# Vulnerability

What is vulnerability?

Vulnerability may be defined as “The extent to which a community, structure, services or geographic area is likely to be damaged or disrupted by the impact of particular hazard, on account of their nature, construction and proximity to hazardous terrains or a disaster prone area.”

Poor design and construction of buildings,

Inadequate protection of assets,

Lack of public information and awareness,

limited official recognition of risks and preparedness measures, and

disregard for wise environmental management.

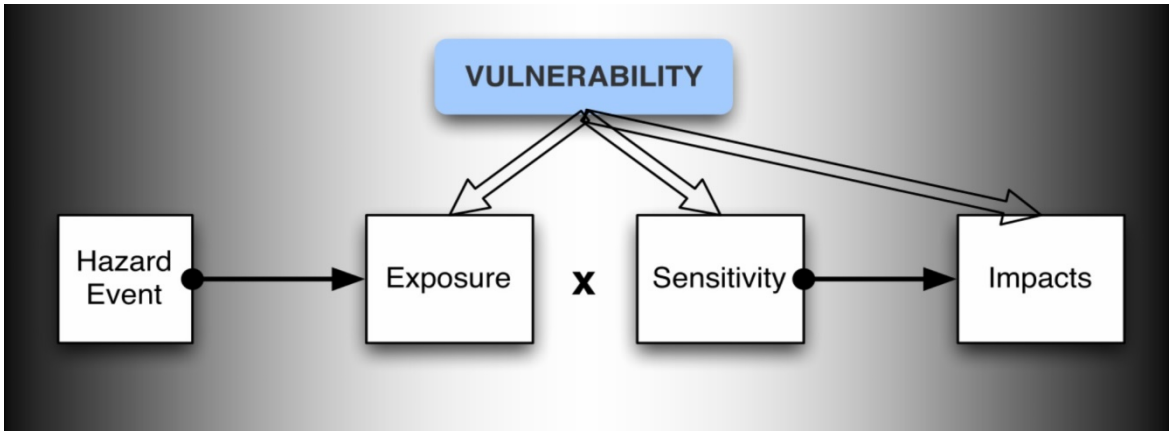
Vulnerabilities can be categorized into physical and social, economic, environment vulnerability.

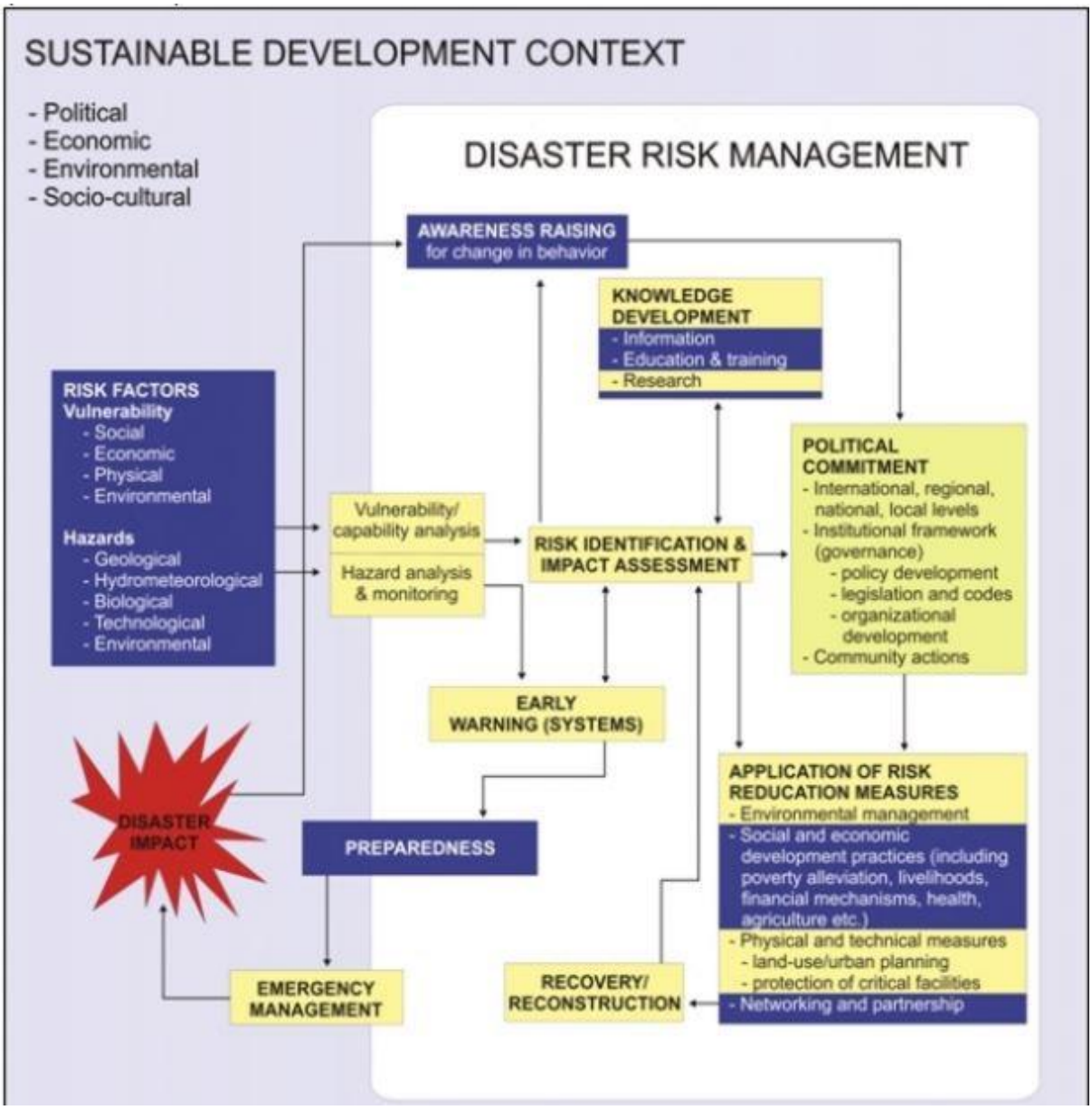
**Physical Vulnerability**: It includes damaged or destroyed by natural hazard such as earthquakes or floods. It is based on the physical condition of people and elements at risk, such as buildings, infrastructure etc.; and their proximity, location and nature of the hazard. It also relates to the technical capability of building and structures to resist the forces acting upon them during a hazard event.

**Economic vulnerability**: the potential impacts of hazards on economic assets and processes (i.e. business interruption, secondary effects such as increased poverty and job loss) Vulnerability of different economic sectors,

**Social vulnerability**: the potential impacts of events on groups such as the poor, single parent households, pregnant or lactating women, the handicapped, children, and elderly; consider public awareness of risk, ability of groups to self-cope with catastrophes, and status of institutional structures designed to help them cope.

**Environmental vulnerability**: the potential impacts of events on the environment. Natural resource depletion and resource degradation are key aspects of environmental vulnerability. Example: Wetlands, such as the Caroni Swamp, are sensitive to increasing salinity from sea water, and pollution from storm water runoff containing agricultural chemicals, eroded soils, etc.



