

CENTRE FOR OPEN AND DISTANCE LEARNING

TEZPUR UNIVERSITY: NAPAAM: SONITPUR

SELF-LEARNING MATERIAL

**PLANNING FOR RISK AND CRISIS
MITIGATION**

DEM 203

SELF-LEARNING MATERIAL

Course Code: DEM 203

Course Title: PLANNING FOR RISK AND CRISIS MITIGATION

Course Advisors

Dr R.R. Haque, Associate professor and Head, Dept. of Environmental Science, Tezpur University

Dr Nimali Gogoi, Associate professor and Head, Dept. of Environmental Science, Tezpur University

Dr Dipak Nath. Assistant Professor, Centre for Disaster Management , Tezpur University

Programme Coordinator/s

Dr Nimali Gogoi, Associate professor and Head, Dept. of Environmental Science, Tezpur University

Dr Dipak Nath. Assistant Professor, Centre for Disaster Management , Tezpur University

Course Contributors

Dr R.R. H a que, Associate professor and Head, Dept. of Environmental Science, Tezpur University

Dr Kh Ashalata Devi, Assistant Prpfessor, Dept of Environment Science , Tezpur University

Course authors

Dr Dipak Nath. Assistant Professor, Centre for Disaster Management , Tezpur University

Course Editor/s

Dr Dipak Nath. Assistant Professor, Centre for Disaster Management , Tezpur University

March 2012

@ CODL, Tezpur University

Published by

Director, Centre for Open and Distance Learning (CODL),
on behalf of Tezpur University.

The material provided here can be freely accessed but cannot be reproduced or reprinted for commercial purposes.

COURSE INTRODUCTION

PART -1

COURSE 1: ENVIRONMENTAL LAWS AND POLICIES

- UNIT-1 : CONSTITUTIONAL PROVISIONS ADDRESSING THE ENVIRONMENT
- UNIT-2 : FORESTS & WILDLIFE
- UNIT-3 : INDIAN ENVIRONMENTAL POLICIES AND MAJOR INITIATIVES
- UNIT-4 : LEGAL PERSPECTIVES OF POLLUTION CONTROL
- UNIT-5 : THE ENVIRONMENT (PROTECTION) ACT 1986 (EPA 1986)
- UNIT-6 : ENVIRONMENTAL IMPACT ASSESSMENT
- UNIT-7 : INTERNATIONAL LAWS
- UNIT-8 : ENVIRONMENTAL LAWS AND POLICIES

COURSE 2: ENVIRONMENTAL POLLUTION MITIGATION

- UNIT-1 : INTRODUCTION
- UNIT-2 : AIR POLLUTION
- UNIT-3 : WATER POLLUTION
- UNIT-4 : NOISE POLLUTION
- UNIT-5 : SOIL POLLUTION
- UNIT-6 : WASTE MANAGEMENT
- UNIT-7 : MANAGING THE OCEANS

COURSE 3: PLANNING FOR RISK AND CRISIS MITIGATION

- UNIT-1 : DISASTER MANAGEMENT ACT. AND POLICY OF INDIA
- UNIT-2 : PLANNING STRATEGIES
- UNIT-3 : PLANNING NEEDS AND EMERGENCY ACTION
- UNIT-4 : PREPARATION OF STATE AND DISTRICT LEVEL DM PLANS
- UNIT-5 : ENVIRONMENTAL MANAGEMENT FOR DISASTER RISK REDUCTION
- UNIT-6 : RISK, LOSS AND NEEDS ASSESSMENT
- UNIT-7 : URBAN, VILLAGE AND SCHOOL DM PLAN
- UNIT-8 : COUNTER DISASTER RESOURCES AND THEIR ROLES

UNIT-1: DISASTER MANAGEMENT ACT. AND POLICY OF INDIA**UNIT STRUCTURE**

- 1.1 INTRODUCTION
- 1.2 OBJECTIVES
- 1.3 DISASTER MANAGEMENT ACT
 - 1.3.1 WHAT IS AN ACT?
 - 1.3.2 NATIONAL DISASTER MANAGEMENT ACT OF INDIA
- 1.4 PROVISIONS OF DISASTER MANAGEMENT ACT 2005
 - 1.4.1 NATIONAL DISASTER MANAGEMENT AUTHORITY (NDMA)
 - 1.4.2 NATIONAL ADVISORY COMMITTEE (NAC)
 - 1.4.3 NATIONAL EXECUTIVE COMMITTEE (NEC)
 - 1.4.4 NATIONAL PLAN
 - 1.4.5 STATE DISASTER MANAGEMENT AUTHORITY (SDMA)
 - 1.4.6 STATE ADVISORY COMMITTEE
 - 1.4.7 STATE EXECUTIVE COMMITTEE (SEC)
 - 1.4.8 DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)
 - 1.4.9 NATIONAL INSTITUTE OF DISASTER MANAGEMENT
 - 1.4.10 NATIONAL DISASTER RESPONSE FORCE (NDRF)
 - 1.4.11 NATIONAL DISASTER RESPONSE FUND
 - 1.4.12 NATIONAL DISASTER MITIGATION FUND
 - 1.4.13 PROVISIONS OF OTHER FUNDS
 - 1.4.14 PUNITIVE MEASURES AND PENALTIES
 - 1.4.15 OTHER IMPORTANT PROVISIONS
- 1.5 NATIONAL POLICY FOR DISASTER MANAGEMENT
 - 1.5.1 WHAT IS POLICY?
 - 1.5.2 WHY WE NEED A DISASTER MANAGEMENT POLICY?
 - 1.5.3 NATIONAL POLICY ON DISASTER MANAGEMENT (NPDM) IN INDIA
- 1.6 WHAT WE LEARNT FROM THIS UNIT?

1.1 INTRODUCTION

Disaster management is a multidisciplinary approach, where every individuals, departments and organizations have specific roles and responsibilities. We need a strong organizational structure for practical risk reduction planning and effective management of disasters. Moreover, formulation of strategy for capacity building of the concerned organizations and resource mobilization is also integral part of disaster management.

In view of increasing trends of disaster events and subsequent loss and damage worldwide, the United Nations and many other international agencies have initiated different programmes for global disaster risk reduction. But, even then the magnitude of loss and damage due to different natural hazards is increasing significantly year by year. This is perhaps due to lack of proper institutional, legal, financial and coordination mechanisms to deal with disasters at national, state, district and local levels in most of the countries.

It is now clear that, relief centric disaster management approach is not an effective mechanism for disaster risk reduction of a system or community. A disaster management plan should have the provisions for genuine risk assessment and planning for prevention, mitigation, preparedness, response and recovery.

Planning for risk and crisis management needs active participation of disaster management agencies, NGOs, CBOs and community members in the process of assessment, analysis and planning. Strong coordination among different stakeholders is also necessary for genuine implementation of the action plan. Strong legal-institutional arrangements at national and state levels are also necessary for effective management of disasters. To achieve these, there should be proper legislations and policies at national and state levels for effective management of disasters.

In this chapter, we shall discuss about Disaster Management Act and Policies of India.

1.2 OBJECTIVES

The main objective of this chapter is to highlight the issues relevant to

- Concept of National Act and Policy.
- Present structure and provisions of Disaster Management Act of India.
- Process and elements of disaster management policy.
- National Policy on Disaster Management in India.

1.3 DISASTER MANAGEMENT ACT

1.3.1 WHAT IS AN ACT?

An Act is a legislation enacted by the national parliament or state assembly to deal with a particular issue, subject, or institution effectively. In India, a legislative proposal in the form of a bill has to pass through various stages to get the status of an Act. The common procedure for adopting a national Act is described below

First reading stage

The process starts with the introduction of a bill or draft of legislative proposal in either house of parliament i.e., Lok Sabha or Rajya Sabha by a minister or private member as government bill or private member's bill. To introduce a bill in the house, the member-in-charge of the bill need to take permission to introduce the bill to introduce the bill. The leave may or may not be granted by the house. If the bill is opposed, the speaker may permit a full discussion followed by vote in the house. This stage is known as "First Reading of the Bill".

If the house permits to introduce the bill, then the draft of the bill could be published in the official gazette. After introduction of a bill, the presiding officer of the house may refer the bill to concerned Standing Committee for examination and preparation of a report thereon. The Standing Committee may take expert opinion or public opinion before finalizing the report for submission to the house.

Second reading

This again comprises two stages for consideration of the bill.

The first stage comprises general discussion on the bill including underlying principles of the bill. The house may refer the bill to a select committee of one house or a joint committee of both the houses to examine the bill clause-by-clause and make amendments to different clauses. The house may also consider the bill straightway without referring the same to a select or joint committee. The government may circulate the bill to states and union territories for their opinion.

The second stage of this phase comprises clause-by-clause consideration of the bill, as introduced or reported by a select or joint committee. Amendments on different clauses could be done based on voting amongst the members present in the house. In this stage, the house also decides the long title and enacting formula of the bill.

Third reading

In this stage, the member-in-charge can move to pass the bill in the house. At this stage, the debate confines to the arguments either in support or rejection of the bill. To pass an ordinary bill, a simple majority of members present in the house on voting is necessary. If a bill needs amendment of constitution, then a majority of total memberships of the house and a majority not less than two-third of the members present in both houses is required to pass the bill in the parliament.

If the bill is passed by one house, it has to send to other house for concurrence. Like this, the parliament adopts Acts on different matters.

1.3.2 NATIONAL DISASTER MANAGEMENT ACT OF INDIA

One year after the great Tsunami in 2004, the Government of India had enacted an Act called “Disaster Management Act, 2005 (*No. 53 of 2005*) for effective management of disasters in India. The Disaster Management Act. came into force considering the need for a paradigm shift in the approach of disaster management from relief centric approach to a proactive regime to give greater emphasis on prevention, mitigation and preparedness.

The Disaster Management Act lays stress on following matters.

