
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; and
- Understand the relationship between development and environment.

1.1 INTRODUCTION

The International Secretariat for Disaster Reduction (ISDR) 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 and natural or both, causes 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” (Hoffman and Oliver- Smith, 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, creates 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 has 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, 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 & Unnikrishnan, 2005).

The High Powered Committee (HPC) was constituted in August 1999 under the chairmanship of J.C.Pant. The mandate of the HPC is 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
- Hailstorms
- Cloudburst
- Heat wave and cold wave
- Snow avalanches
- Droughts
- Sea erosion
- Thunder lightning

2) Geological

- Landslides and mudflows
- Earthquakes
- Large fire
- 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
- Bomb 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 refugees* 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. 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, affected 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 more recent, Vizag accident. Unrestricted felling of forests, serious damage to mountain ecology, overuse of groundwater, changing patterns of cultivation, etc., have precipitated recurring floods and droughts. The spate of landslides in the Himalayas in recent years can be directly related to the 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 Economic Survey 2004-05 indicates decline in the number of people below the poverty line (BPL), from 51.3% in 1977-78 to 26.1% in 1999-2000, it conceded that there are wide variations across states. Poverty is spatially concentrated in pockets in backward states 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 Organisations, rate of growth of employment on current daily status (CDS) basis declined from 2.7 % per annum in 1983-94 to 1.07% in 1994-2000. The decline is largely attributed to stagnation in the agriculture sector. Share of agriculture in total employment dropped from 60% in 1993-94 to 57% 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 has 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 have 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 range 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, drought that affected regions in Central Asia; Afghanistan, Asia and Central America, Cyclone 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, absorbing 80 percent of the total affected populations, 40 percent of the total deaths, and 46 percent of the total economic losses (CRED statistics for 1997-2001).

Disasters have international ramifications in terms of direct and indirect impact (s). Hence, 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% 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 worldwide. Within Asia, 24% 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% of net sown area is vulnerable to droughts
- 55% of total area is in seismic zones III- V, hence vulnerable to earthquakes
- Sub- Himalayan and Western Ghats is 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 Tapi, 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

