SRIRAM'S IAS

GENERAL STUDIES

PAPER - III

DISASTER MANAGEMENT

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DISASTER MANAGEMENT

In the last decade, disasters caused more than 1 million deaths and affected almost 3 million people around the world at a cost of nearly 1 trillion US dollars (World Disasters Report 2009).

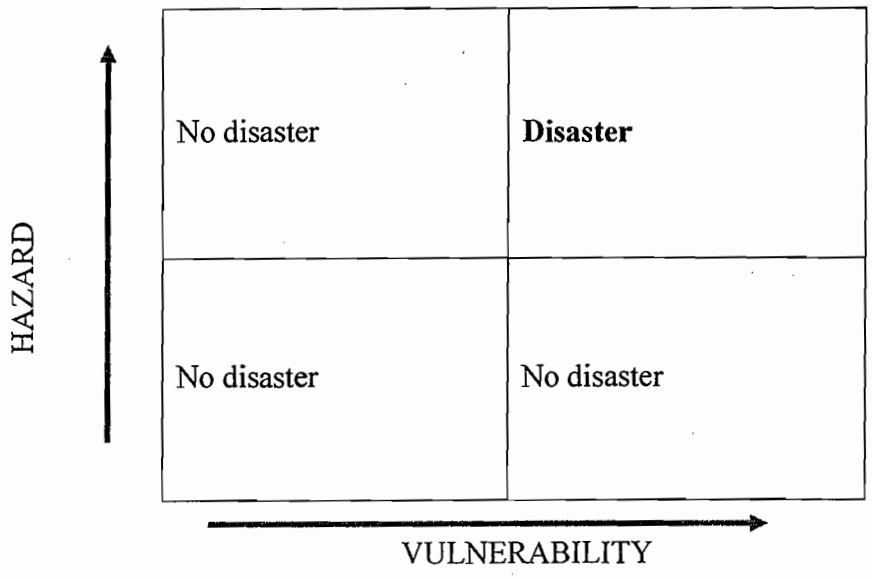
Definition: A disaster is à sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that ***exceed*** the community's or society's ability to cope using its own resources.

(**VULNERABILITY**+ HAZARD) / **CAPACITY** = **DISASTER**

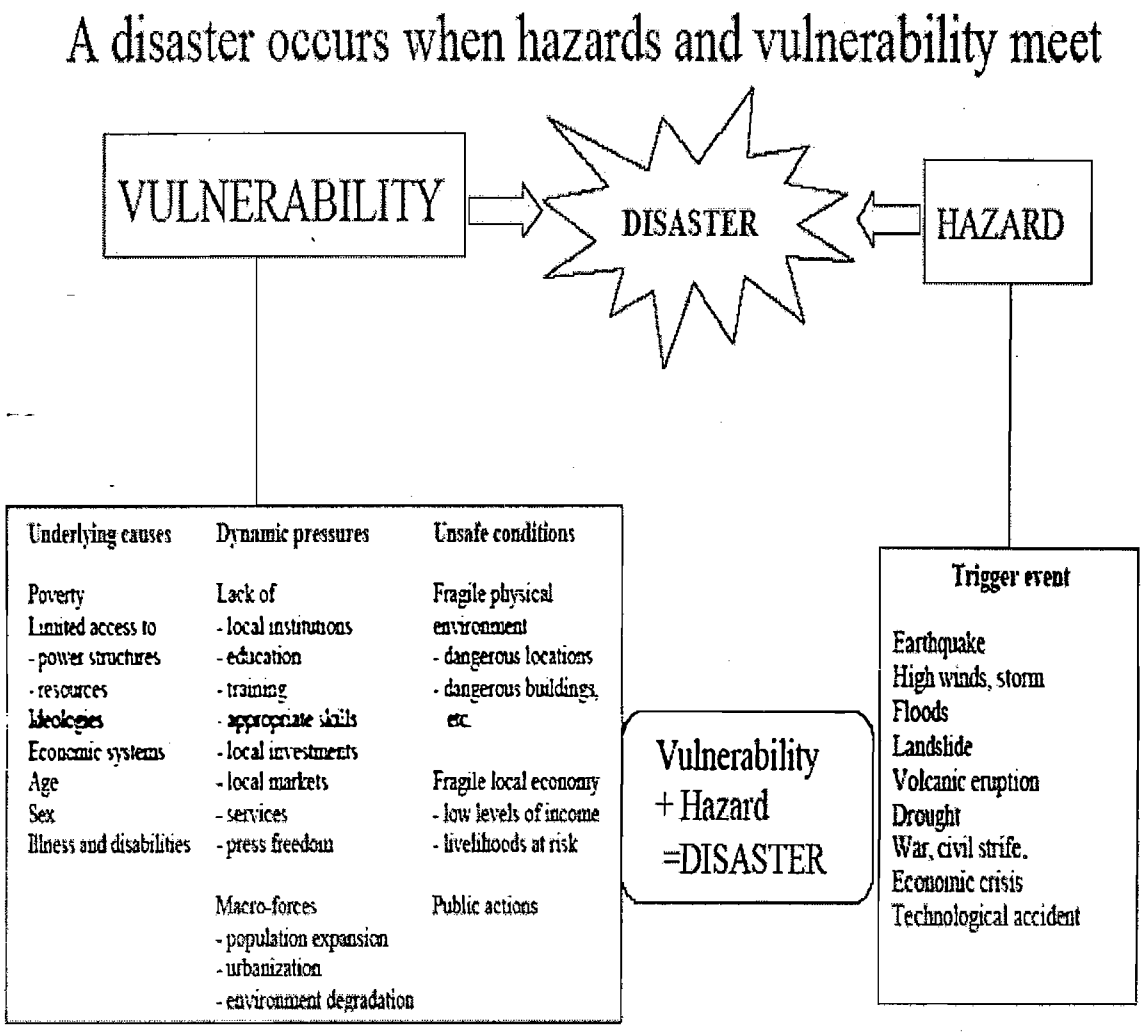
A disaster occurs when a hazard impacts on vulnerable people.

In contemporary academia, disasters are seen as the consequence of inappropriately managed risk. These risks are the product of a combination of both hazard/s and vulnerability. Hazards that strike in areas with low vulnerability will never become disasters, as is the case in uninhabited regions.

The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster.



RELATION BETWEEN HAZARD AND VULNERABILITY



VULNERABILITY:

Vulnerability in this context can be defined as the diminished capacity of an individual or group to anticipate, cope with, resist and recover from the impact of a natural or man-made hazard. The concept is **relative and dynamic.** Vulnerability is most often associated with poverty, but it can also arise when people are isolated, insecure and defenceless in the face of risk, shock or stress.

People differ in their exposure to risk as a result of their social group, gender, ethnic or other identity, age and other factors. Vulnerability may also vary in its forms: poverty, for example, may mean that housing is unable to withstand an earthquake or a hurricane, or lack of preparedness may result in a slower response to a disaster, leading to greater loss of life or prolonged suffering.

The reverse side of the coin is **CAPACITY**, which can be described as the resources available to individuals, households and communities to cope with a threat or to resist the impact of a hazard. Such resources can be **physical or material**, but they can also be found in **the way a community is organized or in the skills or attributes of individuals and/or organizations** in the community.

To determine people's vulnerability, two questions need to be asked:

- To what threat or hazard are they vulnerable?
- What makes them vulnerable to that threat or hazard?

Counteracting vulnerability requires:

- Reducing the impact of the hazard itself where possible (through mitigation, prediction and warning, preparedness);
- Building capacities to withstand and cope with hazards;
- Tackling the root causes of vulnerability, such as poverty, poor governance, discrimination, inequality and inadequate access to resources and livelihoods.

Physical, economic, social and political factors determine people's level of vulnerability and the extent of their capacity to resist, cope with and recover from hazards. Clearly, poverty is a major contributor to vulnerability. Poor people are more likely to live and work in areas exposed to potential hazards, while they are less likely to have the resources to cope when a disaster strikes.

In richer countries, people usually have a greater capacity to resist the impact of a hazard. They tend to be better protected from hazards and have preparedness systems in place. Secure livelihoods and higher incomes increase resilience and enable people to recover more quickly from a hazard.

Disasters jeopardize development gains. Equally, development choices made by individuals, households, communities and governments increase or reduce the risk of disasters.

Examples of potentially vulnerable groups include:

- Displaced populations who leave their habitual residence in collectives, usually due to a sudden impact disaster, such as an earthquake or a flood, threat or conflict, as a coping mechanism and with the intent to return;
- Migrants who leave or flee their habitual residence to go to new places, usually abroad to seek better and safer perspectives;
- Returnees – former migrants or displaced people returning to their homes;
- Specific groups within the local population, such as marginalized, excluded or destitute people;
- Young children, pregnant and nursing women, unaccompanied children, widows, elderly people without family support, disabled persons.

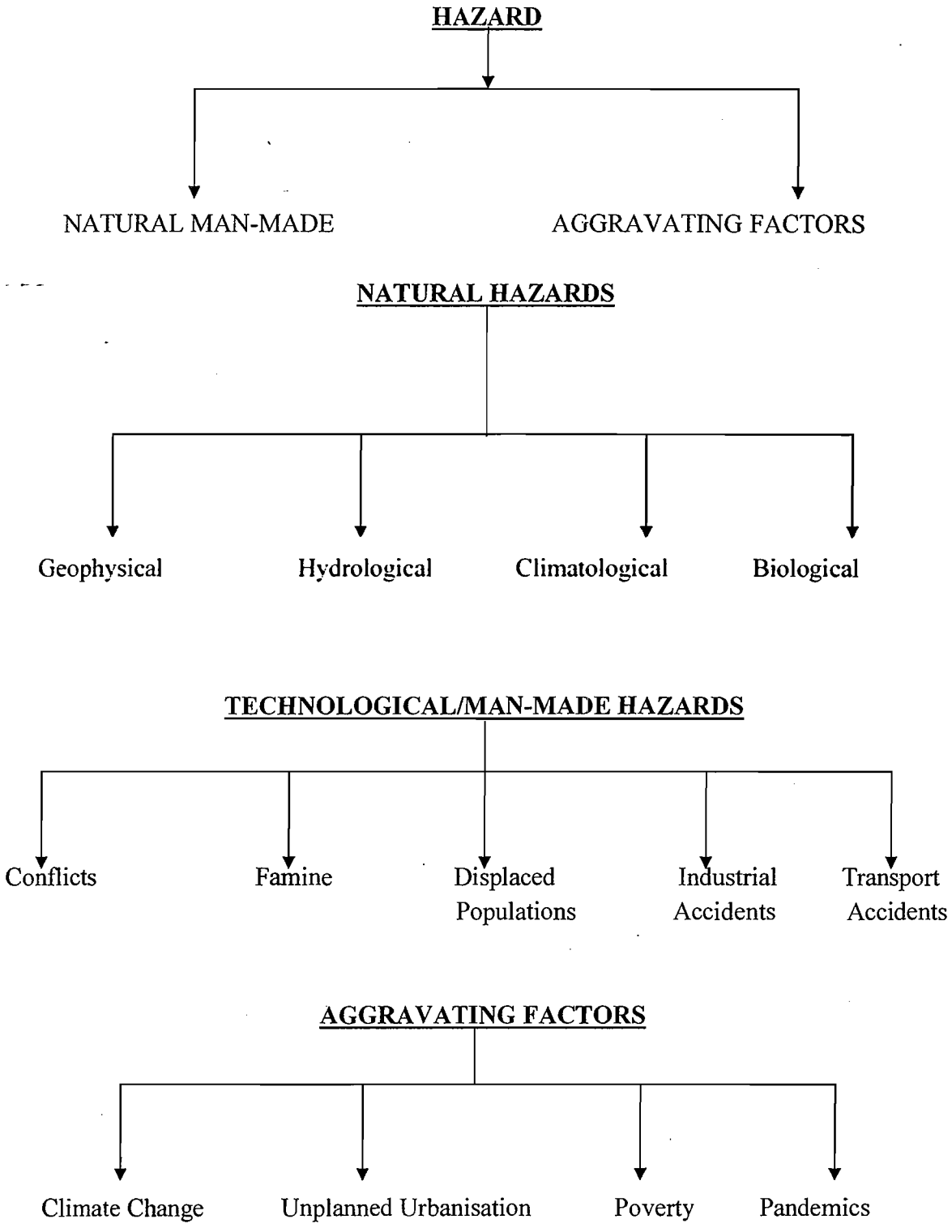
In a disaster, women in general may be affected differently from men because of their social status, family responsibilities or reproductive role, but they are not necessarily vulnerable. They are also resourceful and resilient in a crisis and play a crucial role in recovery. Gender analysis can help to identify those women or girls who may be vulnerable and in what way.

Developing countries suffer the greatest costs when a disaster hits – more than 95 percent of all deaths caused by disasters occur in developing countries, and losses due to natural disasters are 20 times greater (as a percentage of GDP) in developing countries than in industrialized countries.

TYPES OF DISASTER

The studies reflect a common opinion when they argue that all disasters can be seen as being human-made, their reasoning being that human actions before the strike of the hazard can prevent it developing into a disaster. All disasters are hence the result of human failure to introduce appropriate disaster management measures. Hazards are routinely divided into natural or human-made, although complex disasters, where there is no single root cause, are

more common in developing countries. A specific disaster may spawn a secondary disaster that increases the impact. A classic example is an earthquake that causes a tsunami, resulting in coastal flooding.

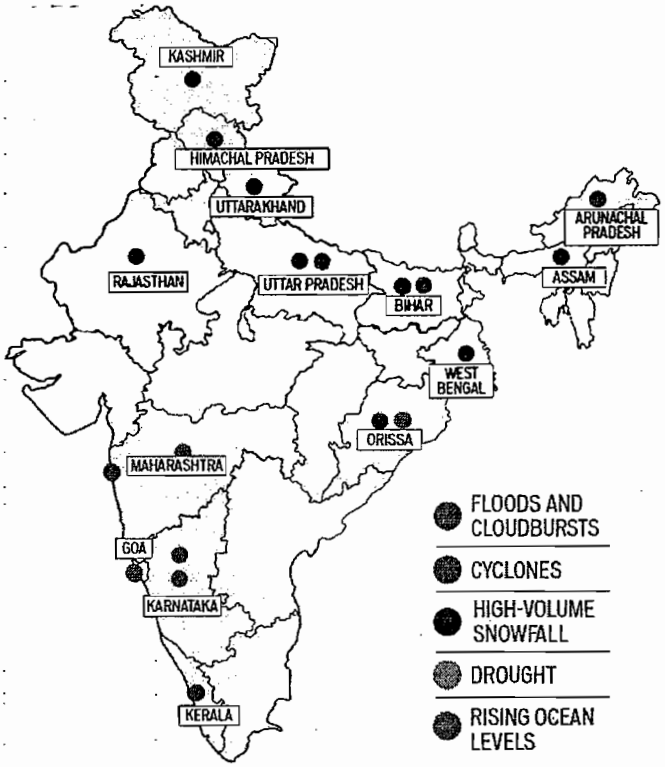


Natural hazards are naturally occurring physical phenomena caused either by rapid or slow onset events which can be **geophysical** (earthquakes, landslides, tsunamis and volcanic activity), **hydrological** (avalanches and floods), **climatological** (extreme temperatures,

drought and wildfires), meteorological (cyclones and storms/wave surges) or **biological** (disease epidemics and insect/animal plagues).

Technological or **man-made hazards** (complex emergencies/conflicts including terrorist/extremist activities, famine, displaced populations, industrial accidents and transport accidents) are events that are **caused by humans** and occur in or close to human settlements. This can include environmental degradation, pollution and accidents. Another way of classifying man-made hazards is according to the hazardous element causing the disaster. It includes **nuclear, biological and/or chemical hazard.**

There are a range of **aggravating factors**, such as climate change, unplanned-urbanization, under-development/poverty as well as the threat of pandemics, that will result in increased frequency, complexity and severity of disasters.



Hydrological hazard map of India

DROUGHT

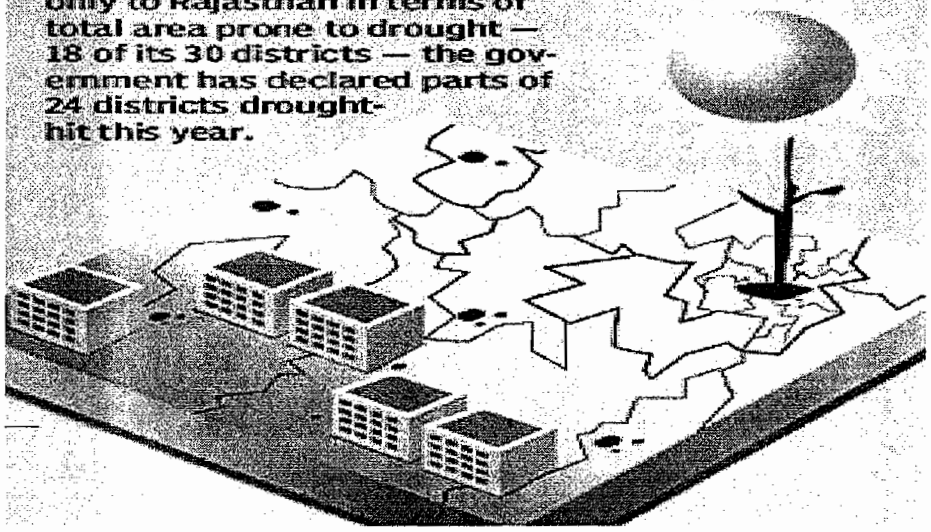
- Scientists warn that India will experience a decline in summer rainfall by 2050. The monsoon accounts for almost 70% of the country's total annual rainfall. Winter rains are also predicted to fall by 10% to 20%.
- The decline in rainfall is expected to hit India's wheat, rice and potato production first, reducing each by millions of tonnes by 2020.

MOST VULNERABLE REGIONS: MAHARASHTRA, KARNATAKA, BIHAR, UTTAR PRADESH, ORISSA, RAJASTHAN

This year, Maharashtra faced the worst drought in four decades, with the scarcity stretching beyond the traditional water-parched areas of the state. "In the state's recorded history, we have never seen such low water levels in certain parts of Maharashtra," chief minister Prithviraj Chavan said in March.

Studies have pointed out that the drought was exacerbated by bad management. The South Asia Network on Dams, Rivers and People (SANDRP), in a report, said the 2012-13 drought was a disaster of water management, accompanied by corruption, water-intensive cropping patterns and the absence of a long-term view to managing water and drought.

Altered rainfall patterns, meanwhile, are acting as the main cause of the frequent droughts in Bihar, eastern Uttar Pradesh and Orissa. In Karnataka, which ranks second only to Rajasthan in terms of total area prone to drought — 18 of its 30 districts — the government has declared parts of 24 districts drought-hit this year.



HIGH-VOLUME SNOWFALL

- Overall snowfall in the western Himalayan region has witnessed a fall over the past decade.
- However, there has been increase in sudden snowfall in the recent past, particularly in Kashmir, causing avalanches and landslides.
- Most of the glaciers in the western Himalayas are receding; only a few in Jammu & Kashmir show no change or are advancing.

MOST VULNERABLE REGIONS: KASHMIR, HP

In 1996, more than 1 lakh people were embarking on a 27-mile ascent into the mountains when a sudden blizzard hit the area around the Amarnath cave in Kashmir.

Trapped in the mountains for several days, more than 242 pilgrims died at the sacred cave shrine.

While the government claims lessons were learnt from 1996, events in 2005 negated their claims. On February 22 of that year, Waltengunar village in south Kashmir was buried under twin avalanches; about 200 people died. The disaster was caused by unprecedented late-winter snowfall.

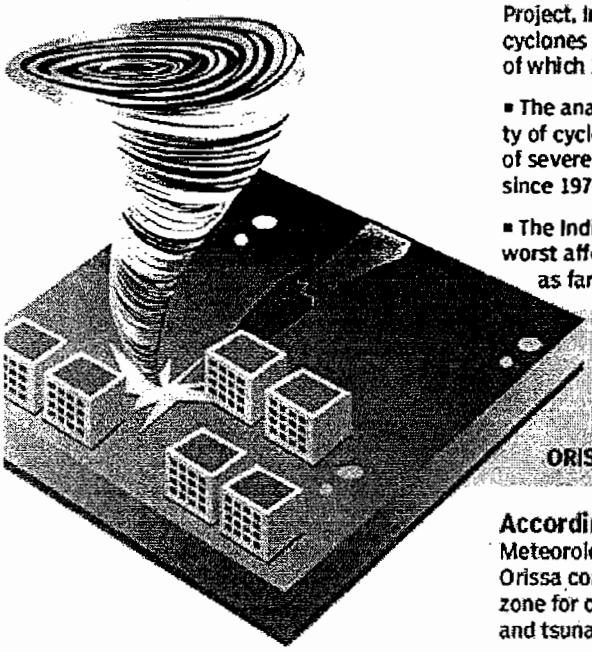
"Kashmir is prone to snow storms, which cause avalanches on the steep mountain slopes," says Shakeel Ramshoo, head of the department of geology and geophysics at Kashmir University. "We become more vulnerable when unplanned construction weakens mountainsides, worsening loss of lives during storms, avalanches."