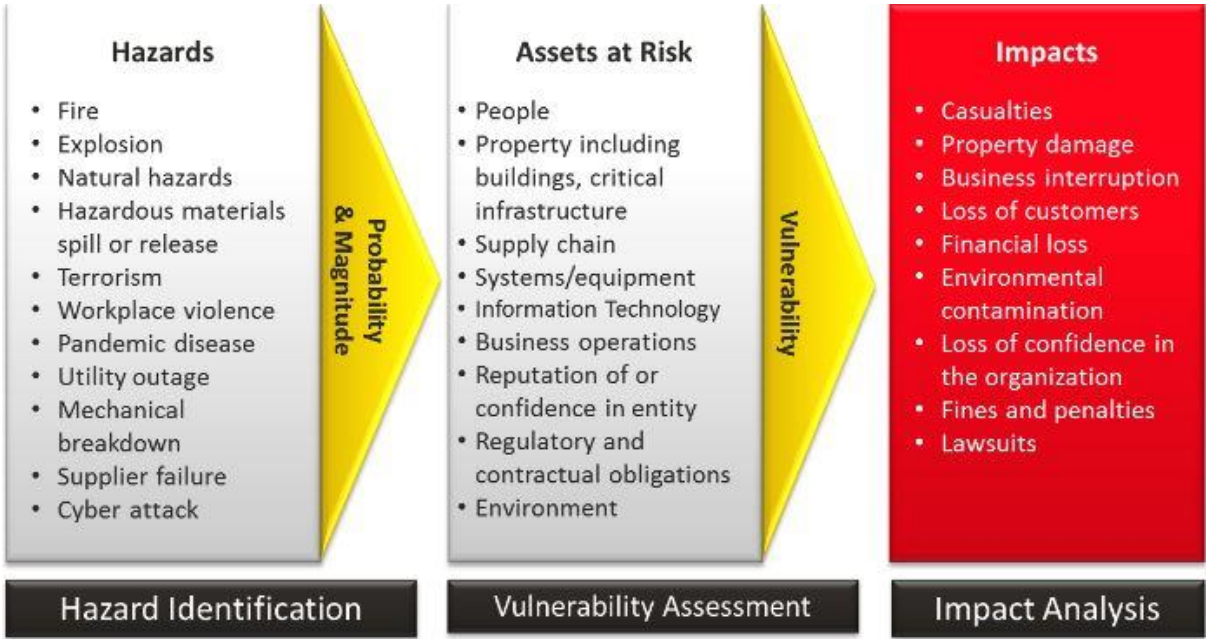



**Frame work of Disaster Risk Reduction**

**WHAT IS RISK ASSESSMENT?**

It defines as a risk , as the probability of harmful consequences casualties, damaged property, lost livelihoods, disrupted economic activity, and damage to the environment resulting from interactions between natural or human-induced hazards and vulnerable conditions. Risk assessment is a process to determine the nature and extent of such risk, by analyzing hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Risk assessment, therefore, is an integral part of decision and policy-making processes and requires close collaboration among various parts of society.




Comprehensive risk assessment consists of the following steps:

1. Understanding of current situation, needs and gaps.

2. Hazard assessment: to identify the nature, location, intensity and likelihood of major hazards prevailing in a community or society.

3. Exposure assessment to identify population and assets at risk and delineate disaster prone areas

4. Vulnerability analysis to determine the capacity (or lack of it) of elements at risk to withstand the given hazard scenarios.

5. Loss/impact analysis to estimate potential losses of exposed population, property, services, livelihoods and environment, and assess their potential impacts on society.

6. Risk profiling and evaluation to identify cost-effective risk reduction options in terms of the socio-economic concerns of a society and its capacity for risk reduction.

**Elements at risk during /after the disaster:**

1. People

2. Livestock

3. Rural housing stock

4. House vulnerable

5. Crops, trees, telephone, electric poles

6. Boats, looms, working implements

7. Personal property

8. electricity, water, food supplies

9. infrastructure supports

**Risk factors vulnerability:**

**Physical Vulnerability**: It includes damaged or destroyed by natural hazard such as earthquakes or floods. It is based on the physical condition of people and elements at risk, such as buildings, infrastructure etc.; and theirproximity, location and nature of the hazard. It also relates to the technical capability of building and structures to resist the forces acting upon them during a hazard event.

e.g. poor design and construction of buildings, unregulated land use planning, etc.

**Economic vulnerability**: the potential impacts of hazards on economic assets and processes (i.e. business interruption, secondary effects such as increased poverty and job loss) Vulnerability of different economic sectors,

e.g. the uninsured informal sector, vulnerable rural livelihoods, dependence on single industries, globalisation of business and supply chains, etc.

**Social vulnerability**: the potential impacts of events on groups such as the poor, single parent households, pregnant or lactating women, the handicapped, children, and elderly; consider public awareness of risk, ability of groups to self-cope with catastrophes, and status of institutional structures designed to help them cope.

e.g. poverty and inequality, marginalisation, social exclusion and discrimination by gender, social status, disability and age (amongst other factors) psychological factors, etc.

**Environmental vulnerability:** the potential impacts of events on the environment. Natural resource depletion and resource degradation are key aspects of environmental vulnerability. Example: Wetlands, such as the Caroni Swamp, are sensitive to increasing salinity from sea water, and pollution from storm water runoff containing agricultural chemicals, eroded soils, etc.

e.g. poor environmental management, overconsumption of natural resources, decline of risk regulating ecosystem services, climate change, etc

**Disaster Risk Reduction:** It refers to the conceptual framework of elements considered with possibilities to minimize vulnerabilities and disaster risk throughout a society, to avoid (prevention) it only includes (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable developments.

**Disaster Risk Management**: It includes but goes beyond Disaster risk reduction by adding a management perspective that combines prevention, mitigation, and preparedness with response.

**Risks Assessment and Analyses:**

Risk assessment includes the identification of hazard agents (seen as hazards risk factors in Figure 1, e.g., tsunamis, flooding, oil leakage, and urban fires), exposure and consequence assessment, and risk characterisation. The first, and perhaps most difficult step in the process, is to identify all hazardous conditions. For example, an earthquake can affect and damage key infrastructure such as water supply systems, roads, bridges petroleum depots, power, housing and trigger secondary events such as liquefaction, landslides, rock falls, raised and drops in land against sea level and flooding from water and irrigation systems. Risk cannot be reduced unless vulnerability and hazardous conditions are recognised before they trigger impact.

Once a hazardous condition is recognised it must be evaluated to determine the threat or risk it presents. The level of risk is a function of the probability of exposure to the hazard and the severity of the potential harm that would be caused by that exposure. Some hazards may present very little risk to people or equipment (e.g. a toxic chemical well enclosed in a strong container in a stationary secure and unpopulated area). Additionally, risk factors include social, economic, physical and environmental vulnerabilities.

**What is a Risk Management**

Risk management encompasses all those activities required to reach and implement decisions on risk reduction or elimination. Once a risk has been characterised, an informed decision can be made as to what control measures, if any, are needed to reduce the risks or eliminate the hazard. Control measures can consist of any action for risk reduction or elimination. Often control measures involve reducing the probability of occurrence or the severity of an incident. Risk management also must start at the lowest possible level of government administration and community with each level accepting responsibility for an appropriate level of mitigation, preparedness, and response and/or recovery activity. This includes strengthening and supporting community level initiatives on disaster risk reduction and encouraging active Participation or involvement of people in the process of risk assessment, planning, implementation of disaster risk management strategies and activities.

**The Social, Economic and Environmental Context of Disaster Risk Reduction Framework**

This Policy aims to be consistent with accepted risk reduction strategies that will Considerably reduce social and economic losses caused by natural and human-induced Disasters such as technological hazards and conflicts.

The essential points adopted in this Policy cover:

a) A necessary shift in managing disasters from a traditional manner – emergency assistance or crisis management – to disaster, conflict and climate change risk Reduction strategies;

b) The general framework and activities of disaster risk management;

c) Integration and mainstreaming of disaster, conflict, climate change and adaptability Across all sectors through economic, social and environmental national recovery and Development;

d) A focus on strengthening community capacities and reducing vulnerabilities;

e) Integration of gender perspectives;

f) The need for attention to be given to children and youth in disaster risk management

**Main objectives of Disaster Risk Management**

The right to life is recognized by the Constitution of the Democratic Republic of Timor-Leste. It is the mandate of the National Disaster Management Directorate (NDMD) to guarantee this right in circumstances of disasters.

The general objective of NDMD is to reduce the risk of disasters. Reducing the risks of disasters is obtained through the diminishment of the occurrences of disasters. Internationally a focus on "reduction" was chosen because the action "eliminate" was deemed to be an unachievable objective.

Disaster reduction actions consist of the following global aspects:

a) Disaster Prevention;

b) Disaster Preparedness for Emergencies;

c) Disaster Response;

d) Recovery/Reconstruction Post-Disaster/Development.

## Difference between Disaster risk management and disaster risk reduction:

| Disaster risk management | Disaster risk reduction |
|---|---|
| 1. It includes almost all kinds of activities, which strength and also non-structural actions to prevent hazards. | 1. It avoid the prevention and includes the all kinds of activities , which strength and also non-structural actions to prevent hazards |
| 2. It includes Mitigation, preparedness, prevention , recovery, | 2. Risk is a "measure of the expected losses due to a hazard event occurring in a given area over a specific time period.<br>Hazards x Vulnerability =disaster risk |
| 3. It also includes rehabilitation, reconstruction, recovery, relief | 3. It includes the hazard analysis and preparations to taken up before disaster. |
| 4. Measures taken up prior to impact of the disaster to minimize its effects sometimes refer to which strength and also non-structural actions to prevent hazards.<br>5. It includes all financial and legal aspects. | 4. Measures to be taken to alert disaster from occurring, if possible to impede hazards so that it does not have harmful effects.<br>5. It does not include financial and legal aspects. |
| 6.It have a authorization structure includes government and non-government agencies | 6. It have only local people to authorization before disaster preparations like early warning. |

## MITIGATION STRATEGIES FOR DRR

Disaster mitigation measures may be structural (e.g. flood dikes) or non-structural (e.g. land use zoning). Mitigation activities should incorporate the measurement and assessment of the evolving risk environment. Activities may include the creation of comprehensive, pro-active tools that help decide where to focus funding and efforts in risk reduction.