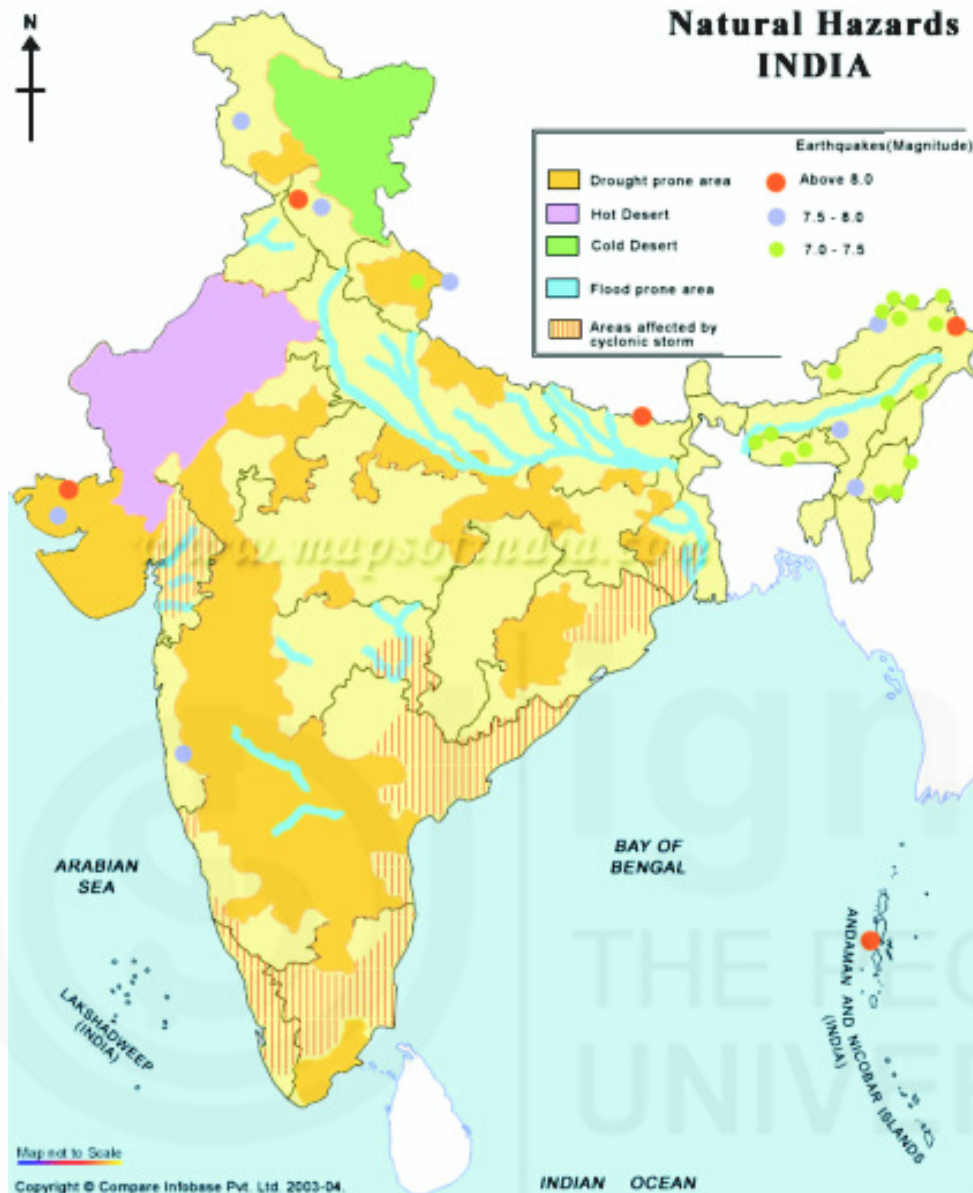
The Himalayan mountain ranges are considered to be the world's youngest fold mountain ranges. The subterranean Himalayas are geologically very active. In a span of 53 years, four earthquakes exceeding magnitude 8 on the Richter scale have occurred in this region. The peninsular part of India comprises 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 which 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 map below 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, 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 this 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 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 (Murthy 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 of 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, alleged state excesses in Punjab, 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 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 actors 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 would be 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 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 warlike 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 and West Bengal, occasionally. Tensions with neighboring 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. Earlier this year, the western state of Rajasthan was struck by drought. 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.

Statistically, it is proven that the Himalayan glaciers are shrinking, and in the next fifty to sixty years they will 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.

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 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 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 consequently 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 drought 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 percent of the country is susceptible to earthquake damages.

Human population of India has already crossed the 1 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, Multipurpose 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 (DPAP) 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 studying trends in the recent past. It is estimated that by 2025, the urban component, which was only 25.7 % (1991) will be more than 50%. The Ninth Five Year Plan estimates India's population size, by 2011, to be 1178.89 million with an urban population share of 32%. A characteristic feature of the urbanisation process is the increasing 'metropolitanisation.'

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 disaster.

Urbanisation is increasing risk at unprecedented levels: communities are becoming increasingly vulnerable since high-density areas with poorly built and maintained infrastructure are subjected to natural hazard: 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 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 subdivision, 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 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 1967.

Disasters have come to stay in the forms of recurring drought in Orissa, the desertification of swathes 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.

Risk 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% 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 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 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 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 upon 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 for the same,

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, 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 postmodern 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 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, so does 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 (1999) 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		
	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, 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 increasing 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 (*Series One*), in a year with normal weather pattern winds blow westward and push the warm surface water towards the western Pacific Ocean. In some years when the winds weaken, warm water spreads almost over almost 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, greenhouse 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 Greenhouse 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 Secretariat of Disaster Reduction has defined 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 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 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. This action allows hurricanes crossing the Atlantic to move farther west and to become more powerful than usual.