- It gives emphasis on institutional, legal, financial and coordination mechanisms for disaster management at national, state, district and local levels.
- It defined the roles and responsibilities of central and state governments; their ministries, line departments, local authorities as well as other stakeholders.
- As per this Act, preparation of Disaster Management Plans for all the states and districts of India is mandatory.
- It has provided the scope for establishment of Response Forces at national, state and district levels.
- It has the provision for generation of national and state disaster response fund for capacity building of response forces and smooth functioning of response operations during disasters.
- It has provided the scope for emergency procurement of equipments and tools, to be used during response operation.
- The Act provides budgetary provisions for disaster management activities at national, state and district levels under different central and state government ministries and departments.
- It laid stress on punitive action for negligence in duty, creating obstruction in disaster management activities, false claim, misappropriation of fund, discrimination in providing relief materials and compensation to the disaster victims etc.
- It has provided the scopes for delegating power to disaster management agencies and response forces; making new regulations and amendments of existing rules; emergency requisition of resources at the time of disaster etc.
- It laid stress on timely utilization of fund, proper accounting and preparation of annual progress reports on disaster management activities at all levels.

1.4 PROVISIONS OF DISASTER MANAGEMENT ACT 2005

1.4.1 NATIONAL DISASTER MANAGEMENT AUTHORITY (NDMA)

As per sub-section (1) of section (3) of Disaster Management Act, a central authority called “National Disaster Management Authority (NDMA)” is to be established with the Prime Minister of India as Chairperson and maximum nine other members nominated by the chairperson. The chairperson may designate one of the members as Vice-Chairperson.

The chairperson may conduct meeting of the central authority as and when necessary. In absence of chairperson, the vice-chairperson is authorized to preside over the meeting.

The central government shall provide offices, consultants and other employees as per requirement of NDMA. The NDMA is responsible for laying down policies, plans and guidelines for timely and effective management of disaster situation and response to disasters.

In case of emergency, the chairperson can exercise all or any of the powers of the authority. The NDMA shall recommend guidelines for minimum standards of relief to be provided to the effected persons. In case of severe disaster, the NDMA may recommend for relief in repayment of loans or granting fresh loans to the affected persons.

1.4.2 NATIONAL ADVISORY COMMITTEE (NAC)

The NDMA may constitute a National Advisory Committee with the members having expertise in the field of disaster management and practical experience of disaster management at national, state and district levels. The members of advisory committee shall be entitled to get allowances as per central government rules. The advisory committee shall provide necessary supports to NDMA in formulating plans and policies.

1.4.3 NATIONAL EXECUTIVE COMMITTEE (NEC)

There shall be one National Executive Committee for formulation of disaster management plans and implementation of plans. The Secretary of the nodal ministry of government of India, which has administrative control over national disaster management, shall be the Chairperson of the committee. The secretaries of the central ministries or departments having administrative control of the agriculture, atomic energy, defence, drinking water supply, environment and forest, finance, health, power, rural development, science and technology, space, telecommunication, urban development, water resources as well as the Joint Chief of defence staff shall be the members of the committee.

The Chairperson of NEC may invite other central or state government officers for attending the meeting of NEC. The NEC may constitute one or more sub-committees for its efficient functioning. The NEC shall be responsible to assist the NDMA in formulating plans and policies and implementing these plans and policies. The NEC shall also be responsible to ensure smooth functioning of disaster management activities at all levels as per direction of central government. The NEC is the coordinating and monitoring body for disaster management in India.

1.4.4 NATIONAL PLAN

The NEC shall prepare National Plan for disaster management for whole of the country in the line of national guidelines and in consultation with state governments, expert bodies or organizations working in the field of disaster management. The national plan shall be approved by the NDMA. The national plan shall include

- Measures to be taken for prevention of disasters and damage mitigation.
- Actions to be taken for integration of mitigation measures.
- Measures to be taken for preparedness and capacity building to deal with disaster situations.
- Roles and responsibilities of different ministries and departments for effective disaster management, strategies.

The national plan shall be reviewed and updated annually. The central government shall provide financial support to implement the national plan. Different ministries and departments shall formulate their own disaster management plans in accordance with the national plan.

1.4.5 STATE DISASTER MANAGEMENT AUTHORITY (SDMA)

Like NDMA for entire India, all states of India shall have State Disaster Management Authorities. The Chief Minister of the states shall be the Chairpersons of the SDMAs of the respective states. The Chairperson of the SDMA shall nominate other members of the state authority, not exceeding eight members. The Chairperson may nominate one of the members as Vice-Chairperson under clause (b) of sub-section (2) of the DM Act. In case of SDMA, Delhi, the Lieutenant Government of Delhi shall be the Chairperson and Chief Minister of Delhi shall be the Vice-Chairperson. The Chairpersons of the State Executive Committees shall be the Chief Executive Officers of SDMAs.

The state government shall appoint officers, consultants and other staff of the SDMA. The SDMA may meet as and when necessary at suitable place and time. The meeting of SDMA shall be presided over by the chairperson. But, in absence of chairperson, the vice-chairperson shall be entitled to preside over the meeting.

Subject to the provisions of Disaster Management Act, the SDMA has the responsibility of laying down plans and policies for effective management of disasters in the state. As per the guidelines of NDMA, the SDMA shall lay down detail guidelines for minimum standard of relief to be provided to the effected people.

1.4.6 STATE ADVISORY COMMITTEE

The SDMA may constitute an Advisory Committee for recommendations on different aspects of disaster management at state and district levels with experts of having practical experience in the field of disaster management. The members of advisory committee shall be entitled to get due allowances as per state government regulations.

1.4.7 STATE EXECUTIVE COMMITTEE (SEC)

There shall be one State Executive Committee for each state to formulate state disaster management plan in the line of national plan and implement this plan effectively. The Chief Secretaries of the respective states shall be the Chairpersons of the state executive committees. Secretaries of the four other departments, as the state government thinks fit for, shall be the members of the executive committee. The SEC may constitute one or more sub-committees for its efficient functioning. The SEC shall be the coordinating and monitoring body of all disaster management related activities in the state.

The SEC shall prepare state disaster management plan as per guidelines laid down by the NDMA and in consultation with district and local authorities. The state plan shall include

- Hazard and vulnerability characteristics of the state.
- Measures to be taken for prevention of disasters or mitigation of damage and disruptions.
- Integration of mitigation measures with development plans and projects.
- Preparedness and capacity building measures for damage mitigation and coping with disasters.
- Roles and responsibilities of state government ministries and departments in relation to the measures to be taken for prevention, mitigation, preparedness, response and recovery.
- Budgetary provisions to implement the plan.
- Provisions to review and update the plan annually.

1.4.8 DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)

By notification in the Official Gazette under sub-section (1) of section (14) of the Disaster Management Act, the state government may constitute District Disaster Management Authorities for every districts of the state. The DDMA shall have a Chairperson and members

not exceeding seven. The Deputy Commissioner / District Collector or Magistrate shall be the Chairperson of the DDMA. The elected representative of the local authority / Chief Executive member of District Council shall be the Co-Chairperson of DDMA. The Chief Executive Officer of District Authority, Superintendent of Police, Chief Medical Officer of the district shall be the ex officio. The state government shall appoint two other district level offices as the members of DDMA.

If the district has Zila Parishad, the chairperson of the Zila Parishad shall be the Co-Chairperson of the DDMA. The state government shall appoint one Chief Executive Officer of DDMA, who is not below the rank of Additional Deputy Commissioner or Additional District Collector/Magistrate. Other officer, consultants and employees of DDMA shall be appointed by the state government.

The DDMA shall be responsible for preparation of the District Disaster Management Plan and taking all measures for disaster management in the district in accordance with the guidelines laid down by national and state authorities. DDMA is the planning, coordinating and monitoring body for disaster management in the district. The District Disaster Management Plan shall include

- Hazard maps of the district showing the areas prone to different natural hazards.
- Vulnerability analysis of the district to identify the hazard and location specific vulnerability factors.
- Measures to be taken by different government departments and local authorities for prevention of hazards, mitigation of damage and disruption.
- Preparedness and capacity building measures to deal with disaster situation.
- Practical and effective response plan elaborating the responsibilities of different departments and local authorities, procedure for prompt response and relief operation, provision for procurement of essential resources, options for establishment of communication links, method for dissemination of information to the public etc.
- The DDMP shall be reviewed and updated annually. The DDMA shall send copies of DDMP to the SDMA and State Government.

By order, the DDMA may engage any district level officer or district level department or local authority in disaster management activities of the district as and when necessary. The officers and departments shall be bound to carry out such duties.

The DDMA has the power and responsibility to

- ✓ give direction to district level departments and local authority to release their resources as and when necessary
- ✓ restrict vehicular traffic and control movement of people
- ✓ conduct search, rescue and relief operations in disaster prone areas
- ✓ establish emergency communication systems in affected areas
- ✓ remove debris and dispose off unclaimed dead bodies
- ✓ use the amenities from any authority or person
- ✓ demolish hazardous structures and construct temporary bridges and other structures
- ✓ regulate the activities of non-governmental organizations in disaster effected areas
- ✓ recommend state government to take supports of military organizations and external disaster management agencies in managing an extreme disaster situation.

1.4.9 NATIONAL INSTITUTE OF DISASTER MANAGEMENT (NIDM)

The Central Government shall establish an institute called the “National Institute of Disaster Management” (NIDM). There shall be a governing body for the institute constituted by the Central Government. The NIDM shall function within the broad policies and guidelines of the NDMA. The Central Government shall provide officers, consultants and employees to NIDM for carrying out its functions. NIDM shall be responsible for

- ✓ planning and promoting training and research in the area of disaster management
- ✓ documentation and development of database at national level
- ✓ developing training modules
- ✓ preparation of comprehensive human resource development plan
- ✓ providing assistance in national level planning
- ✓ providing required assistance to other training and research institutes to conduct training programmes for different stakeholders
- ✓ providing assistance to State Governments and State Training Institutes to formulate plan, policies and frameworks and also conduct training programmes
- ✓ developing course materials for professional courses on Disaster Management
- ✓ conducting or facilitating others to conduct conferences, workshops, courses and training within and outside the country
- ✓ publication of research journal on disaster management
- ✓ undertaking any other function assigned by the Central Government.