Ramshoo says the area between Pahalgam and Amarnath is a disaster in waiting, given the random construction along the riverbed and mountainsides. "Unplanned pilgrimage and tourism also poses a risk. The government recently fixed a limit of 15,000 people trekking to Amarnath per day. But with pilgrim figures that high, businesses will crop up to cater to them. And the results can be disastrous."

This is true of numerous pilgrimage points in the region, prone, as they are, to cloudbursts, heavy rain, flash floods and heavy snowfall. The local meteorological department, however, is confident that it is doing all it can.

"We have come a long way since 1996," says regional director Sonam Lotus. "We have nearly 30 automatic weather monitoring systems across the state. We are adding a radar weather monitoring system next year."

CYCLONES



- The eastern coast is more prone to cyclones than the western coast. As per analysis for National Cyclone Mitigation Project, India has seen 308 cyclones between 1891 and 2000 of which 103 were severe.
- The analysis shows the severity of cyclones had risen with 48 of severe cyclones taking place since 1970s.
- The Indian sub-continent is the worst affected part in the world as far as lives is concerned.

MOST VULNERABLE REGIONS: ORISSA, WEST BENGAL

According to the Indian Meteorological Department, the Orissa coast is a very high-risk zone for cyclones, storm surges and tsunamis.

In coastal West Bengal, the last major cyclone to hit was Aila, in May 2009.

"More than 100 people were killed, with the storm travelling hundreds of kilometres inland," says GC Debnath, regional director of the Indian Meteorological Department.

One key saviour for this region is the thick, impenetrable Sunderbans mangrove forest, which absorbs the force of the cyclone like a sponge.

Unimpeded, a cyclone will cause a storm surge in sea levels, as happened with Aila, flooding villages and farmland with saltwater, rendering them infertile for years.

As it is, the sea level is rising in the Sunderbans at a rate far higher than the already troubling global average. Coupled with the rising ocean temperatures, the region faces potential flooding and stronger cyclonic storms.

Slow-onset Disasters:

Disasters can also be classified as 'slow onset' disasters and 'rapid onset' disasters. Earthquakes, cyclones, floods, tsunamis would fall under the category of rapid onset disasters; climate change (global warming), desertification, soil degradation, and droughts, would fall under the category of slow onset disasters. Slow onset disasters are also termed as 'Creeping Emergencies'. It may be added that with 'prevention' forming an integral part of the 'management cycle', slow onset disasters like global warming, and desertification must find adequate reflection in disaster preparedness - these phenomena gradually erode the 'health' of ecosystems and expose societies to the vagaries of nature. Unlike the rapid onset disasters, their impact is not felt immediately; however societies lose their ability to derive sustenance from their surroundings, over a period of time. Development policies and the manner in which they are implemented are some of the main reasons for the slow onset disasters.

FLOODS AND CLOUDBURSTS

- Various studies show that surface air temperatures in India are rising at the rate of 0.4 degrees Celsius every 100 years. A study by the Indian Institute of Tropical Meteorology says heavy rainfall days during the monsoon period will increase by 15% to 20% by 2050, resulting in more flash floods.

- Higher temperatures also mean faster melting of Himalayan glaciers and, since the melting season coincides with the monsoon, any intensification of the monsoon is likely to contribute to flood disasters in the Himalayan catchment area.

- Climate change could cause faster melting of glaciers resulting in the flooding of lakes as happened with Kedar Lake in Kedarnath.

MOST VULNERABLE REGIONS: UTTARAKHAND, HIMACHAL PRADESH, UTTAR PRADESH, BIHAR, ASSAM, ARUNACHAL PRADESH

The scale of the Uttarakhand disaster has been immense, but the disaster itself is not unprecedented. Since 1980, 31 flash floods have hit Uttarakhand. In 2012, they claimed more than 70 people in Uttarkashi district alone. In 2013, about 900 people died in flash floods in the state.

The clearer warning sign, say climate scientists, lies in the fact that the conditions that make this Himalayan state particularly vulnerable exist across the entire region, from Jammu & Kashmir to Arunachal Pradesh.

In 2007, 58 people died in flash floods in Shimla district; in all, 33 cloudburst related flash floods have hit Himachal Pradesh since 1973.

Rapid glacial melt is causing lakes to form at high altitudes, which are then prone to flooding into swollen rivers during cloudbursts or downpours. One such flash flood struck Kinnaur district in 2005, washing away roads and bridges and causing losses worth more than ₹600 crore.

This year too, flash floods triggered landslides in Kinnaur, killing 24 and causing damage worth crores.

- In Assam, silt deposits caused by flooding are called monsoon deserts.

In Arunachal Pradesh, hydropower projects are weakening river banks and affecting the flow of rivers. Dams are having a similar effect in Assam.

Rampant construction of roads and buildings on river banks has been held responsible for creating 'monsoon deserts' in the floodplains of Assam, where fertile tracts have been turned into sandy wastelands by the dumping of silt during flooding.

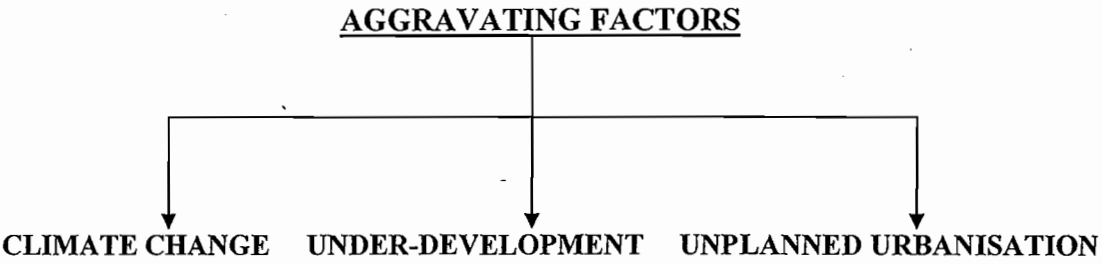
In Bihar and Uttar Pradesh, increasingly frequent downpours and cloudbursts are costing lives and property.

More than 3 million people were displaced when the Kosi river burst its banks in 2008.

Already this year, 70 people have died in UP and hundreds of villages have been affected, some of them wiped out completely.

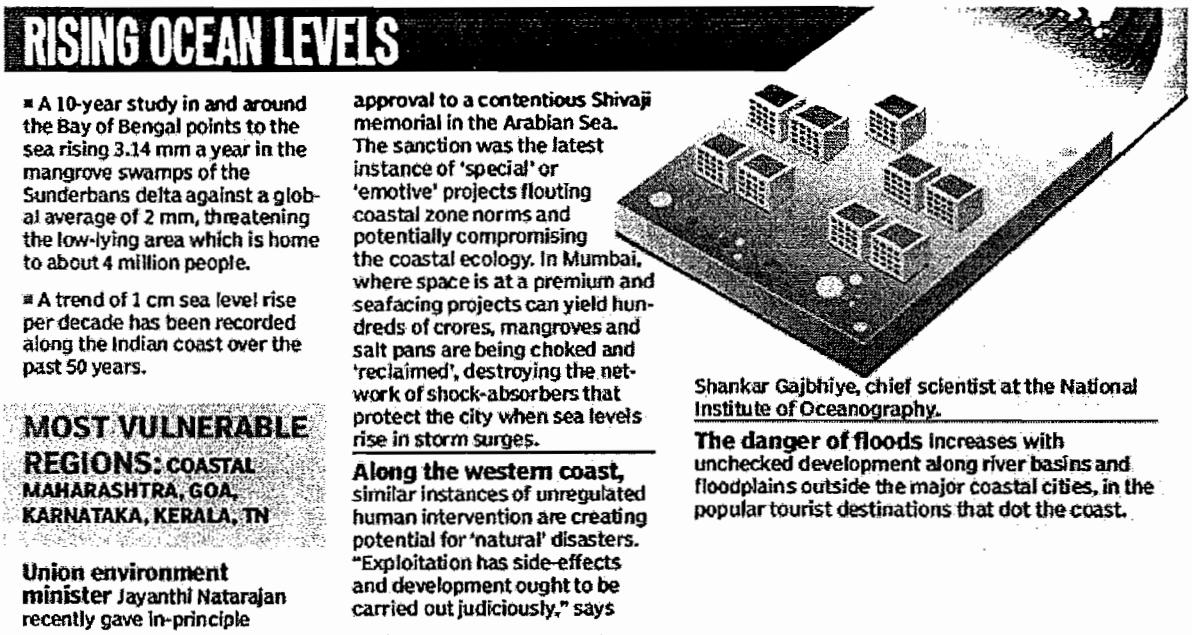
Aggravating factors

There are a range of challenges, such as climate change, unplanned-urbanization, under-development/poverty as well as the threat of pandemics, that will shape humanitarian assistance in the future. These aggravating factors will result in increased frequency, complexity and severity of disasters.



Climate change

Climate change ranks amongst the greatest global problems of the 21st century and the scientific evidence on climate change is stronger than ever: the Intergovernmental Panel on Climate Change (IPCC) released its Fourth Assessment Report in early 2007, saying that climate change is now unequivocal. It confirms that extremes are on the rise and that the most vulnerable people, particularly in developing countries, face the brunt of impacts.



RISING OCEAN LEVELS

- A 10-year study in and around the Bay of Bengal points to the sea rising 3.14 mm a year in the mangrove swamps of the Sunderbans delta against a global average of 2 mm, threatening the low-lying area which is home to about 4 million people.
- A trend of 1 cm sea level rise per decade has been recorded along the Indian coast over the past 50 years.

MOST VULNERABLE REGIONS: COASTAL MAHARASHTRA, GOA, KARNATAKA, KERALA, TN

Union environment minister Jayanthi Natarajan recently gave in-principle approval to a contentious Shivaji memorial in the Arabian Sea. The sanction was the latest instance of 'special' or 'emotive' projects flouting coastal zone norms and potentially compromising the coastal ecology. In Mumbai, where space is at a premium and seafacing projects can yield hundreds of crores, mangroves and salt pans are being choked and 'reclaimed', destroying the network of shock-absorbers that protect the city when sea levels rise in storm surges.

Along the western coast, similar instances of unregulated human intervention are creating potential for 'natural' disasters. "Exploitation has side-effects and development ought to be carried out judiciously," says Shankar Gajbhiye, chief scientist at the National Institute of Oceanography.

The danger of floods increases with unchecked development along river basins and floodplains outside the major coastal cities, in the popular tourist destinations that dot the coast.

Under-development/poverty

Disasters are a development & humanitarian concern. Poverty in itself is the cause of many insidious disasters like migration, food scarcity, etc. A poor state is less capable to build its resilience and hence is more vulnerable to disasters. Further, poverty is like to aggravate the vulnerability through formation of slums, poor nutrition, poor access to safe drinking water and sanitation, poor healthcare facilitites, etc.

Under-development and Polity of the state

There is a close association between the political scenario in a state and the vulnerability to hazards. States which have political stability, democratic and participative governance, accountable and transparent administration have high resilience and low vulnerability.

Unplanned urbanization

Today 50 % of the world population lives in urban centers by 2030 this is expected to increase to 60%. The majority of the largest cities, known as Mega Cities are in developing countries while 90% of the population growth of developing countries will be urban in nature.

Migration from rural to urban areas is often trigged by repeated natural disasters and lack of livelihood opportunities. However, at the same time many mega-cities are built in areas where there is a heightened risk for earthquakes, floods, landslides and other natural disasters. Many people living in large urban centres such as slums lack access to improved water, sanitation, security of tenure, durability of housing, and sufficient living area. This lack of access to basic services and livelihood leads to increasing risk of discrimination, social exclusion and ultimately violence.

Rohn Emergency Scale

The **Rohn Emergency Scale** is a scale on which the magnitude (intensity) of an emergency is measured. It is the first scale that quantifies any emergency situation based on a mathematical model. The scale can be tailored for use at any geographic level – city, county, state or continent. It can be used to monitor the development of an ongoing emergency event, as well as forecast the probability and nature of a potential developing emergency and in the planning and execution of a National Response Plan.

According to the Rohn Emergency Scale, all emergencies can be described by three independent dimensions: (a) scope; (b) topographical change (or lack thereof); and (c) speed of change. The intersection of the three dimensions provides a detailed scale for defining any emergency.

Principles of Emergency (Disaster) Management

There are eight principles that are to be used to guide the development of a doctrine of emergency management.

1. Comprehensive – consider and take into account all hazards, all phases, all stakeholders and all impacts relevant to disasters.
2. Progressive – anticipate future disasters and take preventive and preparatory measures to build disaster-resistant and disaster-resilient communities.
3. Risk-driven – use sound risk management principles (hazard identification, risk analysis, and impact analysis) in assigning priorities and resources.
4. Integrated – ensure unity of effort among all levels of government and all elements of a community.
5. Collaborative – create and sustain broad and sincere relationships among individuals and organizations to encourage trust, advocate a team atmosphere, build consensus, and facilitate communication.
6. Coordinated – synchronize the activities of all relevant stakeholders to achieve a common purpose.
7. Flexible – use of creative and innovative approaches in solving disaster challenges.
8. Professional – a science and knowledge-based approach; based on education, training, experience, ethical practice, public stewardship and continuous improvement.

International organizations involved in disaster management (other agencies given at the end)

International Association of Emergency Managers

The International Association of Emergency Managers (IAEM) is a non-profit educational organization dedicated to promoting the goals of saving lives and protecting property during emergencies and disasters. The mission of IAEM is to serve its members by providing information, networking and professional opportunities, and to advance the emergency management profession.

It currently has seven Councils around the World: Asia, Canada, Europa, International, Oceania, Student and USA.

International Recovery Platform

The International Recovery Platform (IRP) was conceived at the World Conference on Disaster Reduction (WCDR) in Kobe, Hyogo, Japan in January 2005. As a thematic platform of the International Strategy for Disaster Reduction (ISDR) system, IRP is a key pillar for the implementation of the Hyogo Framework for Action (HFA) 2005–2015: Building the Resilience of Nations and Communities to Disasters, a global plan for disaster risk reduction for the decade adopted by 168 governments at the WCDR.

The key role of IRP is to identify gaps and constraints experienced in post disaster recovery and to serve as a catalyst for the development of tools, resources, and capacity for resilient recovery. IRP aims to be an international source of knowledge on good recovery practice.[14]

Red Cross/Red Crescent

National Red Cross/Red Crescent societies often have pivotal roles in responding to emergencies. Additionally, the International Federation of Red Cross and Red Crescent Societies (IFRC, or "The Federation") may deploy assessment teams, e.g. Field Assessment and Coordination Team – (FACT) to the affected country if requested by the national Red Cross or Red Crescent Society. After having assessed the needs Emergency Response Units (ERUs) may be deployed to the affected country or region. They are specialized in the response component of the emergency management framework.

United Nations

Within the United Nations system responsibility for emergency response rests with the Resident Coordinator within the affected country. However, in practice international response will be coordinated, if requested by the affected country's government, by the UN Office for the Coordination of Humanitarian Affairs (UN-OCHA), by deploying a UN Disaster Assessment and Coordination (UNDAC) team.

World Bank

Since 1980, the World Bank has approved more than 500 operations related to disaster management, amounting to more than US$40 billion. These include post-disaster reconstruction projects, as well as projects with components aimed at preventing and mitigating disaster impacts, in countries such as Argentina, Bangladesh, Colombia, Haiti, India, Mexico, Turkey and Vietnam to name only a few.

Common areas of focus for prevention and mitigation projects include forest fire prevention measures, such as early warning measures and education campaigns to discourage farmers from slash and burn agriculture that ignites forest fires; early-warning systems for hurricanes; flood prevention mechanisms, ranging from shore protection and terracing in rural areas to adaptation of production; and earthquake-prone construction.

In a joint venture with Columbia University under the umbrella of the Prevention Consortium the World Bank has established a Global Risk Analysis of Natural Disaster Hotspots.
In June 2006, the World Bank established the Global Facility for Disaster Reduction and Recovery (GFDRR), a longer term partnership with other aid donors to reduce disaster losses by mainstreaming disaster risk reduction in development, in support of the Hyogo Framework of Action. The facility helps developing countries fund development projects and programs that enhance local capacities for disaster prevention and emergency preparedness.

European Union

Since 2001, the EU adopted Community Mechanism for Civil Protection, which started to play a significant role on the global scene. Mechanism's main role is to facilitate co-operation in civil protection assistance interventions in the event of major emergencies which may require urgent response actions. This applies also to situations where there may be an imminent threat of such major emergencies. The heart of the Mechanism is the Monitoring and Information Center. It gives countries access to a platform, to a one-stop-shop of civil protection means available amongst the all the participating states. Any country inside or outside the Union affected by a major disaster can make an appeal for assistance through the MIC. It acts as a communication hub at headquarters level between participating states, the affected country and dispatched field experts. It also provides useful and updated information on the actual status of an ongoing emergency.

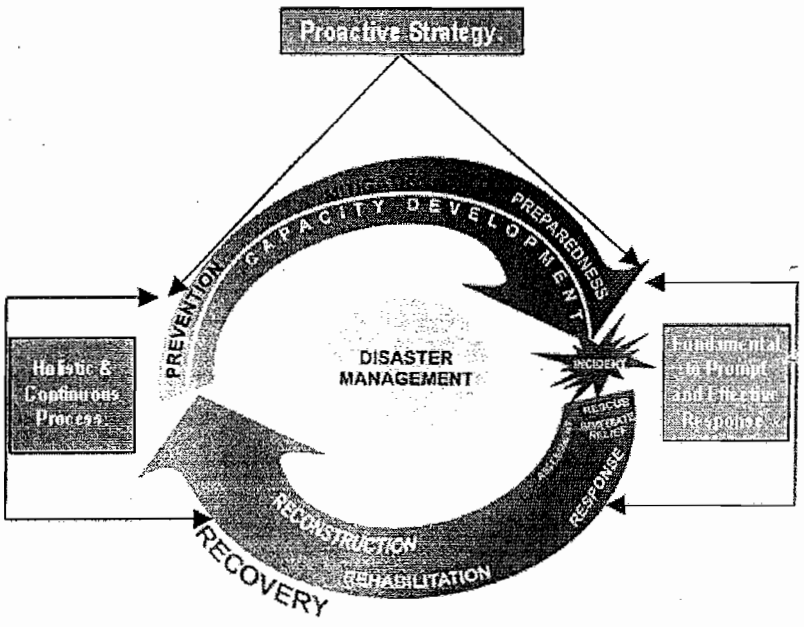
APPROACH TO DISASTER MANAGEMENT

Till recently, the approach to Disaster Management has been reactive and relief centric. A paradigm shift has now taken place at the national level from the relief centric syndrome to holistic and integrated approach with emphasis on prevention, mitigation and preparedness. These efforts are aimed to conserve developmental gains as also minimize losses to lives, livelihood and property. The current approach also focuses on disaster risk reduction. Disaster risk reduction (DRR) (disaster reduction) has been defined as the 'systematic development and application of policies, strategies and practices to minimise vulnerabilities, hazards and the unfolding of disaster impacts throughout a society, in the broad context of sustainable development'.

A typical Disaster Management continuum as shown below, comprising of six elements i.e., Prevention, Mitigation and Preparedness in pre-disaster phase, and Response, Rehabilitation and Reconstruction in post-disaster phase, defines the complete approach to Disaster Management.

The cost of natural disasters has hit $2.5 trillion so far this century, a study by the UN International Strategy for Disaster Risk Reduction (UNISDR) said.

DISASTER MANAGEMENT CONTINUUM



Prevention

Prevention was recently added to the phases of emergency management. It focuses on preventing the human hazard, primarily from potential natural disasters or terrorist (both physical and biological) attacks. Preventative measures are taken on both a domestic and international levels. These are activities designed to provide permanent protection from disasters. Not all disasters, particularly natural disasters, can be prevented, but the risk of loss of life and injury can be mitigated with good evacuation plans, environmental planning and design standards. In January 2005, 168 Governments adopted a 10-year global plan for natural disaster risk reduction called the Hyogo Framework. It offers guiding principles, priorities for action, and practical means for achieving disaster resilience for vulnerable communities.