Other examples of mitigation measures include:

- Hazard mapping
- Adoption and enforcement of land use and zoning practices
- Implementing and enforcing building codes
- Flood plain mapping
- Reinforced tornado safe rooms
- Burying of electrical cables to prevent ice build-up
- Raising of homes in flood-prone areas
- Disaster mitigation public awareness programs
- Insurance programs

## PREVENTION STRATEGIES FOR DRR

Implementation of these activities and measures is rarely done in isolation and includes a number of associated activities, including:

- Identification and measuring disaster risk
- Education and knowledge development
- Informing people about their risk (awareness raising)
- Incorporating DRM into national planning and investment
- Strengthening institutional and legislative arrangements
- Providing financial protection for people and businesses at risk (finance and contingency planning)
- Integrating DRR across multiple sectors, including health, environment, etc.

## Hyogo Framework for Action

The first step in this process was the formal approval at the WCDR of the Hyogo Framework for Action (2005–2015) (HFA). This was the first internationally accepted framework for DRR. It set 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 provided 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, where UNISDR is based. The subsequent Global Platforms were held in June 2009, May 2011 and May 2013, all in Geneva.

## Sendai Framework for Disaster Risk Reduction

Sendai Framework for Disaster Risk Reduction was approved at the 3rd World Conference on Disaster Risk Reduction in March 2015, held in Sendai, located in Japan. It is the successor to the Hyogo Framework that came into effect from 2005 and ended in 2015, with the approval of Sendai Framework.

India is susceptible to natural and man-made disasters, hence it is an important topic for budding civil servants. This article gives a brief introduction to the Sendai Framework and throws light on its objectives and high priorities.

### Sendai Framework for Disaster Risk Reduction (SFDRR) – Introduction

1. The Member States of the United Nations Organisation approved the Sendai Framework for Disaster Risk Reduction (SFDRR) at the Third World Conference on Disaster Risk Reduction in March 2015, held in Sendai, Japan.

2. This treaty is voluntary and not binding upon the member states.

3. Under the framework, the primary role of the Member States is to reduce the identified disaster risks.

4. The framework has a time frame of 15 years, i.e., 2015-2030.

5. United Nations International Strategy for Disaster Reduction (UNISDR) is tasked with the implementation, follow-up, support and review of the Sendai Framework.

6. The predecessor to Sendai Framework for Disaster Risk Reduction was the Hyogo Framework for Action (2005-2015), an all-inclusive international accord on disaster risk reduction. The Hyogo framework was successful in galvanizing many stakeholders including the commercial sector, NGOs, scientists and governments in making progress towards disaster risk reduction

## SFDRR – Objectives

1. SFDRR aims at achieving a substantial reduction of disaster risk and disaster losses in lives, livelihoods and health; in the environmental, cultural, social, physical-economic assets of people, communities, businesses over the next 15 years.

2. The framework comprises of a set of standards, an all-encompassing framework containing achievable targets and an instrument with a legal basis for disaster risk reduction.

3. The framework calls for the sharing of responsibility among the stakeholders including the private sector, the government and the other stakeholders.

4. It highlights the concerns on human health and well-being that are common to disaster risk reduction, climate change and sustainable development.

## Sendai Framework – High Priorities

1. Understanding the disaster risk.

2. Strengthening the governance of disaster risks for managing disaster risks.

3. Investments in disaster risk reduction for resilience

4. Improving the disaster preparedness to ensure effective response, recovery, reconstruction and rehabilitation.

## Major Departures regarding the Sendai Framework

In the domain of disaster management, the Sendai Framework provides the way forward for the period ending in 2030. There are some major departures in the Sendai Framework:

For the first time the goals are defined in terms of outcome-based targets instead of focusing on sets of activities and actions.

It places governments at the center of disaster risk reduction with the framework emphasizing the need to strengthen the disaster risk governance.

There is significant shift from earlier emphasis on disaster management to addressing disaster risk management itself by focusing on the underlying drivers of risk.

It places almost equal importance on all kinds of disasters and not only on those arising from natural hazards.

In addition to social vulnerability, it pays considerable attention to environmental aspects through a strong recognition that the implementation of integrated environmental and natural resource management approaches is needed for disaster reduction

Disaster risk reduction, more than before, is seen as a policy concern that cuts across many sectors, including health and education.

## Difference between Hyogo Framework and Sendai Framework

| Hyogo Framework | Sendai Framework |
|---|---|
| The Hyogo framework was the first plan which explained, described and detailed the work that is required from all different sectors and actors to reduce disaster losses. | The Sendai Framework (2015-30) is the successor instrument to the Hyogo Framework for Action (2005-15).<br>Sendai framework recognises that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders |
| The Hyogo Framework sets five priorities for action, the first two being: governance and risk identification. | The Sendai Framework sets four priorities for action to be implemented at national & local levels and at global & regional levels-<br>Understanding the disaster risk.<br>Strengthening the governance of disaster risks for managing disaster risks.<br><br>Investments in disaster risk reduction for resilience<br>Improving disaster preparedness to ensure effective response, recovery, reconstruction, and rehabilitation. |

### India's Initiatives for DRR after signing Sendai Framework

India released the first-ever National Disaster Management Plan, a document based on the Sendai Framework for Disaster Risk Reduction.

The plan is based on the four priority themes of the Sendai Framework, namely: understanding disaster risk, improving disaster risk governance, investing in disaster risk reduction and disaster preparedness, early warning, and building back better in the aftermath of a disaster.

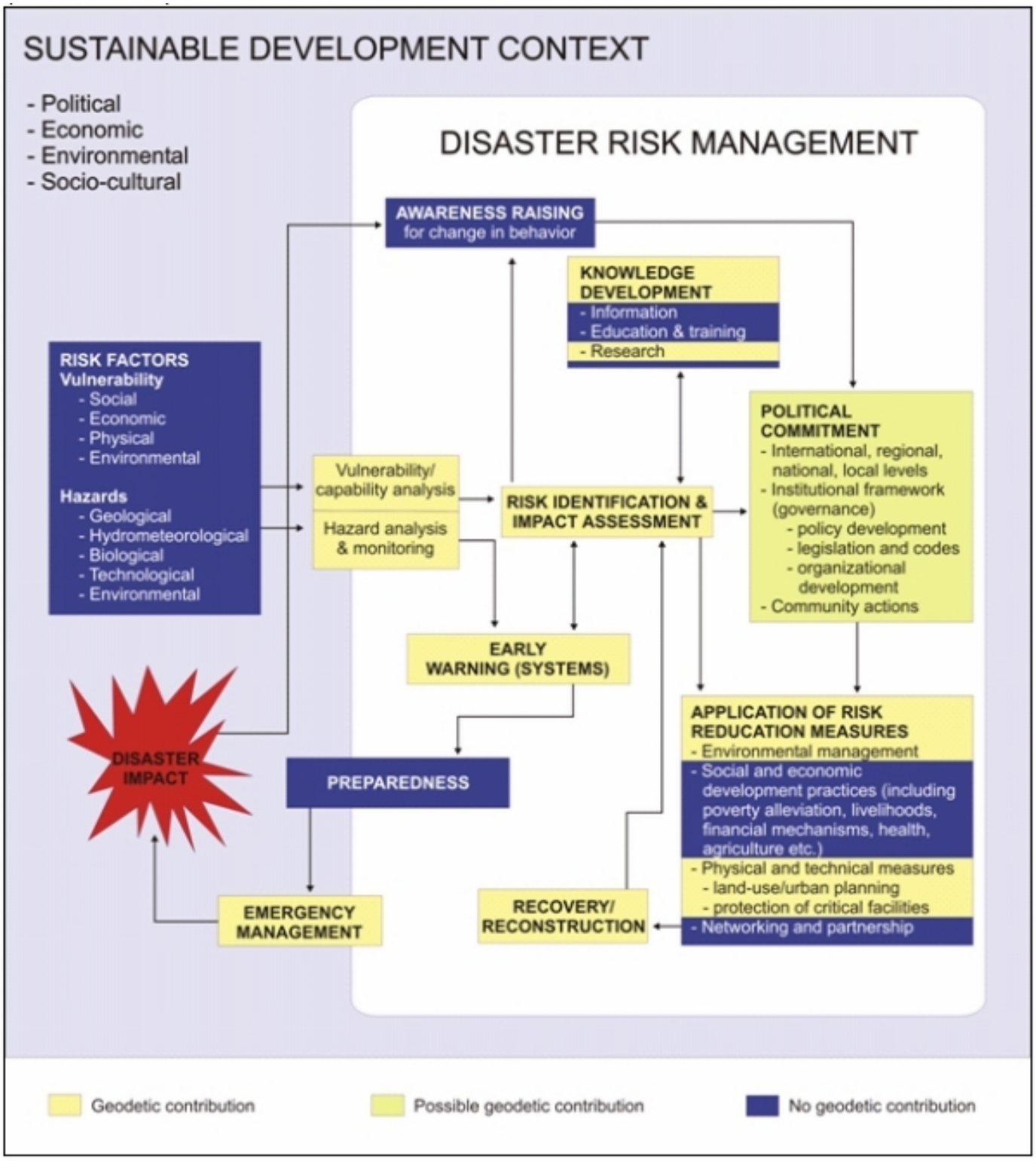
The plan has a regional approach, which will be beneficial not only for disaster management but also for development planning.

