plan formulated by the disaster manager:

- Logistical requirements such as fuel, oil, tents, materials for cleaning and sanitation and other supplies such as food, water, etc.
- Procurement of supplies
- Food security
- Inventory of intended beneficiaries
- Warehouse facilities
- Modes of transport
- Methods of distribution including dry ration and wet ration

Information Management

Information is a key resource in managing disasters. Effective management of information is a prerequisite for dealing with any emergency. Any planning and control activity requires information about the existence of various resources, operations involved, stakeholders etc. The operationalising of an organisation needs routine type of information for day to day activities.

Disaster management requires information on various aspects such as the socio-economic profile of community, topography of the area, weather, existing infrastructure etc., as it is helpful in assessing the vulnerability to hazards. Presently, such data are being generated by multiple actors which include government, private sector, NGOs, CBOs, UN organisations etc. Since the data is fragmented and stored at several locations and formats, this calls for putting together the scattered data to support disaster management activities. There is hence, a need for an effective disaster management information system with networking between those who provide the data, the government and the community.

Disaster manager needs to examine the possibilities of creating a synergy of technologies and interaction between different agencies. Networking and multi-agency interface lead to institutionalisation of disaster management. The technique of Management Information System (MIS) adequately equipped with the necessary infrastructure and expertise to constantly monitor the risk profile of possible disasters will be useful. We shall be discussing about the technique of MIS in section 18.4 of this Unit.

The principles we have discussed in this Unit, find a concrete shape in the form of

Incident Command System (ICS). This is institutionalised in many countries in the present times. We shall now discuss the significance of ICS as a managerial tool to the disaster manager.

18.3 INCIDENT COMMAND SYSTEM: A MANAGERIAL TOOL

Managing disasters is a multifaceted activity and involves putting together the key activities of command, control and coordination of response. Operations management during emergencies is concerned with or requires prompt decision-making, problem solving and matching resources to priorities. The basic premise on which the Incident Command System (ICS) functions, is to foster a formalised management structure that coordinates several activities pertaining to a crisis and provides a direction. ICS is an appropriate model for command, control and coordination of response aimed towards the goal of stabilising the incident and protecting the life, property and environment.

ICS was developed initially in the 1970s in USA in response to a series of major wild land fires in Southern California. Many other countries gradually have adopted this model.

There is a person designated as the incident commander who is in charge of the incident and entrusted with the tasks of managing the response. These include:

- Protection of life and property
- Control of personnel and equipment
- Establish command
- Assess priorities at the time of incident
- Determine operational objectives
- Formulate and implement the Incident Accident Plan
- Develop an appropriate organisation structure
- Coordinate the emergency activities
- Ensure the safety of respondents

The ICS organisation functions on the basis of the following components:

- Incident command
- Planning
- Operations
- Logistics
- Finance

You are familiar with the functions of disaster manager and important of these are discharged by the incident commander. The Command function is directed by the incident commander as he/she is the person in charge of the incident. The incident commander is involved in planning, and creation of the Incident Action Plan, which defines the response activities and resource utilisation for a specified time period. The Operations Section is

responsible for operationalising or executing the response activities as indicated in the Incident Action Plan. The Logistics Section provides assistance in the form of facilities, services, materials, personnel to handle the incident. The logistics functions are geared to cater to the incident responders. The Finance Section is in charge of meeting the costs of incident.

The ICS provides for a flexible, standardised response management system, logical and smooth organisation and availability of trained personnel to meet the crisis. Any disaster ranging from a minor accident to a large scale one requires cooperation among several agencies. The disaster manager can use the ICS as an effective managerial tool.

In addition, there are certain other managerial skills and techniques that the disaster manager needs to be familiar. This we shall be highlighting in the next Section.

18.4 DISASTER MANAGER: SKILLS AND TECHNIQUES

Disasters are the critical situations which pose tremendous challenges to the persons entrusted with managing them. The disaster manager is expected to devise a sound process and system that have the potential of saving the lives, property, livestock, livelihoods etc. There are certain skills, techniques and tools that facilitate the task of disaster manager. These are not different from those applied in day-to-day activities. The disaster manager is to apply or tune these to the situations of crisis. We shall be highlighting some of the important skills and techniques the disaster manager needs to be conversant.

Problem Solving and Decision Making

Management involves solving problems and arriving at decisions. The best decisions generally are those that are well thought of, and planned ahead of time. For example, a flood preparedness plan is the outcome of an organised decision making process. But in crises such as disasters, decisions are taken in a reactive manner, as they are turbulent situations. A disaster manager functions in varied managerial environments. As soon as the disaster occurs, the disaster manager finds himself/herself in a chaotic situation. This requires him/her to assess the current situation and take quick decisions, who otherwise in normal course functions in a stable environment. At times the environment can also be diverse and the disaster manager is expected to handle different situations with varying needs. For instance, the disaster requirements in urban and rural areas can be different, accordingly the situations have to be managed and decisions are to be taken. The environment can be technically complex too wherein decisions pertaining to agriculture, housing, and health are to be made. Hence disaster manager encounters diverse situations. But an organised approach to problem solving and decision-making is to be developed. Though there cannot be a rational approach to decision making certain basic guidelines can be adhered to.

Decision-making is the process of determining a course of action. As students of public administration you know that there are two types of decisions – *programmed* and *non-programmed*. Programmed decisions are generally taken for handling routine problems, such as those relating to stocking of food grains, providing training in first aid and so on. Decisions taken, for example, regarding devising new strategies for information dissemination to the public, is a non-programmed decision.

When we refer to decision making, it is the rational decision making model, and it comprises the following steps:

Definition/Identification of Problem

The general tendency on the part of an individual is to examine or analyse the entire situation in totality instead of identifying the problem. For example, if there is a cyclone alert, instead of reiterating that the cyclone is approaching, the problem can be promptly identified as evacuating the people especially those residing in low lying areas. One needs to be very specific in identifying the various aspects of the problem.

If there is not a single but several related problems, one needs to prioritise as to which one is to be initially addressed. For example, due to impending cyclone threat, the problem could be evacuation both of people and livestock, arrange shelter, provide food and water, protect infrastructure and so on. As a disaster manager, one needs to prioritise the problems in order of significance and the feasibility of solving.

Determining the Goals

Once the problem has been identified, the next step is to determine the goals. In the scenario of an impending disaster such as cyclone, the immediate goal is to ensure the safety of people and move them to cyclone shelter. On determining this goal, the sub goals can be prioritised. These could be for instance, dissemination of cyclone warning, preparing the people for evacuation, informing the community leaders, Panchayat Raj functionaries and others and set a time frame for evacuation.

Generating Alternatives

Once the objectives are set, the different alternatives for solving the problems are to be determined. This facilitates foreseeing and analysing the consequences likely to arise on choosing the alternatives. The disaster manager can make use of group decision making techniques as many a times, the decision quality is higher when made in groups. The group as a whole tends to create better ideas. *Brainstorming* is one of the techniques of decision-making that generates several solutions to the problem. It facilitates pooling as many ideas as possible and choosing the best idea.

Another technique to arrive at an alternative especially, when there are diverse opinions is the *nominal group technique*. Here large groups are broken into small ones and each person responds in writing to a question, the responses are recorded and ranking of the ideas is done. On this basis a final decision is taken.

Delphi is another technique that helps in meaningful and accurate decision-making. This involves the participation of insiders as well as specialists from outside the organisation to provide certain judgments relating to the problem. Each expert is asked to make some prediction and once a convergence of opinions begins to emerge, the results are made use of in arriving at decisions. Delphi technique is applied to diverse problems. Though it is laborious and time consuming, it facilitates decision-making in an emotional environment.

Evaluating the Alternatives

On arriving at several alternatives to the problem, an assessment of each alternative is done in terms of its feasibility to implementation. Then ranking is done of the alternatives. For instance, while drawing up the evacuation plan, different alternatives can be drawn up or prioritised as follows:

- Determining the evacuation plan
- Prioritising the categories of persons to be evacuated (women and children, old, physically challenged etc.,)
- Arranging for transportation of the people
- Making the cyclone shelters ready along with the provision for food and water.

Once the ranking done, the various steps to be followed in the implementation of alternatives are worked out, the resources required in terms of human resources, facilities, money and time, for completion of the activity, the persons responsible for its implementation, their roles and responsibilities are clearly laid down.