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. 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 – RECENT TRENDS

Structure

- 2.0 Learning Outcome
- 2.1 Introduction
- 2.2 Overview of Recent Trends in Disaster Management
- 2.3 Disaster Management in Mountainous Areas
- 2.4 Disaster Management in Riverine Regions
- 2.5 Disaster Management in Coastal Regions
- 2.6 Strands in Disaster Management
- 2.7 Conclusion
- 2.8 Key Concepts
- 2.9 References and Further Reading
- 2.10 Activities

2.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

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

2.1 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.

2.2 OVERVIEW OF RECENT TRENDS IN DISASTER MANAGEMENT

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 charcoal 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 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 conception 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 in/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 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 John 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.

2.3 DISASTER MANAGEMENT IN MOUNTAINOUS AREAS

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 of Burrad et.al. 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 zones 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, 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, 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. 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 at 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:

- 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 operative 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 millions 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).

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.

2.4 DISASTER MANAGEMENT IN RIVERINE REGIONS

Several countries 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 imminent 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 Indian 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, the average run off in the river system in the country is assessed at 1,869Km³. Of this the utilisable portion by conventional storage and diversion is estimated as about 690Km³. In addition there is substantial replenishable groundwater resource in the country, estimated at 432km³. 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 Himalayan Rivers are fed by the melting snows and glaciers of the great Himalayan range, 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 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 that 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.

2.5 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 *Hurricanes* and *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 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 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 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 to 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 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 there 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.

In order to control floods, politicians and bureaucrats have been laying stress on the construction of dams and embankments, which has necessitated much greater expenditures. It has been estimated that at the time of Independence about 6000 kms. of embankments were existing on various rivers, providing a reasonable degree of protection to about 3 million ha. of flood prone area. However, the average flood affected population per year increased from about 16 million in the 1950's to 43 million in the 1970's to 53 million in the 1980's. Not only have the flood relief expenditure increased from Rs. 230 crores in 1980-81 to Rs. 537 crores in 1986-87 even the related damages have increased substantially from Rs. 60 crores during the 1950's. This figure increased 38 times to an astounding Rs. 2307 crore per year during the 1980s. The increase in the flood damages and the affected area provides clinching evidence as to the country's proneness to floods on one hand and lack of preparedness on the other.

2.6 STRANDS 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, 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.

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 mechanism. 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.

2.7 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.

2.8 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 $\sim 28^{\circ}\text{C}$ in the Indian Ocean) (Gadgil, *et al.* 1984). The frequency of storms is highest in the Bay of Bengal (Fig. 3). Though storms are tracked better today owing to satellite 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 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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2.10 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 3 COMMUNITY BASED DISASTER MANAGEMENT

Structure

- 3.0 Learning Outcome
- 3.1 Introduction
- 3.2 Concept of Community Based Disaster Management (CBDM)
- 3.3 Principles, Strategies and Challenges
- 3.4 Requirements in CBDM
- 3.5 CBDM: Approach and Direction
- 3.6 Features of CBDM: Understanding Through Case Studies
- 3.7 Examples in Resilience
- 3.8 Conclusion
- 3.9 Key Concepts
- 3.10 References and Further Reading
- 3.11 Activities

3.0 LEARNING OUTCOME

After studying this Unit, the learner should be able to:

- Explain the significance of community participation in disaster management, especially disaster planning and disaster response; and
- Describe the modalities for arranging for CBDM.

3.1 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 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 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 PNRC project in Benguet province 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 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 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 to matters 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 Giles and Mohan, where initiatives come more from citizens rather than as one- way traffic from official institutions. To that end, government has to work actively 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 ad- hoc 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*, *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 Holand, 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.