Mitigation

Every dollar spent on mitigation saves three to five dollars on relief and rehabilitation.

Mitigation embraces all measures taken to reduce both the *effect* of the hazard itself and the vulnerable conditions in order to reduce the *potency* of a future event. Therefore, mitigation activities can be focused on the *hazard itself* or the *elements exposed* to the threat. Mitigation involves Structural and Non-structural measures taken to limit the impact of disasters. Structural mitigation are actions that change the characteristics of a building or its surrounding, examples include shelters, window shutters, clearing forest around the house. Non-structural mitigation on personal level mainly takes the form of insurance or simply moving house to a safer area. Examples of mitigation measures which are hazard specific, include; modifying the occurrence of the hazard, for example, water management in drought prone areas, avoiding the hazard by siting people away from the hazard and strengthening structures to reduce damage when a disaster occurs.

In addition to these physical measures, mitigation should also be aimed at reducing the physical, economic and social vulnerability to threats and the underlying causes for the same. Therefore, mitigation may incorporate addressing issues such as land ownership, tenancy rights, wealth distribution, etc.

Instruments for Mitigation of Hazards

There are various instruments through which the adverse impact of a hazard can be reduced. Such instruments differ for different types of hazards but these could be categorized into the following:

- Proper environmental management.
- Hazard reduction measures.
- Effective implementation of legal measures

Some common mitigation measures are:

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

Personal mitigation is a key to national preparedness. Individuals and families train to avoid unnecessary risks. This includes an assessment of possible risks to personal/family health and to personal property. For instance, in a flood plain, home owners might not be aware of a property being exposed to a hazard until trouble strikes. Specialists can be hired to conduct risk identification and assessment surveys. Professionals in risk management typically recommend that residents hold insurance to protect them against consequences of hazards.

Preparedness

Personal preparedness focuses on preparing equipment and procedures for use *when* a disaster occurs, i.e., planning. This protective process embraces measures, which enable governments, communities and individuals to respond rapidly to disaster situations to cope with them effectively.

Preparedness includes the formulation of viable emergency plans, the development of warning systems, maintenance of inventories and training of personnel. It may also embrace search and rescue measures as well as evacuation plans for areas that may be 'at risk' from a recurring disaster.

Preparedness, therefore, encompasses those measures that are taken before a disaster event, which are aimed at minimising loss of life, disruption of critical services, and damage when the disaster occurs. All preparedness planning needs to be supported by appropriate legislation specifying clear allocation of responsibilities and budgetary provisions for specific activities.

Some common preparedness measures are:

- Forecasting and early warning systems(described below) for different disasters
- Emergency management plans for responsible agencies (for monitoring, alert and evacuation, immediate disaster assistance, deployment of search and rescue teams and distribution of relief material, etc.)
- Community awareness and education
- Preparation of disaster management plans for the community
- Mock drills, training and rehearsals.Preparedness measures can take many forms including the construction of shelters, implementation of an emergency communication system, installation of warning devices, creation of back-up life-line services (e.g., power, water, sewage), and rehearsing evacuation plans.

Early Warning Systems

The objective of an early warning system is to alert the community of any impending hazard so that they can take preventive measures. An early warning system basically has four components - capturing the precursor events, transmission of this data to a central processing facility, alert recognition of an impending crisis and warning dissemination.

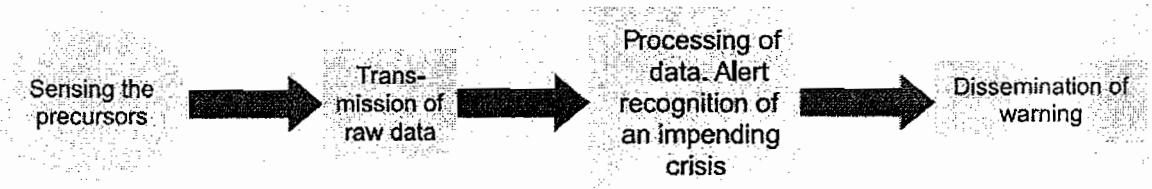


Figure showing components of early warning system

Capturing the precursor events is generally a technology driven process for most disasters. However for disasters like epidemics, strikes and terrorism, the human element plays a vital role in the data capture. Transmission of this data to the central processing facility is also totally technology based. Alerts are generated based on data analysis. Sometimes, alert generation may take some time, as a decision making process may be involved. The dissemination of warning to the vulnerable sections again has both technology and human elements.

Response

The response phase of an emergency may commence with search and rescue but in all cases the focus will quickly turn to fulfilling the basic humanitarian needs of the affected population. This assistance may be provided by national or international agencies and organizations. Effective coordination of disaster assistance is often crucial, particularly when many organizations respond and local emergency management agency (LEMA) capacity has been exceeded by the demand or diminished by the disaster itself.

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

The chief behavioural attribute required in recovery is resilience. As highlighted in the World Disasters Report, 2004, community resilience is a big factor in disaster recovery.

Recovery is used to describe the activities, which encompass the three overlapping phases of emergency *relief, rehabilitation* and *reconstruction.*

Response includes services for the disaster affected

The provision of services to disaster survivors can be grouped into four main categories:

- relief;
- emergency shelter and settlement;
- emergency health;
- water and sanitation; and
- tracing and restoring family links.

The timely and appropriate provision of these essential services is intended to stabilize the physical and emotional condition of the affected population, preventing further loss of life and acting as the basis for future recovery. It is easy to see how the different services are interrelated: providing food to destitute disaster victims doesn't make sense unless they also have the water, stove, fuel and cooking sets needed to cook the food or the means to eat it; water and sanitation are critical in maintaining health and preventing the spread of disease. The relative importance of one or other of them can change over time during the emergency phase, depending on needs and available resources.

Relief: Relief refers to the provision of essential, appropriate and timely humanitarian assistance to those affected by a disaster, based on an initial rapid assessment of needs and designed to contribute effectively and speedily to their early recovery. It consists of the delivery of a specific quantity and quality of goods to a quantified group of beneficiaries, according to selection criteria that identify actual needs and the groups that are least able to provide them for themselves.

Relief can be sub-divided into three categories:

- **Food:** Food supplies are frequently part of the Red Cross/Red Crescent response to emergencies. However, it is essential in each situation to first establish that food supply is a correct response and then that the composition is defined and described after an adequate comprehensive survey. In every instance it is necessary to ensure that food donations are culturally and nutritionally appropriate for the affected population and that the costs of their purchase, transportation, storage and distribution is kept to a minimum.
- **Shelter** is a critical determinant for survival in the initial stages of a disaster. Beyond survival, shelter is necessary for security and personal safety, protection from the elements and resistance to ill health and disease. Shelter assistance is provided to individual households for the repair or construction of dwellings or the settlement of displaced households within existing accommodation or communities. When it is not possible to provide individual shelter, collective shelter is provided in suitable large public buildings or structures, such as warehouses, halls or barracks, or in temporary planned or self-settled camps.
- **Non-food items:** When people have lost everything in a disaster, they require basic and culturally appropriate goods and supplies to maintain their health, privacy and dignity, to meet their personal hygiene needs, to prepare and eat food and to achieve necessary levels of thermal comfort. These might include clothing, blankets, bedding, stoves and kitchen sets, water containers and hygiene products.

Shelter: Sheltering' is a process – not just a 'product'

Meeting shelter needs after disasters should be seen as a process of 'sheltering' done by affected households with different materials, technical, financial and social assistance.

This assistance provided in the immediate aftermath of disaster can include:

- The distribution of tents or materials and tool kits to repair damaged houses or to build temporary/transitional/core shelters
- The improvement of living conditions in collective shelters and public buildings.
- The provision of cash to buy materials, hire labour or pay for rents. This assistance can be provided either to the affected families or to those hosting them.
- The provision of local construction specialists to advise on safe building techniques.
- A flexible combination of the above solutions, based on assessed needs and preferences.

The different needs of affected households for safety, privacy, protection from the climate and maintaining their livelihoods should be addressed appropriate to the context and available resources.

Shelter solutions must also enable households to improve their homes over time as resources and opportunities permit. Therefore inflexible solutions that do not lend themselves to incremental change over time should be avoided if and where possible. Sheltering goes beyond the immediate provision of basic shelter solutions and is closely associated with longer-term reconstruction as well as with assisting individuals, families and communities to re-establish themselves and enable a return of individual dignity.

Shelter as part of disaster management

All shelter activities are informed by the ongoing work in relief, recovery, disaster preparedness, water and sanitation, logistics and procurement, and other related disciplines.

Disasters provide an entry point to reduce future shelter risks and vulnerabilities, and build resilient communities. Disasters can also make resources and institutional support available to address underlying causes. The provision of shelter assistance after a disaster is an opportunity to ensure that the shelter risks of affected households are reduced through

programming and awareness-raising. This requires rethinking emergency response to include consideration of broader longer term shelter and settlement issues including housing land and property rights, adaptation to climate change, sustainability and urbanisation.
On a personal level the response can take the shape either of a *shelter in place* or an *evacuation*. In a shelter-in-place scenario, a family would be prepared to fend for themselves in their home for many days without any form of outside support. In an *evacuation*, a family leaves the area by automobile or other mode of transportation, taking with them the maximum amount of supplies they can carry, possibly including a tent for shelter. If mechanical transportation is not available, evacuation on foot would ideally include carrying at least three days of supplies and rain-tight bedding, a tarpaulin and a bedroll of blankets being the minimum.

Tracing and restoring family links
The separation of family members in natural disasters is a critical humanitarian concern. The scale of the problem can be understood when we consider large internal population movements such as seen in floods in China and India in 2002 with respectively twenty million and seven million people evacuated from their homes and livelihoods. Often the primary need of affected family members is to restore family links; this is ***usually more important to the individual than receiving relief assistance***.
Competent contingency planning will reduce the risk of separated families, or put in place pre-planned ways in which family members can be aware of the location and status of family members. In an increasingly 'global village' we may have many nationalities affected by a disaster, with distant family members desperate for news of family members

Psychological Support:
Almost 10 per cent of the people affected by the tsunami – potentially half a million people – had mental health problems so severe that they required professional treatment. Psychosocial care deals with a broad range of emotional and social problems and helps in restoring social cohesion as well as the independence and dignity of individuals and groups. It prevents pathologic developments and further social dislocations. Normalisation of emotional reaction is an important task in psychosocial care for the survivors of the disaster. Emotional reactions such as guilt, fear, shock, grief, vigilance, numbness, intrusive memories, and despair are responses of people experiencing unforeseen disasters beyond their coping capacity. Emotional reactions are normal responses to an abnormal situation. Nearly 90% of survivors of disaster do undergo these emotional reactions.

Cash and voucher programmes:
Although the type of emergency assistance required after a disaster is often fairly easy to identify (for instance, earthquake, flood and hurricane victims almost always need emergency shelter), how it is delivered to the intended beneficiaries can make a huge difference to their level of vulnerability, by allowing them to gain more control of their lives and improving their survival chances. Large-scale emergency response often relies heavily on the channelling of emergency aid from outside the affected area, requiring significant logistics, infrastructure and human resources. Donations are often sought during this period, especially for large disasters that overwhelm local capacity. Due to efficiencies of scale, money is often the most cost-effective donation if fraud is avoided. Money is also the most flexible, and if goods are sourced locally then transportation is minimized and the local economy is boosted. Sometimes this can increase vulnerability by stifling local coping mechanisms (for example, by fostering dependency) and undermining local markets. In some cases, urgently needed relief items can be bought locally and do not have to be brought in from outside.

Issues in Disaster Response

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

Rehabilitation

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

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

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

Also, people are expected to access regular government welfare schemes for relief in disaster situations, which is difficult, given the exigent circumstances.
Crucial factor in rehabilitation as borne out by experiences from past disasters is training of personnel in various aspects of rehabilitation, such as, special concerns of widows and orphans, with respect to health and livelihood requirements besides community participation in damage and loss assessment and vulnerability analysis

Reconstruction

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

Post-modern thinking is impacting urban planning in a major way.
Instead of 'modernist' emphasis on uniformity, diversity is being lauded as the desired virtue. Accordingly, indigenous knowledge is being incorporated in modern engineering technology to produce viable structures in earthquake, flood and cyclone prone areas. Physical vulnerability of structures causes maximum disaster casualties. Hence, stress is also on retrofitting old structures with a view to making them disaster-resistant besides making new ones with disaster-resistant technology. Also, instead of the *old cluster approach* to housing which, as more in consonance with industrialisation would be changed for more *differentiated housing and open spaces*, which would provide for more aesthetic and safer cities. From a social perspective, modern cities have increased isolation and alienation of human beings. This has led theorists in the West to talk about 'social capital' as it is increasingly getting scarcer in modern societies that are getting 'atomised'. Social capital is an intangible resource that invests in social ties, which proves an invaluable resource in recovery during emergences. In simple terms, it means people reaching out to each other and helping rebuild lives. Isolation is counter- effective of social capital.

Gujarat Earthquake as a case study of the disaster cycle

The processes covered by the disaster cycle can be illustrated through the case of the Gujarat Earthquake of 26 January 2001. The devastating earthquake killed thousands of people and destroyed hundreds of thousands of houses and other buildings. The State Government as well as the National Government immediately mounted a largescale relief operation. The help of the Armed Forces was also taken. Hundreds of NGOs from within the region and other parts of the country as well as from other countries of the world came to Gujarat with relief materials and personnel to help in the relief operations. Relief camps were set up, food was distributed, mobile hospitals worked round the clock to help the injured; clothing, beddings, tents, and other commodities were distributed to the affected people over the next few weeks. By the summer of 2001, work started on long-term recovery. House reconstruction programmes were launched, community buildings were reconstructed, and damaged infrastructure was repaired and reconstructed. Livelihood programmes were launched for economic rehabilitation of the affected people.

In about two year's time the state had bounced back and *many of the reconstruction projects had taken the form of developmental programmes* aiming to deliver even better infrastructure than what existed before the earthquake. Good road networks, water distribution networks, communication networks, new schools, community buildings, health and education programmes, all worked towards developing the region.

The government as well as the NGOs laid significant emphasis on *safe development* practices. The buildings being constructed were of earthquake resistant designs. Older buildings that had survived the earthquake were retrofitted in large numbers to strengthen

them and to make them resistant to future earthquakes. Mason and engineer training programmes were carried out at a large scale to ensure that all future construction in the State is disaster resistant. Since the state is also drought and cyclone affected, building construction for cyclone resistant housing was propagated in the coastal areas, and water harvesting systems were given a thrust for drought mitigation.

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

Subsequently, hazardous events struck the state again. There was a cyclone warning in 2004, which was responded to with a very efficient evacuation implemented by the government and the NGOs. The community was already aware of the evacuation plan and was trained how to react. Similarly, major floods hit the state in June-July 2005.
Once again, the role allocation was clear to all the concerned stakeholders in the government as well as the NGOs and the community too knew how to help the relief teams help them. Losses were minimised, and the relief and rehabilitation process went off smoothly.
This case study shows how there was a disaster event during the earthquake, followed by immediate response and relief, then by recovery including rehabilitation and retrofitting, then by developmental processes. The development phase included mitigation activities, and finally preparedness actions to face future disasters. Then disaster struck again, but the impact was less than what it could have been, primarily due to better mitigation and preparedness efforts. The disasters were again followed by response and recovery, and the cycle goes on.

Management of Urban Floods: Case Study of Mumbai Floods 2005
Lessons:

1. The limitations of the weather prediction and early warning system were exposed.
2. Response of Government agencies was quick. Army was deployed within 12 hours of heavy rainfall on the first day i.e. 27th July, 2005.
3. Declaration of holidays on 27th and 28th July, 2005 reduced distress.
4. Civil society responded in a big way.
5. Massive immunization and effective mobilization of health services prevented major epidemic.
6. While unprecedented rainfall was the main reason for the Mumbai flood in 2005, major contributing factors were unplanned urban development in complete disregard of the delicate environment and ecology of the area, such as:
   - 900 green plots were de-reserved to make way for real estate developments.
   - 730 acres of mangrove wetland filled in Mahim creek for the development of Bandra-Kurla complex.
   - Western Expressway was widened despite objections from BMC thereby seriously compromising the drainage system.
   - Course of Mithi river diverted for expansion of airport runway.
   - Transferable Development Right was allowed indiscriminately without consideration of carrying capacity of the area.
7. The drainage system was clogged by solid wastes.

8. The Disaster Management Plan was not updated.
9. Community was not involved in the planning process.

Civil society's role in disaster management:

Civil society is contributing significantly to all aspects of disaster management cycle, particularly, relief. Civil society is the new hope of the new world order in the face of state and market failure in different respects. It is being seen as the answer/alternate/counterpoise to globalisation and weakening states. Civil society is hence, the buffer against state excesses and the market; the latter now developing in collusion with state governments, hence sharing interests with it, especially in the third world. In the newfound nexus, citizen could be a mute spectator, unless there are optional protection mechanisms.

Civil society, in this respect offers new hope in that it has fought successfully for human causes round the world, such as landmine ban, protection of environment etc. It has also successfully challenged arbitrary political regimes such as Marcos's in Philippines. However, there is the darker side, which should not be overlooked. The civil strife in Rwanda involved civil society organisations in a negative way (Rieff, 1999). Besides, civil society is an inseparable/organic entity of a culture; the members therefore could be as indoctrinated as any with flawed perceptions. Also, perceiving civil society as an alternative to State (roll back of state) would be a fundamental error, as all said and done, State remains the principal agency for citizens' welfare and it is to it that people turn in distress situation.

Also, civil society organisations work systematically only under the aegis of the state. Left alone, they are an amorphous entity; potentially perhaps, chaotic. Also, their international linkages/origin make them suspect with regard to national security. Behavioural aberration on their part in the sense of being generally non-cooperative with and distant from the state is also discomfiting. During the Marathwada earthquake, non-government organisations were seen to leave work midway and withdraw. They were also not organised and systematic to the desired degree. They even messed up, creating unnecessary chaos in the recent Muzaffarabad earthquake. As articulated in the India Disasters Report, 2005, crises in Marathwada and other places in India showed that the involvement of local people and civil society groups in rescue and relief was not a clearly defined process. According to Parasuraman and Unnikrishnan in the India Disasters Report, (2005), the specific areas where civil society participation is desirable should be specifically laid down to avoid chaos and confusion in emergency situations. Those are; training project staff, information dissemination, programmes monitoring, housing, and social and economic rehabilitation measures. They, in turn, must be given adequate room to explore and innovate. The agencies must submit a time-bound plan of action, outline their approach unambiguously, clearly defining their specific roles, articulating a programme management strategy, and must establish that they have the necessary resources to see the things through.

The converse picture is equally important. Attitudinal change on the part of the governments to reinforce participation is also required. The response in the Marathwada earthquake exhibited that the government views rescue and relief work as a piecemeal business; the responsibility of its revenue department, and therefore, public support need not be factored into it. In the absence of a well-defined process of involving people, spontaneous involvement has often gone misdirected and is viewed as *obstruction* by the authorities.

The overall perspective of the administration is to view people as passive recipients of government largesse rather than as valuable partners in any undertaking. This is retrograde

and undemocratic. The general perception is that people impede disaster response, not facilitate it. The result is too many isolated, ill- coordinated efforts on the part of individuals and government and non-government agencies with lack of proper coordination between them. Institutionalisation/strengthening *social capital* during normal times to be tapped in readiness during emergencies in the form of *organised collective effort* at the level of the society is the right policy stance in this regard. The desideratum of the discussion is that government and civil society and the private corporate sector should operate in tandem for effective disaster response.

Paradigm shift: from "helpless" victims to social capital

Social Capital

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. A woman in Mumbai has chosen to reside in a low cost dwelling in a flood prone area because that would leave her money to finance her daughter' education (World Disasters Report, 2004).

Post- Modernism and Disaster Management

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

For organisational theory, post-modernism implies a shift of emphasis towards teamwork rather than strict stipulations of hierarchy with undesirables like status differentiation, monolithic order *et al;* cooperation rather than compliance, participatory management rather than monocentric order, peoples' participation, especially regarding choice in service provisioning, etc. To reiterate, this applies to both secular and religious organisations. This is partly a result of growing suspicion towards monocentric authority whereby public and private interests are often confused/diffused; former unknowingly acting as a camouflage for the latter and similar suspicions, not wholly unfounded. Post modernism argues for more 'political space' for articulation of myriad concerns which in practice make up public interest. Post-modernism, in one word, epitomises harmony/balance in the physical, cultural, material and spiritual senses.