In decision-making, a cost benefit analysis is generally done. *Firstly*, the likely costs and benefits arising out of this activity are to be analysed. *Secondly*, the quantitative assessment in terms of monetary value is done. *Thirdly*, the costs and benefits likely to accrue in future are examined based on the present costs. This is not an easy task as there are methodological problems involved in cost benefit analysis. It is at times difficult to assess the monetary value of any activity. Also there are problems in determining the future outcomes especially the direct and indirect loss potential and application of economic appraisal skills.

Monitoring and Evaluation

Irrespective of who and how has the decision been made, it is important to monitor and evaluate the results of the decisions. Especially in crises, it is essential to keep track of the decisions made, the persons who had made the decision and those entrusted with its implementation. Evaluation facilitates review of decisions for bringing about suitable improvements.

A model of *Six Thinking Hats* developed by Edward de Bono is a powerful technique of looking at decisions from a number of perspectives. Each thinking hat reflects a different style of functioning. We shall discuss them now.

White Hat: This thinking enables one to focus on the available data, examine it and learn and analyse the gaps in decision-making.

Red Hat: This attitude prompts one to look at problems in a reactive manner rather than with reasoning.

Black Hat: This enables one to be cautious and defensive and look at the weak points in a plan or a decision being made. It helps to eliminate certain plans or alter them or prepare contingency plans. It facilitates minimising flaws before embarking on a course of action.

Yellow Hat: It helps one think positively about the benefits of the decision and its inherent value.

Green Hat: It facilitates one to develop creative solutions to problems.

Blue Hat: This is for process control. Six thinking hats is a good technique for looking at the effects of a decision from a number of viewpoints. It facilitates bringing in creativity within decision making (www.mindtools.com).

Planning

The planning process involves formulating goals, methods and strategies to achieve the goals, specific objectives to be accomplished to achieve the goals, the assigning of tasks to the people for implementation and required resources in the form of personnel, materials, technology, finance etc., to implement the strategies.

The planning process involves the following steps.

- A clear definition of overall goals, the plan is to achieve is to be done. For instance let us assume that the disaster manager formulates the goal of building the capacities of the community in meeting any disaster threat.
- The specific objectives that need to be specified can be formulated by analysing the situation. There are many methods. One is the Strengths Weaknesses Opportunities and Threats (SWOT) analysis. In this case, this analysis pertaining to the community is to be done.

Establish Sub-goals

On the basis of the analysis and the overall major goals, a set of sub goals is to be built or developed by the disaster manager. This could be the Information Education and Communication activities, training, skill building, etc.

Formulating Strategies to Achieve Goals

The various strategies or methods to achieve the goals are to be determined. For instance, the various methods of disseminating information, providing education and communication such as pamphlets, posters, plays, talks, etc., can be designed.

Allocate Responsibilities for Achieving Objectives

Plan implementation requires clear-cut assignment of responsibilities to various organisations and personnel. For example, the NGOs, CBOs, PRI functionaries, etc., can be identified and assigned the responsibilities and can be made accountable.

Formulating a Plan Document

The plan of action is documented and given to all involved in its execution.

Project Management

The Plan document has several activities and some of these can be executed in the form of project. A project comprises a set of identified activities that must be completed within a time frame. The activities under the project require special skills, creative inputs and effective decision making capabilities.

The project plan outlines the major goals and objectives, personnel responsible for the activities and the required resources (human, equipment, materials and money). Once the project proposal is finalised it is put to execution. This involves organising the project team, formulating operating rules and detailed scheduling of activities. All projects require constant monitoring. The progress of the projects is continuously tracked and controlled to ensure corrective action. There are various reporting tools that bring out the variations in project implementation. These include Gantt charts, cost control schedules etc.

Strategic Management

It is a tool or technique that integrates planning, budgeting, implementing, monitoring, reporting and controlling. It facilitates anticipating the future by analysing the various facets of the organisation that is., its culture, mission, strengths and weaknesses. Strategic Management involves:

- Strategic assessment of the situation
- Strategic analyses for developing organisational plans by identifying the strengths, weaknesses, opportunities or favourable conditions and unfavourable conditions
- Strategic direction in which appropriate strategies are determined; and
- Strategic planning involving creation of a range of scenarios

The implementation of a strategy encompasses allocating sufficient resources (financial, personnel and infrastructure), establishing a chain of command to carry out the tasks efficiently, assigning responsibility for tasks to specific individuals or groups and implementing specific plans and programmes. Strategic management requires continuous reassessment. Hence performance evaluation is undertaken at regular intervals for modifying the plans and strategies.

In managing a crisis, the disaster manager involves in strategic management and resorts to the following measures.

- Constituting a crisis management team
- Developing worst case scenarios
- Creating a crisis management plan

The crisis management team is required to foresee and anticipate the crisis and manage the recovery process. The team has to develop worst-case scenarios to determine the types of disasters that could possibly occur. A crisis management plan is to be prepared indicating the clear procedures, details of specifics of the operations and roles for various categories of personnel.

Disaster Information System

The disaster manager is to respond to challenges efficiently, take judicious decisions and perform the tasks in effective manner. As we had discussed in the earlier sections, information is a key component for effective decision-making. It is the collection or repository of expertise, experience and database utilised for discharging responsibilities.

The disaster manager requires information to:

- Formulate or specify the objectives
- Determine the plan of action for achieving the objectives; and
- Provide feed back

The significance of information in managing activities and situations has always been emphasised. F.W. Taylor highlighted the significance of collecting information through studies to find out the one best way to do things. Herbert Simon in his theory of decision making about which you have studied in MPA-012 emphasised on examining as many

alternatives as possible to arrive at a rational decision.

Management Information System (MIS) is a system designed by an organisation to collect and report information on a programme that facilitates the manager to plan, monitor and evaluate the organisations and performance of any programme. It includes the physical infrastructure used in computing data, a set of instructions and procedures that help the people use the systems and related data in the form of database.

Managing of information and creation of information infrastructure are very essential in disaster management. Disaster is generally confined to a particular geographical area, hence the disaster manager needs to collect information from several sources and involve other organisations and experts in relevant disciplines, NGOs, CBOs, community etc. The most important aspect of information management is providing the right information at the right time to the right people. In a crisis, the disaster manager has to determine the recipients of information, and make it available to them. The disaster information system that is created is to comply with the requirements of every possible disaster scenario.

Leadership

Leadership facilitates the formulating of vision, shaping effective strategy and motivating employees to achieve the goals. Leadership is distinct from ‘command’. It reflects a particular approach of working with people and hence leadership skills are of prime importance in organisations and situations such as crises as they cannot be controlled through command. A disaster manager needs to emulate or demonstrate a style based on cooperation, participation and performance.

Leadership is a personal trait and every person possesses certain distinct attributes, which need to be made use of in disaster situations. It’s due to this that a disaster manager is able to guide others and not just because of the authority he/she possesses to make decisions. Let us now discuss certain leadership theories. An understanding of this enables in identifying the styles and skills necessary for a disaster manager.

Leadership Theories

There are several theories of leadership. The *trait theory* is based on the assumption that people are born with certain inherited traits some of which are particularly suited to leadership. A combination of traits makes a good leader. Some of these include, being assertive, decisive, energetic, persistent, cooperative, self-confident etc.,

The *behavioural theory* is not based on inborn traits or capabilities. It assumes that leadership capability can be learnt rather than being inherent.

Participative leadership style is based on involving other stakeholders also in the process. This is said to elicit more commitment and participation from the people in making decisions and implementing them.

Kurt Lewin identified three types of leadership styles. These are:

Autocratic: This is a style where the leader takes decisions on own without any consultation.

Democratic: Here, the leader involves the people in decision-making.

Laissez-faire: This style intends to minimise the leader’s involvement in decision-making by allowing people to make their own decisions.

Rensis Likert identified four main styles of leadership. These are:

Exploitative authoritative: In this style, the leader has a low concern for people and makes use of such methods as threats and those inducing fear.

Benevolent: This is the style that reflects concern for people by the persons occupying authoritative positions.

Consultative: The leader here is receptive to ideas.

Participative: The leader makes maximum use of participative methods to involve people from the lower echelons of the organisations.

Hersey and Blanchard's Leadership Styles

These are based on the assumption that leaders should adapt a particular style that matches the development needs of the followers.

These include:

S1: Telling / Directing

*Development levels D1: Low competence, low commitment / unable and unwilling
Leader: High task focus, low relationship focus.*

In this type, the followers cannot perform the job and hence are not motivated. Hence the leader takes the directive role, tells them what to do. For example, the disaster manager works with the team, as they have low maturity and less information about disaster preparedness and response.