1.4.10 NATIONAL DISASTER RESPONSE FORCE (NDRF)

As per Disaster Management Act, 2005, the Central Government may constitute National Disaster Response Force for the purpose of specialist response in disaster situations in the country. The general superintendence, direction and control of the NDRF shall be vested by NDMA. Command and supervision of the NDRF shall be done by a Director General, appointed by the Central Government.

1.4.11 NATIONAL DISASTER RESPONSE FUND

The Central Government shall constitute a fund called “National Disaster Response Fund” for meeting expenditures of disaster response activities. The National Disaster Response Fund shall be available to the National Executive Committee (NEC) to meet the expenses for emergency response, relief and rehabilitation in accordance with the guidelines of Central Government and in consultation with NDMA.

1.4.12 NATIONAL DISASTER MITIGATION FUND

The Central Government may constitute another fund called “National Disaster Mitigation Fund” exclusively for the projects meant for mitigation of disaster risk of the country at all levels. The National Disaster Mitigation Fund shall be applied by NDMA.

1.4.13 PROVISIONS OF OTHER FUNDS

Similarly, the State Governments shall constitute “State Disaster Response Fund” and “State Disaster Mitigation Fund” for the purpose of disaster response and mitigation activities in the states. The State disaster response and mitigation funds shall be available with the State Executive Committee and SDMA respectively.

Every state and central government ministries and departments shall make provisions of special funds in their annual budget for the purpose of carrying out disaster management activities and programmes as per their disaster management plans.

1.4.14 PUNITIVE MEASURES AND PENALTIES

There is provision in the Disaster Management Act for punitive measures and penalties due to

- Creating obstruction in the functioning of disaster management agencies or refusing to comply with the direction given by central and state governments; national, state or district disaster management authorities; national or state executive committees under this Act.
- False claim for obtaining relief, assistance, repair, reconstruction or other such benefits consequent to any disaster.
- Misappropriation of money and material meant for providing relief to disaster victims.
- Making or circulating a false warning about occurrence and magnitude of disaster, which may cause panic of common people.
- Any offence committed by any department or head of the department or any government official.
- Failure or refusal in performing duty by any officer or concerned official.
- Contravention of any order regarding requisition of resources.
- Offence committed by any company or corporate body in the matter of disaster management activities. In this case, the director, manager, secretary, or other officers of the company or corporate body shall be declared guilty and punished accordingly.
- Discrimination in distributing relief material or compensation to the disaster victims on the ground of sex, caste, community, religion or political affiliation etc.

1.4.15 OTHER IMPORTANT PROVISIONS

- The central government may issue any direction in writing to central or state ministries, departments, authorities, executive committees, statutory bodies or any officer of these agencies for any assistance in disaster management related activities.
- On request or order of national, state and district authorities or executive committees; the officers or employees shall perform any of the functions in connection with the prevention of disaster or mitigation or rescue or relief work.
- The national and state executive committees or district authority or any authorized officer shall have the power of requisition of any resources or facilities for the purpose of prompt response; any premises needed or likely to be needed for rescue operation; any vehicle needed or likely to be needed for transportation of resources or people in connection with rescue, relief and reconstruction.

The period of requisition shall not extend beyond the period for which these resources, premises or vehicle needed. Requisition of these resources, facilities, premises or vehicle shall be made on payment as determined by central or state government.

- The national or state or district authority may recommend the government to give direction to the controlling authorities of print and electronic media to carry out warning or advisories regarding disasters.
- If necessary, the national or state executive committee may delegate certain powers to the chairperson or any member or any officer of the committee in writing or issuing order.
- The national authority shall prepare annual report comprising full account of activities of previous year and submit the same to the central government. The central government shall place the report before both the houses of the parliament within one month of its receipt. Similarly, the state authority shall prepare annual report of the state comprising activities undertaken during previous year and submit the same to the

state government. The state government shall place the report before legislative assembly.

- As per this Act, *“No court (except the Supreme Court or a High Court) shall have jurisdiction to entertain any suit or proceeding in respect of anything done, action taken, orders made, direction, instruction or guidelines issued by the Central Government, National Authority, State Government, State Authority or District Authority in pursuance of any power conferred by, or in relation to its functions, by this Act.”*

Moreover, the Central Government shall have the power to make rules for carrying out the purposes of this Act. The National Institute of Disaster Management with prior approval of Central Government may make regulations consistent with this Act and the rules thereunder.

The rules made by Central Government and regulations made by National Institute of Disaster Management shall be laid before each house of parliament during parliament session.

1.5 NATIONAL POLICY FOR DISASTER MANAGEMENT

1.5.1 WHAT IS POLICY?

The term *policy* depicts a set of basic principles and associated guidelines formulated by the authorized body of an organization to achieve a particular goal. Government policies are generally made in pursuance of specific Acts enacted by the parliament and may not necessarily be passed by the parliament of a nation. A policy may need approval of union cabinet or governing body of an organization. The policy refers the procedure and protocol to carry out certain activities or preserve the interest of national community.

Policy may be a set of guidelines for subjective and objective decision-making. The guidelines for subjective decision-making assist decision makers in considering the relative merits of number of factors before taking a decision. For example, policy for construction of big dams assists the engineers to design a dam considering hazard and vulnerability factors, impact factors on environment and downstream population, hazard resistant construction norms etc. The guidelines for objective decision-making are generally operational in nature, e.g., inbuilt operational policy for downloading a software, book, references etc. from a website.

1.5.2 WHY WE NEED A DISASTER MANAGEMENT POLICY?

The disaster management policy is required to establish suitable organizational structure and develop adequate infrastructure and faculties along with necessary budgetary provisions to deal with different aspects of disaster management at national to local levels.

A strong disaster management policy considers the following major factors

- ✓ Importance of hazard, vulnerability and capacity assessment to assess the disaster risk of an area or a system or an establishment.
- ✓ Probable impact of the hazards to the system and community.
- ✓ Resource assessment to assess the capacity and needs of the community and disaster management agencies to deal with hazards or disasters.
- ✓ Organizational arrangement required for risk and crisis management.
- ✓ Guidelines for sustainable development and protection of environment.

The basic advantages of a comprehensive disaster management policy are

- ✓ It allows both government and non-governmental agencies to play leading role in disaster management related activities in coordination with vulnerable communities.
- ✓ It provides basic guidelines and norms for integrated and coordinating efforts of all stakeholders to deal with disaster situations.
- ✓ It defines the organizational structure required to deal with different aspects of disaster and responsibilities of different organizations and individuals.
- ✓ It gives guidelines for procurement and optimum utilization of resources.
- ✓ It gives scope to educate people about their risk and motivate them towards adopting measures for disaster risk reduction and preparedness to cope with disaster.
- ✓ It also provides opportunity to get international assistance and cooperation during severe disasters.

1.5.3 NATIONAL POLICY ON DISASTER MANAGEMENT (NPDM) IN INDIA

Background

The Union Cabinet of India approved the *National Policy on Disaster Management* (NPDM) in 2009. The NPDM was prepared in pursuance of the Disaster Management Act, 2005 with a vision to make India safe and disaster resilient.

The main objective of this policy is to develop a holistic, proactive, technology driven and multi disaster oriented strategy to address all aspects of disaster management covering prevention, mitigation, preparedness, response and recovery phases; institutional, legal and financial arrangements; techno-legal regime; capacity development; knowledge management; research and development.

This policy has laid stress on risk assessment; modern technology oriented and environment friendly risk mitigation measures; early warning and contemporary forecasting mechanisms; involvement of media in educating vulnerable community about their risk and risk mitigation measures; needs assessment of vulnerable community; capacity building; efficient response and relief; disaster resilient structures and habitat; and sustainable development.

This policy also addresses the concerns of vulnerable people including women, children, differently able persons and other disadvantage groups. Due consideration has been given to the issues of equity and inclusiveness in formulating the guidelines for grant of relief and rehabilitation of affected persons.

The NPDM was formulated to bring the transparency and accountability in all aspects of disaster management by involving all stakeholders covering vulnerable community, community based organizations, civil society, local bodies and Panchayati Raj Institutions (PRIs).

Institutional and legal arrangements for disaster management

The NPDM has recommended institutional and legal framework for disaster management in India in the tune and in pursuance of Disaster Management Act, 2005. The policy also suggest continuation of earlier institutional arrangements. The institutional and legal framework includes

- National Disaster Management Authority (NDMA)
- National Executive Committee (NEC)
- State Disaster Management Authority (SDMA)
- State Executive Committee (SEC)
- District Disaster Management Authority (DDMA)
- Local Authorities including Panchayati Raj Institutions, Municipalities, District and Cantonment Boards and Town Planning.
- National Institute of Disaster Management (NIDM)

- National Disaster Response Force (NDRF)
- State Disaster Response Force (SDRF)
- Cabinet Committee on Management of Natural Calamities (CCMNC)
- Cabinet Committee on Security (CCS)
- High Level Committee (HLC)
- Central Government and its Ministries and Departments
- National Crisis Management Committee (NCMC)
- State Government and its Ministries and Departments
- District Administration
- Armed Forces
- Central Para Military Forces
- State Police Forces and Fire Services
- Civil Defence and Home Guard
- National Cadet Corps (NCC)
- National Service Scheme (NSS)
- Nehru Yuva Kendra Sangathan (NYKS)

Financial arrangements

The NPDM recommended guidelines for financial arrangement to deal with different aspects of disaster management in the tune of Disaster Management Act, which include

- Creation of National Disaster Response Fund.
- Creation of National Disaster Mitigation Fund.
- Budgetary provision for all central ministries and departments to support their disaster management plans.
- Creation of state disaster response and mitigation funds.
- Provisions of fund for national, state and district level disaster mitigation projects.
- Generation of financial tools like catastrophic risk financing, risk insurance, catastrophe bonds, micro-finance, calamity relief fund, environmental relief fund, disaster risk insurance, micro insurance, warranty of newly constructed houses etc.