It is designed in such a way that it can be implemented in a scalable manner in all phases of disaster management.

It also identifies major activities such as early warning, information dissemination, search and rescue, medical care, transportation, evacuation, etc., to serve as a checklist for agencies responding to a disaster.

As per the Sendai Framework, in order to reduce disaster risk, there is a need to address existing challenges and prepare for future ones by focusing on monitoring, assessing, and understanding disaster risk and

sharing such information. The Sendai Framework notes that it is “urgent and critical to anticipate, plan for and reduce disaster risk” to cope with disaster.




Framework of Disaster risk Reduction

# Capacity Building Measures in Disaster Management

**Capacity development** – The process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time.

**Disaster risk management (DRM)** – The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

**Disaster risk reduction (DRR)** – The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

**Capacity Building: <u>Definition:</u>**

- Capacity is the combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk or the effects of a disaster.
- These actions can include: resource development, financial management (diversification of funding sources), organizational learning, leadership development and other activities.

**Introduction**

Capacity building is an ongoing process that equips officials, stakeholders and the community to perform their functions in a better manner during a crisis/disaster. In the process of capacity building, we must include elements of human resource development, i.e., individual training, organizational development such as improving the functioning of groups and organizations and institutional development. At the national level, The National Institute of Disaster Management (NIDM) is the capacity building arm and the States have disaster management cells in the State Administrative Training Institutes performs the function of capacity building for effective and efficient disaster management. There are a number of other training institutes which are engaged in training and capacity building in the area of disaster management.

**Need for capacity building**

• Comprehensive formulation of objectives.

• Conduct of Training Needs Analysis

• Preparation of Knowledge, Skills and Attitude • Administration of Face-to-Face Training Programme (FFTP)

**Various elements of capacity building**

• Education on disaster prevention and response

• Training to vulnerable communities

• Collaboration with relief agencies

• Mock drill • Household preparation

• Understanding warning/de-warning messages

• First aid preparedness

**Role and Responsibilities**

- To develop parameters/guidelines under which NIDM has to function and correspondence relating thereto. Preparation of NIDM guidelines Matters relating to Capacity Building Grant under Finance Commissions.
- International Co-operation including preparation/finalization of MoUs in the field of DM with various countries, and its implementation, visit of foreign delegation for bilateral meetings, etc.
- To coordinate with International Organization such as UNDRR, UNDP, UNICEF, UNOCHA, UNFPA, AHA Centre, IORA, BRICS, SCO, BIMSTEC, ADPC, ADRC, G20, World Bank, SAARC, ASEAN, etc.
- Nomination of officers of NDMA as guest lecturer or participant for attending International and National Workshops / Seminars / Training / Meetings, Forums / etc.
- Implementation of various projects of Capacity Building on Disaster Management (DM), DRR, Disaster Response in collaboration with State Govts/UTs and CDM, LBSNAA, Mussoorie.
- Monitoring of implementation of the National Disaster Management Guidelines on School Safety Policy – 2016 in all schools of India
- Monitoring of DM Exhibition & Mock Drills in all Schools of AMRUT Cities (500).
- Processing of proposals of partial financial support for organizing events on disaster related subjects receives various Departments of GoI/State Govts. and Institutions such as IITs, JNU, FICCI, CII, TIFAC and NGOs etc
- Processing of proposals for extending NDMA logo for organizing events on disaster related subjects support
- Parliament Questions/RTI Matters/VIP references/reports & returns, budget,
- Training part of NDRF

**Community Participation**

Community participation, generally, refers to the involvement of people in any project to solve their own problems or to develop their socio- economic conditions. They participate in setting goals, and preparing, implementing and evaluating plans and programs. Basically, it is a dynamic group process in which all members of a group contribute, share or are influenced by the interchange of ideas and activities toward problem-solving or decision- making .

**Purpose of Community Participation:**

- Enhancing professional skills and knowledge of key personnel and strengthening capacities for risk assessment
- Addressing the issues of vulnerable groups i.e. the issues of women, children, disabled
- Community-based programming for preparedness, mitigation and risk reduction
- Developing partnership approach to disaster management involving all stakeholders – the government, local communities, NGOs, media, private sector, academia, and donor communities.

**Incentives to community's participations:**

- Community participation motivates people to work together – people feel a sense of ◦ community and recognize the benefits of their involvement.
- Social, religious or traditional obligations for mutual help
- Genuine community participation – people see a genuine opportunity to better their own lives and for the community as a whole
- Remuneration in cash or kind

**Community participation can take place during any of the following activities:**

1) Needs assessment
2) Planning
3) Mobilizing
4) Training
5) Implementing
6) Monitoring and evaluation

**Community participation activities before disaster**

1) Focus group discussion
2) Awareness and conscious buildup
3) Collect information and distribution
4) Mapping the vulnerable zone
5) Risk assessment
6) Early warning by using indigenous knowledge