3.2 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 on-going 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 percent 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 inhering in communities and neighbourhoods during a disaster. It starts immediately after the disaster strikes, since the reconstruction programme incorporates both physical and social issues. *Hence, involvement of people in recovery process is the key to success.*

3.3 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. Gabriel Almond 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 (2000), 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 restrictions on information relating to security, foreign policy, defence, law enforcement and public safety are standard. 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.

The Bill provides for a fee to access information, but without specifying what the minimum or maximum amounts would be. Most important, there is no

mechanism to punish delay or refusal to grant information. So there is no compelling reason for the official concerned to provide answers. Instead, the law provides for two internal appeals within the government machinery and, in addition, blocks access to civil courts (further read at the Infochange India web site)

- *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 is happening presently in Europe. 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 participatory exercise where vulnerable communities articulate their own concerns and also suggest measures, which need 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, is 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. Programmes that improve knowledge of HIV/AIDS can prevent the disease's spread. 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, for example, fishermen who venture out despite warnings of cyclones 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 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 inheres 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 centered 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 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, 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.

3.4 REQUIREMENTS IN CBDM

The World Health Organisation (WHO) in collaboration with the League 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.
- Dummy runs and practice alerts organised by the local authority.
- Strengthening of flimsy structures in avoidance with the programmes of the local administration, groups of dwellings can be strengthened with the help of voluntary workers, school children etc.
- 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:

- Encounters, 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,
- 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, Mussourie:

- ✓ Are maps prepared and available to the community (topographic, demographic, hazard and vulnerability)?
- ✓ Is a public information center/control room designated 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 public 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 recently during the Mumbai floods. Therefore, the role of local health personnel is crucial in both mitigation and preparedness as is 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 which is presently lacking in the non-government sector. Over the long term however, the network of PHCs would have to be improved for capacity building to tackle disaster vulnerability. As per Alpna Sagar in the *Alternate Economic Survey, 2004-05*, Indian data reveals that there is shortfall of infrastructure and personnel in the rural areas. While the shortfall for primary health centers and sub centers is about 7-8 percent; that for community health centers is about 40 percent. The shortfall for specialists at the community health centers is anywhere between 90-95 percent while there is rarely more than one doctor at the primary health center though the ideal number is two. There is acute shortage of grassroots workers, from 20 percent of female workers to 50 percent shortage of male workers. There is also a shortage of more than 50 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 available at affordable prices to the poor. However, its functioning has been plagued by

corruption. There have been reported mal practices 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;
- 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.

3.5 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 healthy cooperation between India and elsewhere in Asia have led to remarkable results. Cooperation has not just better results for the community but 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 far too 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) and brought them onto the global center 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 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 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.

3.6 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?

3.7 EXAMPLES IN RESILIENCE

The following sections discuss how community based disaster management can be:

- Self-driven,
- Led by local champions,
- 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 existed from time 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 (FAO).

Chipko: from tree hugging to satellite images

The Uttaranchal region is constituted of Himalayan districts in North India. During the late sixties, a massive program to develop roads was undertaken in the region. 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, 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. 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 busloads 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-leaved 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 affect 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 Magan bhai 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 adapt 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 children of 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. Everyone, from the village women, the masons, the leaders and the businessmen, has 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 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 given in the following figure.