S2: Selling / Coaching

D2: Some competence, low commitment / unable and willing

Leader: High task focus, high relationship focus.

The follower is willing to perform the job but lacks the skills and knowledge. The leader attempts to persuade and help the follower to complete the task.

S3: Participating / Supporting

D3: High competence, variable commitment / Able and unwilling

Leader: Low task focus, high relationship focus.

There is a sense of participation on the part of the followers to do the job. The knowledge of the team about the situation increases and they assume more tasks and responsibilities. The team leader does not direct the followers.

S4: Delegating

Follower: D4: High competence, high commitment / Able and willing

Leader: Low task focus, low relationship focus

There is a lot of commitment, knowledge and willingness on the part of team members or followers. The leader delegates work to them, and trusts them for performance.

Hurricane Katrina, the worst natural disaster in the United States that left nearly one million Americans homeless, raised the issue of strong leadership skills. Ronald Heifetz, the co-founder of Centre for Public Leadership, says that good leaders often emerge in crisis and during that crisis, they make it a point to be visible. For example after the September 11, 2001 attack on New York city, the Mayor of the City was on the streets everyday and people could see him at a greater distance. In times of disturbance, human beings turn to their authority figures to coordinate protective response.

In disaster situations, leadership styles could be a combination of several characteristics. In crisis or emergency, the leader is supposed to act immediately. There is little time to consult, delegate or involve other members. Since prompt action is required, *autocratic* leadership is appropriate. During the transition or post-disaster phase, a more participative and supportive style, and a less autocratic or directive one is desirable. During reconstruction, mitigation or preparedness planning a *participative and achievement* oriented style is suitable. For example, in undertaking reconstruction activity, adoption of a particular housing technology, the community, artisans and local masons can be involved. The disaster managers can adopt *informal* styles of functioning. They are to come out of their command and control hierarchies and bureaucracies and attempt to build networks. With the increasing scale and complexity of disasters, one needs to move always from the concept of one person, one team and one organisation to a collective model and manage the issues related to such calamities. Leadership is to be diversified across all levels and groups.

Conflict Resolution

Conflicts are natural and inevitable outcomes of any team effort. There are bound to be differences of opinion and views. Creighton (2004) identifies five basic sources of conflict. These include:

Relationship Conflict: This is conflict rooted in poor communication, misperceptions, dueling egos, personality differences, etc. This kind of conflict produces strong emotions and often must be addressed before people are able to resolve other forms of conflicts.

Data Conflict: This conflict results from a lack of important information, or contradictory information or misinformation.

Values Conflict: This occurs when people disagree about what is good or bad, right or wrong, just or unjust.

Structural Conflict: This happens when the situation is set up in such a way that a conflict is built in. The structure that causes the conflict may be the way, in which the roles and relationships had been defined, or unreasonable time constraints, unequal power or authority, unequal control of resources or geographical or physical constraints.

Interest Conflict: This occurs over substantive issues (money, physical resources, time), procedural issues (the way the dispute is to be resolved) or psychological issues (perceptions of trust, fairness, desire for participation, respect).

Hence managing disaster situations calls for handling human relationships and inter personal behaviour. There are several agencies, organisations, personnel and community, who are involved in disaster management activities. Hence, conflict resolution assumes significance. The traditional view considered conflicts as organisational abnormalities that have effect on organisational performance. But over time, the works of several social scientists considered

conflict a normal process, which can rejuvenate the organisation. Mary Parker Follett, an administrative theorist, views that it is possible to conceive conflict as not necessarily a wasteful outbreak of incompatibilities, but a normal process by which socially valuable differences register themselves for the enrichment of all concerned. She suggests three methods to deal with conflict - *Dominance, Compromise and Integration*.

The disaster manager initially needs to analyse the root causes of the conflicts. This includes the issues causing the conflict, the substance of the problem, real and perceived differences, the feasibility of the issue to negotiation, etc. Then on the basis of the nature of the conflicts, the disaster manager can resolve through negotiation, mediation, arbitration or adjudication. Irrespective of any technique adopted for conflict resolution, the disaster manager needs to take cognisance of certain values. These include:

- Respect for all the parties involved in the conflict
- Participation and Empowerment
- Justice; and
- Understanding diverse views and perspectives.

Disaster manager has to realise that conflict can lead to innovation and change. Instead of eliminating, it can be managed effectively to ensure organisational efficiency. In managing interpersonal relations, motivation of the personnel is another important factor. The basic principles disaster manager has to keep in view are:

- Self motivation which enables the manager to understand what motivates the personnel
- Align or tune the goals of the employees with the goals of organisation
- Understand / identify the motivating factors of personnel; and
- Establish suitable organisational policies and procedures and employee performance systems to motivate the personnel.

What is important is the manager has to reinforce the self worth of employees by reassuring them of their value to the organisation. In this Section we have attempted to orient you with certain key managerial principles and techniques. These facilitate the tasks of disaster manager. But the disaster manager may not be able to arrive at solutions to all the problems they encounter. But due to the exposure, they learn certain lessons that are helpful in handling situations in future. There are some important lessons that the disaster manager need to be aware of which we shall now briefly discuss.

18.5 KEY LESSONS FOR DISASTER MANAGER

The disaster manager has to be well aware of certain key lessons that shall guide his / her activities. These include:

- Disasters are events that have peculiar characteristics and hence there can be no general theory of management that can provide a set of prescriptive rules. The management principles are to be applied as per the situation with certain amount of innovativeness and creativity.
- Disaster managers need to demonstrate risk taking, creative and entrepreneurial behaviour.

- Natural disasters call for leadership skills. The MIT Sloan's pioneering Distributed Leadership Model (DLM) moves away from "command and control" in favour of "cultivate and coordinate". During disasters leadership is required at all levels. The DLM requires understanding the context in which one is operating, developing productive relationships and networks, visualising the desired outcome and inventing ways of working together to realise the vision.
- Every disaster, the disaster manager is to realise, is different and requires a plan based on the resources and within the available limitations prevailing at that time.
- The disaster manager needs to bring together multiple stakeholders, who can address the crises.
- Capabilities to absorb the situation, work out multiple scenarios, introduce innovation have to be strengthened.
- Excessive reliance on any technique or technology is to be avoided. Alternative arrangements need to be made to deal with the crises. For example at times technology does not come of use. Any failure of telecommunication links, virtually leads to collapse of emergency operation. This occurs in many situations. Hence disaster managers need to be aware of this and anticipate and plan for alternative system.

Disasters are inevitable and no community or country can be exempted from it. The consciousness about the impact of disaster is making everyone realise the need to reduce its influence. One such effort is to sharpen the skills of disaster managers and strengthen their ability to be prepared for the crises. The disaster manager need also to learn certain lessons from the past experiences and put together the managerial acumen, techniques, and interpersonal skills and manage the crises.

18.6 CONCLUSION

Effective management of disasters requires the disaster manager discharging certain important managerial functions, and being equipped with key skills and techniques. The application of this helps in handling of situation of crises and bringing events under control. We have discussed the broad set of activities the disaster manager is expected to discharge during disaster situations and also in normal times. The disaster manager has multidimensional roles to perform in managing the organisations, operations and people. The Unit highlighted some of the important facets of these roles. The Incident Command System about which we have dealt in the Unit is an important management tool that puts together planning, command, control and coordination of activities during a disaster. The disaster manager can utilise this tool in managing a disaster. Certain skills such as decision making, planning, strategic management, project management and leadership facilitate the functioning of disaster manager. The Unit highlighted some of these skills and techniques. Since disasters are inevitable, the disaster manager assumes an important role and has to put together the managerial acumen, skills and techniques and some lessons from the handling of disasters. The Unit attempted to bring out these issues.

18.7 KEY CONCEPTS

ABC Analysis : It is the analysis of range of items in an organisation on cost criteria. A-items are considered very important

which consume high costs and hence need tight controls on usage. B-items are of intermediate cost centre, which require moderate control while C-items are of low cost centre.

Gantt Chart

- : It is a horizontal bar chart developed as a production control tool in 1917 by Henry L. Gantt, an American engineer and social scientist. It depicts activities and shows progress of the execution of activities. The beginning and end of the block in the chart correspond to the beginning and end date of the activity.

SWOT Analysis

- : It stands for Strengths, Weaknesses, Opportunities and Threats. It is a methodology used to aid strategic planning, to evaluate the strengths, weaknesses, opportunities and threats involved in a project or activity, on the basis of which a decision is made.