**Community participation activities during disaster**

1) First aid and Medicare
2) Emergency response during disaster

3) Rehabilitee the affected people

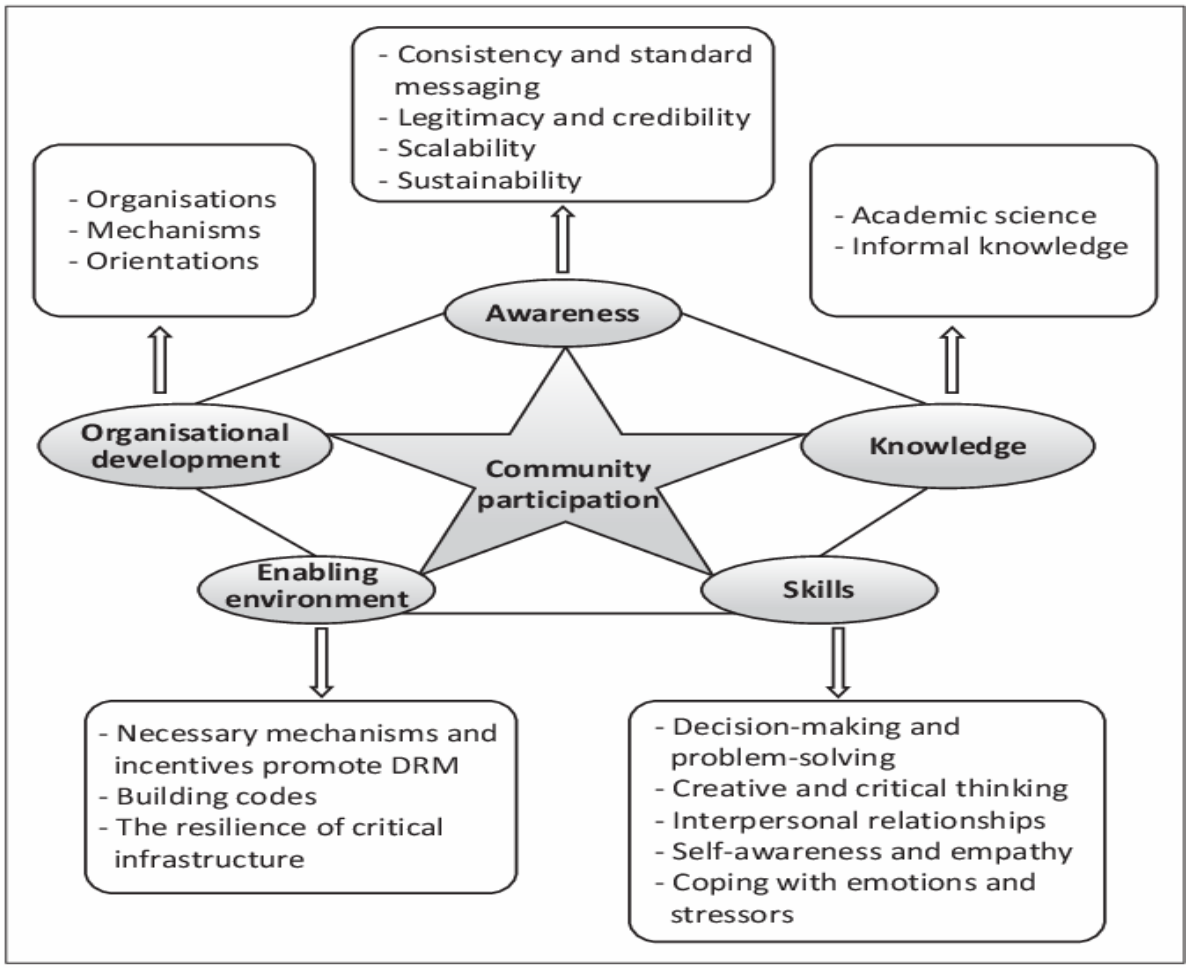
**Community participation activities after disaster**

1) Relief

2) Recovery

3) Reconstruction

4) Restoration




DRM, disaster risk management.

**FIGURE 2:** Participation and risk management cycle.

## Contemporary studies and work towards disaster risk reduction

### Role of Science and Technology:

The Sub-Committee on Disaster Reduction (SDR) ofthe National Science and Technological Council (NSTC) in the United States has articulated important areas that require continued energy and resources to meet the challenges of hazard risk reduction. The areas include terrorism events, mitigation activities, hazard information, hazard research, risk communication capabilities etc. The comprehensive approach to disaster management entails inclusive strategy for disaster management i.e. prevention and mitigation, preparedness, response and recovery, correlated for the purpose of sustainable development strategies. The all-hazards approach targets developing a common framework based on knowledge from all relevant fields for handling all types of disasters. The focus is harnessing science and technology for risk reduction from all man-made or natural disasters including terrorism. The integrated approach places reliance on administrative coordination for joint strategizing for risk reduction that includes all organisations. The developmental relief approach underlines the need of undertaking disaster relief as part of long term development.

### Role of Information Technology:

Information Technology has revolutionized communication giving connectivity to remote and far flung areas. The World Wide Web and the Internet have provided information in specialized branches of disaster management. The information communication revolution has made possible the setting up of local area and wide area networks known as Intranet and Extranet that link up institutions over distant regions and facilitate information sharing on a global basis. Modern strategies include Geographical Information System (GIS) by which detailed spatial analysis of ‘at risk’ area is accomplished through satellite imagery. Indian Meteorological Department (IMD) has commissioned a satellite based communication system called cyclone warning dissemination system for cyclone warning in coastal areas. Information Technology has greatly aided planning for disaster response and preparedness and has made disaster risk reduction more fact based.

**Role of Information, Education and Public Awareness:**

Modern approach is Community based disaster management which involves local people, Panchayati Raj Institutions (PRIs) police, paramilitary forces, fire brigade, medical team and people from NGOs. Manpower planning with effective strategies can largely reduce the risk and also enhance the preparedness of the people about various disasters. Managing people implies creating awareness by providing knowledge about information and technology, resources and skills. The aim is to improve the ability of vulnerable communities to cope with disasters through developing their coping capacity by building on existing practices, skills and local structures. According to a policy statement of Red Cross 2001, adopting a community based approach is the best guarantee that disaster preparedness will be implemented and sustained.

**Role of Stakeholder's Participation:**

All concerned parties in disaster policy and implementation should put in concerted effort towards disaster preparedness. This implies continuous participation of all stakeholders with regard to new and emergent issues in town planning, administrative up gradation, employment and livelihood in urban and rural areas, mobilization of nongovernment efforts etc

**Role of Disaster Prevention:**

Disaster prevention involves activities to provide out right avoidance of the adverse impacts of hazards and means to minimize environmental, technological and biological disasters. In Uttarakhand, major landslides occur because of blasting carried out for road cuttings, construction of dams and reservoirs, housing schemes, agricultural practices on steep slopes etc. implemented without proper environmental impact assessment. Public policy with preventive provisions is required to protect against landslide hazards such as minimizing the exposure of facilities and populations to landslides. Preventive and remedial measures are studied within the purview of environmental geomorphology. Best preventive measure against cyclone is provision of warning system and second line unconventional communication infrastructure called Amateur Radio. The National Institute of Amateur Radio (NIAR)has established HAM radio networks along the coastal belts of Andhra Pradesh. Drought is a slow onset disaster and can be controlled through timely action and proper monitoring of the drought prone area through remote sensing.

Other measures includeplanting drought resistant seed varieties and education to farmers. Proper town planning and effective enforcement of legislation and codes for mitigation can effectively prevent loss of life from earthquakes. Undesirable side effects of dams and embankments have shifted focus to non structural mitigation measures to prevent losses from flood disasters

## Disaster risk reduction plan

**Disaster risk reduction :** Disaster risk reduction is defined as the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse effects. Disaster reduction strategies include, primarily, vulnerability and risk assessment, as well as a number of institutional capacities and operational abilities. The assessment of the vulnerability of critical facilities, social and economic infrastructure, the use of effective early warning systems, and the application of many different types of scientific, technical, and other skilled abilities are essential features of disaster risk reduction.

$$\text{Disaster risk (R)} = \frac{\text{Vulnerability (V) x Hazard (H)}}{\text{Capacity (C)}}$$

OR

$$\text{Disaster risk} = \text{function of H and V/C}$$

The Disaster Risk Reduction (DRR) Programme assists Members in developing and delivering services that are directed at protecting lives, livelihoods and property from natural hazard in a cost-effective, systematic, and sustainable manner. This ultimately contributes to resilient and sustainable development under a changing climate.

The scope of the Programme encompasses strengthening the National Meteorological and Hydrological Services' (NMHSs) capacities to:

- support preparedness through early warning systems;
- provide hazard information for risk assessments, prevention, response and recovery, and risk transfer across sectors;
- mitigate existing risks and prevent the creation of new risks;
- respond to user requirements; and,
- cooperate and engage in disaster risk governance structures at all levels.


**Disaster risk reduction plan**

**Spatial planning**: Disaster risks should be taken into consideration when development master plans are being prepared or revised and updated. The focus should be on the different risk factors and the incorporation of multi sectoral aspects such as water and sewerage systems management, environmental management, infrastructure development, flood mitigation, zoning and land use

**Modification and enforcement of building codes**: Another significant component of this pillar is the introduction of mandatory building codes and their enforcement in all areas. Building codes should incorporate the concept of essential infrastructure (i.e. assets that are critical for the operation of society and the economy). Essential infrastructure, particularly that related to food storage and the supply chain, health, education, water, energy and telecommunications, must be properly designed and constructed to withstand the most common hazards

**Management of public investment**: It is highly advisable for any new public investment in infrastructure to be based on a country's development plan and for it to incorporate a multi-hazard assessment component that can contribute to DRR efforts. Ministries responsible for project approval should include investment and infrastructure protection measures throughout the project, starting with the feasibility and design phases. Public and private investments in structural and non-structural measures for disaster prevention and DRR are needed to increase

the economic, social, health and cultural resilience of people, communities, countries and their assets along with the resilience of the environment itself. These factors can drive innovation, growth and job creation.

UNIT-4

## Disaster Planning & Management:

Emergency management program is based on the framework of the four phases of emergency management: prevention-mitigation, preparedness, response, and recovery. All phases are highly interconnected; that is, each phase influences the other three phases.