Disaster Prevention, Mitigation and Preparedness

The NPDM suggested proper planning in developmental process to avoid a disaster like situation or mitigate loss and damage or prepare to cope with disaster. As per this policy, special emphasis should be given to undertake mitigation measures including

- Measures in all developmental projects.
- Initiation of national disaster mitigation projects in high priority areas by NDMA with the support of Central Ministries and Departments as well as State Governments.
- Special assistance to State Governments for state level mitigation projects and programmes.
- Adoption of indigenous knowledge and coping mechanisms for disaster risk mitigation.

Risk assessment and vulnerability mapping

Hazard zonation, hazard mapping and vulnerability analysis to be carried out by using modern technological know-how; like GIS and remote sensing, GPS technology etc.; for multi hazard prone areas. Central ministries and departments, national agencies, knowledge based institutions, State and District level Disaster Management authorities are to carry out risk and vulnerability assessment of all disaster prone areas.

Urban development

Considering the increasing trend of disasters in urban areas, the NPDM recommended for special action plans to check unplanned urbanization, improve urban drainage systems with

special focus on non-obstruction of natural drainage systems; develop Decision Support System (DSS) for urban risk management through mapping of infrastructure of spatial resolution; initiate special training for search and rescue etc.

Other important guidelines of NPDM

- Utmost importance to be given for safety and sustainability of critical infrastructures.
- Environmentally sustainable development for maintaining the ecological balance.
- Strategies for climate change adaptation and disaster risk reduction.
- Capacity building of Disaster Management agencies and vulnerable communities.
- Development of forecasting and early warning systems.
- Proper utilization of communication and information technology in decision making, advance warning etc.
- Strengthening of the Emergency Operation Centres (EOCs).
- Medical preparedness and mass casualty management.
- Training and mock drill.
- Community based disaster preparedness.
- Corporate Social Responsibility and Public Private Partnership.
- Revision of municipal regulations and master plans of cities.
- Micro level land use planning.
- Safe construction practices.
- Role of DM authorities, DM executive committees, different ministries, line departments etc. in disaster response.
- Standard Operating Procedure (SOP) and Incident Command System (ICS)
- Management of relief camps and relief supplies.
- Intermediate shelter, temporary livelihood options, socio-economic rehabilitation.
- Recovery and safe development.
- Livelihood restoration.
- Disaster management education in education institutes.
- Synergic application of science and technology.
- Research and development.
- Knowledge dissemination through Information and Communication Technology (ICT)

1.6 WHAT WE LEARNT FROM THIS UNIT?

We need genuine strategies and strong organization arrangements for disaster risk reduction and disaster response. For proper and effective management of disasters, we also need strong institutional and legal arrangements at national and state levels. To achieve these, all nations should have proper legislations and policies at national and state levels.

An Act is basically a legislation enacted by the national or state government to deal with a particular issue. Policy means a set of basic principles and associated guidelines formulated by an authorized body to achieve a particular goal.

The Disaster Management Act of India was enacted by the Government of India in 2005, just one year after the great tsunami. This Act came into force considering the need for a paradigm shift in the approach of disaster management from relief centric approach to proactive regime to give greater emphasis on prevention, mitigation and preparedness.

The DM Act 2005 deals with the issues related to institutional, legal, financial and coordinating mechanisms; role and responsibilities of DM agencies; response activities; procurement of emergency equipments and tools; budgetary provisions for DM activities; delegation of power; fund utilization and accounting; punitive measures etc.

Disaster Management Policy is required to establish suitable organizational structure and develop adequate infrastructure and facilities to deal with different aspects of disaster Management.

The Union Cabinet of India approved the National Policy on Disaster Management (NPDM) in 2009. The NPDM is prepared in the tune and in pursuance of the DM Act 2005 with a vision of making India safe and disaster resilient.

The main objective of this policy is to develop, proactive, technology driven and multi disaster oriented strategy to address all aspects of disaster management covering prevention, mitigation, preparedness, response and recovery phases; Institutional, legal and financial arrangements; techno-legal regime; capacity development; knowledge management; research and development.

PRACTICE QUESTIONS

1. Define Act.
2. Discuss the procedure of enacting an Act in India.
3. Discuss important points of DM Act 2005 of India.
4. What is NDMA?
5. Mention the role of SDMA?
6. Mention few factors under the provision of punitive measures of DM Act 2005.
7. What do you mean by policy?
8. Describe basic advantages of DM policy.
9. Write few lines on NPDM.

RECOMMENDED BOOKS AND REFERENCES

1. National Policy on Disaster Management, Published by NDMA, New Delhi, 2009.
2. Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, 2005.

UNIT-2: PLANNING STRATEGIES

UNIT STRUCTURE

2.1 INTRODUCTION

2.2 OBJECTIVES

2.3 ORGANIZATIONAL STRUCTURE AND LEGAL-INSTITUTIONAL FRAMEWORK IN INDIA

2.3.1 CONCEPT OF ORGANIZATIONAL STRUCTURE

2.3.2 DISASTER MANAGEMENT STRUCTURE IN INDIA

2.3.3 LEGAL-INSTITUTIONAL FRAMEWORK AS PER DM ACT, 2005

2.4 NODAL MINISTRIES AND ORGANIZATIONS FOR DM IN INDIA

2.4.1 NATIONAL EXECUTIVE COMMITTEE

2.4.2 NODAL MINISTRIES, WHICH DEAL WITH SPECIFIC DISASTERS IN INDIA

2.4.3 OTHER PRIME ORGANIZATIONS AND TASK FORCES INVOLVED IN

DM

ACTIVITIES.

2.5 UN DISASTER MANAGEMENT AND MITIGATION SYSTEM

2.5.1 OFFICE OF THE UNITED NATIONS DISASTER RELIEF COORDINATOR (UNDRO)

2.5.2 UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

2.5.3 FOOD AND AGRICULTURE ORGANIZATION (FAO)

2.5.4 WORLD FOOD PROGRAMME (WFP)

2.5.5 WORLD HEALTH ORGANISATION (WHO)

2.5.6 UNITED NATIONS HIGH COMMISSION FOR REFUGEES (UNHCR)

2.5.7 UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO)

2.5.8 UNITED NATIONS CENTRE FOR HUMAN SETTLEMENTS (UNCHS)

2.5.9 UNITED NATIONS INTERNATIONAL CHILDREN'S EMERGENCY FUND (UNICEF)

2.6 GENERAL STRATEGIES FOR FORMULATION OF DISASTER MANAGEMENT PLAN

2.6.1 WHAT IS PLAN?

2.6.2 STRATEGIES FOR FORMULATION OF DISASTER MANAGEMENT

PLAN

2.7 SUPPORT REQUIREMENTS FOR DISASTER MANAGEMENT

2.8 STEPS FOR RISK REDUCTION PLANNING

2.9 INCIDENT COMMAND SYSTEM (ICS)

2.10 WHAT WE LEARNT FROM THIS UNIT?

2.11 PROBABLE QUESTIONS

2.12 SUGGESTED READINGS

2.1 INTRODUCTION

Now we are familiar with the fact that, the complete disaster management cycle has many stages, which involves pre, and post disaster management related activities and during disaster management. Practical planning for disaster management needs to have the strategies for risk management and crisis management. This involves risk assessment, early warning, prevention of disaster, damage mitigation, preparedness to cope with disaster, rescue, safe shelter, relief operation, rehabilitation of disaster victims and recovery of normal condition.

That is why, the approach of disaster management is multidisciplinary. Only national and state governments can not prepare and implement disaster management plans. It needs support from different government, non-governmental and academic organizations as well as community based organizations.

It is essential to find out the suitable organizations to be involved in the process of formulation and implementation of disaster management plans. Also, there should be a clear organizational framework defining vertical and horizontal coordination mechanism and sequence of activities to be carried out by these organizations. The planning strategies should also reflect resource assessment and mobilization of counter disaster resources; command, control and coordination mechanisms.

In this unit, we shall discuss different issues and aspects of disaster management planning.