VED Analysis

- : It is the process of analysing the intrinsic value of the investments for achieving the objectives of the organisation.

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18.9 ACTIVITIES

- 1) Make a checklist of activities, you as a disaster manager, would discharge on receiving a cyclone alert.
- 2) In managing a disaster, which leadership style would you prefer to adopt? Give reasons.

UNIT 19 DISASTER MANAGEMENT STRATEGIES

Structure

- 19.0 Learning Outcome
- 19.1 Introduction
- 19.2 Changing Complexion of Disaster Management
- 19.3 Disaster Management Strategies: An Overview
- 19.4 The Path Ahead
- 19.5 Conclusion
- 19.6 References and Further Reading
- 19.7 Activities

19.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Analyse the changing complexion of disaster management;
- Provide an overview of the disaster management strategies; and
- Project the path ahead for disaster management.

19.1 INTRODUCTION

Disasters wipe out years of development by destructing economies and causing extensive damage to lives and properties. Tsunami in Asia in 2004, Hurricane Katrina in USA in 2005, Muzzaffarabad Earthquake in 2005, to name a few, resulted in serious social and economic costs. Though a United Nations Report titled '*Living with Risk*' indicates that there has been a decline in the number of loss of lives from natural disasters, yet the prevalence of disasters is on the rise. The detrimental consequences of disasters on society, economy and environment cannot be overemphasised. The question that arises is whether the devastation and destruction are inevitable? As we have been reiterating in the Units of this Course, a certain amount of it cannot be avoided, but can be minimised through enhancing the national disaster management capacities to address the various aspects of prevention, preparedness, mitigation, response, rehabilitation and recovery. Over the last two decades, efforts towards evolving multifaceted disaster management strategies have been taken up, globally about which you have been acquainted with in the previous Units.

We have reached the Final Unit of this Course. By now you must have acquired sufficient grasp over the various facets of disaster management. In this Unit, we shall orient you about the changing complexion of disaster management and provide an overview of important disaster management strategies. Finally, we shall attempt to project the path ahead for the disaster management.

19.2 CHANGING COMPLEXION OF DISASTER MANAGEMENT

Disasters pose a threat to the development strategies of nations as they destroy the productive capacity, interrupt economic and social activities and create irreversible changes in the natural resource base. Hence, disaster management has been viewed traditionally as a strategy for preparing and managing the aftermath of the sudden events. It was always felt that disasters overwhelm the capacity of the nations and communities by causing severe hardships and loss. Gradually by 1990s, a change in the perception about disasters was visible. They are no longer considered as sudden occurrences that can be handled by emergency response and rescue services. Disaster prevention, which earlier was not a development priority, added a new dimension to disaster management. A general awareness is beginning to be generated that disaster impact can be minimised through improved development planning and implementation.

Risk reduction as a significant disaster management strategy is gaining importance. Disaster policies, it was perceived, can identify the probable risks the community faces and its capacity to withstand these. Hazards, it was realised need to be looked upon as an integral part of development process. The developmental perspective to disasters, as we have already discussed in Unit 16 of this Course, views disasters as not random acts of nature but as an outcome of poor risk management that has occurred over time. Hence risk reduction strategy is being embarked upon for achieving sustainable development and protection of people and livelihoods. Disasters currently are being seen as opportunities to capitalise on the inflow of resources for relief to promote long-term development. In a traditional sense, disaster relief and development were looked at as two distinct entities. The affected communities were considered helpless and passive receivers of aid without being involved in the process of relief and rehabilitation.

There is a distinct change in disaster management trends now as reflected in the Table below:

Table - 19.1

From	To
Helplessness of the victims	Awareness of the ability to cope
International response	National reliance
Outside response	Community self reliance
Emergency agency responsibility	Everyone's responsibility
Individual aid	Restoration of social system
Victims as receivers	Victims as actors
Good dole out	Training and Institution building
Donor focused	Victim focused

Source: *Proceedings of Third Disaster Management Practitioners Workshop for Southeast Asia, 2004.*

There is thus a paradigm shift from the traditional relief and disaster preparedness towards a developmental approach that is multidimensional incorporating a combination of strategies aiming at the institutional and community levels. The earlier emergency management approach has given way to disaster risk management. It is increasingly realised that one needs to be aware of the risks involved with disasters and handle them. According to Jerrilos (1999), this strategy focuses on the underlying conditions of risk generated by unsustainable development, which lead to disaster occurrence. Its objective is to increase capacity to manage and reduce risks and hence the occurrence and magnitude of disasters..... A disaster risk is the probability of injury, loss of life, and damage to property, disruption of services and activities and negative environmental effects.

Transformation in the Disaster Management Model

The traditional model of disaster management tends to regard it as a combination of a number of phased sequences of action or a continuum as indicated in the figure 19.1 below:

Traditional Model –Sequences of Action

Pre-disaster Risk-reduction Phase

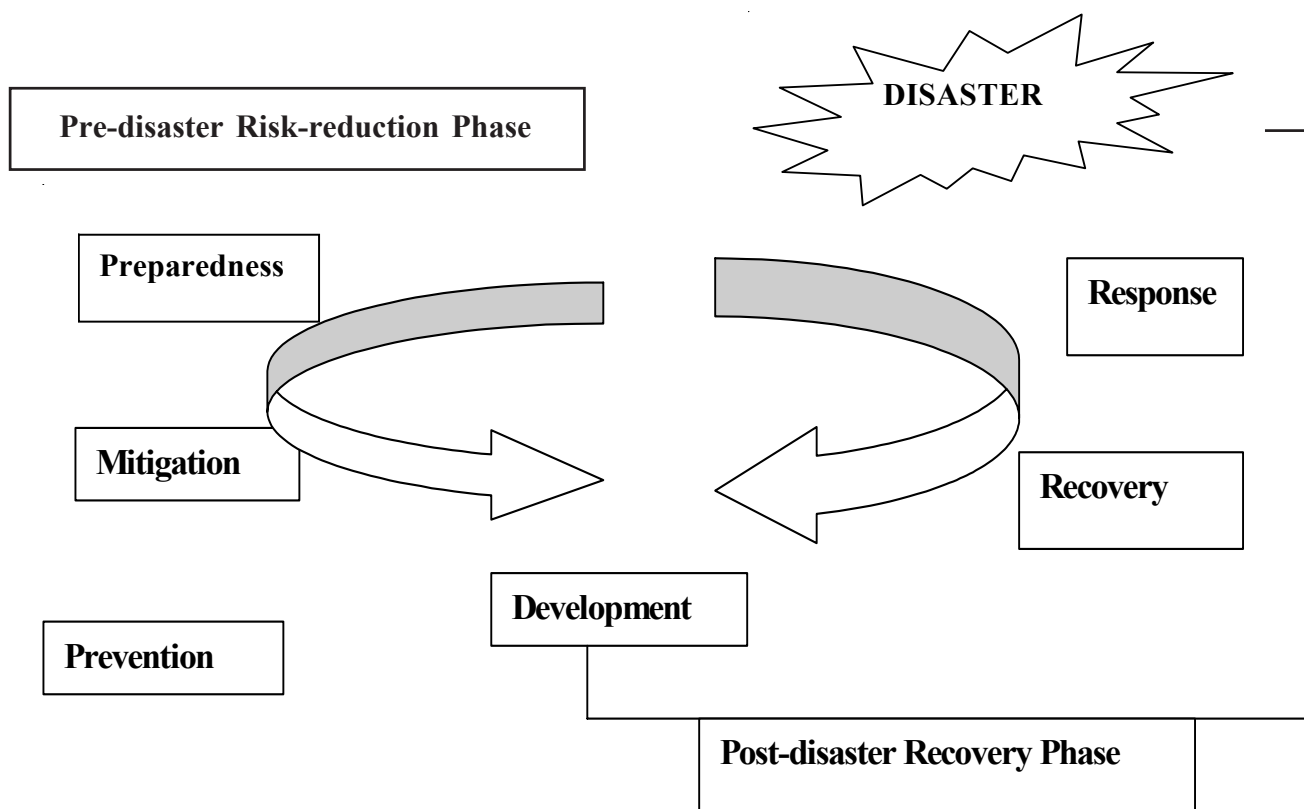


Fig. 19.1

Source: *Green Paper on Disaster Management, Department of Provincial and Local Government, South Africa.*

As you are aware, there are different phases of managing disasters from development to recovery, which have been discussed in this Course. The new model of disaster management namely the 'expand-contract' model (Fig. 19.2) explains disaster management as a continuous process. Disasters, it is felt, are managed in a parallel series of activities rather than in a sequence of action. For example, in case of any disaster such as cyclone,

the 'relief and response' strand expands to cope with the immediate effects of the disaster. Gradually, the 'recovery and rehabilitation' strand – including prevention will expand to address the rehabilitation needs of the affected community. The significance of the different strands depends on the relationship between the hazard event and the vulnerability of the community that is involved. This approach is based on the premise that disaster management includes a number of interventions and actions that may be occurring simultaneously and not always in a phased manner.