Prevention-Mitigation, Preparedness, Response and Recovery

**Prevention-Mitigation**

**Prevention:** The actions taken to decrease the likelihood that an event or crisis will occur

**Mitigation:** The actions taken to eliminate or reduce the loss of life and property Damage related to an event or crisis, particularly those that cannot be prevented;

**Preparedness**: activities to design and implement strategies, processes, and protocols to prepare for potential emergencies;

**Response:** The immediate actions to effectively contain and resolve an emergency;

**Recovery**: Activities and programs designed to return conditions to a level that is acceptable.

**Emergency Management:** which has replaced Civil defence, can be seen as a more general intent to protect the civilian population in times of peace as well as in times of war.

Civil Protection is widely used within the European Union and refers to government approved systems and resources whose task is to protect the civilian population, primarily in the event of natural and human-made disasters.

**Crisis Management** is the term widely used in EU countries and it emphasizes the political and security dimension rather than measures to satisfy the immediate needs of the civilian population.

**Disaster risk reduction**: An academic trend is towards using the term is growing, particularly for emergency management in a development management context. This Focuses on the mitigation and preparedness aspects of the emergency cycle

## *Preparation of emergency management programme:*

Preparedness planning for disaster management is quite useful. The preparedness plans can either be short-term or long-term encompassing the organizational aims and objectives, structure for tackling disasters, preparedness measures, communication system, warning arrangements, community disaster operations, operational aspects of implementation of plans, post-disaster review, training and public awareness. A Disaster Preparedness Plan made at any level:

Provides for hazard identification and risk analysis

Indicates basic information about the resources, demography, existing organizational set up, administrative facilities at the state, district and local levels

Describes preparedness and mitigation measures as well as response mechanisms

Defines specific roles and responsibilities for various actors at different levels

Ensures networking/coordination with the media, NGOs, international agencies and other stakeholders.

**Planning for disaster preparedness and mitigation:**

**Disaster management Programme**

Natural disasters cannot be prevented, but their impact on people's lives can be reduced to a considerable extent. Disaster management covers all aspects of preventive and protective measures, preparedness, rescue, relief and rehabilitation operations. It has three phases:

***1. Impact phase**:* This has three stages.

*Pre-impact/response*

- Forecast
- Early warning
- Preparedness
- Tracking/monitoring approach of disaster
- Alertness/evacuation.

*Impact*

- Close monitoring of impact; establishing emergency communication; deploying rescue teams; medical support and other life-saving activities. Supply/air dropping of food, drinking water and essential items.

*Post-impact*

- Medical care
- Food, clothing and shelter for rescued people
- Estimating loss of life and property
- Disposal of bodies/animal carcasses, prevention of epidemics
- Repair and restoration of essential services/infrastructure.

***2. Relief and rehabilitation phase***

- Temporary shelter/drinking water/food/clothing/minimum household utility goods for victims
- Repair of roads, electricity and communication networks
- Salvaging damage to agriculture/distribution of seeds, fertilizer, etc.
- Restoration of health/educational facilities or temporary alternative arrangements
- Distribution of ex-gratia relief for those killed and compensation for the losses

- Building durable houses for victims.

### *3. Long-term mitigation and preparedness phase*

This is a crucial period and devoted to long-term development of disaster prone areas to minimize the impact of the hazard and prepare the people as well as all supporting systems in the area to face future disasters.

*Long-term planning for preventive measures*

- Soil conservation/afforestation in river catchments
- Planting shelter belts/mangroves in coastal areas
- New cropping patterns to minimize crop loss
- Prevent human settlements in low-lying areas, relocate settlements to safer places.

*Long-term protective measures*

- Safe construction for houses/strict implementation of safety codes
- Hazard-proof roads, bridges, canals, water reservoirs, power transmission lines, etc.
- Flood-protection measures
- Improvement of warning systems
- Organizing people for counter-disaster activities.

## Role of *Panchayati Raj* bodies in local disaster management

While the government has the duty to help people in distress, the latter have a greater responsibility to help the government help them to cope with disasters. *Panchayati Raj* bodies are the most appropriate local institutions for involving people in natural disaster preparedness. *Panchayati Raj* bodies have a role to play in all phases of disaster management.

### *Panchayat role during first phase of natural disaster management*

*Gram Panchayat* or village level

- Convene meetings to ensure timely warning
- Update information on civic amenities/population, etc.
- Select safe locations for people and livestock
- Arrangements to evacuate the elderly, the disabled, children and women
- Medical and sanitation facilities at relief camps
- Disconnecting power lines during high winds/gales; storing foodgrain, drinking water, etc.

Block/*Mandal Panchayat*

- Supervise preparedness of *Gram Panchayats* (GP)
- Consolidate village-level information on items listed under GP
- Assessing preparedness of: primary health centres/evacuation arrangements, etc.
- Engineering staff at the Block/*Mandal* level should repair drainage/canal/roads, etc.
- Contact ex-army/security forces personal/volunteers to organize task force for assistance
- Procure and keep ready rescue material, including boats
- Function as link between district and village-level counter-disaster activities.

*Zilla Panchaya* or district level

- The District Collector/CEO should convene a meeting of all District Heads of sectoral departments and ZP members before the start of likely cyclone periods (May to June & Oct. to Nov.)
- All concerned departments to take up necessary repair and maintenance and related works for preparedness
- Organize 'Task Forces' at district, block and village levels
- Identify NGOs useful in providing assistance during disasters
- Check inventories of items required at short notice for rescue and relief operations
- At first warning, call meeting of Crisis Management Group (CMG) and alert blocks/villages
- All CMG members should be asked to keep their personnel in full preparedness
- District Collector should be CMG Leader and establish a control room managed by senior officers round the clock during the crisis.

***Panchayat role in rescue and relief before and during natural disaster impact***

*Gram Panchayat* or village level

- Set up temporary shelters/relief camps after initial warning/store food and water for people/livestock
- Evacuation of people and livestock should start immediately after final warning
- Keep rescue volunteers and task forces ready
- District/block medical/relief teams may be asked take position at strategic points and coordinate with village volunteers/task forces
- Organize veterinary aid teams for taking care of livestock and removal of carcasses
- Disposal of dead bodies and measures to prevent likely epidemics
- Assessing loss of life, livestock and damage to farming, property, etc.

Block/*Mandal Panchayat*

- Identify vulnerable areas and send task forces/volunteers to supervise safety measures
- Evacuate people from these areas and help GPs in organizing relief camps
- Arrange for emergency communication through police wireless/ham radio, etc.
- Arrange supply of food and other items to relief camps in adequate quantities
- Supervise rescue and relief activities with district-level officers
- Inform CMG in case help needed from police and defence forces
- Assist armed forces in rescue and relief operations
- Supervise rescue and relief and coordinate with various agencies including NGOs.

*Zilla Panchayat* or district level

- Monitor situation, identify blocks and villages most likely to be affected and issue warnings
- Activate control room and keep a full watch on the situation
- Arrange emergency communication with the help of police wireless/ham radio, etc.
- Arrange transport for evacuation of people and livestock
- Arrange for temporary shelters/relief camps
- Seek assistance of the armed forces if necessary
- Monitor rescue and relief operations at village and block levels

- Assist lower *panchayats* in mobilizing task forces/volunteers/NGOs for rescue and relief.

***Panchayat role in reconstruction and long-term mitigation planning***

*Gram Panchayat* or village level

- Assist in identifying victims for compensation, and then in its distribution
- Formulate reconstruction plans for houses, community buildings, roads, etc. within GP jurisdiction with the assistance of technical departments at block and district levels
- Enforce minimum specifications for safe construction
- Help district and block level organizations in arranging awareness camps for management and mitigation of disasters and ensure participation of the villagers
- Organize village-level task force/volunteers and train them in counter-disaster measures
- Assist in supervising and monitoring reconstruction and development projects
- Encourage local people to insure assets/livestock, which should be mandatory for those who can afford. Seek government help for those who are too poor to afford insurance.

Block/*Mandal Panchayat*

- Assist in rehabilitation, repair and reconstruction
- Assist *gram panchayats* in identifying victims for payment of compensation and in its distribution
- Prepare village and block-level mitigation plans; consolidate/integrate these with the block plan
- Enforce minimum safety specifications for construction
- Assist in long-term mitigation planning and its integration with block/district development plans
- Supervise and monitor reconstruction and long-term mitigation projects implemented by GPs and Block *Panchayats*.