2.2 OBJECTIVES

The major objectives of this chapter are

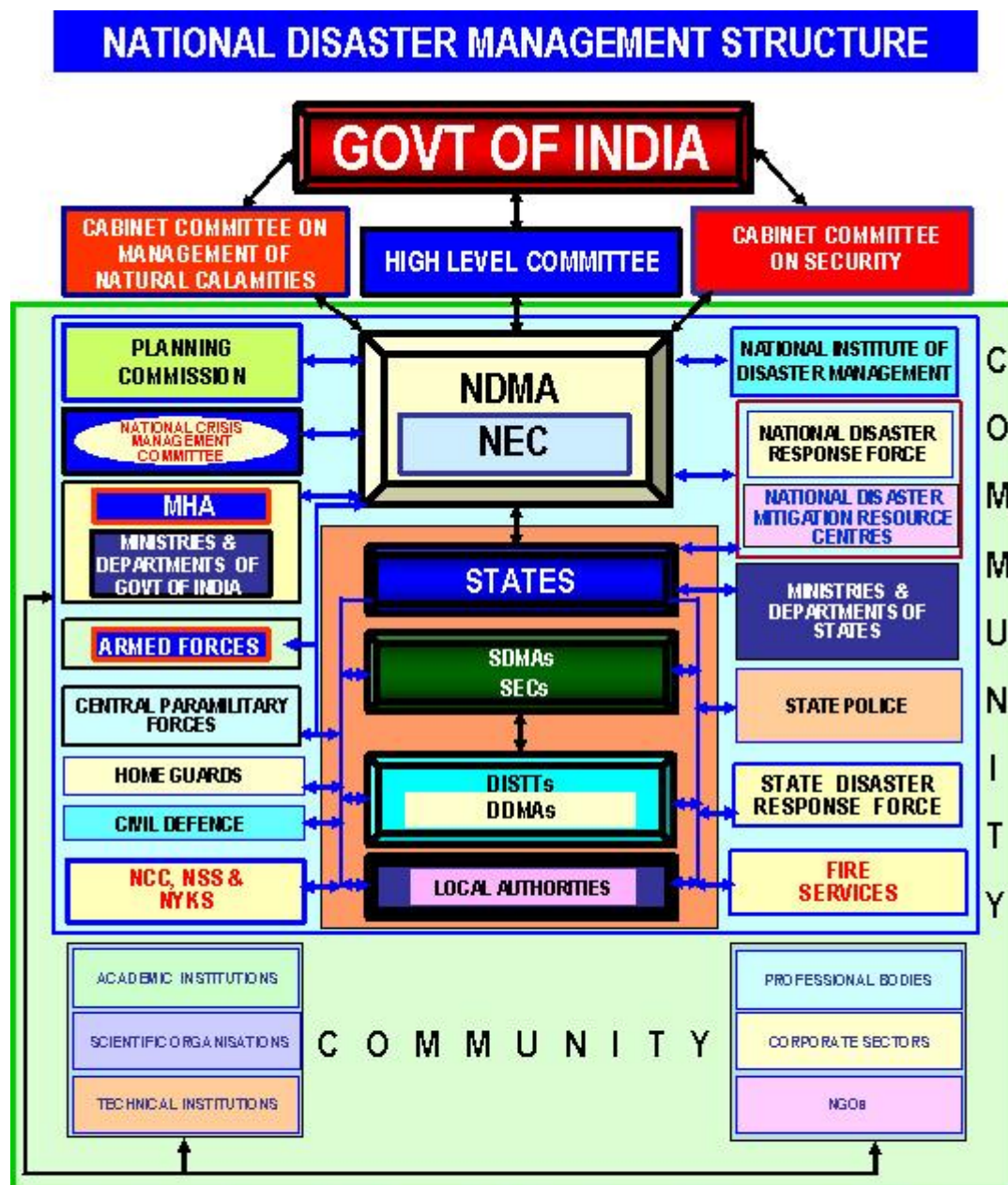
- To discuss about sensible organizational framework for disaster management.
- To discuss the strategies need to be adopted for effective disaster management planning.
- To determine the support requirements for disaster management.
- To define the steps of disaster management planning.
- To highlight the importance of Incident Command System in dealing disastrous incidents.

2.3 ORGANIZATIONAL STRUCTURE AND LEGAL-INSTITUTIONAL FRAMEWORK IN INDIA

2.3.1 CONCEPT OF ORGANIZATIONAL STRUCTURE

Though, the national and state governments are primarily responsible for preparation of disaster management plans for national to local levels; but the organizational structure for disaster management at all levels comprises central and state ministries and line departments, disaster management authorities and institutions, local governments and Panchayati Raj Institutions. Non-governmental organizations, community based organizations and community people play supportive role to the organizational structure in the process of assessment, planning and execution of plans. The Disaster Management Act 2005 and National Policy for Disaster Management of India defined the organizational structure and their framework for managing disasters at national to local levels. In unit 01, we have elaborately discussed about Disaster Management Act. Here, we shall specifically discuss about organizational framework for disaster management in India.

2.3.2 DISASTER MANAGEMENT STRUCTURE IN INDIA



- Notes:**
1. This diagram reflects interactive linkages for synergised management of disasters and not a hierarchical structure.
 2. Backward and forward linkages, especially at the functional level, are with a view to optimise efficiency.
 3. Participation of the Community is a crucial factor.

Source : Disaster Management in India, published by Ministry of Home Affairs,
Government of India, 2011

The central government is the supreme authority to take all measures for the purpose of disaster management in India. The central government has the power to formulate rules and guidelines and make necessary amendments in these rules and guidelines, as it deems necessary. The central government appoints officers, consultants and employees of National Disaster Management Authority and has the power to assign any job related to disaster management to any officer or organization at any time.

The Cabinet Committee on Management of Natural Calamities (CCMNC) was constituted to oversee different aspects of management of natural calamities including assessment and identification of the measures to reduce the impacts of these natural calamities.

The Cabinet Committee on Security (CCS) looks after the issues related to defence of the country, law & order, internal security, policy matters concerning internal and external security implications, political and economic issues related to national security.

The high-level committee comprises Finance Minister as the Chairman and Home Minister, Agriculture Minister and Deputy Chairman of Planning Commission as members of the committee. The high-level committee is mainly responsible to approve the recommendations of the Inter-Ministerial Central Team on central assistance to be provided to the disaster-affected states. The Inter-Ministerial Central Team generally makes recommendations based on assessment of damage caused by severe disasters in the states.

As discussed earlier, the National Disaster Management Authority (NDMA) is the Central Authority and has the power to approve the plan, policy and guidelines prepared by National Executive Committee (NEC) in consultation with National Advisory Committee and other experts of disaster management.

Similarly, there are State Disaster Management Authorities (SDMAs), State Executive Committees (SECs), District Disaster Management Authorities (DDMAs) and local authorities to formulate plan and policy for effective management of disasters at state, district and local levels.

The National Crisis Management Committee (NCMC) comprises high-level officials of Government of India headed by Cabinet Secretary to deal with major crises of the country. The Crisis Management Group (CMG) comprising Central Nodal Ministries supports the NCMC.

The Ministry of Home Affairs, Government of India is the Nodal Ministry to look after all disaster management related issues and activities in the country. All other Central Ministries and Departments have the key role in managing disasters as assigned by the Central Government and Authority.

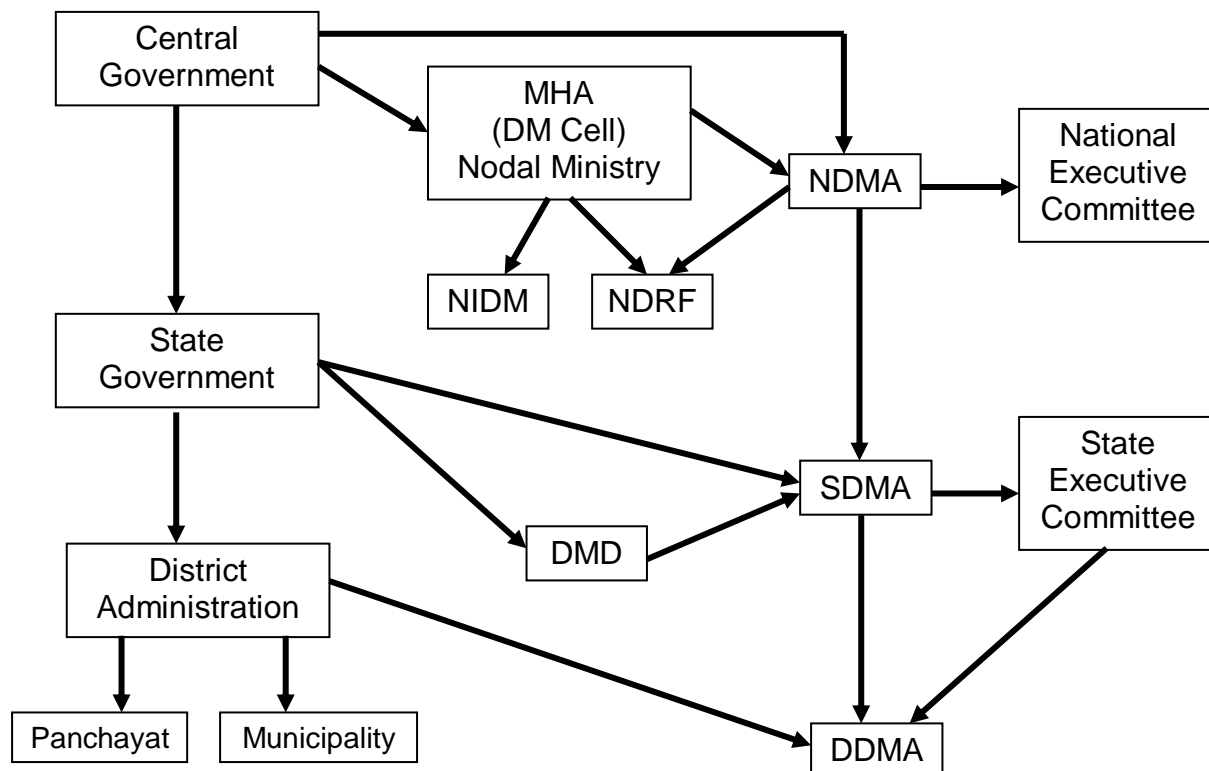
In case the situation is beyond control of the Civil Administration, the Armed Forces are called upon to assist the civil authority. The Armed forces also participate in imparting training to trainers and disaster Management officials. Similarly, Central Paramilitary Forces, Civil Defence, Home Guards, NCC, NSS, Nehru Yuva Kendra Sangathan, State Police, Fire Services etc. play vital role in response activities.

There is one National Institute of Disaster Management, which is basically responsible to carryout academic and research works, conduct training programmes, prepare documentation, develop training modules and database, assist the government in formulating disaster management plans, publish journal etc.

There is National Disaster Response Force (NDRF) for the purpose of specialist response in disaster situations in the country, under the general superintendence, direction and control of NDMA. Similarly, many states already have State Disaster Response Forces (SDRFs), which are responsible to carry out response operation during disaster situation under the guidance and control of SDMA.

Academic Institutions, Scientific Organizations, Technical Institutions, Professional Bodies, Corporate Sectors, NGOs, CBOs and community members have supportive role to assist the organizational structure in assessment, planning, technology development, training and awareness, response, relief etc.

2.3.3 LEGAL-INSTITUTIONAL FRAMEWORK AS PER DM ACT, 2005



Source : Disaster Management in India, published by Ministry of Home Affairs,
Government of India, 2011

2.4 NODAL MINISTRIES AND ORGANIZATIONS FOR DM IN INDIA

2.4.1 NATIONAL EXECUTIVE COMMITTEE

As per Disaster Management Act 2005, the National Executive Committee (NEC) is the supreme body to formulate and implement plans and policies. The NEC is also responsible for smooth functioning of disaster management activities in India. The NEC is the coordinating and monitoring body for disaster management in India.