Sustainable Development

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

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. 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.

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:

1. 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.

2. 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

3. 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.

4. Social capital and 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. Social capital involves in all social ties; modalities are different, as, between people, between institutions, government and civil society, between region and countries and so on.

Studies conducted under the aegis of the World Bank indicate the following three indicators of social capital:

Trust: Two elements of this indicator are trust in *others* and trust in *institutions* (government, police, politicians, journalists, etc.). This is the *defining element* of social capital.

Civic Engagement: Civic engagement is a measure of involvement of people in social and political matters. It implies *volunteerism* on the part of people and modalities (provisions) for the same in social and political matters.

Social Networks: Social networks are the third indicator that is frequently found in the research. They are formed by the person's immediate environment and by secondary networks. Networks centred on the individuals include immediate networks (i.e. the close family, friends and neighbours with whom the person has frequent contact and who provide support). The secondary networks include those formed through relationships that individuals establish, especially in the workplace and recreational environments, during community or religious activities.

*5. **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.

Energising Local Government

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

Indicators of progress towards disaster resilience

At the UN's World Conference on Disaster Reduction (WCDR) in Kobe, Japan, in 2005, only days after the 2004 Indian Ocean earthquake, began the process of pushing international agencies and national governments beyond the vague rhetoric of most policy statements and toward setting clear targets and commitments for DRR. The first step in this process was the formal approval at the WCDR of the Hyogo Framework for Action (2005–2015) (HFA). This is the first internationally accepted framework for DRR. It sets out an ordered sequence of objectives (outcome – strategic goals – priorities), with five priorities for action attempting to 'capture' the main areas of DRR intervention. The UN's biennial Global Platform for Disaster Risk Reduction provides an opportunity for the UN and its member states to review progress against the Hyogo Framework. It held its first session 5–7 June 2007 in Geneva, Switzerland. UN initiatives have helped to refine and promote the concept at international level, stimulated initially by the UN's designation of the 1990s as the International Decade for Natural Disaster Reduction.

Hyogo Framework for Action (HFA)

Specific gaps and challenges were identified upon review of progress made in implementing the Yokohama Strategy in the following five main areas:

(a) Governance: organizational, legal and policy frameworks;
(b) Risk identification, assessment, monitoring and early warning;
(c) Knowledge management and education;
(d) Reducing underlying risk factors;
(e) Preparedness for effective response and recovery.

Priority Action 1: Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.

Countries that develop policy, legislative and institutional frameworks for disaster risk reduction and that are able to develop and track progress through specific and measurable indicators have greater capacity to manage risks and to achieve widespread consensus for, engagement in and compliance with disaster risk reduction measures across all sectors of society

Priority Action 2: Identify, assess and monitor disaster risks and enhance early warning.

The starting point for reducing disaster risk and for promoting a culture of disaster resilience lies in the knowledge of the hazards and the physical, social, economic and environmental vulnerabilities to disasters that most societies face, and of the ways in which hazards and vulnerabilities are changing in the short and long term, followed by action taken on the basis of that knowledge.

Priority Action 3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels.

Disasters can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience, which in turn requires the collection, compilation and dissemination of relevant knowledge and information on hazards, vulnerabilities and capacities.

Priority Action 4: Reduce the underlying risk factors.

Disaster risks related to changing social, economic, environmental conditions and land use, and the impact of hazards associated with geological events, weather, water, climate variability and climate change, are addressed in sector development planning and programmes as well as in post-disaster situations.

Priority Action 5: Strengthen disaster preparedness for effective response at all levels.

At times of disaster, impacts and losses can be substantially reduced if authorities, individuals and communities in hazard-prone areas are well prepared and ready to act and are equipped with the knowledge and capacities for effective disaster management.

Protection to displaced people by international law

International law, for example Geneva Conventions defines International Red Cross and Red Crescent Movement the Convention on the Rights of Persons with Disabilities, requires that "States shall take, in accordance with their obligations under international law, including international humanitarian law and international human rights law, all necessary measures to ensure the protection and safety of persons with disabilities in situations of risk, including the

occurrence of natural disaster." And further United Nations Office for the Coordination of Humanitarian Affairs is formed by General Assembly Resolution 44/182. People displaced due to natural disasters are currently protected under international law (Guiding Principles of International Displacement, Campala Convention of 2009).

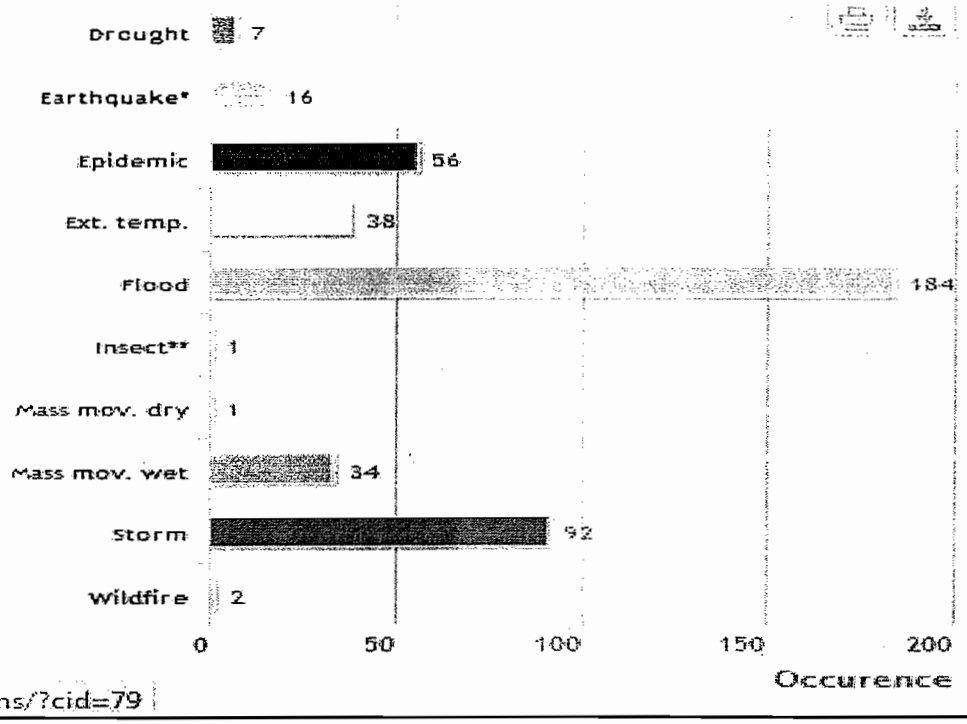
DISASTER MANAGEMENT IN INDIA

Natural Disasters from 1980 - 2010

Overview

No of events:	431
No of people killed:	143,039
Average killed per year:	4,614
No of people affected:	1,521,726,127
Average affected per year:	49,087,940
Economic Damage (US$ X 1,000):	48,063,830
Economic Damage per year (US$ X 1,000):	1,550,446

Natural Disaster Occurence Reported



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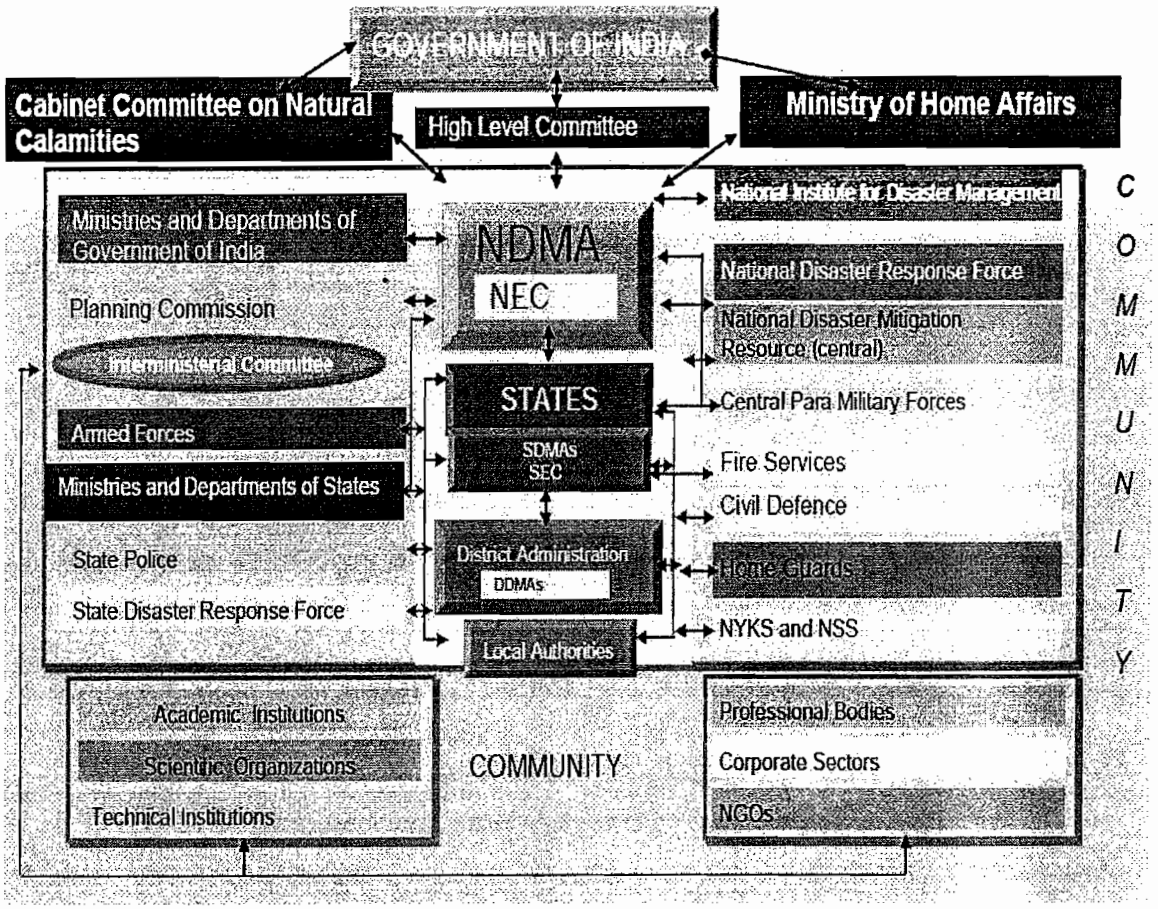
Disaster Management Act, 2005

This Act provides for the effective management of disaster and for matters connected therewith or incidental thereto. It provides institutional mechanisms for drawing up and monitoring the implementation of the disaster management. The Act also ensures measures by the various wings of the Government for prevention and mitigation of disasters and prompt response to any disaster situation.

The Act provides for setting up of a National Disaster Management Authority (NDMA) under the Chairmanship of the Prime Minister, State Disaster Management Authorities

(SDMAs) under the Chairmanship of the Chief Ministers, District Disaster Management Authorities (DDMAs) under the Chairmanship of Collectors/District Magistrates/Deputy Commissioners. The Act further provides for the constitution of different Executive Committee at national and state levels.
Under its aegis, the National Institute of Disaster Management (NIDM) for capacity building and National Disaster Response Force (NDRF) for response purpose have been set up. It also mandates the concerned Ministries and Departments to draw up their own plans in accordance with the National Plan. The Act further contains the provisions for financial mechanisms such as creation of funds for response, National Disaster Mitigation Fund and similar funds at the state and district levels for the purpose of disaster management. The Act also provides specific roles to local bodies in disaster management.

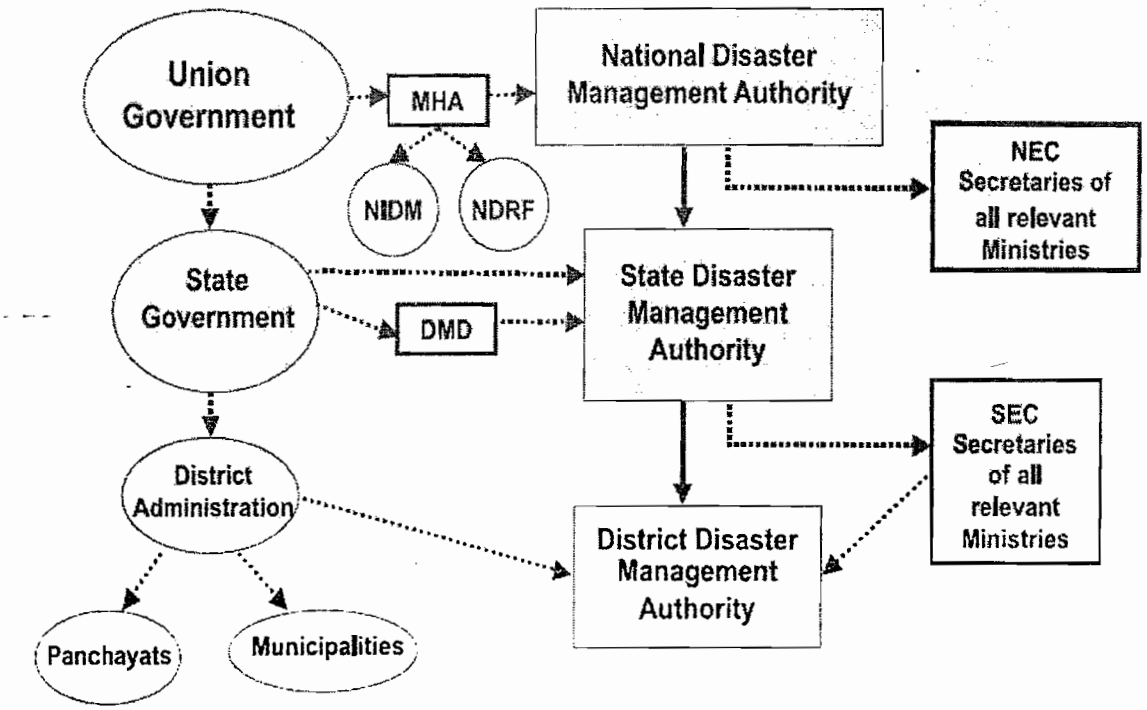
Further the enactment of 73rd and 74th Amendments to the constitution and emergence of local self- government, both rural and urban, as important tiers of governance, the role of local authorities becomes very important. The DM Act, 2005 also envisages specific roles to be played by the local bodies in disaster management.



National disaster management structure

Role Players : Legal-institutional Framework

Disaster Management Act, 2005



2ND ARC's recommendations on The Disaster Management Act, 2005 (Central Act) to bring in the following features:

a. Disaster/Crisis Management should continue to be the primary responsibility of the State Governments and the Union Government should play a supportive role.

b. The Act should provide categorization of disasters (say, local, district, state or national level). This categorization along with intensity of each type of disaster will help in determining the level of authority primarily responsible for dealing with the disaster as well as the scale of response and relief - detailed guidelines may be stipulated by the NDMA on this subject.

c. The functions of the National Disaster Management Authority should be: to recommend policies, to lay down guidelines for preparation of different disaster management plans and standard operating procedures; to promote and organize vulnerability studies, research and evaluation; to advise on parameters of categorization and on declaration of national and state level disasters; to develop expertise and knowledge in the field of crisis/disaster management and disseminate to the field, to develop and organize training and capacity building programmes, to coordinate the early warning systems; to deploy specialized manpower and machinery in support of local/State Governments, where required; to advise on constitution and use of the Disaster Management Funds and; to give recommendations on all matters relating to crisis/disaster management to the government.

d. The task of implementation of mitigation/prevention and response measures may be left to the State Governments and the district and local authorities with the line ministries/departments of Government of India, playing a supportive role.

e. The law should cast a duty on every public functionary, to promptly inform the concerned authority about any crisis, if he/she feels that such authority does not have such information.

f. The law should create a uniform structure at the apex level to handle all crises. Such a structure may be headed by the Prime Minister at the national level and the Chief Minister at the state level. At the administrative level the structure is appropriately headed by the Cabinet Secretary and the Chief Secretary respectively.

g. The law should make provisions for stringent punishment for misutilization of funds meant for crisis/disaster management.

h. The role of the local governments should be brought to the forefront for crisis/disaster management.

i. The NEC as stipulated under the Disaster Management Act need not be constituted, and the NCMC should continue to be the apex coordination body. At the state level, the existing coordination mechanism under the Chief Secretary should continue.

National policy on disaster management 2009

This policy aims at: (i) Promoting a culture of prevention, preparedness and resilience at all levels through knowledge, innovation and education; (ii) Encouraging mitigation measures based on technology, traditional wisdom and environmental sustainability; (iii) Mainstreaming disaster management into the developmental planning process; (iv) Establishing institutional and technolegal frameworks to create an enabling regulatory environment and a compliance regime; (v) Ensuring efficient mechanism for identification, assessment and monitoring of disaster risks; (vi) Developing contemporary forecasting and early warning systems backed by responsive and fail-safe communication with information technology support; (vii) Ensuring efficient response and relief with a caring approach towards the needs of the vulnerable sections of the society; (viii) Undertaking reconstruction as an opportunity to build disaster resilient structures and habitat for ensuring safer living; and (ix) Promoting a productive and proactive partnership with the media for disaster management.

Traditionally, relief in the wake of natural calamities has been treated as the primary responsibility of the States. Successive Finance Commissions have also reiterated this position. Even though the States are primarily responsible for relief activities, the Central Government associates itself with measures aimed at ameliorating the sufferings of the people on account of natural calamities. Towards this end, the Central Government, with its resources, physical and financial does provide the needed help and assistance to buttress relief efforts in the wake of major natural calamities. The dimensions of the response at the level of National Government are determined in accordance with the existing policy of financing the relief expenditure and keeping in view the factors like (i) the gravity of a natural calamity, (ii) the scale of the relief operation necessary, and (iii) the requirements of Central assistance for augmenting the financial resources at the disposal of the State Government.

Types of Response:

The Central response can be:

(i) Policy response, and

(ii) Administrative response.

Policy response:

The policy response to a natural calamity would be provided by the Prime Minister, Cabinet Committees and the Agriculture Minister. The objectives of policy response would be:

a. To empathise with the sufferings of the people affected by natural calamity., and

b. To sub-serve long term and short term policy objectives of the government.

Administrative response:

The response of the administration to a situation arising out of a natural calamity can be on account of:

i. a follow-up of a policy objective of the Government;
ii. the need for an assessment of the situation and for a central response;
iii. States' requests for central assistance; and
iv. the need for information as a governance objective.

Central response: Central Government's response, at the policy level, to a natural calamity would lead to Central initiatives in the form of:-

i. visits of the calamity affected areas by President, Prime Minister and other dignitaries;
ii. activating the administrative machinery for assisting in relief measures; and
iii. setting up a machinery for implementing, reviewing and monitoring of relief measures.

The administrative response at the Central Government level would broadly relate to:-

i. operational requirements; and
ii. provision of Central assistance as per existing policy.

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

i. **Primary relief functions,** and
ii. **Secondary relief functions.**

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

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

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

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

National Disaster Management Authority

Over the centuries, local communities have developed their own indigenous survival mechanisms. This rich storehouse of knowledge is a part of our country's legacy. The Arthashastra, (a treatise on public administration by Chanakya in the 4th century B.C), devoted a section to mitigation measures to combat famines. Modern methods of crisis management began to be applied from the late 1870s when the first Famine Commission suggested formulation of Famine Codes and establishment of Agriculture Departments in the provinces to improve agricultural production as a safeguard against famines as well as preparatory measure to deal with acute scarcities occasioned by frequent failure of rains.

NDMA Policy

This Policy framework is also in conformity with the International Strategy for Disaster Reduction, the Rio Declaration, the Millennium Development Goals and the Hyogo Framework 2005-2015. The themes underpinning this policy are:- (Five "C" as a memory aid)

- Community-based disaster management, including last mile integration of the policy, plans and execution.
- Capacity development in all related areas.
- Consolidation of past initiatives and best practices.
- Cooperation with agencies at national, regional and international levels.
- Compliance and coordination to generate a multi-sectoral synergy.

From the national vision and aforementioned theme, the objectives guiding the policy formulation have evolved to include:

- Promoting a culture of prevention and preparedness – by centre-staging DM as an overriding priority at all levels and at all times.
- Encouraging mitigation measures based on state-of-the-art technology and environmental sustainability.
- Mainstreaming DM concerns into the development planning process.
- Putting in place a streamlined institutional techno-legal framework in order to create and preserve the integrity of an enabling regulatory environment and a compliance regime.
- Developing contemporary forecasting and early warning systems backed by responsive and fail-safe communications and Information Technology (IT) support.
- Promoting a productive partnership with the Media, NGOs and the Corporate Sector in the areas of awareness generation and capacity development.
- Ensuring efficient response and relief with a caring humane approach towards the vulnerable sections of the society.
- Making reconstruction an opportunity to build back better and construct disaster-resilient structures and habitats.