*Zilla Panchayat* or district level

- Planning and implementation of rehabilitation, repair and reconstruction
- Compensation for loss of life, property, etc.
- Hazard and vulnerability mapping
- Anti-disaster measures to be integrated in all development projects
- Special funding to use disaster-resistant construction technologies in vulnerable areas
- Supervision of all construction and developmental activities.

## Psychosocial Support and Mental Health Services (PSSMHS)

Disasters causes devastating effect on the human life, usually leaving a trail of human agony including short and long term psychosocial trauma on the survivors. Generally in any response the physical effects of survivors get immediate attention and psychosocial needs

often given less importance if not intervened may lead to dysfunction and disability. Timely psycho-social support will prevent development of long term psychosocial problems and hasten the recovery of survivors. Overall goal of psychosocial support intervention would be to enhance the coping and resiliency of the community towards improving overall well being. Psychosocial Support and Mental Health Services (PSSMHS) is one of the important cross cutting areas of DM intervention. The plan for PSSMHS shall be a component of overall planning for disaster management with an aim of providing Psychosocial Support and Mental Health Services integrated with preparedness, response, mitigation, relief and rehabilitation. The Ministry of Health and Family Welfare (MoH&FW) is the nodal ministry. The overall plan for the PSSMHS will be developed by the nodal ministry, other line ministries may prepare their plans based on the nodal ministries plans.

## Preparation Of Emergency Management Programme:

1. **Short term Planning:**

*a) **Capacity development***

i) Sensitising and training (Basic and advance) on PSSMHS across identified departments, sectors and levels.

ii) Strengthening of the national, regional and nodal capacity building institutions and resource centres at district and state level.

iii) Developing PSSMHS needs assessment indicators and templates.

iv) Strengthening of District Counselling Centres under Dept of Social welfare/ Women and Child Development (WCD).

v) Map vulnerable groups and accord priority in preparedness activities.

vi) Strengthening the resource base and data management/documentation in PSSMHS**.**

***b) Education & Training***

i) Inclusion of Disaster PSSMHS in Post-Graduate Curriculum of Psychiatry, Psychology, Social Work, Disaster Management, Emergency Medicine and Health Education.

ii) Inclusion of PSSMHS in Under Graduate medical studies.

iii) Integrating with all training programmes in the area of Psychology, Social Work, Mental Health, Emergency Medical Response, Hospital Administration, Nursing and Paramedics.

iv) Involve and train local community volunteers in basic psychosocial support.

v) Mobilize trained psychosocial response teams national and state level.

vi) Map vulnerable groups and accord priority in preparedness activities.

***c) Community Based Disaster Management***

i) Inclusion in the CBDM Plan and training of Panchat Raj (PRI) team members.

ii) Developing awareness materials for the community.

iii) Evolve a mechanism for community outreach education programmes on PSSMHS.

***d) Networking, Awareness other Measures***

i) Enhance the network of institutions working in the field of mental health, give focus for creating PPP to augment the community resources.

ii) Take measures to increase public awareness about psychosocial care in disasters.

iii) Integrating with all training programmes in the area of Psychology, Social Work, Mental Health, Emergency Medical Response, Hospital Administration, Nursing and Paramedics.

iv) Involve and train local community volunteers in basic psychosocial support.

v) Mobilize trained psychosocial response teams national and state level.

vi) Map vulnerable groups and accord priority in preparedness activities.

e) ***Control Room & Emergency Operation Centre:***

The State level control room will be suitably equipped. A standby State level control will be developed, which will be immediately activated if the main control room gets affected due to any disaster. The district control rooms will be strengthened adequately. During emergencies temporary control rooms will be set up as close as possible to the location of the crisis. The State and district control rooms will be located in Emergency Operation Centres that will have all emergency support functions of various departments/agencies functioning together during emergencies.

f) ***Environmental protection:***

One of the most important components of Disaster mitigation is protection of the eco system. Efforts will be made to preserve and protect these systems with people's cooperation. The Government will promote conservation and restoration measures, especially with involvement and participation of the communities dependent on such environmental niches. In drought prone areas, watershed management and improvement of the vegetative cover will be given due priority. Emphasis will be given on promoting better sewerage and waste management systems in the urban areas.

**B) Mid term Plan:**

i) Creation of core group of master trainers at district level

ii) Strengthening public-private partnership in research & development

iii) Formation of National PSSMHS resource Inventory under national Health Resource Inventory Initiation of distance learning courses for sensitization across various categories of disaster management stakeholders.

iv) Development and standardization of uniform training packages for different designated target groups.

v) Initiation of distance learning courses for sensitization across different categories of disaster management stakeholders.

vi) Incorporation of PSSMHS trainings in DMHP, district health and hospital plans.

C) **Long term Plan**:

i) Intensive Post Graduate / Post Graduate Diploma courses in PSSMHS.

ii) Streamlining of institutions and their activities

**Land-use Planning:** A branch of physical and socio-economic planning;

Determines the means and assesses the values or limitations of various options in which land is to be utilized, with the corresponding effects on different segments of the population or interests of a community, taken into account in resulting decisions

Involves data studies and mapping; analysis of environmental and hazard data

Formulates alternative land-use decisions and design of a long-range plan for different Geographical and administrative scales

Helps to mitigate disasters by discouraging high-density settlements and construction of key installations in hazard-prone areas, control of population density and expansion

Facilitates charting of service routes for transport, power, water, sewage and other critical facilities.

**Mapping Exercises:**

One of the most important activities of the CBDP is the mapping of risk, vulnerabilities and capacities of the village by the community itself; because it is a very simple and cost-effective tool to collect ground level data. This is done through Participatory Rural Appraisal (PRA) exercise. Before the mapping exercise starts, the community members discuss among themselves their experiences/observations of previous disasters they have faced or the disasters they may face in future. It :

provides a pictorial base to the planning process, especially for the semi-literate populace and ensures maximum community involvement across gender, caste and other divides

Is found to be very effective in raising awareness among the community, and thereby enhancing participation of the community in problem identification

Makes use of locally available resources rather than depending on the external agencies for help and support

Encourages villagers/community members to draw the maps on the ground using locally available materials such as stone, sand and various colour powders for different items and indicators

Mapping is of various types:

a) **Safe Mapping**

It is called safe or opportunity mapping. It includes:

Road, alternative route, boats, communication centres

Safe shelter

Elevated lands, high land (mounds)

Alternate route for safe evacuation

Safe Primary Health Centres, Fire Stations, Police Stations

Safe place for evacuees

Godown, food stock availability, fodder availability etc.

Site for storing foodstuff

Identification of Disaster Management Teams

Temporary camp sites

**b) Social and Resource Mapping**

Resource mapping focuses on identifying locally available assets and resources that can be utilized for building the capacities of the community during and after disasters. Apart from infrastructure and funds, it could be individuals with specific skills, local institutions and people's knowledge, as all these have the capacity to create awareness and bring about changes in the community. A resource map is therefore not limited to a map depicting the available resources alone, but also its distribution, access and utilization within the village. It includes keeping a record of:

Safe shelters (pucca houses, community centres)

Drinking water sources

Water bodies

Agricultural land

Forest land

Dispensary and Primary Health Care Units

Road

Power installations

Telephone Office

Post Office and other structures

School and college buildings

Godowns (both government and private)

Dealers of dry food, kerosene etc

Tent house (generators, tarpaulins, utensils required in case of community cooking)

c) ***Risk Mapping***

The purpose of a risk map is to identify and classify areas, taking into account the probable damages that could occur as a result of a disaster. It:

Allows the identification of the location of risks and threats

Offers authorities and organizations with ideas, shared with the community and experts, to make decisions and know about the existing dangers and threats

Promotes participation of local stakeholders to analyze, and make way for understanding their perception of the situations

Registers historical events that have negatively affected the community

***d) Vulnerability Mapping***

The group preparing the vulnerability map needs to select those risks that are found in the area to be mapped and decide which risks will be addressed. The risks would include:

Seismic activity

Landslide / slope failure

Windstorm, cyclone, tornado, typhoon

Floods

Excessive precipitation, flash floods

Extreme drought

Industrial activities

Commercial activities

Road / Boat / Air accidents

Terrorist attack

Fire accidents

**Execution of Emergency Management Programme:**

Once emergency needs have been met and the initial crisis is over, the people affected and the communities that support them are still vulnerable. Recovery activities include rebuilding infrastructure, health care and rehabilitation. These should blend with development activities, such as building human resources for health and developing policies and practices to avoid similar situations in future.

a). Includes actions taken to return to a normal or an even safer situation following an emergency.
b). Recovery includes getting financial assistance to help pay for the repairs.
c). Recovery activities take place after an emergency.