The Secretary of the Ministry of Home Affairs, which is the nodal ministry and has administrative control over disaster management in India, is the Chairperson of NEC. The members of the NEC are the Secretaries of the ministries and departments, which have administrative control over

- Agriculture
- Atomic Energy
- Defence
- Drinking water supply
- Environment and forest
- Finance
- Health
- Power
- Rural development
- Science and technology
- Space
- Telecommunication
- Urban development
- Water resources
- Chief of integrated defence staff

2.4.2 NODAL MINISTRIES, WHICH DEAL WITH SPECIFIC DISASTERS IN INDIA

- Ministry of Civil Aviation deals with Air Accidents.
- Ministry of Home Affairs deals with Civil Strife.
- Ministry of Railways deals with Railway Accidents.
- Ministry of Environment and Forest deals with Chemical Disasters.
- Ministry of Health deals with Biological Disasters.
- Ministry of Agriculture deals with Natural Disasters.
- Department of Atomic Energy is responsible to deal with the Nuclear Accident inside or outside the country, which may cause serious threat to the people of India.

2.4.3 OTHER PRIME ORGANIZATIONS AND TASK FORCES INVOLVED IN DM ACTIVITIES.

INDIAN METEOROLOGICAL DEPARTMENT (IMD)

Indian Meteorological Department (IND) is responsible to collect data of all natural phenomena and develop effective warning systems for timely forecasting of occurrence of natural hazards. The IMD is involved in following activities

- It receives basic meteorological information from surface observatories.
- It operates Pilot Balloon, Radio Sonde/Radio Wind observatories.
- It runs current weather observatories to meet the requirements of aviation industry.
- It has established Cyclone Detection Radar system.
- It has established INSAT Meteorological Data Processing System for reception and processing of imagery.
- It runs observational programmes to support hydrologists, agriculture scientists, seismologists, and environmentalists.
- It operates Cyclone Warning Centres in cyclone prone states.
- It has developed models of numerical weather prediction.
- The IMD communicates the warnings of probable natural hazards through different communication channels like point to point teleprinter links, linking of Regional Collecting Centres to Regional Telecom Hub, telex, Radio Tele Type broadcast, VSAT technology, VHF and HF/RT links, All India Radio hook-up, Television.

Central Water Commission (CWC)

The CWC is a national apex engineering organization for water resource development in the country. By this time, it has developed significant technological know-how for planning, investigation, management and design of different schemes related to water resource development.

This organization has contributed a lot in the field of irrigation, flood management, flood forecasting, hydro-power generation etc. This organization is responsible for water storage and inflow forecast. The CWC provides relevant data to local authorities for issuing advance warning of flood to mitigate loss and damage. It also provides data to agriculture ministry relevant to availability of water for irrigation.

Collection of rainfall and river discharge data through gauge stations and discharge network is its another mandate to facilitate academic and administrative organizations in developing schemes for flood management and taking advance measures for flood damage mitigation. It also prepares daily water level and flood forecast bulletins using suitable computer software.

The major responsibilities of CWC are

- Extending supports to states in preparation of master plans and schemes for flood control.

- Development of flood forecasting mechanism and warning network for mitigating flood damage.
- Scrutinizing the flood control master plans and schemes of the states for consideration by the planning commission.
- Examination of multipurpose schemes for drainage network and flood control.
- Study of river morphology and river mechanics.
- Develop facilities for hydrological observations.
- Extending supports to state government for water resource development.
- Conducting training programmes for technical staff.
- Monitoring of dam safety.

Task forces and line departments linked to these task forces

There are many task forces associated with different aspects of disaster management. Let us discuss about few important task forces and the organizations linked to these task forces.

- **Warning:** IMD, CWC, Water Resources Department, Radio, Doordarshan, DIPRO, Department of Telecommunication, Police etc.
- **Evacuation & Rescue:** NDRF, SDRF, Armed Forces, State Police, VDP, Fire Services, Civil Defence, Home guards, Zila Sainik Board, NCC, NYK, NSS, Department of Forests, Soil conservation, PWD, Department of Sports, Scouts & guides, PRIs etc.
- **Shelter Management:** Revenue Department, DRDA, PRIs, Police, VDP, NCC, NSS, Transport Department, Railways, PWD, Water Resources Department, Electricity Board, Forests Department, DIC, Housing Board, Scouts & Guides etc.
- **First Aid & Medical:** Health & Family Welfare, Red Cross, DSWO, ICDS, Ayurvedic and Homeopathy Colleges, Veterinary etc.
- **Water & Sanitation:** Public Health Engineering Department, DRDA, PRIs, Municipality, Town Committee, Irrigation, Agriculture Engineering etc.
- **Carcass disposal:** Municipality, Town Committee, Veterinary, Police, VDP, PRIs, Department of Fisheries etc.
- **Trauma counseling:** Health & Family Welfare, Red Cross, ICDS etc.
- **Damage assessment:** Revenue and all other developmental departments.
- **Relief & coordination:** Revenue and Relief Department, Food & Civil supplies, FCI, Warehousing Corporation, Veterinary Department, Fisheries, Agriculture etc.
- **Patrolling:** Police, VDP, Nagarik Samities, Zila Sainik Board, Scout & Guide, NSS, NCC etc.

2.5 UN DISASTER MANAGEMENT AND MITIGATION SYSTEM

Though, it is the duty of a national government to deal with disasters of the country, but the United Nations coordinates international cooperation in the field of disaster management through the organizations under its aegis. The United Nations agencies are providing support systems to all the countries, specially the developing and third world countries, for capacity building, disaster risk reduction, disaster response and reconstruction. In the event of severe disaster in a country, the United Nations agencies under the aegis of United Nations – Disaster Management Team (UN-DMT) are responsible for providing technical and material assistance to the government of the affected country and mobilizing its resources for response and recovery.

The following organizations are playing vital role under the aegis of United Nations in the field of international cooperation for disaster management.

2.5.1 OFFICE OF THE UNITED NATIONS DISASTER RELIEF COORDINATOR (UNDRO)

It is the focal point of United Nations Disaster Management system and responsible for mobilizing and coordinating the emergency relief to the disaster affected countries. The major

activities of UNDRO are to promote the culture of preparedness for risk mitigation, disseminate information, plan for risk reduction, and provide financial support to the government of the disaster-affected country based on request of the concerned government and with approval of UNDRO Coordinator.

2.5.2 UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

The UNDP provides technical and financial assistance to the governments of the disaster prone countries to carry out activities related to disaster risk mitigation, planning for sustainable development, training and awareness programmes, and other aspects of disaster management. This organization is also responsible to extend technical, material and financial supports for post disaster relief, rehabilitation and reconstruction; promoting risk reduction techniques; emergency management etc. UNDP can approve certain amount of fund to the disaster-affected country for immediate relief, rehabilitation, reconstruction and emergency management.

2.5.3 FOOD AND AGRICULTURE ORGANIZATION (FAO)

This organization has the responsibility of extending technical and financial supports to the natural hazard prone countries for vulnerability reduction; rehabilitation of agriculture, livestock, fisheries, and local food production etc. This organization also monitors the status of food production of different countries and assesses the requirements of exceptional food assistance.

2.5.4 WORLD FOOD PROGRAMME (WFP)

WFP is responsible for providing required food to disaster affected country for humanitarian relief and extending necessary supports to the disaster-affected countries for rehabilitation, reconstruction and risk reducing development programmes. Funds for these purposes are allocated from WFP general resources and International Emergency Food Reserve.

2.5.5 WORLD HEALTH ORGANISATION (WHO)

WHO is the international nodal organization, which provides advice and assistance to all the countries for preventive and curative health care; preparedness and capacity building of the national and regional health services for rapid disaster response and other medical health care related matters.

2.5.6 UNITED NATIONS HIGH COMMISSION FOR REFUGEES (UNHCR)

The UNHCR looks after the issues related to protection of refugees and provides necessary assistance to the concerned nations for permanent solution of the problems.

2.5.7 UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO)

The UNESCO's main objective is to carry out scientific works related to disaster risk mitigation. It conducts programmes for risk assessment and risk mitigation. This also assists the national governments in carrying out studies on hazards of geological and hydro-meteorological origins.

2.5.8 UNITED NATIONS CENTRE FOR HUMAN SETTLEMENTS (UNCHS)

The UNCHS is primarily responsible to develop and promote innovative methodologies to determine the level of disaster risk, based on hazard and vulnerability analysis, and assist the vulnerable countries in formulating plans for damage mitigation. This organization provides supports in developing safe platforms for human settlement through planning for sustainable development, hazard resistant design and construction.

2.5.9 UNITED NATIONS INTERNATIONAL CHILDREN'S EMERGENCY FUND (UNICEF)

The UNICEF takes care of child health and nutrition programmes of all the countries, especially the disaster prone and disaster-affected countries. It has the authority to provide technical, material and financial supports to the disaster prone countries for conducting

training and awareness programmes; promoting culture of preparedness; and dealing with disaster situations.

2.6 GENERAL STRATEGIES FOR FORMULATION OF DISASTER MANAGEMENT PLAN

2.6.1 WHAT IS PLAN?

The term *PLAN* depicts tentative course of action or scheme or method or programme or systematic arrangement of elements for the accomplishment of an objective. We can formulate a plan based on some real or imaginary parameters. To formulate a practical plan; we must be careful about target of the plan, activities to be undertaken to achieve the target, sequence of activities, role of different organizations or individuals, provisions for procurement of necessary resources, budgetary provision to meet the expenditures related to all activities etc. Otherwise, we will not be able to translate the plan into action plan.