Roles and Responsibilities

NDMA as the apex body is mandated to lay down the policies, plans and guidelines for Disaster Management to ensure timely and effective response to disasters. Towards this, it has the following responsibilities:-

- Lay down policies on disaster management ;
- Approve the National Plan;
- Approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan;
- Lay down guidelines to be followed by the State Authorities in drawing up the State Plan;

- Lay down guidelines to be followed by the different Ministries or Departments of the Government of India for the Purpose of integrating the measures for prevention of disaster or the mitigation of its effects in their development plans and projects;
- Coordinate the enforcement and implementation of the policy and plan for disaster management;
- Recommend provision of funds for the purpose of mitigation;
- Provide such support to other countries affected by major disasters as may be determined by the Central Government;
- Take such other measures for the prevention of disaster, or the mitigation, or preparedness and capacity building for dealing with the threatening disaster situation or disaster as it may consider necessary;
- Lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.

Organisation

National Disaster Management Authority has been constituted with the Prime Minister of India as its Chairman, a Vice Chairman with the status of Cabinet Minister, and eight members with the status of Ministers of State

The concept of the organization is based on a disaster divisions-cum-secretariat system. Each member of the Authority heads disaster-specific divisions for specific disaster and functional domains. Each member has also been given the responsibility of specified states and UTs for close interaction and coordination.

The NDMA Secretariat, headed by a Secretary is responsible to provide secretarial support and continuity.

National Executive Committee (NEC)

A National Executive Committee is constituted under Section 8 of DM Act, 2005 to assist the National Authority in the performance of its functions. NEC consists of Home Secretary as its Chairperson, *ex-officio*, with other Secretaries to the Government of India in the Ministries or Departments having administrative control of the agriculture, atomic energy, defence, drinking water supply, environment and forest, finance (expenditure), health, power, rural development science and technology, space, telecommunication, urban development, water resources. The Chief of Integrated Defence Staff of the Chiefs of Staff Committee, *ex-officio,* is also its Members.

NEC may as and when it considers necessary constitute one or more sub-committees for the efficient discharge of its functions. For the conduct of NEC, Disaster Management National Executive Committee (Procedure and Allowances) Rules, 2006 has been issued. NEC has been given the responsibility to act as the coordinating and monitoring body for disaster management, to prepare a National Plan, monitor the implementation of National Policy etc. vide section 10 of the DM Act.

State level Institutions

State Disaster Management Authority (SDMA)

The DM Act, 2005 provides for constitution of SDMAs and DDMAs in all the states and UTs. As per the information received from the states and UTs, except Gujarat and Daman & Diu, all the rest have constituted SDMAs under the DM Act, 2005. Gujarat has constituted its SDMA under its Gujarat State Disaster Management Act, 2003. Daman & Diu have also established SDMAs prior to enactment of DM Act 2005.

State Executive Committee (SEC)

The Act envisages establishment of State Executive Committee under Section 20 of the Act, to be headed by Chief Secretary of the state Government with four other Secretaries of such departments as the state Government may think fit. It has the responsibility for coordinating and monitoring the implementation of the National Policy, the National Plan and the State Plan as provided under section 22 of the Act.

District level Institutions

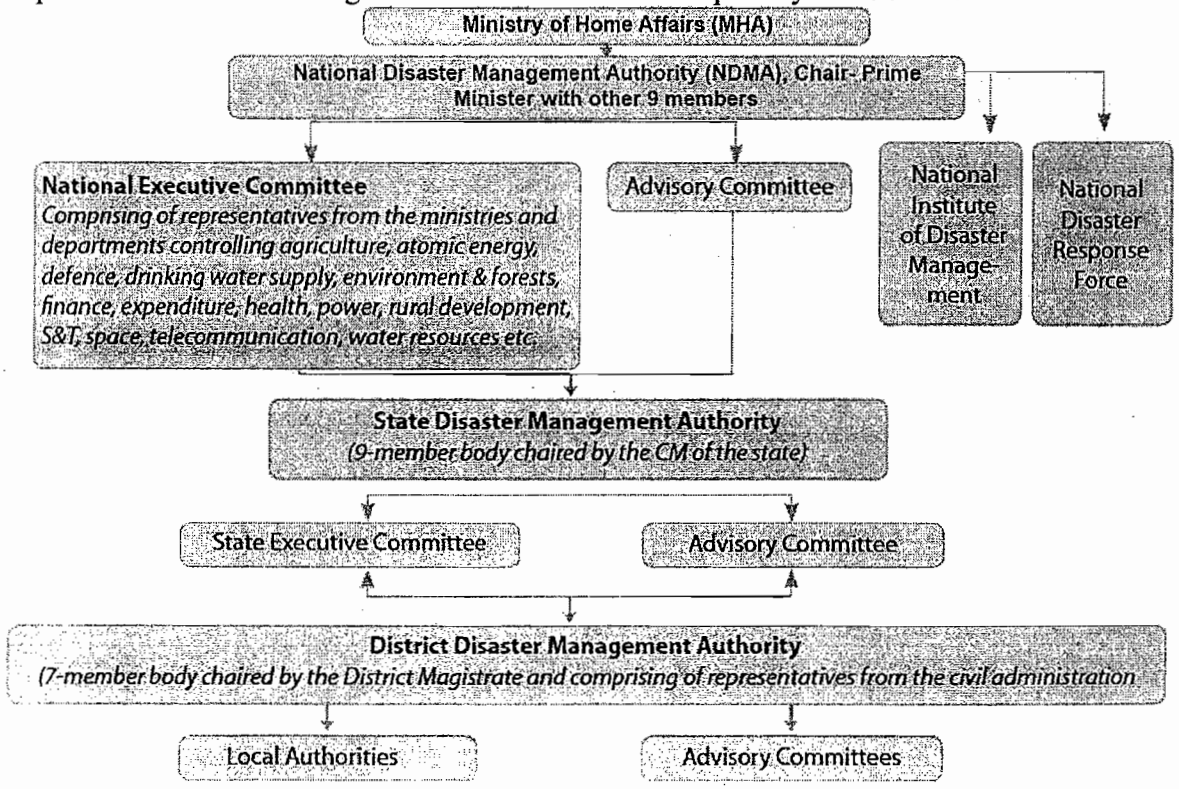
District Disaster Management Authority (DDMA)

Section 25 of the DM Act provides for constitution of DDMA for every district of a state. The District Magistrate/ District Collector/Deputy Commissioner heads the Authority as Chairperson besides an elected representative of the local authority as Co-Chairperson except in the tribal areas where the Chief Executive Member of the District Council of Autonomous District is designated as Co-Chairperson. Further in district, where Zila Parishad exist, its Chairperson shall be the Co-Chairperson of DDMA. Other members of this authority include the CEO of the District Authority, Superintendant of Police, Chief Medical Officer of the District and other two district level officers are designated by the state Government.

The District Authority is responsible for planning, coordination and implementation of disaster management and to take such measures for disaster management as provided in the guidelines. The District Authority also has the power to examine the construction in any area in the district to enforce the safety standards and also to arrange for relief measures and respond to the disaster at the district level.

Institutional Framework for Metropolitan Cities

In the larger cities (say, with population exceeding 2.5 million), the recommendation of the second Administrative Reforms Commission has suggested that the Mayor, assisted by the Commissioner of the Municipal Corporation and the Police Commissioner to be directly responsible for Crisis Management. It has now been accepted by the Government.



National Disaster Response Force

The DM Act, 2005 has made the statutory provisions for the constitution of the **National Disaster Response Force (NDRF)** for the purpose of specialized response to natural and man-made disasters. **According to Section 45 of the Act, the Force has to function under the general superintendence, direction and control of the National Disaster Management Authority (NDMA) and under command and supervision of Director General, NDRF.** In lieu with the Section 44 (i) of the Act that states NDRF a specialist force, the force is multi-disciplinary, multi-skilled, high-tech force of the NDMA capable of dealing with all types of natural and man-made disasters.

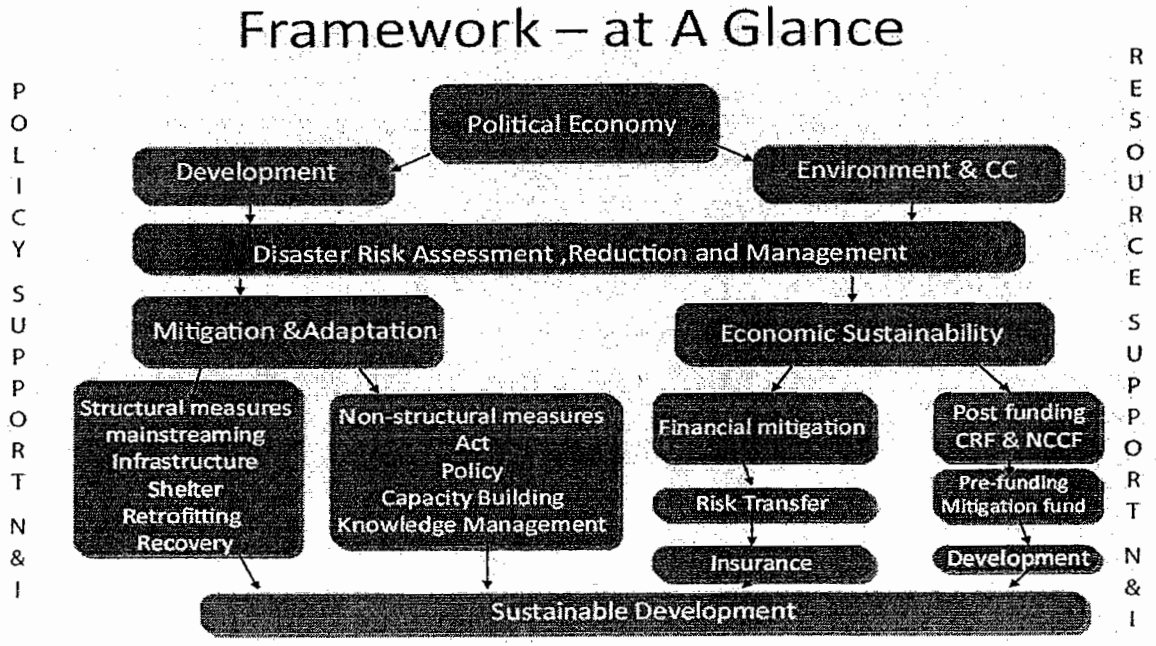
National Institute of Disaster Management

The National Institute of Disaster Management (NIDM) was constituted under an Act of Parliament with a vision to play the role of a premier institute for capacity development in India and the region. The efforts in this direction that began with the formation of the National Centre for Disaster Management (NCDM) in 1995 gained impetus with its redesignation as the National Institute of Disaster Management (NIDM) for training and capacity development. Under the Disaster Management Act 2005, NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation and policy advocacy in the field of disaster management.

NIDM provides technical support to the state governments through the Disaster Management Centres (DMCs) in the Administrative Training Institutes (ATIs) of the States and Union Territories.

NIDM hosts the SAARC Disaster Management Centre (SDMC) and works as its national focal point.

Its vision is to create a Disaster Resilient India by building the capacity at all levels for disaster prevention and preparedness.



INTERFACE AMONG STAKEHOLDERS LEADING TO DEVELOPMENT OF SOCIETY

NDMA guidelines on specific disasters:

Focus and Objectives of Guidelines

NDMA is engaged in the formulation of guidelines through a consultative process involving multiple stakeholders, including the government, non-government organisations, academic and scientific institutions, the corporate sector and community. Since its inception, NDMA has so far released various disaster specific and thematic guidelines. Salient features of the guidelines issued are as follows:-

Management of Landslide and Snow Avalanches: The objectives of these guidelines are to institutionalise the landslide hazard mitigation efforts, to make the society aware of the various aspects of landslide hazard in the country and to prepare the society to take suitable action to reduce both risks and costs associated with this hazard.

Management of Cyclones: The guidelines aim to deal with the tropical cyclones by way of appropriate coping strategies and risk reduction plans along with greater public awareness. An approach encompassing Early Warning System on cyclones, structural measures for preparedness and mitigation, covering cyclone shelters, buildings, road links, drains, embankments, communication/power transmission networks, and non- structural mitigation options, such as coastal zone management, coastal flood plain management, natural resources management, awareness generation related to CDM, hazard zoning and mapping, including the use of GIS tools, capacity development, etc; and its implementation strategies are suggested.

Management of Earthquake: The guidelines emphasise that all new structures are built in compliance with earthquake resistant building codes. Town planning, bye-laws, structural safety audits of existing lifeline structures and other critical structures in earthquake prone areas, carrying out selective seismic strengthening and retrofitting ought to be addressed.

Management of Floods: The guidelines aim at measures for preparedness, prevention, mitigation in the pre-flood stage and on prompt and effective response, relief and recovery during – and post flood stages. Importance on non-structural measures besides structural measures is emphasized in the guidelines. Setting of basin-wise organisations for flood management and also for setting up a National Flood Management Institute for training, education and research are suggested in the guideline.

Chemical Disasters (Industrial): These guidelines call for a protective, participatory, well-structured, fail-safe, multi-disciplinary and multi-structural approach at various levels. On the basis of vulnerabilities and consequences of chemical accidents, the guidelines review the existing regulatory framework and practices and thus propose for a regulatory framework, code of practices, capacity development, institutional framework, etc.

Management of Chemical (Terrorism) Disasters: The guidelines focus on outlining the preparedness and efforts made for mitigating the chemical terrorism, the act of violence perpetrated to achieve professed aims, using chemical agents. They also deal with the aspects of surveillance measures for strengthening the intelligence in order to prevent intentional use of chemical agents.

Preparation of State Disaster Management Plans: The aim of the state DM plan is to ensure that the components of DM are addressed to facilitate planning, preparedness, operational, coordination and community participation. The guideline suggests outlays for preparation of the plan to include the state profile, vulnerability assessment and risk analysis, prevention measures, mainstreaming DM concerns into developmental plan and programme projects, preparedness measures, response and partnership with the other stakeholders besides providing for financial arrangement.

Psycho-Social Support and Mental Health Services in Disasters: Disasters leave a trail of agony and affect the survivors' mental health. The guidelines on this subject outlay the entire gamut of psycho-social support and mental health services with a view to build the nation resilient to respond effectively in all types of disasters.

Medical Preparedness and Mass Casualty Management: A Mass Casualty Event (MCE) is an incident resulting in a number of victims large enough to disrupt the normal course of emergency and health care services. The guidelines for MCE focus on all aspects of medical preparedness and mass casualty management with emphasis on prevention, mitigation preparedness, relief and medical response etc. They aim to develop a rigorous medical management framework to reduce the number of deaths during MCE.

Management of Nuclear and Radiological Emergencies: The overall objective of the guidelines is to implement the concept of prevention of nuclear and radiological emergencies. In rare cases of their occurrence due to factors beyond human control, the guidelines suggest the emergency should be managed through certain pre-planned and established structural and non-structural measures to minimise risks to health, life and the environment.

Incident Response System: These guidelines provide directions and guidelines to central ministries and the states for an effective and well coordinated response. They suggest a multi-disciplinary, and systematic approach to guide administrative mechanisms at all levels of the government with scope for participation of private sector, NGOs, PRIs and communities to work together seamlessly in the response activities. The guidelines are applicable to the management of all incidents - natural or human-made.
The proposed methodology is expected to be equally useful for handling all kinds of incidents such as terrorism (Counter Insurgency), law and order situations, serial bomb blast, hijacking, air accidents, chemical, biological, radiological and nuclear (CBRN) disasters, mine disaster, port and harbour emergencies, forest fires, oil field fires and oil spills.

Strengthening of Safety and Security for Transportation of POL tankers: The guidelines envisage measures for prevention and for adoption of preparedness practices to a level that there is no chance of error. This calls for firming up the regulations, setting up of mechanisms of strict conformation, as well as fail proof functioning by each role player.

Management of Biological Disaster: The guidelines for management of biological disasters focus on all aspects of Biological Disaster Management (BDM) including Bio-terrorism (BT). It emphasises a preventive approach such as immunisation of first responders and stockpiles of medical countermeasures based upon risk reduction measures by developing a rigorous medical management framework to reduce the number of deaths during biological disasters, both intentional and accidental. These include the development of specialised measures pertaining to the management of biological disasters.

Management of Tsunami :The guidelines present an introductory overview on the tsunami risk and vulnerability in the country and the preparedness as a nation. It provides for structural mitigation measures and lay down strategies for protecting lifeline with the sea front besides laying down the guidance for developing the techno legal regime and giving an account of various tool kits for tsunami risk management.

Role of NGOs in Disaster Management: The guidelines discuss the role of NGOs in disaster preparedness, mitigation and response and spell out the institutional mechanism for improving the effectiveness of disaster management through effective coordination between NGOs and the government at different levels.

Urban Flooding: The guidelines aim to develop plans for the management of urban flooding with a view to guide the ministry and other government bodies for preparation of their disaster management plans on this aspect of disaster, recurrent in urban areas during monsoon. While reviewing the existing international and national practices for the design and maintenance of the urban drainage system, it addresses the issue of urban flood risk, vulnerability analysis and hazard mapping and provides for response action.

Management of Dead in the Aftermath of Disaster: These guidelines are aimed at institutionalising the standard procedure for proper management of dead bodies and animal carcasses in the aftermath of disasters.

Plan to counter threats to Municipal Water Supply and Water Reservoirs : The plan aims to counter any threat to municipal water supply and water reservoir in view of such a perception and taking into account the present water supply system and legislative framework. The plan suggests to framing a preparedness plan and also outlining the guidelines for a standard operating plan.

NDMA from time to time has also been organizing workshops on different issues related to disasters and publishing its reports for action by concerned Ministry or agency. Such reports are given as under

(i) **Training regime for disaster response:** The key to efficiency in disaster response does not lie in good equipment but in effective ongoing training of NDRF personnel. . The report on the training regime is the outcome of detailed needs analysis, followed by extensive research on good practices in disaster response training in vogue within the country and elsewhere in the world. The training regime so devised aims to help the process of capacity building of NDRF for efficient and effective discharge of its onerous responsibility.

(ii) **Pandemic Preparedness:** The outcome of the workshop held on the subject on 21- 22nd April, 2008 deals with the existing status of preparedness at different levels of the government and attached offices and inter-dependency of the sectors. The report presents the recommendations following two days of deliberations, on the subject.

(iii) **Revamping of Civil Defence set up in the country:** The changing scenario, reducing changes and occurrence of traditional wars, an steadily and increasing threat from natural and man- made disasters, with large scale devastation of life and property, warrants a greater role on the part of Civil Defence from merely hostile act-centric responsibility to a holistic role in all the facets of disaster management in the country. It recommends revamping the existing structure of civil defence for enhancing its functional responsibilities in realistic and cost effective manner.

Flood Management Guidelines in India:

Institutional Framework

As per the constitutional provisions, FM is a state subject and as such the primary responsibility for flood management lies with the states. The central government has taken various initiatives and set up a number of organisations dealing with the floods. The most notable one is the enactment of the National Disaster Management Act, December 2005 and setting up of the NDMA, which has been assigned to deal with all types of disasters including the floods. The National Executive Committee (NEC) with the Secretary of GOI of the ministry or department having administrative control of the subject of the DM as the Chairman and Secretaries of other ministries concerned and the Chief of the Integrated Defence Staff to the Chairman Chiefs of the Staff Committee (CISC) as Members, will assist the NDMA in the discharge of its functions and ensure compliance of the directions issued by the central government apart from preparing the National Disaster Management Plan. The state governments are to set up State Disaster Management Authorities (SDMAs) and State Executive Committees (SECs) to perform similar functions at the state level. These are in addition to existing organisations dealing with the floods in the states.

Flood Prevention, Preparedness and Mitigation

Floods being the most common natural disaster, people have, out of experience, devised many ways of coping with them. However, encroachments into the flood plains over the years has aggravated the flood problem and a need to take effective and sustained FM measures has been felt. Various measures, structural and nonstructural, have been taken by the central and state governments and as a result, considerable protection has been provided to the people. However, more efforts are required in this direction and there is a need to put in place a techno-legal regime to make structures flood-proof and regulate the activities in the flood plains of the rivers. Flood forecasting and warning and Decision Support System (DSS) will be established on a scientific basis taking into account the latest technological developments in the world.