Expand-Contract Model

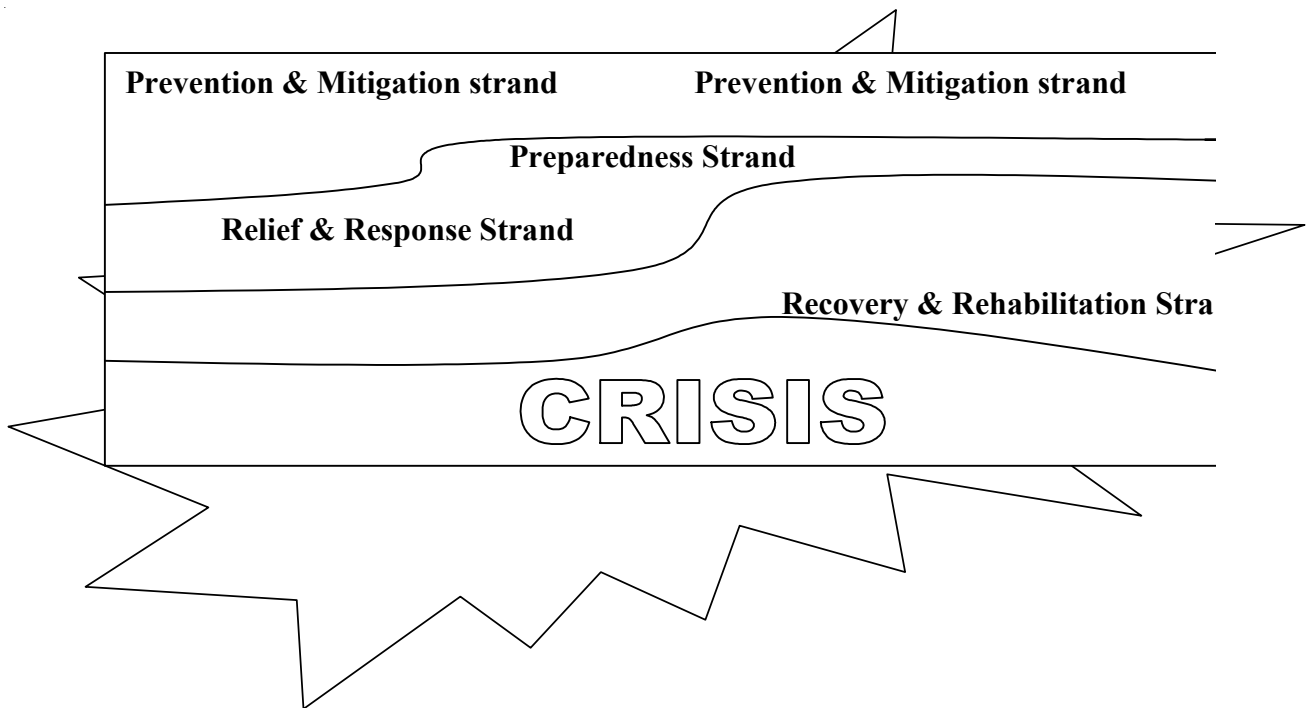


Fig. 19.2

Source: *Green Paper on Disaster Management, Department of Provincial and Local Government, South Africa*

As you all know, the national governments, non-governmental organisations, and the various agencies of United Nations have made significant strides in pursuing strategies for disaster reduction. We can say that the governance approach that is gaining importance in all spheres of activity is permeating the area of disaster management. Governance, which is wider than government, comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests. The social networks and multilevel governance processes that include public, private and community partnerships have proliferated at an accelerated pace.

Norio Okado (2005) terms the involvement of citizens, private sector, and other participatory groups in the process of disaster risk management as “Novel Public Management”. This is considered a new trend in the 21st century. Its features are:

- An emerging role of NGOs
- Innovative schemes of public-private partnership

- Increasing importance of citizen initiatives
- Institutional participatory process for multiple stakeholders
- Public information as common good and its release to society and stakeholders; and
- Growing concerns for public risk and increasing need for integrated risk management.

This new trend is considered to be a turning point in disaster prevention. The emerging role of NGOs in civil society, increasing significance of government private sector partnership and extending spectrum of social services are the characteristics of this perspective which is required to be integrated within the framework of disaster risk management.

The contemporary challenges are to manage the human safety and security. A strategy that provides for identification, assessment and management of risks arising out of disasters is gaining importance. It is a prerequisite for sustainable risk reduction in developing countries. New strategies for crises management in the present day globalised world are emerging. What is required is to bring in appropriate institutional reforms, building the capacities of human resources, enhancing the government's ability to govern and manage effectively in the transformed environment. We need to examine the strategies being evolved at different levels of governance from the national to local level. In the next Section, we shall provide you with an overview of the key strategies.

19.3 DISASTER MANAGEMENT STRATEGIES: AN OVERVIEW

It is being realised that disaster management ought to be given a proper policy direction and any strategy needs to adhere to the following principles:

- Fostering a culture of prevention
- Identifying the key issues to be addressed especially in the development process
- Permeating the concern for disaster risk reduction across all levels of government
- Evolving equitable, consistent and fair mechanisms of provision of disaster assistance
- Providing transparency, participation and exchange of information
- Taking cognisance of local conditions and environment
- Devising efficient, effective, flexible, adaptive and sustainable strategies; and
- Introducing a multidisciplinary and integrated approach to manage disasters.

To recapitulate, a beginning in evolving a disaster management strategy was made in May 1994, with the Yokohama Strategy emanating from the International Decade for Natural Disaster Risk Reduction. The Yokohama strategy emphasised that disaster prevention, mitigation and preparedness are better than disaster response in achieving the goals and objectives of vulnerability reduction. The Yokohama Strategy for Disaster Reduction centered on the objective of saving human lives and protecting property. The strategy focused on:

- Development of a global culture of prevention

- Adoption of a policy of self-reliance in each vulnerable country and community
- Education and training in disaster prevention, preparedness and mitigation
- Development and strengthening of human resources and material capabilities and capacities of research and development institutions
- Involvement and active participation of the people
- Priority to programmes that promote community-based approaches to vulnerability reduction
- Effective national legislation and administrative action
- Integration of private sector in disaster reduction efforts
- Involvement of non-governmental organisations; and
- Strengthening the capacity of the United Nations system in disaster reduction

As you all know, the International Strategy of Disaster Reduction (ISDR) pronounced in 2001 as a follow up to the International Decade for Natural Disaster Reduction (IDNDR), intended to enable all societies to become resilient to the effects of natural hazards and related technological and environmental disasters to reduce human, economic and social losses. The ISDR considered that appropriate disaster reduction strategies and initiatives at the national and international level, as well as the implementation of United Nations Agenda 21 can strengthen the likelihood of reducing or mitigating the human, economic and social losses caused by disasters and thereby facilitate sustained growth and development. It called for participation of communities as an essential element for successful disaster reduction policy and practice. Vulnerable communities, especially in developing countries demonstrate extraordinary capacities to prevent such losses. The strategy emphasised on the need to create disaster resilient societies and prevent human, economic and social losses through public participation at all levels of implementation of the strategy.

The World Conference on Disaster Reduction held in January 2005 at Hyogo, Japan identified the specific gaps arising out of the Yokohama strategy. These are:

- Governance: organisational, legal and policy frameworks
- Risk identification, assessment, monitoring and early warning
- Knowledge management and education
- Reducing underlying risk factors; and
- Preparedness for effective response and recovery

The Conference adopted the framework for Action for 2005-2015 as *Building the Resilience of Nations and Communities to Disasters*. It promoted a strategic and systematic approach to reducing vulnerabilities and risks to hazards. The Conference identified the following strategies:

- Effective integration of disaster risk considerations into sustainable development policies, planning and programming at all levels, with a special emphasis on disaster prevention, mitigation, preparedness, and vulnerability reduction.

- Development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards; and
- Systematic incorporation of risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programmes in the reconstruction of affected communities.