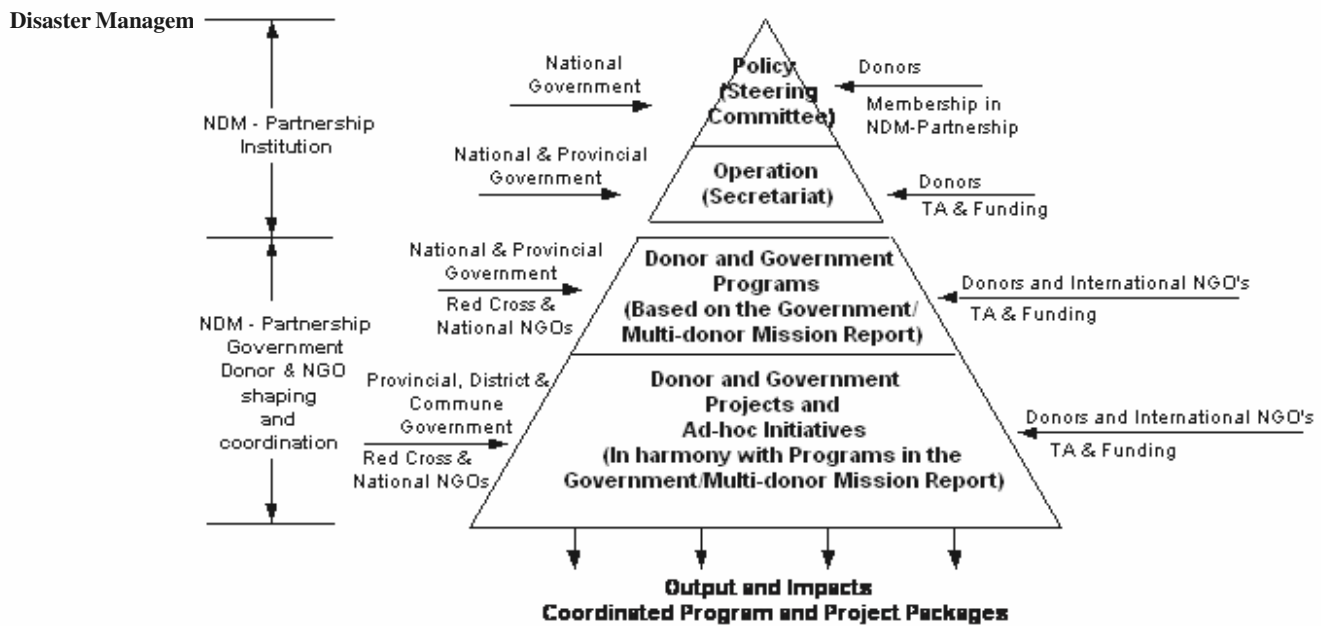


Figure: Institutional Framework of NDM Partnership, Vietnam

3.8 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!

3.9 KEY CONCEPTS

Community : Scholars differentiate between *society* and *community* 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 that configurations change.

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 *private interest* (builders in case of vulnerable buildings) and *public interest* (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 world, in a PRA approach, are:

Three common elements found all over 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 and Action : PLA combines:

- 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” (Linda).

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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3.11 ACTIVITIES

- 1) In the above case studies which community-level solutions have been applied for mitigating various disasters? Make a table of disasters and coping measures. For each of the 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 4 DISASTER MANAGEMENT STRATEGIES

Structure

- 4.0 Learning Outcome
- 4.1 Introduction
- 4.2 Changing Complexion of Disaster Management
- 4.3 Disaster Management Strategies: An Overview
- 4.4 The Path Ahead
- 4.5 Conclusion
- 4.6 References and Further Reading
- 4.7 Activities

4.0 LEARNING OUTCOME

After going through 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

4.1 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, have 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, globally efforts towards evolving multifaceted disaster management strategies have been taken up, 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 a 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.

4.2 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 traditionally has been viewed 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 face 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. Relief was in a way top-down in nature. 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 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 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 to 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 below:

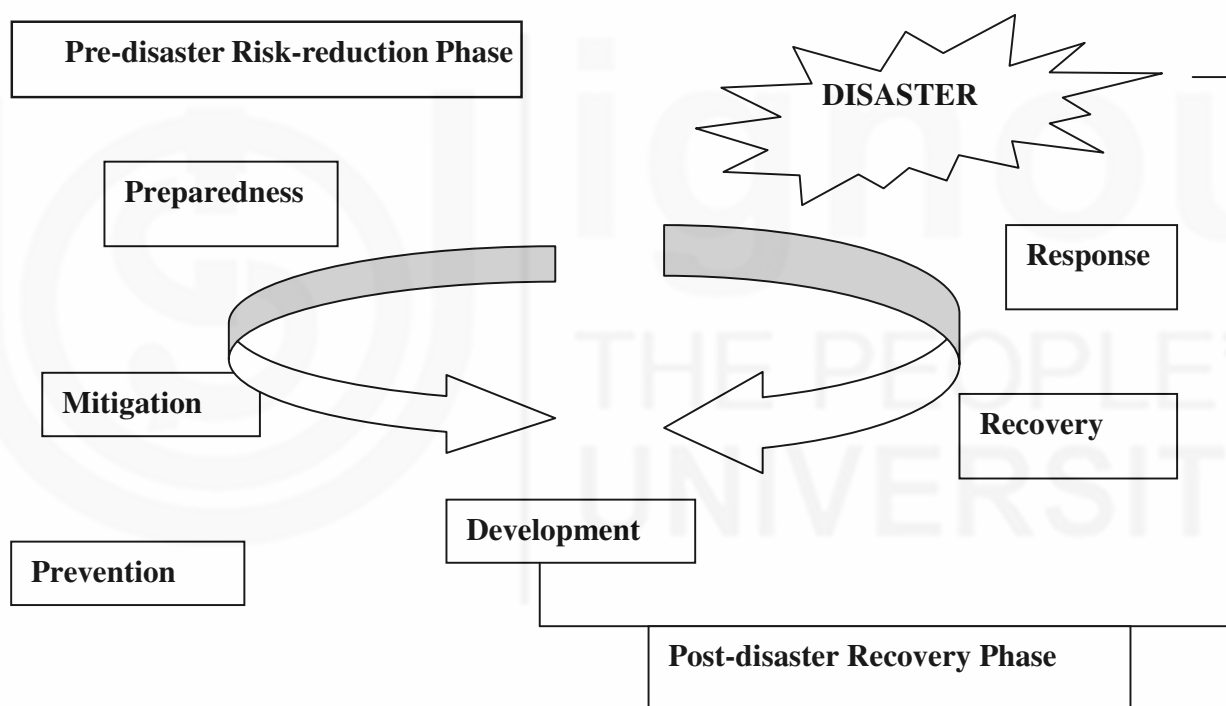


Figure 19.1: Traditional Model –Sequences of Action

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 views 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.