1. Rapid damage assessment.

2. Search and rescue.

3. Emergency medical care.

4. Emergency restoration of essential services.

5. Fire-fighting.

6. Emergency communications.

7. Crisis decision-making.

8. Evacuation, protection of lives and property.

9. The provision of emergency shelter for victims.

10. Debris removal (also associated with recovery).

11. Other activities that take place during the immediate post-impact Emergency period.

12. Land monitoring

13. Identification of high seismic area

14. Development Regulations and Building Codes

**Long term :Damage Assessments**

Assessments in terms of the extent and monetary value of damages can be carried out with the help of local government offices (e.g., municipal engineering office, municipal agricultural office, etc.), field surveys and interviews.

a. **Effects on Basic Services**: electricity, water supply (potable water and irrigation water), sanitation

b. Infrastructure: buildings, hospital/clinics, homes, road systems

c. Livelihood: crops, sources of food/products

d. Landscape: soil stability, extent of coastline and land erosion

e. Ecological Communities: vegetation, terrestrial and aquatic life, forest cover

2. **Components**

a. Rescue of affected people

b. Distribution of basic supplies such as food, water, clothing, shelter, medical care and minimum household utility goods

c. Repair and restoration of roads, electricity and communication networks

d. Salvaging damage to agriculture, distribution of seeds and fertilizer, etc.

**Short term: Recovery and Rehabilitationa) 'build back better' principle:**

Recovery and rehabilitation is carried out weeks and months after the disaster. It involves the restoration of basic services (e.g., communications, commuter transportation, electricity for homes), infrastructure (e.g., roads and bridges, schools), and livelihood. The goal of this phase is not only to restore what existed previously but also to set communities on a better and safer development path and to facilitate resilient recovery.

**b) Community-Based Needs Assessments:**

In order to come up with a proper and acceptable program for recovery and rehabilitation, it is also important to understand the felt needs of affected communities. Consulting affected populations through interviews prior to any recovery program ensures public acceptance and

support of any planned endeavour. A needs assessment helps prioritize particular areas that need the most immediate action for rehabilitation.

1. Infrastructure and Services
2. Community Livelihood
3. Priorities for Habitat Restoration

C) **Long Term: Reconstruction and Development**

Measures to rehabilitate human communities and natural ecosystems are critical in post-disaster situations in order to support human lives and sustain the delivery of ecosystem goods and services such as food, fuel and protection from natural events. A key concept here is climate-resilient recovery (CRR) where communities are not only provided with assistance to recover from climatic change events but are also equipped to deal with future disasters better. Reconstruction is a much longer-term activity that will involve permanent rebuilding, improved infrastructure, and recovery with enhanced preparation for the next climate change-related event. It should aim to build a better standard than what existed before ('build back better' principle) and be guided by the ecosystem approach to recovery and rehabilitation.

1. Climate-Resilient Livelihood

2. Climate-Resilient Infrastructure

3. Ecological Restoration

d) **Incorporation of Indigenous Ideas and Practices**

Traditional and local conceptions (or misconceptions?), technology and practices may either hamper or enhance disaster management efforts. Regardless of their effects, it is important that they should be taken into consideration and respected at all times. And, if beneficial, these might even be useful to be developed further and then integrate in pre- and post-disaster planning (e.g., traditional stonewalling technique to minimize soil erosion and increase slope integrity).

e) **Resource mobilisation**:

To augment the resources available with the State Govt. assistance from Union Government, public and private sector, multi-lateral and bilateral agencies, UN organizations, the Civil Society and other charitable organizations will be sought with the approval of the State Government. Communities and individuals would be encouraged to raise resources necessary

for immediate relief within the community itself and to access the Community Disaster Management Fund and institutional credit. A coordination mechanism will be put in place at all levels under the aegis of the State Disaster Management Authority, to ensure equitable distribution of resources, avoid duplication of efforts and generate synergy.

f) **Rehabilitation of orphans and widows:**

For the rehabilitation of orphans and widows a community-based approach will be adopted. Institutional rehabilitation will be considered only as an alternative option. The Women and Child Development Department will be the Nodal Department for the rehabilitation of the children who become orphans, and persons who become widows and physically or mentally challenged due to disasters.

g) **Order** :

Ordered that the Resolution be published in the State Gazette for general information. By order of the Governor.

***Administrative Response during Disaster:***

The basic responsibility for undertaking rescue, relief and rehabilitation measures in the event of natural disasters is that of the State Governments concerned. The role of the Central Government is supportive, in terms of physical and financial resources and complementary measures in sectors such as transport, warning and inter-state movement of food grains. Relief Manuals and Codes are available for undertaking emergency operations.

A broad view of the administrative response at national, state and district levels is given below

**a) National Organisation**

Under the Indian federal system, disaster management is the responsibility of State Governments. However, there is a Crisis Management Group headed by the Cabinet Secretary and consisting of nodal ministries in charge of various types of disasters and supporting ministries. For natural disasters, the Ministry of Agriculture is the nodal Ministry and the other Ministries play a supportive role. In the event of a disaster, a multi-disciplinary Central Government team, at the invitation of the affected State, carries out disaster assessment and makes recommendation for assistance.

**b) State Level Organisation**

Disaster preparedness and response in the State is usually delegated to the Relief and Rehabilitation Department or the Department of Revenue. The Crisis Management Group at the State level is headed by the Chief Secretary of the Government, with participating of all the related agencies.

**c) District Level**

A District Level Co-ordination and Review Committee is constituted and is headed by the Collector as Chairman with participation of all other related agencies and departments

**d) Contingency Action Plan**

A National Contingency Action Plan (CAP) has been notified. It facilitates the launching of relief operations without delay. This is updated every year. The CAP identifies the initiatives required to be taken by various Central Ministries/Departments in the wake of natural calamities, sets down the procedure and determines the focal points in the administrative machinery.

At the State level, the State Relief Commissioner (or Secretary, Department of Revenue) directs and controls the relief operations through Collectors or Deputy Commissioners, who are the king-pin of all relief operations, co-ordination, direction and control at the district level

**e) Arrangements for Financing Relief**

Schemes for financing expenditure on relief and rehabilitation in the wake of natural calamities are governed by the recommendations of Finance Commissions appointed by Government of India after every five years. Under the existing scheme, in operation for the period 1995-2000, each State has a corpus of funds called Calamity Relief Fund(CRF), administered by a State Level Committee, headed by the Chief Secretary of the State Government. The size of the corpus is determined having regard to the vulnerability of the State to different natural calamities and the magnitude of expenditure normally incurred by the State on relief operations. The corpus is built by annual contributions of the Union

Government and the State Governments concerned in the ratio of 3:1. At present, the aggregate accretion in the States' CRF for a period of five years from 1995-2000 amounts to Rs. 63042.70 million. The States are free to draw upon this corpus for providing relief in the event of any natural calamity. In the event of a major disaster warranting intervention at the national level, a provision exists in the form of National Fund for Calamity Relief with a

corpus of Rs. 7000.00 million (for 1995-2000) for the Union Government to supplement the financial resources needed for relief operations.

**Mitigation measures During disasters:**

1. Integrated multi-hazard approach (emphasis on cyclone and tsunami risk in coastal areas)

2. Early warning system for cyclones and tsunamis

3. Evacuation plans(emphasis on self reliance for sustenance with coastal community)

4. Capacity building

5. Training of all concerned

6. Public awareness programmes

7. Hazards mapping and vulnerability analysis

8. Risk identification, Zoning, mapping

**Measures to be strengthened in Structural Mitigation:**

1. Seawalls and coral reefs

2. Tsunamis breakwaters

3. Increasing the river dike height

4. Tsunami and cyclone shelters

5. Evacuation routes identification

6. Permanent structures strictly according to BIS codes

7. Retrofitting of vulnerable structures for tsunamis/cyclone resistance

8. Retrofitting important buildings like (Fire stations, school buildings railways, hospitals)

**Measures to be strengthened in Non-Structural Mitigation:**

1. Education

2. Public awareness

3. Information management

4. Risk communications

5. Land use zoning in accordance with law

6. Maintaining natural sand dunes

7. Reducing vulnerability

8. Empowerment