Important Aspects of the Guidelines

While all the activities under the Guidelines are important for minimising flood risk and loss of lives and properties, the issues which need special attention are the following:

- Indiscriminate encroachment of the flood plains of the rivers and waterways of natural and man-made drainage channels and reclamation of ponds, chaurs, lakes and depressions have led to increased flood risk to lives and properties. The regulation of developmental activities in these areas and an appropriate techno-legal regime based on the model bill circulated by the CWC, is an urgent necessity.
- The change in priority in use of storage space of the multi-purpose reservoirs for irrigation, hydropower, drinking and industrial water supply by ignoring flood moderation has led to large scale flooding. The operation manuals and rule curves of all the reservoirs will be reviewed and modified to give priority to flood moderation.
- Flood forecasting and warning is a non-structural measure, which aims at minimising losses and enabling the agencies concerned to plan rescue and relief measures. The efforts of the CWC, IMD, NRSA and the state governments will be integrated and a mechanism developed wherein during the monsoon, the representatives of all these organisations and the basin states work together in formulation and dissemination of reliable forecasts and warning.

National Flood Risk Mitigation Project (NFRMP): NFRMP has been envisaged for mitigation or reduction in risk, severity or consequences of floods. It aims at ensuring that arrangements are in place to mobilise the resources and capability for relief, rehabilitation, reconstruction and recovery from disasters besides creating awareness among vulnerable communities. NDMA has been entrusted to prepare a Detailed Project Report (DPR) on Flood Risk Mitigation Project.

Flood Management Programme: The state governments are engaged in flood management work since the independence of the country. Upto the Tenth Five Year Plan, 45.6 million hectares (m-ha.) of flood prone areas in the country had been provided a reasonable degree of protection. The Eleventh Five Year Plan envisages protecting an additional area of 2.18 million hectares. Management of water resources is primarily the responsibility of the state governments. The schemes for Flood Control and Protection are therefore, to be planned, funded and executed by the state governments. The Government of India, under the aegis of Ministry of Water Resources has launched the "Flood Management Programme (FMP)" at a total cost of ` 8000 crores for the 11th Plan period (2007-12).

Earthquake management in India:

Critical Areas of Concern for the Management of Earthquakes in India

The critical areas of concern for the management of earthquakes in India include the:

- lack of awareness among various stakeholders about the seismic risk;
- inadequate attention to structural mitigation measures in the engineering education syllabus;
- inadequate monitoring and enforcement of earthquake-resistant building codes and town planning bye-laws;
- absence of systems of licensing of engineers and masons;
- absence of earthquake-resistant features in non-engineered construction in suburban and rural areas;
- lack of formal training among professionals in earthquake-resistant construction practices; and
- lack of adequate preparedness and response capacity among various stakeholder groups

In our present state of knowledge, earthquakes can neither be prevented nor predicted in terms of their magnitude, or place and time of occurrence. Therefore, the most effective measures of risk reduction are pre-disaster mitigation, preparedness and preventive measures for reducing the vulnerability of the built environment combined with expeditious and effective rescue and relief actions immediately after the occurrence of the earthquake.

Six pillars for earthquake management in India

1. Earthquake resistant construction of new structures
2. Selective seismic strengthening and retrofitting of existing priority structures and lifeline structures
3. Regulation and enforcement
4. Awareness and preparedness
5. Capacity development
6. Emergency response

National Earthquake Risk Mitigation Project (NERMP): Understanding the importance of the management of such hazardous situations caused by the earthquake, the Government of India has taken a national initiative for launching a project of 'National Earthquake Risk

Mitigation Project (NERMP). The proposed project aims at strengthening the structural and non-structural earthquake mitigation efforts and reducing the vulnerability in the high risk districts prone to earthquakes. Necessary risk mitigation measures are proposed to be put in place in the highly seismic zones. NDMA, tasked with this project has prepared a Detailed Project Report (DPR) which is under consultation with all the stakeholders. The proposed components of the project include techno-legal regime, institutional strengthening, capacity building and public awareness etc.

National Building Code (NBC): The National Building Code of India (NBC), a comprehensive building code, is a national instrument providing guidelines for regulating the building construction activities across the country. The NBC was first published in 1970 at the instance of Planning Commission and was revised in 1983. Thereafter three major amendments, two in 1987 and the third in 1997 were issued. Considering a series of further developments in the field of building construction, including the lessons learnt in the aftermath of number of natural calamities like devastating earthquakes and super cyclones, a project for comprehensive revision of NBC was taken up under the aegis of National Building Code Committee. The revised NBC has now been brought out as National Building Code of India 2005 (NBC 2005). The salient features of the revised NBC include meeting the challenges posed by natural calamities and reflecting the state-of-the-art and contemporary applicable international practices.

Efforts by Building Materials & Technology Promotion Council (BMTPC): The BMTPC undertook projects for retrofitting of life-line structures for generating awareness among the people as well as various government agencies about the need and techniques of retrofitting. The Council has initiated retrofitting of MCD school buildings in Delhi. It has further initiated a study of 250 bedded hall of Bara Hindu Rao Hospital, New Delhi. It has earlier carried out seismic strengthening and retrofitting of the sub-district hospital in Kupwara in Jammu & Kashmir, 442 structures in Gujarat and primary school buildings at Thano, Block Raipur and Dehradun. The experience on these retrofitted buildings is aimed to help people at large and the policy makers in particular in working towards reducing the vulnerability of lakhs of existing public and private buildings, thereby protecting most number of people in case of future earthquakes.

Initiative by Ministry of Panchayati Raj: It releases funds under Backward Regions Grant Fund (BRGF) for meeting critical infrastructural gaps and other developmental requirements. The ministry has financed several district plans under the BRGF for construction of panchayat buildings, anganwadi centres, school buildings, class rooms, roads, bridges, culverts etc. And restructuring of State Institutes for Rural Development (SIRD) buildings, block resource centres, panchayat training centers etc. The ministry has advised all the states that it is imperative for all such structures to be made disaster resilient in the line with the national vision of disaster management.

Tsunami management in India:

Important steps towards preparedness and mitigation against tsunami are:

1. Tsunami Vulnerability assessment
2. Tsunami early warning system and dissemination of the warning
3. Structural mitigation measures such as shelters, bio-shields, protection of critical infrastructure, structural audit of the sea front and coastal natural resources.
4. Regulation and enforcement of techno-legal regimes with regard to land use, coastal zones, monitoring of shelterbelt plantations and mangrove regeneration zones, etc.

5. Emergency response to tsunami through emergency search and rescue, incident response system, community based disaster response, involvement of the private sector, emergency medical response, etc.

Cyclone management in India:

National Cyclone Risk Mitigation Project (NCRMP) Initiative: The scheme aims to upgrade cyclone forecasting, tracking and warning systems, build capacity in multi-hazard risk management and to construct major infrastructures including multi-purpose cyclone shelters and embankments.

Principal Components: The major components under the scheme are as follows;

- Community mobilisation and training,
- Cyclone Risk Mitigation Infrastructure (construction of cyclone shelters, roads/missing links and construction/repair of Saline Embankments etc.),
- Technical assistance for capacity building on Disaster Risk Management (risk assessment, damage and need assessment),
- Capacity Building and knowledge creation along with project management and implementation support.

States covered**:** In the first phase of the project, states of Orissa and Andhra Pradesh are being covered.

Integrated Coastal Zone Management Project (ICZMP): Ministry of Environment and Forest (MoEF) has launched the ICZMP. The objective of the project is to assist GoI in building the national capacity for implementation of a comprehensive coastal management approach in the country and piloting the integrated coastal zone management approach in states of Gujarat, Orissa and West Bengal.

Landslides management in India:

'National Landslide Risk Mitigation Project' (NLRMP) has been proposed to be launched. It aims at strengthening the structural and non-structural landslide mitigation efforts, reducing the landslide risk and vulnerability in the hilly districts prone to landslides and mud flows and minimise the risks arising out of disasters in landslides.

Drought management in India:

The Department of Agriculture & Cooperation, under the Ministry of Agriculture, Government of India released a manual for drought management in November, 2009. The manual suggests for looking beyond the traditional drought management through famine codes for dealing with situations of mass hunger and collective penury. It focuses on plans which take into account all capabilities of the state to address the impact of drought i.e., focus on mitigation measures, tapping newer technologies, enabling the systems adapt to the new legal framework and including improvement and area development programmes in drought mitigation.

The National Institute of Agriculture and Extension (MANAGE), Hyderabad has been identified to launch a National Project for Integrated Drought Monitoring & Management, with MANAGE as the lead partner. A proposal submitted by MANAGES to implement this national project through available budgetary provisions of Department of Agriculture & Cooperation is under consideration. Another proposal to set up a National Institute of Drought Management is also under consideration of Ministry of Agriculture & Cooperation.

The Drought Prone Areas Programme (DPAP) and Desert Development Programme (DDP) are being implemented by the Government of India since 1973-74 and 1977-78 respectively. These programmes aim at drought proofing and minimising desertification of fragile areas in the arid, semi-arid and dry-sub humid regions often affected by severe drought conditions and desertification.

National Rainfed Area Authority in the Ministry of Agriculture has been set up to address the issue of drought mitigation on a long term basis. It comprises experts who provide knowledge inputs regarding systematic upgradation and management of the country's dryland and rainfed agriculture.

The Ministry of Agriculture & Cooperation has also undertaken some other measures to address the drought management including:

- Implementation of water harvesting conservation, artificial recharge of ground water, traditional water harvesting and conservation, water saving technologies like drip and sprinkler irrigation systems, improved water saving farm practices, long term irrigation management etc,
- Working towards convergence of lessons learnt from studies carried out by multiple institutions working in related fields such as Central Research Institute for Dry land Agriculture (CRIDA), International Crop Research for Semi-arid Tropics (ICRISAT), India Meteorological Department (IMD), National Remote Sensing Centre (NRSC) and Indian Council for Agricultural Research (ICAR), etc,
- Exploring practices such as harvesting cereal crops for fodder, supplemental irrigation if feasible, and ensuring availability of seeds when alternative crops are beneficial with logistic support from state and district machineries,
- Maximising efficient use of available surface and groundwater in drought prone areas i.e. to resort to drip and sprinkler practices wherever possible, particularly for commercial crops including fruit orchards,
- Undertaking construction of water shed structures at the right place to enhance water recharge for life saving irrigation at critical stages of crop growth and during drought situations, and
- Using optimally the services of Village Resources Centre established by Indian Space Research Organisation, ICAR, State Agriculture University and other organisations towards management of drought.

Nuclear Hazards

With increased emphasis on power generation through nuclear technology, the threat of nuclear hazards has also increased. The Department of Atomic Energy (DAE) has been identified as the nodal agency in the country in respect of man made radiological emergencies in the public domain. Nuclear facilities in India have adopted internationally accepted guidelines for ensuring safety to the public and environment. A crisis management system is also in place to take care of any nuclear hazard. In addition to the other types of emergency response plans in place within the facility to handle local emergencies, response plans have also been drawn up for handling such emergencies in the public domain, which are called as "off site Emergencies". These plans - *drawn up separately in detail for each site* - which are under the jurisdiction of the local district administration, cover an area of about 16 km radius around the plant or the off site Emergency Planning Zone.

Forecasting of disaster in India:

Disasters	Agencies
Cyclone	Indian Meteorological Department
Tsunami	Indian National Centre for Oceanic Information Services
Floods	Central Water Commission
Landslides	Geological Survey of India
Avalanches	Snow and Avalanche Study Establishment
Heat & Cold Waves	Indian Meteorological Department

DISASTER-WISE NODAL FORECASTING AUTHORITIES IN INDIA

National Emergency Operation Centre (NEOC)

The National Emergency Operation Centre (NEOC) in the Ministry of Home Affairs functions 24X7 to monitor the disaster or disaster like situation. Based on the feedback received from National Forecasting Agencies viz Indian Meteorological Department, Central Water Commission, Snow & Avalanche Study Establishment etc. advisories to the concerned States/UTs are issued from time to time for keeping watch on the developing situation and take necessary measures such as evacuation of the vulnerable persons, operation of relief camps, pre positioning of essential commodities etc.

During the south west monsoon, daily situation reports (sitreps) are prepared based on the feedback received from the affected States and concerned Central Ministries and organizations, and are sent to all concerned. During the calamities of severe nature, special situation reports are also prepared and issued to all concerned. NEOC also issue SMS alerts to the concerned officials of the concerned ministries to keep everybody updated and in the loop.

Policy for Acceptance of External Assistance

The present policy of Government of India is to not issue a formal appeal on behalf of the Government, either directly or through any other agency, to attract relief. However, relief donated on a voluntary basis are accepted and acknowledged as a sign of international solidarity. There is no objection to NGO's issuing appeals for donations provided it is clear that the appeals are not at the instance of the Government of India. In the case of UN organisations and agencies (like OCHA) such appeals would imply endorsement by member countries and they are advised against appeals for international assistance.

National Disaster Response Fund (NDRF)

Sourcing of National Disaster Response Fund (NDRF): The Government of India raised this Fund by levying the "National Calamity Contingency Duty" on imported petrol and products, crude oil, motor cars, imported multi utility vehicles, two wheelers, mobile phones, pan masala and certain specific tobacco products. The collection for year 2009-10 was ` 3160.00 crore and was expected to be around ` 3900.00 crore in the financial year 2010-2011. For the year 2011-12, the estimate is ` 4525.00 crores.

Disaster Response Reserve

In the context of disaster relief, the 13th Finance Commission has observed that procurement of relief materials on short notice is often associated with premium in pricing and could adversely impact quality. The Commission also felt that a national inventory of equipment and material should be maintained for providing immediate relief. The Commission has accordingly recommended an initial grant of `.250.00 crores in the form of a revolving fund to be provided to the NDRF for this purpose.

Capacity Building Grant

On the recommendation of the 13th Finance Commission, ` 525.00 crore has been allocated to the states for taking up activities for building capacity in the administrative machinery.

ISRO's role in disaster management:

The Disaster Management Support (DMS) Programme of ISRO, provides timely support and services from aero-space systems, both imaging and communications, towards efficient management of disasters in the country. The DMS programme addresses disasters such as flood, cyclone, drought, forest fire, landslide and Earthquake. These include creation of digital data base for facilitating hazard zonation, damage assessment, etc., monitoring of major natural disasters using satellite and aerial data; development of appropriate techniques and tools for decision support, establishing satellite based reliable communication network, deployment of emergency communication equipments and R&D towards early warning of disasters.

To support the total cycle of disaster/ emergency management for the country, in near real time, the database creation is addressed through National Database for Emergency Management (NDEM), a GIS based repository of data. NDEM is envisaged to have core data, hazard-specific data, and dynamic data in spatial as well as aspatial form.
Airborne ALTM-DC data acquisition is being carried out for the flood prone basins in the country. The development of flight model of C band DMSAR is nearing completion. SAR data was acquired over selected basins using Development model of DMSAR. Towards providing emergency communication for disaster management activities, and at the behest of Ministry of Home Affairs (MHA), ISRO has set up a satellite based Virtual Private Network (VPN) linking the National Control Room at MHA with DMS-DSC at NRSC, important national agencies, key Government Offices in Delhi and the Control Rooms of 22 multi-hazard-prone States. Further ISRO has developed and deployed INSAT Type-D terminals (portable satellite phones), INSAT based Distress Alert Transmitter (DAT) for fishermen, Cyclone Warning Dissemination System (CWCS) and DTH based Digital Disaster Warning System (DDWS) in disaster prone areas.

As part of R&D support to DMS for remote sensing applications, work on Tropical Cyclone Track intensity and landfall prediction, Earthquake Precursor studies, Coastal Vulnerability mapping and Early Warning of Landslides are being carried out.

The DMS programme is also supporting the many international initiatives by sharing data and information. Through International Charter "Space and Major Disasters" and Sentinel Asia (SA) initiative for supporting disaster management activities in the Asia-Pacific region, ISRO is providing IRS datasets and other information for use during major calamities.

INTERNATIONAL COOPERATION IN THE FIELD OF DISASTER MANAGEMENT

The Hyogo Framework for Action (mentioned above)

United Nations International Strategy for Disaster Reduction (UNISDR)
The UNISDR to serve as the focal point in the United Nations System for the coordination of disaster reduction and to ensure synergies among the disaster reduction activities of the United Nations Systems and regional organizations and activities in socio-economic and humanitarian field.

The mission of UNISDR is to be an effective coordinator and guide all its ISDR partners, globally and regionally, to:

- Mobilise political and financial commitments to disaster risk reduction and Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA);
- Develop and sustain a robust, multi stake-holder system;
- Provide relevant knowledge and guidance.

United Nations Disaster Assessment and Coordination (UNDAC)
The United Nations Disaster Assessment and Coordination (UNDAC) team is a stand-by team of disaster management professionals which are nominated and funded by member governments. OCHA, UNDP and operational humanitarian United Nations Agencies such as World Food Programme (WFP), United Nations Children's Fund (UNICEF) and World Health Organization (WHO). UNDAC is designed to assist the United Nations and governments of a disaster-affected country in meeting international needs for early and qualified information during the first phase of a sudden-onset of emergency as well as in the coordination of incoming international relief at the national level and/or at the site of the emergency.

United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA)
The United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) is designed to be the UN focal point on major disasters. Its mandate was also expanded to include the coordination of humanitarian response, policy development and humanitarian advocacy. OCHA is thus an interagency body, serving UN agencies and NGOs in the humanitarian domain. Its main product is the Consolidated Appeals Process, an advocacy and planning tool to deliver humanitarian assistance together in a given emergency.

International Search and Rescue Advisory Group (INSARAG)
INSARAG is a global network of more than 80 countries and disaster response organizations under the United Nations umbrella. INSARAG deals with urban search and rescue (USAR) related issues. INSARAG aims at establishing standards for international USAR teams and methodology for international coordination in earthquake response. Members of INSARAG are both earthquake-prone and responding countries and organisations. INSARAG was established in 1991, following initiatives of international search and rescue teams that responded to the 1988 Armenia earthquake.

Global Facility for Disaster Risk Reduction (GFDRR)
GFDRR was set up in September 2006 jointly by the World Bank, donor partners (21 countries and four international organisations), and key stakeholders of the International

Strategy for Disaster Reduction (UN-ISDR). It is a long-term global partnership under the ISDR system established to develop and implement the HFA through a coordinated programme for reversing the trend in disaster losses by 2015. Its mission is to mainstream disaster reduction and climate change adaptation in a country's development strategies to reduce vulnerability to natural hazards. At the national and local levels, it also includes other sectoral development strategies that the countries most vulnerable to natural disasters may undertake to alleviate poverty and address sustainable growth.

Asian Disaster Reduction Centre (ADRC)

The mission of the ADRC is to enhance disaster resilience of the member countries, to build safe communities and to create a society where sustainable development is possible. The Centre works to build disaster resilient communities and to establish networks among countries through many programmes including personnel exchanges in this field. Currently there are 29 member countries of ADRC. Each member country has to bear the annual contribution calculated on the basis of GDP. India is one of the founder members of ADRC. Presently India contributes about US $ 28,100 annually to ADRC as membership fees.

Key activities of ADRC are as under:

- Collaboration with UN organizations,
- To organise the Asian Conference on Disaster Reduction, an annual international conference for officials responsible for disaster reduction efforts in member countries and experts employed by the UN and other international agencies, for the purpose of sharing disaster information and reinforcing mutual cooperation between member countries and agencies,
- Systematic gathering of information on natural disaster and disaster reduction, setting up a database of Asian disaster-reduction information and sharing experiences for a Safer Asia including satellite data
- Development and application of the Global unique disaster Identifier Number (GLIDE) system: ADRC proposed a globally common, unique identification scheme for disaster events, as a tool for facilitating the sharing of disaster information archived by organisations around the world
- Human Resource Development by visiting research programmes, disaster reduction seminars and training courses;
- Promoting cooperation with member countries, international organizations and NGOs through cooperative projects with member countries;
- Disaster Reduction Projects in SAARC countries. At present using a special fund of Japan-
- SAARC, the ADRC has been conducting projects for Earthquake Risk Reduction and Recovery Preparedness (ERRP) Programme for the South Asian Region.