The prevailing disaster management approaches and strategies are propagating a comprehensive approach towards handling disasters. Effective, holistic, and proactive disaster management strategies focusing on disaster risks, vulnerability of communities, and multilevel and multidimensional coordination among all stakeholders are emerging. We have already acquainted you with the basic tenets of Total Disaster Risk Management Approach (TDRM) in Unit 2 of this Course. This approach builds on the gains of the International Decade of Natural Disaster Reduction (IDNDR), the International Strategy for Disaster Reduction (ISDR) and other existing endeavours. It integrates the existing knowledge and techniques on disaster reduction and response and risk management. Inherent to this approach is effectively communicating the knowledge techniques at all levels and facilitating the appreciation of governments of the relevance of disaster risk management in achieving sustainable development objectives. We have discussed in detail the strategies of the approach in Unit 2 of this Course.

USAID's Disaster Mitigation Strategic Objective emphasises preparing for and responding to natural disasters. This strategy targets the following broad sets of beneficiary groups:

- At-risk population for example, women, children, scheduled castes and tribes in high-risk disaster prone communities
- Service providers, for example, first responders
- Public and private partners for example, banks, insurers, NGOs, business aid
- Government of India, public policy makers, military, police and disaster management officials.

This strategy has the following components:

Increased Community Preparedness to Mitigate and Manage Disasters

This encompasses:

- Community level disaster planning
- Drought Mitigation
- Public awareness and Information campaigns
- First responder training
- Hospital preparedness
- Exposure to “best practices” opportunities (in-country, regional and international)
- Building code enforcement
- Weather and flood forecasting; and

- Early warning systems

Improved Capacity of Public and Private Partners to Meet Critical Needs of Vulnerable Groups in Disaster Situations

This includes:

- Incident command systems training
- Search and rescue operations
- Stockpiling of relief supplies
- Partners training for capacity building; and
- Coordination of international relief resources

Facilitated and Expedited Reconstruction and Rehabilitation in Accordance with Sound and Equitable Standards

This involves:

- Retrofitting of public buildings
- Support for materials stockpiling for reconstruction inputs
- Microfinance support for affected small-scale enterprises or the informal sector
- Training programmes for construction engineers and masons on how to build more disaster-resistant structures; and
- Information system support to promote transparency and equity in Government of India and private sector disaster response

It is evident that the major goal is to reduce disaster risk. In tune with this, the strategies veer around:

- Institutionalising National Systems and Capacities for Disaster Management
- Constitution of Disaster Management Authorities at National, State, and District Levels
- Strengthening Governance Mechanisms at the Local Level
- Building Community Resilience
- Reducing the Vulnerabilities of the Communities at Risk; and
- Fostering Public Private People Partnership.

We shall examine these strategies in brief now:

Institutionalising National Systems and Capacities

The Government of India has adopted mitigation and prevention as essential components of the development strategy. The Tenth Five Year Plan document incorporated a detailed Chapter on Disaster Management. The plan indicated that to move towards safer development, development projects should be sensitive towards disaster mitigation. The design of development projects and the process of development should take the aspect

of disaster reduction and mitigation within its ambit; otherwise the development ceases to be sustainable and eventually causes more hardships and loss to the nation.

The terms of reference of the Twelfth Finance Commission were modified and it was mandated to look at the requirements for mitigation and prevention apart from its existing mandate of looking at relief and rehabilitation. The Government of India has issued guidelines that where there is a shelf of projects, those addressing mitigation will be given a priority. It has also been mandated that each project in a hazard prone area shall have disaster mitigation / prevention as a term of reference and this needs to be reflected in the project document.

Constitution of Disaster Management Authorities at National, State and District Levels

The National Disaster Management Authority (NDMA) has been constituted in December 2005 consisting of the Prime Minister of India as the Chairperson and other members not exceeding nine to be nominated by the Chairperson. The National authority subject to the provisions contained in the Act shall have the responsibility for laying down the policies, plans and guidelines for disaster management for ensuring timely and effective response to disaster.

Every state government also is to establish a State Disaster Management Authority consisting of the Chief Minister of the State as the ex-officio Chairperson and other members not exceeding eight to be nominated by the Chairperson of the State Authority. This authority has the responsibility for laying down policies and plans for disaster management in the State.

A District Disaster Management Authority for every district is to be constituted by the state government. This is to consist of the Collector or District Magistrate or the state government may prescribe Deputy Commissioner as the Chairperson in ex-officio capacity and members not exceeding seven as.

Strengthening Governance Mechanisms at the Local Level

The modern disaster management practice recognises the strengthening of disaster management capacities at the district level and below, as this is the cutting edge of governance. There are efforts made to reach out to local governments to help them build local capacity, acquire knowledge and resources and provide them with decision-making authority.

The formulation of District Disaster Management Plan (DDMAP) can serve as an effective strategy to address the district's response to disaster situations. It can act as a multi-hazard response plan for the disasters and provide for the institutional framework required for managing such situations. The DDMAP can serve as an effective tool to:

- Improve preparedness at the district level through risk and vulnerability analyses
- Ascertain the inventory of existing resources and facilities available with the various agencies at the district level
- Use scientific and technological advances in Remote Sensing, Geographical Information System, etc., in preparation of the plan; and
- Develop a framework for proper documentation of future disasters in the district.

The 73rd Constitutional Amendment has conferred Constitutional Status on the Panchayati Raj Institutions (PRIs) in India. Sensitisation, training and orientation of the PRI members can go a long way in effective disaster management. The Eleventh Schedule of the Constitution identifies key areas for developmental schemes for PRIs. These include land improvement, minor irrigation, education, poverty alleviation programmes etc. The PRIs can incorporate mitigation component in every development project in these areas. The primary responsibility for managing any kind of disaster at the local level lies with the local governance institutions apart from the community organisations and NGOs. The local governments are best positioned to provide the necessary leadership and direction and shoulder responsibility for providing succour to the victims and also contribute in ensuring long-term risk reduction.

Osborne and Gaebler, who propagated the concept of entrepreneurial government, are of the view that the right kind of government redefines its role to be a catalyst and facilitator. Such governments will tend to define problems and assemble resources for others, while at the same time improve coordination between NGOs and the community. In the wake of this paradigm shift, one important strategy could be to build the capacities of local governments. This can be through the following ways:

Human Resource Development: This will include equipping the local government officials with an understanding of prevalent hazards, vulnerabilities and capacities in their local area of operation, the necessary risk assessment skills and knowledge of risk management approaches.

Institutional Development: This will entail improving management structures to strengthen capacity to act as a facilitator for coordination between the organisations and communities involved in disaster management and encouraging information dissemination for increased disaster awareness amongst the communities.

Legislative Development: Making legal and regulatory changes to enable local governments to enhance their capacities to allocate financial resources for disaster management, develop disaster plans, integrate mitigation strategies into the development process and involve business community, neighbourhood associations; builders and media in risk reduction planning (Mehta, 1999).

Building Community Resilience

Resilience is the capacity to cope with unanticipated dangers after they have become manifest, and learning to bounce back. All individuals have resilience but the degree to which one is able to cope with an adversity varies. Whenever a disaster occurs, the portrayal by media indicates or reflects that the communities are helpless and can be saved only through aid from outside. Though initially some assistance is required, later the way people pull together and rebuild their lives is quite amazing. So the people have the capacity to survive, adapt and bounce back after a crisis. Hence over time, strengthening or building the resilience of communities has become a key strategy at the global level.

There is a shift from vulnerabilities to capacity assessment and building, particularly of the community. The approach is more community-based about which we have already discussed in Unit 9 of this Course. The following table indicates the features of traditional and community-based approaches:

Features	Traditional	Community-based
Locus of concern	Institution	Community
Participation	Token	Dominant to control
Decision making	Top down	Bottom up
Main actors	Programme staff	Community residents
Resources	Programme based	Internal resources
Main method used	Extension services	Community organising
Impact on local capacity	Dependency creating	Empowering

Source: *Proceedings of Third Disaster Management Practitioner's Workshop for Southeast Asia, 2004.*

The building of disaster resilience at community level is only the beginning of the strategy. To ensure a wider impact on managing disasters, the message of risk reduction needs to be broadened. In Andhra Pradesh the efforts made by the rural community in the drought affected village Zaheerabad in Medak District reveals how with the right help, communities can build their resilience. Low rainfall and deforestation have left the soils arid and eroded. Also much of the crops viz., wheat, rice and cotton are prone to pests and require expensive fertilisers and pesticides.