So, prior to preparation of a plan to address a particular issue, we must do some groundwork to understand the issues pertaining to the target of the plan including assessment of our needs to implement the plan and our capacity to fulfill the needs. Most of the plans are not formulated based on genuine assessment of needs and capacity. Implementation of some mega plans may need huge fund, manpower and resources. If we do not have capacity to meet the requirements of fund, manpower and resources to implement the plan, it will be a futile exercise. There should be genuine strategies to achieve the objectives of the plan.

2.6.2 STRATEGIES FOR FORMULATION OF DISASTER MANAGEMENT PLAN

As discussed earlier, disaster management is a multidisciplinary subject, where every individual/organization/institution has certain role and responsibility. Broadly, disaster management covers two aspects, risk management and crisis management. The activities pertaining to disaster management plans are pre disaster, during disaster and post disaster activities.

Pre disaster activities are linked to disaster risk mitigation comprising risk assessment, measures for risk mitigation i.e, prevention of disasters, mitigation of damage and preparedness to cope with disaster. Rescue and safe shelter of disaster victims are integral parts of disaster activities. Post disaster actions include relief, rehabilitation and recovery. So, to make a practical disaster management plan, we must try to address all these elements of activities. Let us see some general perspectives of disaster management plan step-by-step.

The purpose of disaster management plan

The purpose of a disaster management plan is to anticipate the probability of damage and disruption in the event of occurrence of a hazard and measures to be taken for mitigation of damage and disruption. The disaster management plan also takes care of wide range requirements for counter disaster activities. A practical disaster management plan addresses the whole scope of disaster management cycle including pre, during and post disaster management related activities.

So, the objectives of the disaster management plan are to

- ✓ Anticipate the future situation through genuine risk assessment.
- ✓ Identify the suitable measures for risk mitigation.
- ✓ Enhance the preparedness level of the vulnerable community for coping with disasters.
- ✓ Assess the available counter disaster resources and further needs.
- ✓ Enhance the capacity of disaster management agencies for effective response.
- ✓ Find out the scopes for rehabilitation and reconstruction.

- ✓ Define the budgetary provision for proper implementation of the plan.

Considering the above-mentioned broad objectives, we can formulate disaster management plan for a particular disaster prone area.

Risk assessment

As we have already discussed earlier, disaster risk of an area is directly related to characteristics of hazards to which the area is exposed and the vulnerability profile of the area. An area may be single hazard or multi hazard prone. The risk of the area is proportional to frequency, magnitude, response time and exposure time of the hazards. At the same time, it is also dependent on elements at risk and susceptibility of elements at risk to probable hazards. So, the disaster risk is largely hazard and location specific.

For genuine risk assessment, hazard and vulnerability assessments are necessary. Use of remote sensing generated satellite imagery and Geographic Information System (GIS) is also unavoidable for genuine risk assessment of natural hazard prone areas.

So, provisions should be there in the Disaster Management Plan for genuine risk assessment of the hazard prone areas including primary and secondary data collection, procurement of satellite imagery, establishment of analytical laboratory having GIS tools and software, preparation of hazard map, data analysis, and determination of disaster risk factors of the hazard prone areas.

Risk management

Risk management involves the appropriate measures for prevention of hazards, mitigation of damage or preparedness to cope with disaster. Risk management activities are linked to risk assessment, because such measures are variables to the characteristics of hazards and vulnerability factors. One set of measures may not be suitable for different hazard prone areas.

In this stage, both structural and non-structural measures are involved. So, the disaster management plan should address the issues relevant to scopes and facilities to identify and implement the appropriate measures required for prevention, mitigation and preparedness. This stage also involves capacity and needs assessments in terms of skilled manpower, tools, equipments, fund etc.

For example, if an area is flood prone and the disaster risk is high i.e., the probability of damage and disruption is high, then

- ✓ For prevention of flood, we may need to go for an embankment. For proper design and construction of the embankment, involvement of Water Resources Department is necessary. For funding of the scheme, the direct involvement of government is essential. For supervision of progress and monitoring of the condition of the embankment, involvement of both Water Resources Department and community people are required.
- ✓ For damage mitigation, vulnerable community should try to follow land-use and building regulations. For which, active involvements of government bodies/authorities as well as community people are equally important. Early warning mechanism is also a part of this stage.
- ✓ For preparedness to cope with disaster, vulnerable people should try to adopt all mitigation measures as well as alternative adjustment processes. For this, provisions should be there for community awareness, insurance, compensation, material support etc.

Response

This stage of planning is also related to risk assessment and risk management. Based on nature of risk and damage, we can identify the requirements for response activities. This stage

of plan covers the aspects of formation of response forces, capacity building of the response forces, training of response forces and volunteers, procurement of required resources and timely mobilization of resources, strategies for timely rescue and safe shelter of the victims, management of evacuation centres, effective relief operation, coordination amongst different agencies involved in response activities etc.

Recovery

This stage of planning involves statement of policy of recovery process; concrete programme for rehabilitation and reconstruction; role and responsibilities of government bodies and authorities; role of affected communities; provisions of fund and other requirements; prospects and constraints etc.

Organizational structure

The plan should clearly define the organizational structure required for formulation and implementation of the disaster management plan. This should also highlight the sequence of activities to be carried out and role of different organizations relevant to these activities. The organizational structure may involve government authorities, government departments, non-governmental organizations, local authorities, academic institutions, community based organizations etc.

Operational implementation of the plan

The plan should have strategies for proper implementation, monitoring and timely review of the plan.

2.7 SUPPORT REQUIREMENTS FOR DISASTER MANAGEMENT

Though, disaster management agencies are primarily responsible for formulation and implementation of disaster management plan, but long-term planning for disaster management needs supports of different organizations and logistics. Codes, norms, guidelines, training, awareness and research programmes are also part of the support system for long-term disaster management. Long-term disaster management plan addresses all phases of disaster management cycle i.e., prevention, mitigation, preparedness, response, and recovery. It is the duty of disaster management authorities to recognize the important support systems and involve these support systems in planning and decision making process.

Some of the important resources, from which DM agencies may get significant inputs for hazard analysis and prevention of hazards, are

- ✓ Academic and research institutions.
- ✓ Technical authorities and scientific programmes.
- ✓ Government departments having public safety responsibilities.
- ✓ Industrial safety organizations.
- ✓ Agencies connected with national and international developmental projects.
- ✓ National planning authorities or commissions.
- ✓ Private sector companies and contractors.
- ✓ Military forces.
- ✓ Non-governmental organizations and media.

The support requirements for effective damage mitigation and preparedness may be

- ✓ National Act and Policy.
- ✓ Land use regulation and building codes.
- ✓ Organizations involved in assessment and monitoring of hazards and vulnerability.

- ✓ Organisations having resources and expertise for analyzing mitigation projects.
- ✓ Warning systems.
- ✓ Incentive, compensation and insurance.
- ✓ Indigenous adjustment methods.
- ✓ Training, awareness etc.

Resources essential for response activities are

- ✓ Trained and well equipped Response and Task forces.
- ✓ Trained volunteers.
- ✓ Equipments and tools.
- ✓ Warning systems.
- ✓ Geographical and hazard maps.
- ✓ Past records on damage characteristics and post disaster response activities.
- ✓ National policy for international assistance.
- ✓ Effective relief mechanism.
- ✓ Emergency support services.
- ✓ Technical advisory services.
- ✓ Standard emergencies services.
- ✓ Military services.
- ✓ NGOs and CBOs familiar with response activities etc.

For effective disaster management, we need proper logistics. Here, logistics implies arrangement of facilities and procurement and delivery of right supplies in sufficient quantity, good condition, and right place and time. The logistics required for disaster management related activities may be,

- ✓ Infrastructure, facilities and laboratories for data collection and analysis.
- ✓ Transport facilities for land, sea, inland water, air etc.
- ✓ Operational support items like fuel, lubricants etc.
- ✓ Malignance items like spare parts etc.
- ✓ Emergency and survival kits.
- ✓ Items likely to be required for reconstruction, like building materials.
- ✓ Safe storage facilities at major distribution points.
- ✓ Evacuation centres at safe and hazard free areas.
- ✓ Well equipped control rooms and Emergency Operation Centres (EOCs).
- ✓ Hazard preventive devices.
- ✓ Commodities required for relief operation.
- ✓ Commodities required for response activities.
- ✓ Alternative communication facilities.
- ✓ Data base, satellite imagery, GIS based digital maps etc.

Other support requirements for disaster management are

- Training Centres to conduct trainings for trainers and others on different aspects of disaster management. The trainings courses may be on general disaster management, skill development, coordinated disaster management action, specialized training etc.
- Public awareness to educate and aware the common public about their disaster risk and risk reduction measures. Such programmes help to motivate the vulnerable people for participation in disaster management related activities.
- Research on different aspects of disaster management is essential to develop new methodologies and technologies for risk assessment and risk reduction measures. The research information can be utilized for understanding hazard characteristics, progression of vulnerability, risk factors, damage mitigation approaches etc.

2.8 STEPS FOR RISK REDUCTION PLANNING

- Hazard mapping & zoning are required to demarcate the hazard prone locations in an area, identify the types of hazards to which the area is exposed, and determine the possible impact of hazards on the physical and living elements of the area.
- Vulnerability assessment is essential to identify the unsafe conditions of an area and understand the progression of vulnerability factors involving dynamic pressure and root causes of the unsafe conditions. This is required to take appropriate measures for damage mitigation.
- Capacity and needs assessments are essential to identify the available resources, means and strengths and further needs of these to deal with disaster situations.
- Assessment of resources and elements at risk are essential to determine the existing recourses, which are either useful to mitigate disaster risk or at risk. This enables the Disaster Managers to take corrective measures.
- Target and activities should be clearly defined to understand the objectives of the plan and sequence of activities to be done. This is necessary to define the organizational structure and role of different organizations and to determine the support requirements for proper implementation of the plan.
- Incident Command System (ICS) is required to define the organizational structure for command, control and coordination. This is also a tool for defining emergency response and incident management systems.
- Command, priorities and coordination policies help the organizational structure to work effectively, on priority basis and maintain coordination amongst different organizations under the leadership of a central commander.
- Contingency planning based on hazard, vulnerability and capacity assessments is required for prevention of hazards, damage mitigation, preparedness, community mobilization, rescue, relief, rehabilitation, recovery etc.
- Assignments to individuals and organizations; based on their expertise, skill and capacity; should be clearly defines to get timely and effective supports form all the individuals and organizations in disaster management related activities.
- Legislations and policies are required for proper and timely implementation of the plan.
- Monitoring of progress is also essential for timely actions and genuine implementation of all the mitigation measures.