SAARC Disaster Management Centre (SDMC)

SAARC is association of South Asian countries for regional cooperation which was established on 16th January, 1987. It has eight member countries, namely Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka with its head quarters at Kathmandu. SAARC Disaster Management Centre (SDMC) was set up in October 2006 at the premises of National Institute of Disaster Management in New Delhi. The Executive Director of the NIDM is also the Director of SAARC Disaster Management Centre New Delhi. The Centre has the mandate to serve all eight Member Countries of South Asia Association of Regional Cooperation (SAARC) - by providing policy advice and facilitating capacity building services including strategic learning, research, training, system development and exchange of information for effective disaster risk reduction (DRR) and

management in South Asia. The Centre has developed its network with various organisations and institutions in the South Asian countries for research, documentation training and capacity building. and to promote better cooperation and understanding amongst the countries for holistic management of disasters.

The GOI-UNDP DRR Programme (2009-2012) has two components:
(i) Institutional Strengthening and Capacity Building for Disaster Risk Reduction (DRR)
(ii) Urban Risk Reduction (URR).

Program for Enhancement of Emergency Response (PEER)
The Program for Enhancement of Emergency Response (PEER) is a regional training programme initiated in 1998 by the United States Agency for International Development's, Office of U.S Foreign Disaster Assistance (USAID/OFDA) to strengthen disaster response capacities in Asia.

UNDMT:
In India, ten UN agencies comprise the UN Disaster Management Team (UNDMT): FAO (Food and Agriculture Organisation), ILO (International Labour Organisation), UNDP (United Nations Development Programme), UNESCO (United Nations Educational, Scientific and Cultural Organisation), UNFPA (United Nations Population Fund), UNHCR (United Nations High Commission for Refugees), UNICEF (United Nations Children's Fund). WFP (World Food Programme) and WHO (World Health Organisation). In January 2009, UNAIDS (Joint UN Programme on HIV/AIDS) became a member of the UNDMT.

Role of the UNDMT:
Information-sharing: Providing a common platform for ideas, information, strategies, approaches, activities, plans and programmes with respect to disaster risks and preparedness;

Internal capacity building: Facilitating capacity building and skills development of members with critical expertise to support actors in disaster management through training, joint activities and sharing lessons learnt experiences;

Ensuring quick response: Updating the Disaster Preparedness Plan by synergising individual UN agency plans to ensure early, effective and coordinated UN response to an emergency;

Enhancing partnerships: Providing an interface with various actors such as Government, Bilateral/ Donor agencies, National and International NGOs, Community-based organisations and communities through involvement in workshops and consultations with a view to promote partnerships;

Programming: Serving as the platform for UNDAF Disaster Risk Reduction development.

Bilateral cooperation: India cooperates with many nations on disaster management. Important ones are the US, Russia, Switzerland, the EU, etc.

Supreme Court on disaster management:

A bench headed by Justice AK Patnaik sought response from the Centre, the states and the Union Territory of Andaman & Nicobar Islands on a PIL alleging that governments have failed to implement in true spirit the act which was passed in 2005. The six other states issued the notice are Tamil Nadu, Odisha, Andhra Pradesh, Maharashtra, West Bengal and Gujarat.

Thirteenth Finance Commission and disaster relief

- The National Calamity Contingency Fund (NCCF) should be merged with the National Disaster Response Fund (NDRF) and the Calamity Relief Fund (CRF) with the State Disaster Response Funds (SDRFs) of the respective States.
- Contribution to the SDRFs should be shared between the Centre and states in the ratio of 75:25 for general category states and 90:10 for special category states
- The total size of the SDRF has been worked out as Rs. 33,581 crore, to be shared in the ratio given above, with an additional grant of Rs. 525 crore for capacity building.
- Assistance of Rs. 250 crore to be given to the National Disaster Response Force to maintain an inventory of items required for immediate relief.
- Mitigation and reconstruction activities should be kept out of the schemes funded through FC grants and met out of overall development plan funds of the Centre and the states.

UTTARAKHAND DISASTER

The Disaster: floods and landslides.
Primary reason: unprecedented prolonged heavy rainfall.
Cause of primary reason: The interaction between the well-formed low-pressure system of the south-west monsoon from east to west and the upper air westerly trough running from north-west Rajasthan to the east that resulted in the heavy rainfall over Uttarakhand. In fact, the westerly system dragged the monsoon trough, which was anchored over Rajasthan and central India until then, towards the north across Haryana. A monsoon trough facilitates the movement of rainfall-causing low-pressure systems along its path. Its rapid movement northwards enabled the low-pressure system that was in the eastern part of the country to quickly traverse and locate itself over north-west India.

Associated clamtological, geomorphological and other natural factors leading to the disaster: The region around Kedarnath is known to geologists to be prone to landslides. The massive destruction was the result of large-scale debris carried by the huge volume of water from the upper reaches above the town. One of the compounding factors was that the glacial regions above Kedarnath had received fresh and excess snowfall when heavy rainfall hit the region. Rainwater, with higher temperature, falling on the snow must have led to heavy snow melt and this runoff would have added to the rainwater runoff, resulting in a huge water flow that carried with it a huge debris flow, which struck the town with enormous ferocity. The National Remote Sensing Centre identified a total of 192 landslides in this Himalayan stretch, of which many landslides were triggered in the glacial regions in the mountains above Kedarnath. The large-scale debris flows from above were the result of these massive landslides.

On the basis of the pattern of overlay of sediments and their nature, the flow from the north-west occurred after the one from the north-east. The debris flow from the north-east was triggered by a large, 75 m wide, landslide caused by heavy rainfall high on the mountains, which then came down the steep slope about 500 m, gathering the debris in its path. The flow was initially channelled into a narrow gully formed by the glacier and on exiting it the flow spread out in the floodplains before striking the town over a large area. The steepness of the slope would have given the debris enormous velocity when it struck the town. The total length traversed by this debris flow is estimated to be about 1,200 m.

The event from the north-west was, however, quite different. A moraine, which had created a block for a basin to form, allowing the water to build up in it as a pool or a lake, which is what the local people call the Chorabari Tal, to which, in fact, pilgrims trek a few kilometres along the west side of the valley to have a dip.

The water not only filled up the lakes and rivers that overflowed but also may have caused breaching of moraine dammed lakes in the upper reaches of the valley. Eyewitness accounts say a huge wall of water swept the Kedarnath town in a flash. The moraine had been breached by the rapidly building up water because of heavy rainfall and the water overtopping the moraine wall. The breach led to the sudden release of the impounded water and resulted in a massive wall of water sweeping across the Kedarnath valley and the town and causing a huge flash flood.

According to the NRSC scientists, this lake would have had a depth of about 15 m, and the event was not exactly a glacial lake outburst flood (GLOF), which occurs when a dam or moraine wall is breached because of the sheer pressure exerted by the stagnant glacial water

and ice that it encloses. This was a case of lake flooding because of excessive rainfall and consequent overtopping of the moraine wall, which eventually breached.

Geomorphological study of the area indicates that the surface slopes consist mostly of glacial, fluvio-glacial, or fluvial materials, which are mostly unconsolidated and loose in nature. Geologically, the rocks in this area are found highly deformed, degraded and dissected by structural discontinuities and drainages.

Seismo-tectonically, the area is traversed by several lineaments, faults and thrusts, which are considered to be geodynamically active.

The drainage studies indicate a migratory or shifting nature of the river systems that causes aggradations on the concave end of the river and degradation or toe erosion on the convex part of the river. Due to morphological setting of the area, the river has high sinuosity and hence, high level of erosive capacity, especially when it is loaded with sediments (the erosive power of river with sediments is almost square of the erosive power without sediments).

Aggravating factors:

1. The area has been denuded to a great extent due to deforestation and tree cutting for road construction, and other activities such as building construction, mining and hydel projects. It has also resulted in increased surface flow and rise of river bed due to disposal of debris in the river. Statistics of the forest department show that between 2000 and 2010. as many as 3,903.24 hectares (ha) forestland was diverted for mining projects.

2. Hydel power projects: There is a rush to construct mini- and micro-dams on Himalayan Rivers in order to tap the maximum potential of hydroelectric power. Although many of these dams are run-of-the-river and not storage dams, they still disturb the environment because they require rivers to be diverted through tunnels to generate power. The construction of these tunnels and other infrastructure unsettles the mountainous terrain and in the event of an earthquake, or even a cloud burst, contributes to a greater quantity of rocks and sediment crashing down. Micro and mini projects, or run-of-the-river ones, may not be as destructive as large storage dams, yet the cumulative effect of scores of these on the river, its flow patterns and carrying capacity and the local ecology may be significant. Most of the 69 projects are lesser than 25 MW. But even small run-of-the river projects can cause severe damage to the rivers. They re-route water through tunnels, cutting through mountains to increase the pressure, leaving long stretches of river dry for instance, the 10 MW Madhya Maheshwar SHP plant in Uttarakhand uses a 4 km-long tunnel to divert water. What's more, a large number of these projects are at very short distances from each other, leaving little space for rivers to regenerate and revive. What has to be evaluated is the fragility of the entire region and whether multiple interruptions of natural river flows are sustainable. Such an assessment has not been made while clearing hydroelectric projects. And even if the building of such dams cannot be linked directly to the recent calamity, it is imperative that the entire dam-building exercise be looked at afresh. This is important not just for Uttarakhand but also for the entire region and beyond.

3. Construction on flood plains and low lying areas: successive governments in Uttarakhand have failed to formulate land use and development policies that are ecologically sensitive and sensible. As a result, buildings were permitted on floodplains of the very rivers that today have wreaked such destruction.

4. Unregulated increase in tourist flow: The increase in such unsafe construction is linked to the noticeable increase in religious tourism in recent years. While this brings in substantial revenues to the state and also provides employment to many in the region, the pressure of hundreds of thousands of additional people within a short time span can adversely affect local ecologies. For instance, while in the past pilgrims would walk or use horses and ponies to make their way to shrines in the upper reaches of Uttarakhand, today they can travel by cars, jeeps and even helicopters. Such tourism has also increased the demand for accommodation and other facilities, an inevitable outcome of a growing "yatra" economy. In the past decade, the number of tourists has risen by 155 per cent, the state's tourism department data shows. Last year, 28.4 million tourists visited the state between May and November. The state's population is 14 million.

5. Large number of tourists in the town at the time of disaster: Tourists, as opposed to locals, are less capable of enduring any disaster in that area. The social capital of the locals is much higher than the tourists. The first to respond in any disaster are the locals and hence they are much better disposed to endure the disaster.

6. Even though the Central government is aware of the gravity of the situation and has initiated some half-hearted measures such as declaring a 130-kilometre stretch of the Ganga, from Gangotri to Uttarkashi, an eco-sensitive zone, logical follow-up measures for example, putting an immediate end to all construction activities or banning sand mining and blasting of hills—have not been taken.

7. Climate change: The Indian Institute Of Tropical Meteorology has stated that the "moderate" rainfall events are on the decline in India in the recent past and the "intense" rainfall events are on the rise. While a direct link between the current disaster and climate change cannot be established for sure, yet the number of such "unprecedented" rainfalls will most likely rise in the coming future.

Lack of disaster preparedness:

1. Lack of early warning systems: If a warning system had been in place, such as radars and climate prediction instrumentation, some of the damage could have been mitigated. The world over, such systems have helped minimise loss of life. Despite knowing that such destructive floods can happen given the terrain of the region, Uttarakhand does not possess basic climate forecasting equipment and has to depend on the neighbouring states of Punjab and Uttar Pradesh to get this information.
2. Essential links missing in disaster response system: Uttarakhand apparently had prepared a disaster management plan in 2007 but going by its response to this crisis, it is evident that essential elements were not in place.

Poor coordination between disaster management agencies amplified the impact: Despite warnings from the India Meteorological Department (IMD), the state machinery could not crank itself up to meet the challenge. On June 16 and 17, IMD warned of "extremely heavy rainfall" (244.5 mm and above).

At 9 a.m. on June 15, IMD's Dehradun centre issued a bulletin to the state government that five places in the state Joshimath, Badrinath, Kedarnath, Yamunotri and Gangotri would receive "rather heavy" to "extremely heavy rainfall" in the next 72 hours. IMD advised pilgrims to cancel their travel up the hills. The State Disaster Management Authority (SDMA) was also intimated but did not know what to do.

The state is among five in the country to have Disaster Mitigation and Management Centre (DMMC), an autonomous body for disaster management. Once SDMA and DMMC receive the warning, they should relay it to district magistrates. Every district should have a district disaster management authority (DDMA), which should comprise people who can interpret IMD data.

On June 16, state government officials did nothing more than issue an advisory about open and blocked roads. Soon, heavy downpour caused floods and landslides. Mud and debris from hill slopes cut off vital road linkages within the state. Twelve bridges crumbled. On June 17, the state government finally shook off its inertia. The chief secretary held a meeting with the state disaster management team and issued an alert that rescue operations should begin on June 18. But by this time most of the damage had been done.

CAG report on Uttarakhand's disaster preparedness: Institutional Apathy and dysfunction For a State like Uttarakhand where massive landslides have been an annual feature, the government should have an agency ready to spring into action the moment there is any such incident, especially during the peak tourist season. The State, in fact, has none. The State Disaster Management Authority (SDMA), constituted in 2007 and headed by the Chief Minister, has not even prepared the mandatory disaster management plan yet. The executive committee of this body, which is supposed to advise the SDMA, and which came into being in 2008, has not met even once. SDMA was formed in 2007. But five years later, it is yet to frame a disaster management plan, the Comptroller and Auditor General (CAG) of India, which audited SDMA, stated in its report. CAG also pointed out that only 66 of the 117 sanctioned posts in the state authority have been filled up.

Uttarakhand, despite having a history of natural disasters, had not even mapped the frequency and intensity of the various types of disasters it had suffered; that there was no early warning system; and that the communications system was inadequate. Moreover, the villages identified as vulnerable by the Geological Survey of India had not been shifted or any precautions taken. The CAG reported that the State had mismanaged the disaster response fund as well, resulting in the Centre not releasing this fund in 2011-12.

According to the CAG report, the National Disaster Management Authority (NDMA), which was constituted in the wake of the Gujarat earthquake and the tsunami and is chaired by the Prime Minister, has not fared any better. The NDMA suffers from "critical gaps" in its preparedness for calamities, making it largely ineffective when responding to the numerous disasters the country faces, such as floods and earthquakes, says the report.

The CAG report says that the NDMA has not only failed to formulate a disaster management plan, but it is yet to complete even a single mitigation and vulnerability mapping project. These include hazard mapping for floods, landslides, and earthquakes; rolling out a national school safety plan; establishing a mobile system for detecting radiation; and building a nationwide disaster communication network. Its national executive body has not met even once between 2008 and 2012, the CAG report says.

Significantly, the one body that is active on this front is the Disaster Management and Mitigation Centre, an autonomous body which is abominably understaffed. It has 120 personnel, of whom 30-40 are permanently in the field.

This when around 76 per cent of India's coastline is prone to cyclones and tsunamis and 59 per cent of the country is vulnerable to earthquakes, 10 per cent to floods and river erosion, and 68 per cent to droughts.

Road to recovery:

1. **The Himalayan states must build a viable and sustainable forest-based economy**: The standing forests of the region are an important reservoir of biodiversity; these provide protection against soil erosion and increased flooding in the plains and are sinks for carbon. One way ahead would be to develop a strategy to "pay" for these ecosystem services of the standing forests of the region and to ensure that the proceeds are shared with local communities. The 12th and 13th Finance Commissions have included the concept of compensating states for standing forests in its report. Unfortunately, the funds provided for these services are meagre. More importantly, no money has been given to states as yet. The Himachal Pradesh government is currently working on assessing the ecosystem and carbon sequestration services of its standing forests. This issue should be discussed and a common policy evolved so that Himalayan states can "value" their forests better.

   This policy must also include the voices and concerns of local communities, dependent on forests for their agriculture and basic needs. All studies in the high Himalayan villages show the role of forests most crucially as fodder and water sources for sustaining agriculture in this region. How can forests be used to build local economies has to be the big question.

2. **Tourism that is not destructive**
   1. Build an inventory of key pilgrimage sites in the state, with an understanding of its ecological capacity based on location and fragility
   2. Immediately control the number of visitors to important pilgrimage sites. These restrictions on the key and most important pilgrimage sites can be done immediately and can be further revised based on the carrying capacity estimates
   3. Ban construction of roads for the movement of pilgrims and tourists to within 10 km of the high-altitude pilgrimage areas in order to create an ecological and spiritual buffer. These areas, like national parks and sanctuaries, should be maintained as special areas, which are maintained with minimal human interference to help us connect with nature
   4. Similar to sanctuaries and national parks, create a provision of buffer areas, surrounding the pilgrimage sites, where development is restricted. To build local interest in these areas, strictly enforce rules to give communities living in the area advantage of the pilgrimage activities
   5. Use the carrying capacity action plan to create facilities for tourists, particular facilities for sanitation and for garbage disposal
   6. Make it mandatory for expeditions to remove and take back all non-degradable items. This can be enabled through a security deposit and check on the items being carried for the expedition. Create local community interest in management of these sites.
   7. Promote homestead tourism, instead of five-star tourism, based on policy incentives. These incentives would include fiscal benefits provided to house-owners for providing tourist related facilities
   8. Regulate homestead tourism through a third-party audit and certification programme, which would promote good practices in the tourist complexes

9. Use the certification programme to include rating of key environmental sustainability guidelines – like reuse and recycling of waste and energy efficiency and renewables. This will involve tourists also in understanding the special needs of the Himalayas and their role in protecting its beauty

10. Increase the rate of entry tax charged by all hill towns. This tourism tax for entry into fragile ecosystems should be increased substantially and across the board in all towns of the Himalayas. The fund created from this tax should be used for a dedicated purpose of increasing facilities for tourists. (For instance, Costa Rica has a tourist surcharge, charged from every hotel based on its occupancy for eco-development).

11. Impose high charges for parking of private vehicles in markets and fragile areas of hill towns, which will also restrict the number of vehicles being allowed into the areas and reduce pollution and congestion

3. **The strategy for water development must balance the opportunity for energy and threat to livelihood, particularly in the age of changing climate and hydrology**
We need to understand the impact of this development on the ecology and hydrology of the region. It is feared that the hydrology will be impacted because of climate change and extreme events. This flood in Uttarakhand has seen hydropower projects badly affected. It is also clear that the impact of the flood was exacerbated because of the number and poor construction of the hydropower projects. These projects must be reviewed and many scrapped. Cumulative EIA Cumulative assessment becomes even more important in case of hydropower projects on a river system to understand the impact of the existing projects on the ecology and how feasible is it to build new projects in the same basin.

Scientists say there is a need to review dam building concepts such as Design Flood. This ensures that the dam can hold enough water to avert even a disastrous flood that may occur once in a hundred years. But the Indian standard for fixing criteria for design flood for safety of dams does not directly incorporate the concept of hazard,

The policy for water-based energy in the region needs to be carefully balanced to take these concerns into account. The policy should lay down mandatory ecological flow provisions (at least 50 per cent in lean season); a distance criterion (5 km) and tough enforcement measures and penalties for ensuring that construction of the project does not harm the mountain stability or local water systems. It must be noted that while rivers cannot and must not be re-engineered, dams can be re-engineered to optimize on available water for energy generation.

4. **The need for energy in remote villages must be secured first, before export to regions outside**
Given the cost of reaching conventional energy to the remote households of this region, there is an opportunity to develop an alternative model for energy use in this region. Today people in the region have no alternative but to use firewood for their cooking and scarcely available kerosene for their lighting needs. Small hydropower projects (below 25 MW) were conceived initially to provide a local energy source. However, over time, in the Ganga basin as with other key basins, this concept has been changed so that all projects now feed to the national/state grid, which may or may not reach local communities. The rationale provided is that the national grid is more reliable and so more efficient to distribute energy.

But given the lack of access of energy to households in these remote regions of the country, there is a need to rethink the objectives. It is also a fact that the losses in the current transmission and distribution system practically wipe out the gains made from such small

projects. The purpose of building small projects must be to provide local energy supply through interactive grids (as being done in Nepal, for instance).

5. **Promote local organic agriculture and its produce as speciality, high value premium produce of a fragile ecology**
   Organic agriculture, if promoted properly, has the potential to preserve and protect the delicate ecology of this Himalayan state while promoting the fortunes of the farmers as well.

6. **Use ecosystem-based tourism for development but with safeguards and local benefits:**
   High mountain adventure, biodiversity and nature tourism is the most obvious route to economic development in the Himalayas. There is a problem of pollution, litter and solid waste disposal in most high Himalayan tourist sites. Construction activity is unchecked; in most cases hotels and lodges come up in the most fragile areas.

   The move towards eco-tourism needs to be promoted carefully so that best practices can be learnt and disseminated. Most importantly, local people must benefit from the tourism economy. In Leh, for instance, where the government has consciously promoted homestead tourism, there is greater attention to fighting pollution in the town and protecting the ecology. We need policies to promote mountain tourism for local benefits (see box).