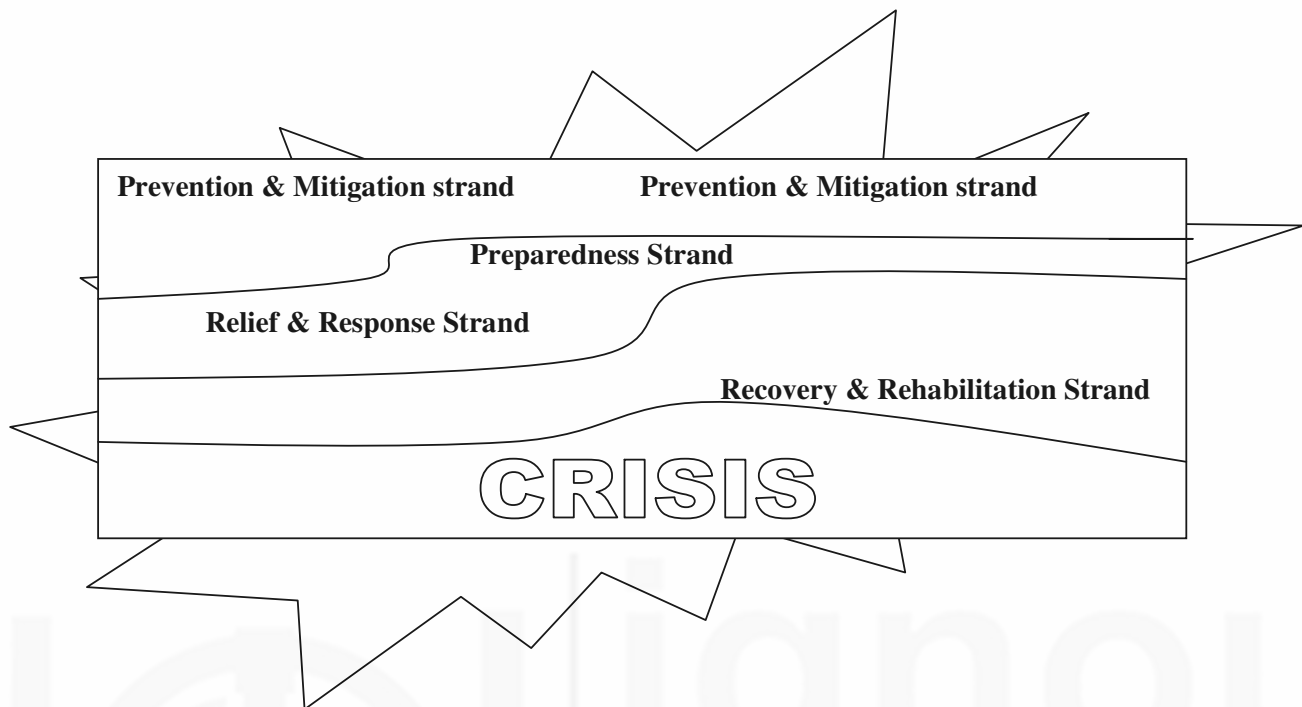


Figure 19.2: Expand-Contract Model

Source: Green Paper on Disaster Management, Department of Provincial and Local Government, South Africa

As you all know, the national government, 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, 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 goods 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.

4.3 DISASTER MANAGEMENT STRATEGIES: AN OVERVIEW

It is being realised that disaster management is 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 on 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, 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 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 Disasters, the International Strategy for Disaster Reduction 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 their 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 e.g. women, children, scheduled castes and tribes in high-risk disaster prone communities
- Service providers, e.g. first responders
- Public and private partners e.g. 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 engineers and reasons 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 major strategies veer around:

- Institutionalising National Systems and Capacities for Disaster Management
- Strengthening Governance Mechanisms at the Local Level
- Building Community Resilience
- Reducing the Vulnerabilities of the Communities at Risk
- Fostering Public Private People Partnership; and

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 has 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 have been modified and it has been 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 have 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 Deputy Commissioner as the Chairperson in ex-officio capacity and members not exceeding seven as may be prescribed by the state government.

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 to analysis
- 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 the necessary succour to the victims and also contribute in ensuring long-terms 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 (Wildavsky, 1991) All individuals have resilience but the degree to which one is able to cope with any 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 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 were wheat, rice and cotton are prone to pests and require expensive fertilisers and pesticides.

A Local NGO 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 land 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 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 an inter governmental and public private effort. FEMA developed a “life cycle” mode of disaster management.

Disasters – and their costs were the product of planning and mitigation that needed 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, for example, 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.

4.4 THE PATH AHEAD

The current perceptions regarding disasters need to undergo a transformation. These 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 links between development and disasters is increasingly being realised and was infact a 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 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 principle of human dignity, equality and equity at the global level”. The General Assembly has set eight goals for achieving development and poverty eradication by the year 2015. These include:

- Eradicating external poverty and hunger
- Achieving universal primary education
- Promoting gender equality and empower 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 1,3,6,7 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 in natural disaster. 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 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 Organization (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 assistance finance 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 centered on the Kyoto Protocol, also provide a focus for international attention that can directly address the concern 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

4.5 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 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 goals, policies and practices that harness people's strengths instead of vulnerabilities. It is a challenging road ahead for disaster management.

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4.7 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 Councillor.