A Local NGO, viz. Deccan Development Society (DDS) employs various strategies to help increase local resilience. These are:

- Forming women's collectives and encouraging collective farming by women
- Initiating programmes to restore arid land back into a productive asset
- Promoting afforestation and mini-watershed management; and
- Creating community gene and grain fund

DDS works with local communities to enable them cultivate idle land and reintroduce customary farming practices. Local food grains, which are drought resistant and less dependent on expensive and external inputs, are grown. The grain, which is grown, is stored in each village and it is the Community Grain Fund (CGF). Each community identifies poorest households who buy the grain at the subsidised rates. The money earned becomes a revolving fund. Three principles - local production, local storage and local consumption distinguish DDS's strategy from the government managed public distribution system.

To further boost the capacity of farming families to withstand drought, DDS promoted the innovative idea of a seed bank to rescue traditional crop varieties that thrive in arid conditions. Seeds of different varieties were collected from villages and the community gene fund has grown into a movement across the region. As the change brought about in these villages are based on knowledge, skills and resources largely internal to the community, rather than being dependent on large investments of external money or technology, this is a path that other communities in semi-arid regions may follow to create a more resilient future (*World Disasters Report, 2004*).

Globally there are several programmes and projects being taken up to strengthen community resilience. What is important to ensure its sustainability is to forge partnerships with local governance institutions, focus on mitigation measures, Information Education and Communication (IEC) activities and integrate the programmes into development plans.

Reducing the Vulnerabilities of the Communities at Risk

Vulnerability in a way implies that there is a deficit of capacities amongst the people who are at risk. What is required is to identify the different types of vulnerabilities at various levels. Efforts are being made by several organisations including the national governments to analyse the capacities and vulnerabilities.

Livelihoods are the most to be affected by disasters. Agriculture being the primary livelihood in many countries, this gets disturbed and there is always lack or under-development of secondary or tertiary sectors such as agro-based industries, processing units, etc. The traditional and crafts industries also receive a setback. Strategies to strengthen the livelihoods and provide sustainability are occupying a prominent place in disaster management.

In the development field, the sustainable livelihoods (SL) approach first promoted by Chambers and Conway (1992) has become an important organising framework for the efforts of a wide range of multilateral agencies, donors, NGOs, and government bodies. SL is concerned with the potentials, competence, capacities and strengths-rather than weaknesses and needs of the communities. It recognises a range of strengths or assets – called ‘capitals’ to sustain a livelihood. These include:

Natural Capital: This includes water, land, rivers, forests and minerals necessary for the survival of both rural and urban population.

Financial Capital: Access to financial capital such as income, savings, remittance, and credit is a critical resilience factor.

Human Capital: Human capital in the form of knowledge, skills, health and physical ability determine an individual’s level of resilience more than any other asset.

Social Capital: In the sustainable livelihoods context, it is taken to mean the forms of mutual social assistance upon which people draw. These include networks such as clan or caste; membership of more formalised groups such as women’s associations etc.

Physical Capital: It comprises the basic infrastructure, goods and services needed to support sustainable livelihoods including secure shelter and buildings, clean water supply, sanitation, access to information and communications (*World Disasters Report*, 2004).

In India, there are attempts to reduce the vulnerability of communities through strengthening the employment and livelihood strategies. There are several schemes such as Food for Work, Integrated Child Development Scheme, Drought Prone Area Programme, etc. Micro-finance is increasingly being used to create safety nets. The Self Employed Women’s Association (SEWA) along with International Fund for Agricultural Development (IFAD), the World Food Programme (WFP), Government of India and Government of Gujarat, has launched a seven-year livelihood security project *Jeevika*. It organises women into Swashrayee Mandals and provides them loans, and also inculcates a culture of savings among the rural poor that helps them during crises.

The Food and Agriculture Organisation (FAO), realising the interdependence amongst poverty alleviation, development and disaster risk reduction, has initiated a programme on '*The Role of local level institutions in reducing vulnerability to natural disasters*'. It aims at promoting local capacities and local organisations to participate actively – in the design and implementation of locally adopted disaster risk prevention and management strategies. This is in operation in several developing countries such as Philippines, South Africa, Argentina, Vietnam, Iran, etc. Its key strategies include:

- Inclusion of disaster prevention and mitigation components in rural development plans
- Disaster preparedness and contingency planning at district and community levels
- Integrated land use and watershed management
- Social capital formation and enhancing social safety nets
- Recognition and enhancing the local knowledge specifically on risk identification and monitoring, early warning etc., and
- Improved vulnerability assessments and vulnerability monitoring.

Fostering Public-Private-People Partnerships

Public-private partnerships are presently an important strategy of public policy implementation. This is one of the new governance models, which is being experimented in public service delivery. In crises such as disasters that involve huge resources, this is an effective strategy of mobilising private funding and technology that provide gains to the public. It brings all the concerned stakeholders on one platform to share the resources, assets, and knowledge thereby fostering beneficial relationships.

In Gujarat, the Housing Reconstruction Programme taken up in the aftermath of earthquake is a participatory programme with people undertaking the construction of the houses with the assistance of the government. The Confederation of Indian Industry (CII) is playing an important role in eliciting the support from corporate sector in disaster management activities. The Ministry of Home Affairs is seeking the participation of the Builders Association of India (BAI) and Construction Federation of India (CFI) with a combined membership of forty thousand construction companies in the disaster management ventures.

Public-private-people partnerships foster horizontal relationships and networks in the governance process. For instance in USA, the Federal Management Agency (FEMA) was said to arrive generally after a disaster to provide emergency relief and financial assistance. In 1993, administrator James Lee Witt led a radical turnaround. FEMA officials focus more on preventing the damage from disasters through a public private and joint inter governmental effort. FEMA developed a "life cycle" mode of disaster management.

Disasters and their costs is the product of planning and mitigation that needs to begin far in advance of disasters and continue long after to prevent their recurrence. Instead of waiting for a hurricane to hit and dealing with the aftermath, FEMA officials worked closely with the state and local officials to improve evacuation plans. They built partnerships with the construction industry to design and build more houses that are hurricane resistant. FEMA, in short, moved from limited forms of direct service delivery to a complex network-based approach that stretched from federal government into state and local governments and the private sector (Kettl, 2000). Public-private-people partnerships is an

important strategy that brings about devolution of function, sharing of responsibility, extended social networks where there is sharing of administrative responsibilities.

As you would have observed, all the Units dealt with in this Course dealing with various facets of disaster management have identified specific strategies. The objectives or goals the different strategies intend to promote are more or less identical. Disaster risk reduction accompanied by creating community resilience, participation, empowerment, strengthening livelihoods and integrating risk reduction with development are the prime concerns. There are the global challenges too. Having reached the end of the Course, let us know visualise and chalk out the path ahead for disaster management.

19.4 THE PATH AHEAD

The current perceptions regarding disasters need to undergo further transformation. Disasters are no longer to be considered as occurrences that are to be managed through emergency response services. Disasters, natural or human induced, can take place any time, and what is required is awareness and shared responsibility for risk reduction. This needs to be integrated with the overall development of any nation. The vital link between development and disasters is increasingly being realised and was infact the main theme at the World Conference on Disaster Reduction held in Kobe, Japan in 2005. Disaster reduction and mitigation efforts must be “woven into the fabric of a community’s overall development” noted Jan Egeland, the UN Undersecretary General for Humanitarian Affairs.

Globally, all countries presently are working towards the achievement of Millennium Development Goals (MDGs). It was in the year 2000, when the United Nations General Assembly noted with concern the abundant inequalities in human development worldwide and recognised “their collective responsibility to uphold the principles of human dignity, equality and equity at the global level”. The General Assembly has set the following eight goals for achieving development and poverty eradication by the year 2015. These include:

- Eradicating extreme poverty and hunger
- Achieving universal primary education
- Promoting gender equality and empowering women
- Reducing child mortality
- Improving maternal health
- Combating HIV/AIDS, Malaria and other diseases.
- Ensuring environmental sustainability
- Developing a global partnership for development

The UNDP Report on *Reducing Disaster Risks* (2004), focused on integrating disaster risk reduction and development planning to meet the MDGs. It addresses the MDGs 1,3,4,6,7 and 8 as being of primary concern to disaster risk reduction on the following grounds:

MDG 1. Eradicating extreme poverty and hunger

There are many opportunities for interventions that could simultaneously reduce disaster

risk and poverty and hunger. These include:

- Strengthening and diversifying livelihoods
- Encouraging responsible foreign investment and job creation
- A flexible and participatory approach to urban planning
- Building social security, including access to health and education
- The provision of risk / loss spreading mechanisms for those excluded from insurance cover.