7. **Build policies for sustainable urbanisation in the mountains**
   These towns need to be planned, particularly keeping in mind the rush of summer tourists and the fact that tourists do not pay for municipal services. Many states have experimented from banning plastics, to taxing tourists – to better respond to these issues. But they need support and new thinking on everything – on traditional architecture practices, local water management through protection of lakes and different systems of sewage and garbage management.
   It would be important to devise strategies for consolidation of urban settlements, which are governed through land-use planning incorporated in the municipal master plan and are provided all facilities, before further growth is permitted. It is also important given that buildings in these towns are based on the local ecosystem, taking into account seismic fragility and the need for aesthetics. All this will require the creation of strong regulatory institutions in the towns.

   The municipal byelaws must provide for construction activity to be banned in areas, which fall in hazard zones or areas close to rivers, springs and watersheds of the towns. In many cases these provisions exist in the byelaws, but have not been strictly enforced. There needs to be a zero-tolerance policy on these matters.

8. **Road to development**
   Road construction in the state has caused deforestation and soil erosion, leading to uprooting of large trees; disturbance in geological strata, disturbances in water resources, impacted biodiversity, caused pollution and destroyed medicinal wealth, according to the draft state action plan on climate change. The document also claims that the public works department is aware of the implications of climate change and is committed to taking steps to minimize the environmental footprint of the roads sector. If the plan is cleared, new road construction may happen after an environmental impact assessment and geological investigations and without blasting operations.

9. State's Low carbon growth plan

Broadly, the initiatives the state government wants to undertake include a low carbon development strategy, integrate climate concerns in all aspects of development and build a climate resilient development model. How this will be achieved remains a big question. For instance, to increase resilience, the plan aligns itself with the National Mission for Sustaining the Himalayan Ecosystem, which is one of the eight missions under India's National Action Plan on Climate Change. The reality is the mission, despite being around for five years now, is focused only on capacity building without producing any results.

These issues are not new. But what is new is the need to respond more urgently to the changes that are beginning to be seen in this climate vulnerable region. It is also clear that development will be critical for the region to cope with climate change and its variability. This is the opportunity to use new models of development, based on the region's ecology and traditional knowledge and culture, to build an economy capable of withstanding these changes.

NIDM report on Uttarakhand disaster:

Cause of the disaster: heavy precipitation resulted into the swelling of rivers, both upstream as well as downstream areas. Besides the rain water, a huge quantity of water was probably released from melting of ice and glaciers due to high temperatures during the month of May and June. The water not only filled up the lakes and rivers that overflowed but also may have caused breaching of moraine dammed lakes in the upper reaches of the valley, particularly during the late evening on 16 June and on the next day i.e. 17 June 2013. Numerous landslides also took place after these heavy rains and toe erosion of the slopes by the high velocity and volume of water loaded with sediments, stones, rocks and sand.

Geomorphological study of the area indicates that the surface slopes consist mostly of glacial, fluvio-glacial, or fluvial materials which are mostly unconsolidated and loose in nature. The drainage studies indicate a migratory / shifting nature of the river systems that causes aggradations on the concave end of the river and degradation / toe erosion on the convex part of the river. Due to morphological setting of the area, the river has high sinuosity and hence, high level of erosive capacity, especially when it is loaded with sediments (the erosive power of river with sediments is almost square of the erosive power without sediments). The area has been denuded to a great extent due to deforestation and tree cutting for road construction, building construction, mining, hydel projects etc. It has also resulted into increased surface flow and rise of river bed due to disposal of debris into the rivers. Geologically, the rocks in this area are found highly deformed, degraded and dissected by structural discontinuities and drainages. Seismo-tectonically, the area is traversed by several lineaments, faults and thrusts, which are considered to be geodynamically active.

Transformation of hazard into disaster: The hazard turned into a major disaster when people along with their properties and infrastructure occupied such areas without adequate information, knowledge, awareness and preparedness against the potential disaster. As June is a month for pilgrimage by the Hindus and Sikhs, most of the people prefer to visit the temples at Kedarnath, Badrinath and Hemkund Sahib before the monsoon begins. A huge crowd was present in the valley as tourists, pilgrims and trekkers besides the local population, business-men, tour / lodge / guest house operators etc. When the water in the river started growing, these people could not understand what is likely to happen next. By the time, they realized the event, they were already trapped into it and could not find ways to escape. Thus, a large number of people ran to safety on the uphill sides and many of them even tried to

quickly cross the swollen fast flowing river that engulfed them as it appeared in furious mood with lot of big stones and sediments. The river Mandakini changed its course to the west side when the moraine dammed lake at Gandhi Sarovar breached. The sediment loaded river began eroding / dumping whatever came in its way. Most of hotels, shops and guest houses / lodges were located on this side and got washed by the river water, killing many of the people who were present there.

Relief and rescue operation: Relief and Rescue Operations were being carried by various agencies including Army, Air Force, ITBP, NDRF, BRO, S&R teams of the State, District Administration, Police, Local community, NGOs etc. in the Kedarghati, Hemkund Sahib, Badrinath and other disaster struck areas. The helicopter operations for relief and rescue were adversely affected by the bad weather conditions in the affected area. The work done by the Army under Operation Surya Hope is laudable and highly appreciable for saving several lives. Besides the rescue with the helicopters, balley bridges, rope bridge, timber bridges and other such quick launch bridges or trolleys etc. were built quickly across the river to help them cross the valley. The surviving victims were provided with food, water, clothes, medicine, shelter and some amount of money through the relief operations. Those persons who were evacuated from the disaster struck areas were sent by helicopter or road conveyances to Dehradun, Haridwar and other down- stream areas. The representatives from various states as well as the family members/relatives/friends of the victims have also arrived at Dehradun to take them back home. The State Emergency Operation Centre at Dehradun issued regular bulletin about the persons rescued, trapped, missing, killed etc. through website, emails and SMS services. The control rooms were operational in the district headquarters where Additional District Magistrate along with District Project Officer (Disaster Management) and Sub Divisional Magistrate were monitoring and supervising all the relief and rescue works at the district level. Chief Minister of the State, Minister for Disaster Management, Chief Secretary, Principal Secretary (Disaster Management) and Executive Director, Disaster Mitigation and Management Centre were among the main functionaries involved in these operations at the state level.

General background info on Uttarakhand

Uttarakhand, formerly Uttaranchal, is a state in the northern part of India. It is often referred to as the "Land of the Gods" due to the many holy Hindu temples and pilgrimage centres found throughout the state. Uttarakhand is mainly known for its natural beauty of the Himalayas, the Bhabhar and the Terai. On 9 November 2000, this 27th state of the Republic of India was carved out of the Himalayan and adjoining north-western districts of Uttar Pradesh. It borders the Tibet Autonomous Region on the north; the Mahakali Zone of the Far-Western Region, Nepal on the east; and the Indian states of Uttar Pradesh to the south and Himachal Pradesh to the northwest. The state is divided into two divisions, Garhwal and Kumaon, with a total of 13 districts. The high court of the state is in Nainital. Uttarakhand is the only state in India with Sanskrit as one of its official languages.

Two of the most important rivers in Hinduism originate in the region, the Ganga at Gangotri and the Yamuna at Yamunotri. These two along with Badrinath and Kedarnath form the Chota Char Dham, a holy pilgrimage for the Hindus. The state hosts the Bengal tiger in Jim Corbett National Park, the oldest national park of the Indian subcontinent. The Valley of Flowers, a Unesco World Heritage Site located here, is known for the variety and rarity of the flowers and plants found there.

History

The name Uttarakhand finds mention in early Hindu scriptures as the combined region of Kedarkhand (present day Garhwal) and Manaskhand (present day Kumaon). Uttarakhand was also the ancient Puranic term for the central stretch of the Indian Himalayas.

Among the first major dynasties of Garhwal and Kumaon were the **Kunindas** in the 2nd century BCE who practised an early form of Shaivism and traded salt with Western Tibet. It is evident from the Ashokan edict at Kalsi in Western Garhwal that Buddhism made inroads in this region. Folk shamanic practices deviating from Hindu orthodoxy also persisted here. However, Garhwal and Kumaon were restored to nominal Brahmanical rule due to the travails of **Shankaracharya** and the arrival of migrants from the plains.

Between the 4th and 14th centuries, the Katyuri dynasty dominated lands of varying extent from the Katyur (modern day Baijnath) valley in Kumaon.

The historically significant temples at **Jageshwar** are believed to have been built by the Katyuris and later remodelled by the Chands. Other peoples of the Tibeto-Burman group known as **Kiratas** are thought to have settled in the northern highlands as well as in pockets throughout the region, and are believed to be ancestors of the modern day Bhotiya, Raji, Buksha, and Tharu peoples.

By the medieval period, the region was consolidated under the Garhwal Kingdom in the west and the Kumaon Kingdom in the east. During this period, learning and new forms of painting (the **Pahari School of art**) developed. Modern-day Garhwal was likewise unified under the rule of **Parmars** who, along with many Brahmins and Rajputs, also arrived from the plains. In 1791 the expanding Gurkha Empire of Nepal overran Almora, the seat of the Kumaon Kingdom. In 1803 the Garhwal Kingdom also fell to the **Gurkhas**. With the conclusion of the **Anglo-Nepalese War in 1816**, the Garhwal Kingdom was re-established from a smaller region in Tehri, as the larger portion of Tehri, along with eastern Garhwal and Kumaon ceded to the British as part of the Treaty of Sugauli.

On 24 September 1998, the Uttar Pradesh Legislative Assembly passed the Uttar Pradesh Reorganisation Bill, which began the process of creating a new state. Two years later the Parliament of India passed the Uttar Pradesh Reorganisation Act 2000, and thus, on 9 November 2000, Uttarakhand became the 27th state of the Republic of India.

Uttarakhand is also well known for the mass agitation for non-violent protest. One of Chipko's most salient features was the mass participation of female villagers. Both female and male activists played pivotal roles in the movement, including Chandi Prasad Bhatt, Sundarlal Bahuguna, and Ghanasyam Raturi, the popular Chipko poet.

Geography

Uttarakhand has a total area of 53,484 km², of which 93% is mountainous and 64% is covered by forest. Most of the northern part of the state is covered by high Himalayan peaks and glaciers, while the lower foothills were densely forested till logged by British log merchants and, after independence, by forest contractors. Recent efforts in reforestation, however, have begun to restore the historical environment. The Himalayan ecosystem provides habitat for many animals (including bharal, snow_leopards, leopards and tigers), plants, and rare herbs. Two of India's largest rivers, the Ganges and the Yamuna, originate in the glaciers of Uttarakhand, where they are fed by myriad lakes, glacial melts and streams.

The highest elevations are covered by ice and bare rock. Below them, between 3,000 and 5,000 metres (9,800 and 16,000 ft) are the western Himalayan alpine shrub and meadows. The temperate western Himalayan subalpine conifer forests grow just below the tree line. At

3,000 to 2,600 metres (9,800 to 8,500 ft) elevation they transition to the temperate western Himalayan broadleaf forests, which lie in a belt from 2,600 to 1,500 metres (8,500 to 4,900 ft) elevation. Below 1,500 metres (4,900 ft) elevation lie the Himalayan subtropical pine forests. The Upper Gangetic Plains moist deciduous forests and the drier Terai-Duar savanna and grasslands cover the lowlands along the Uttar Pradesh border in a belt locally known as Bhabhar.

Demographics

Uttarakhand has a multiethnic population spread across two geocultural regions: the Gahrwal, and the Kumaon. A large portion of the population is Rajput (various clans of landowning rulers and their descendants)—including members of the native Garhwali, Gujjar, and Kumaoni communities, as well as a number of immigrants. Approximately one-fifth of the population belongs to the ScheduledCastes. Scheduled Tribes such as the Raji, who live near the border with Nepal, constitute less than 5 percent of the population. More than four-fifths of Uttarakhand's residents are Hindus.

The Garhwali and Kumaoni dialects of Central Pahari are spoken in Kumaon and Garhwal regions, respectively. Jaunsari and Bhotiya dialects are spoken by tribal communities in the west and north, respectively. The urban population, however, converses mostly in Hindi, which is an official language of the state. Uttarakhand is the only Indian state to give official language status to Sanskrit.

Description	2011	2001
Actual Population	10,086,292	8,489,349
Male	5,137,773	4,325,924
Female	4,948,519	4,163,425
Population Growth	18.81%	19.20%
Percantage of total Population	0.83%	0.83%
Sex Ratio	963	964
Child Sex Ratio	890	967
Density/km2	189	159
Area km2	53,483	53,483
Literacy	78.82 %	71.62 %
Male Literacy	87.40 %	81.02 %
Female Literacy	67.06 %	63.36 %

Culture

Uttarakhand's diverse ethnicities have created a rich literary tradition in languages including Hindi, Kumaoni, Garhwali, Jaunsari, and Bhotiya. Many of its traditional tales originated in the form of lyrical ballads and chanted by itinerant singers and are now considered classics of Hindi literature. Ganga Prasad Vimal, Manohar Shyam Joshi, Shekhar Joshi, Shailesh Matiyani, Shivani, Mohan Upreti, and Jnanpith awardee Sumitranandan Pant are some of the major literary figures from the region. Prominent philosopher and environmental activist Vandana Shiva is also from Uttarakhand.

Langvir nritya is a dance form for males that resembles gymnastic movements. **Barada nati folk dance** is another famous dance of Dehradun, which is practised during some religious festivals. Other well-known dances include hurka baul, jhumeila, chaufula, and chholiya.

Popular types of folk songs include mangals, basanti, khuded and chhopati. These folk songs are played on instruments including dhol, damoun, turri, ransingha, dholki, daur, thali, bhankora, and masakbhaja. Music is also used as a medium through which the gods are invoked. *Jaagar* is a form of ghost worship in which the singer, or *jagariya*, sings a ballad of the gods, with allusions to great epics, like Mahabharat and Ramayana, that describe the adventures and exploits of the god being invoked. Narendra Singh Negi is a popular singer of the region.

Among the prominent local crafts is **wood carving**, which appears most frequently in the ornately decorated temples of Uttarakhand. **Pahari painting** is a form of painting that flourished in the region between the 17th and 19th century. Mola Ram started the Garhwal Branch of the Kangra school of painting. Haripur Guler was famous as the cradle of Kangra paintings. Kumaoni art often is geometrical in nature, while Garhwali art is known for its closeness to nature. Other crafts of Uttarakhand include handcrafted gold jewellery, basketry from Garhwal, woollen shawls, scarves, and rugs. The latter are mainly produced by the Bhotias of northern Uttarakhand.

A distinctive characteristic of Uttarakhand cuisine is the sparing use of tomatoes, milk, and milk based products. Coarse grain with high fibre content is very common in Uttarakhand due to the harsh terrain. Other food items which are famous are *madua* (Buck wheat) in the interior regions of Kumaun. Generally, either pure ghee or mustard oil is used for the purpose of cooking food. Simple recipes are made interesting with the use of hash seeds as spice. Bal mithai is a popular fudge-like sweet. Other popular dishes include dubuk, chains, kaap, churkani, bhatt ki churdkani, sei, and gulgula. Jhoi/Jholi, a regional variation of kadhi, is also popular.

One of the major Hindu pilgrimages, Kumbh Mela, takes place in Uttarakhand. Haridwar is one of the four places in India where this mela is organised. Haridwar most recently hosted the Purna Kumbha Mela from Makar Sankranti (14 January 2010) to Shakh Purnima Snan (28 April 2010). Kumauni Holi in forms including Baithki Holi, Khari Holi and Mahila Holi, all of which start from Basant Panchmi, are festivals and musical affairs that can last almost a month. Ganga Dussehra, Vasantu Panchami, Makar Sankranti, Ghee Sankranti, Khatarua, Bat Savitri, and Phool Dei are other major festivals. In addition, various fairs like Harela mela, Nanda Devi Mela take place.

Economy

The Uttarakhand state has been one of the fastest growing economies in India.
The real GSDP grew at 13.7% (CAGR) during the FY2005–FY2012 period. The contribution of the services sector to the GSDP of Uttarakhand was just over 50% during FY 2012. Per capita income in Uttarakhand is ₹82,193 (FY 2012) which is higher than the national average of ₹60,603 (FY2012).

According to the Reserve Bank of India, the total foreign direct investment in the state from April 2000 to October 2009 amounted to US$ 46.7 million.

Like most of India, agriculture is one of the most significant sectors of the economy of Uttarakhand. Basmati rice, wheat, soybeans, groundnuts, coarse cereals, pulses, and oil seeds are the most widely grown crops. Fruits like apples, oranges, pears, peaches, litchis, and

plums are widely grown and important to the large food processing industry. Agricultural export zones have been set up in the state for leechi, horticulture, herbs, medicinal plants, and basmati rice. As 90% of the state consists of hills, the yield per hectare is not very high. 86% of all croplands are in the plains while the remaining is from the hills.

Other key industries include tourism and hydropower, and there is prospective development in IT, ITES, biotechnology, pharmaceuticals and automobile industries. The service sector of Uttarakhand mainly includes tourism, information technology, higher education, and banking.

During 2005–2006, the state successfully developed three Integrated Industrial Estates (IIEs) at Haridwar, Pantnagar, and Sitarganj; Pharma City at Salequi; Information Technology Park at Sahastradhara (Dehradun); and a growth centre at Siggadi (Kotdwar). Also in 2006, 20 industrial sectors in public private partnership mode were developed in the state.

Flora and fauna

State symbols of Uttarakhand

Animal	White-bellied musk deer
Bird	Monal
Flower	Brahma kamal
Tree	Burans

It has a recorded forest area of 34651 km^2 which **constitutes 65% of the total area** of the state.

National parks in Uttarakhand include the Jim Corbett National Park (the oldest national park of India) at Ramnagar in Nainital District, and Valley of Flowers National Park and Nanda Devi National Park in Chamoli District, which together are a UNESCO World Heritage Site. A number of plant species in the valley are internationally threatened, including several that have not been recorded from elsewhere in Uttarakhand. Rajaji National Park in Haridwar District and Govind Pashu Vihar National Park and Sanctuary and Gangotri National Park in Uttarkashi District are some other protected areas in the state.

Tourism

Uttarakhand has many tourist spots due to its location in the Himalayas. There are many ancient temples, forest reserves, national parks, hill stations, and mountain peaks that draw large number of tourists. There are 44 nationally protected monuments in the state. Oak Grove School in the state is on the tentative list for World Heritage Sites. Two of the most holy rivers in Hinduism the Ganga and Yamuna, originate in Uttarakhand.

Uttarakhand has long been called "LAND of the gods" (*Devbhumi*), as the state has some of the holiest Hindu shrines, and for more than a thousand years, pilgrims have been visiting the region in the hopes of salvation and purification from sin. Gangotri and Yamunotri, the sources of the Ganga and Yamuna, respectively, fall in the upper reaches of the state and together with Badrinath (dedicated to Vishnu) and Kedarnath (dedicated to Shiva) form the Chota Char Dham, one of Hinduism's most spiritual and auspicious pilgrimage circuits. Haridwar, meaning "Gateway to God", is a prime Hindu destination. Haridwar hosts the Kumbha Mela every twelve years, in which millions of pilgrims take part from all parts of India and the world. Rishikesh near Haridwar is known as the preeminent yoga centre of India. The state has an abundance of temples and shrines, many dedicated to local deities or

manifestations of Shiva and Durga, references to many of which can be found in Hindu scriptures and legends.

Hemkund, nested in the Himalayas, is a prime pilgrimage center for the Sikhs. Tibetan Buddhism has also made itself felt with the reconstruction of Mindroling Monastery and its Buddha Stupa, described as the world's highest, southwest of Dehradun.

Some of the most famous hill stations in India are in Uttarakhand. Mussoorie, Nainital, Dhanaulti, Lansdowne, Sattal, Almora, Kausani, Bhimtal, and Ranikhet are some of the popular hill stations in India.

The state has 12 National Parks and Wildlife Sanctuaries which cover 13.8 percent of the total area of the state. They are located at different altitudes varying from 800 to 5400 meters. The oldest national park on the Indian sub-continent, **Jim Corbett National Park**, is a major tourist attraction.

Valley of Flowers National Park and Nanda Devi National Park in Chamoli District, which together are a UNESCO World Heritage Site. Vasudhara Falls, near Badrinath is a waterfall with a height of 122 metres (400 ft) set in a backdrop of snow-clad mountains. The state has always been a destination for mountaineering, hiking, and rock climbing in India.