At levels from the individual to the national, the impact of disaster takes away the means of generating income as well as any savings and assets. It is this aspect of disaster that emphasises on pro-poor development policy, which provides an opportunity for disaster risk reduction.

Many of the tools for delivering poverty-alleviation projects and programmes need simply to be modified to take account of disaster risk reduction. The added value of such work is to enhance the sustainability of poverty and hunger alleviation.

MDG3. Promoting gender equality and empowering women

Gender influences the types of hazard to which an individual is exposed and an individual's access to resources with which to build resilience to hazard and to recover from disaster. Where structural constraints in society result in the exclusion of women from decision-making or economic security, risk will be unevenly spread.

Highlighting gender in development and disaster risk reduction raises a broader issue of inclusiveness in decision-making. To promote resilience, inclusive and consultative processes are needed that engage those most at risk. Often those at risk are the most resourceful members of society, but also the least included in economic and political life. This will include women, but also child-led households, elderly people caring for grandchildren, ethnic and religious minorities, people weakened by chronic illness and social classes and castes with low social status.

MDG4. Reducing child mortality

Children are at greater risk of being affected, injured or killed by disaster impacts than adults. For example, an estimated 114,000 school-aged children were made homeless by the Marmara earthquake in Turkey in 1999.

It is perhaps the indirect impacts of disaster that have the greatest toll on children and affect the national mortality levels. Most important here is the loss of livelihoods that can lead to extreme poverty and homelessness for children left behind.

Appropriate safety nets, such as help for extended families with capacity to absorb orphans or well run orphanages, can support many children. But for those children born into families whose livelihoods and homes have been taken by disaster impacts, the chances of survival in the first years of life will be reduced.

MDG 6. Combating HIV/AIDS, malaria and other diseases

For many people, natural hazards' stress and shock is felt as one of many pressures. HIV/AIDS and other diseases can undermine individual and collective coping capacity,

just as disaster impacts can take away development gains and livelihoods, making people more vulnerable to illness.

Interventions to strengthen basic health care provision, family health care and preventive health planning can play central roles in strengthening society and building capacity with which to resist natural hazards.

Innovative development policy is required for those instances where natural hazard coincides with high rates of illness. Ways of providing subsistence, security and education for the children of families where adults may be dead or made weak from illness are difficult to find. This is even more so when rural livelihoods are under stress from drought conditions or crops and houses and tools have been swept away by floods.

MDG7. Ensuring environmental sustainability

One of the clearest signals of a crisis in environment-human relations is in natural disasters. Soil degradation, biodiversity loss, over-fishing, deforestation or drinking water scarcity undermine rural livelihoods and pave the way for vulnerability to environmental hazard.

In cities, pollution of waterways and the air and inadequate provision of safe drinking water, sanitation or solid waste management systems shape patterns of illness that run down resistance to everyday hazards. In rural and urban contexts, risk accumulation that ends in disaster is often tied to problems of environmental sustainability. Strategies to enhance environmental sustainability will make a contribution to breaking the chain of accumulated risk.

MDG8. Developing a global partnership for development

The most important components of this goal relate to trade, debt relief and aid. Success rests to a large extent on the willingness of developed countries to meet their commitments. The 2001 Ministerial Meeting of the World Trade Organisation (WTO) in Doha, Qatar placed the needs and interests of the developing countries at the heart of WTO negotiations. However, in 2003, the subsequent stalemate in the Cancun round of WTO negotiations showed greater political will, collaborative thinking and action is required at the international level to allow developing countries to trade on a level playing field.

Increase in financial assistance may reflect an evolving change in international donor priorities. As likely is a response to increasing disaster losses as the disaster-development relationship becomes ever more tightly connected, and human and economic exposure to disaster risk grows.

ISDR has succeeded in building regional and international partnerships for disaster risk reduction and in disseminating good practice. Similarly, negotiations around the United Nations Framework Convention on Climate Change (UNFCCC), most recently centred on the Kyoto Protocol, also provide a focus for international attention that can directly address the concerns of disaster risk reduction.

These goals hence are important in crises management also. The basic components of MDGs – poverty, health, gender equality, education, environment and holistic human development are closely associated with the ability of the population to respond to disasters. Any effort towards meeting these would have to:

- Respond to the local needs

- Understand the dynamics of the local situations
- Reflect a long-term perspective
- Foster development of local capacity instead of perpetuating dependency; and
- Ensure accountability to all concerned stakeholders.

The path ahead for managing disasters is to usher in a people-centered development strategy. This has to be supplemented by:

- Systematic assessment of what enables people to cope with, recover from and adapt to various risks and adversities – at household and community level
- Strengthening social capital as the key objective of all disaster interventions, whether in relief, recovery or risk reduction – rather a by-product
- People-centered approaches to development provide models that can improve humanitarian aid and disaster risk management
- New institutional strategies and cross-sectoral coalitions to boost the resilience of local livelihoods in the face of multi-dimensional risks
- Good governance to create the environment in which more resilient communities can thrive
- Scaling up strategies based on the aspirations and capacities of people at risk (*World Disasters Report, 2004 op.cit.*).

The tendency till now has been mostly to associate disasters with negativities. We need to broaden our vision and work on the positive aspects associated with disasters as reflected below:

	Negative Aspects	Positive Aspects
D	Damage	Development
I	Interruption	Innovation
S	Severe	Sharing
A	Antagonistic	Awareness
S	Scourge	Self-Sufficiency
T	Traumatic	Transformation
E	Emergency	Education
R	Risk	Resilience

Strategies for disaster management indicate several measures both long-term and short-term. But these can give some results only if accompanied by strong political will, keenness and commitment on the part of all concerned actors involved in the exercise. Any effort needs to be outcome and result oriented with a shared vision of future environment, Institutions, mechanisms and processes are always in place and what is to be associated with it is leadership and good governance. Any policy and practice that focuses on people's strengths instead of just vulnerabilities is proactive and it is a positive

paradigm shift to deal with the marginalised sections of society.

The UNDP Report on Reducing Disaster Risks (*op.cit.*) highlighted the need for governance for Disaster Risk Reduction. According to it, governance has economic, political and administrative implications.

- Economic governance includes the decision-making process that affects a country's economic activities and its relationships with other economies.
- Political governance is the process of decision making to formulate policies including national disaster reduction policy and planning.
- Administrative governance is the system of policy implementation and requires the existence of well functioning organisations at the central and local levels. In the case of disaster risk reduction, it requires enforcement of building codes, land-use planning, environmental risk and human vulnerability monitoring and safety standards.

It identified six emerging agendas within Disaster Risk Reduction. These are:

- Appropriate governance mechanisms
- Factoring risk into Disaster Recovery and Reconstruction
- Integrated climate risk management
- Managing the multi-faceted nature of the risk
- Compensatory risk management
- Addressing gaps in knowledge for disaster risk assessment

19.5 CONCLUSION

We cannot overemphasise the detrimental consequences of disasters on economies. Many countries globally are becoming increasingly vulnerable to disasters. The situation demands formulation of appropriate strategies for managing disasters. As discussed in the Unit, risk reduction as a significant disaster management strategy is gaining significance. This strategy, due to the emergence of new trends in the arena of disaster management, assumes varying forms. There is a paradigm shift from the traditional relief and disaster preparedness approach to a development approach. We have highlighted these trends and approaches in the Unit. The changing complexion of the discipline of disaster management is analysed in the Unit. Several strategies have been pronounced over time, aimed at disaster reduction. Many international organisations also are working towards developing an integrated risk reduction strategy. The Unit discussed a few such strategies. The major strategies which have gained prominence such as institutionalising national systems and capacities, strengthening governance mechanisms at local level, building community resilience, reducing the vulnerabilities of the communities at risk and public private people partnerships are highlighted. Disaster Management has to embark upon a strategy aimed at holistic human development integrating the millennium development goals, policies and practices that harness people's strengths instead of vulnerabilities. It is a challenging road ahead for disaster management.

19.6 REFERENCES AND FURTHER READING

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19.7 ACTIVITIES

- 1) Go through the newspapers, magazines or journals and analyse the changing complexion of disaster management. Write a brief note reflecting your views.
- 2) Attempt to highlight a few strategies with reference to any particular disaster.
- 3) Browse some internet websites and collect material on emerging challenges in disaster management. Highlight a few striking trends in the form of a report after discussing it with your Academic Counsellor.