- Drill should be the integral part of the plan to maintain the momentum of disaster management related activities in true spirit and develop the skill and efficiency of individuals and organizations involved in organizational structure.
- Annual report and review of plan are mandatory parts of any plan to see the progress of work, determine the gaps and constraints and review the plan accordingly for better management of disasters in future.

2.9 INCIDENT COMMAND SYSTEM (ICS)

Incident Command System (ICS) is a systematic tool or standardized method, which guides to have a strong and effective organizational structure for proper command, control and coordination. ICS is a management system that is flexible and adaptable to deal with any scale of natural as well as manmade hazard induced disasters.

Initially the Ministry of Home Affairs, Government of India and United States Agency for International Development (USAID) have developed the concept of ICS to address the following issues.

- How to achieve quick and effective response during an emergency, where several departments and agencies are involved?
- How to maintain better coordination amongst responding agencies, which have different organizational structures, line of authority and communication patterns?
- How to enhance the ability and competence of the personnel involved in disaster management system for effective management of crisis situation?

Broadly, ICS is based on five management principles; Command, Planning, Operation, Logistics & Finance and administration.

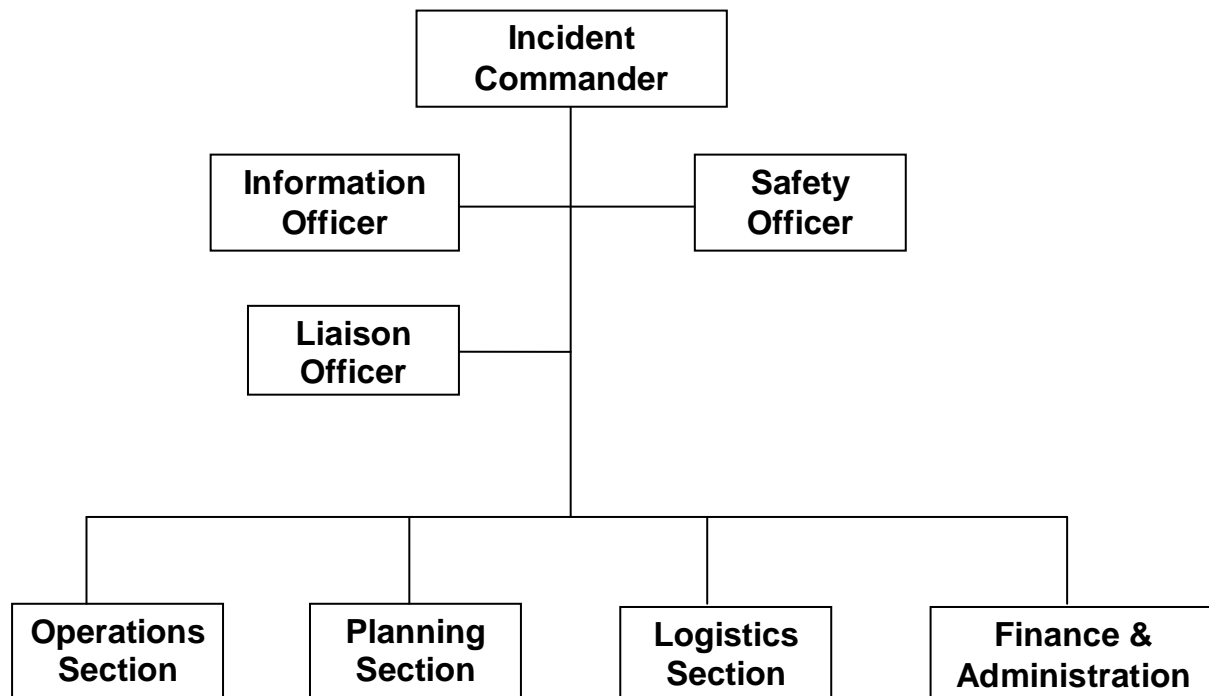


Fig.: Incident Command System

Central commander: who is in overall charge of the incident command mechanism and responsible to deal with an incident like major earthquake, Air accident etc.

Operations section: The operations section is the key section of ICS responsible for giving directives for tactical actions to meet incident objectives.

Planning section: The responsibility of the planning section is collection, evaluation, and display of incident information; maintaining status of resources; and preparing the incident action plan and incident-related documentation.

Logistics section: The logistics section is responsible for providing adequate services and support to the responding agencies required to deal with all incidents.

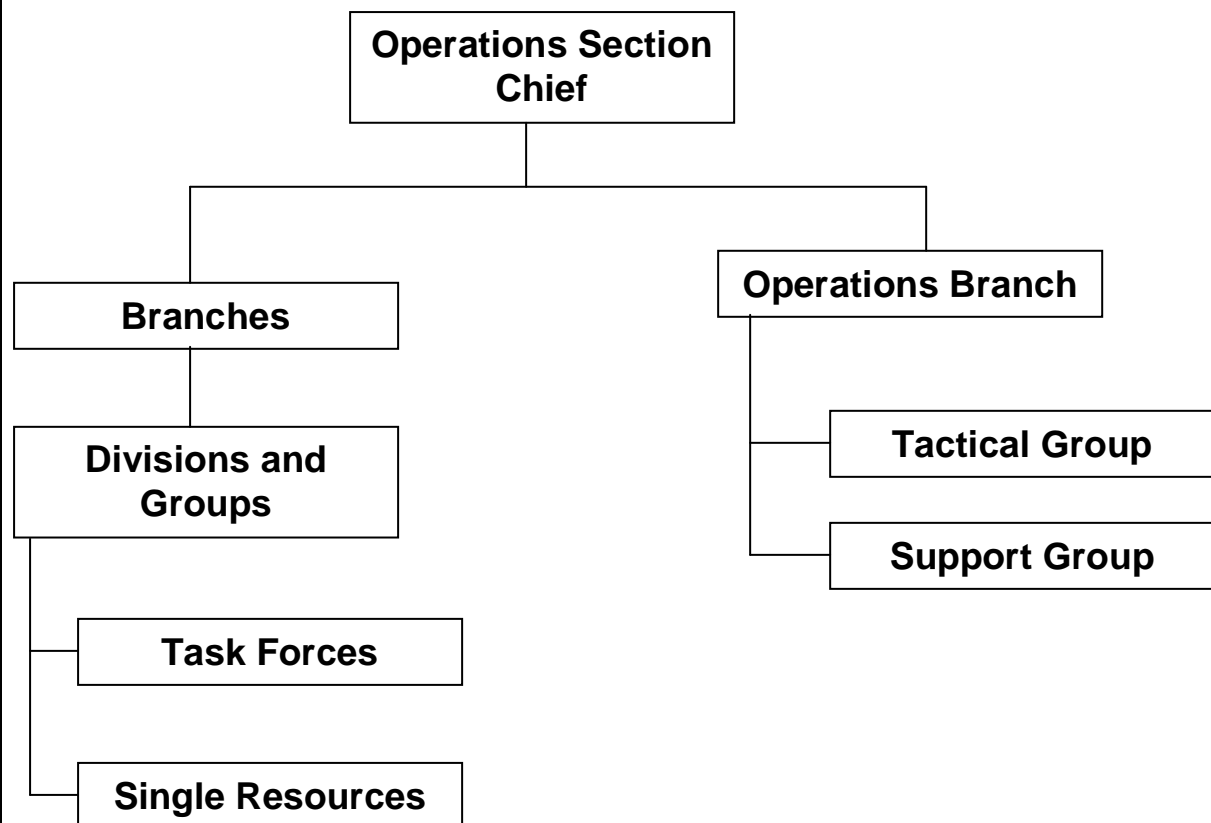
Finance/Administration: The Finance & Administration Sections are responsible for keeping track of incident-related costs, personnel and equipment records, and administering procurement contracts associated with the incident or event.

Information Officer: The Information Officer is responsible for compiling and releasing the information about an incident to the news media, incident personnel, and other appropriate agencies and organizations.

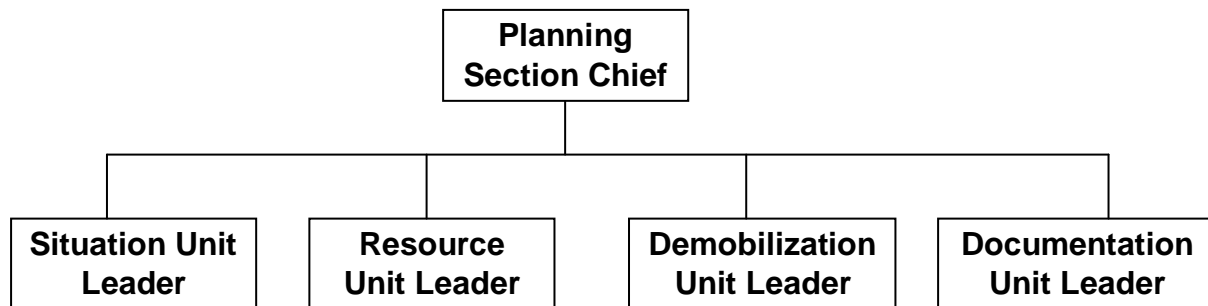
Liaison Officer: Incidents that are multi-jurisdictional or have several agencies involved may require the Liaison Officer position to assist the Command staff for maintaining coordination with each department/agency representatives.

Safety Officer: The role of Safety Officer on the Command Staff is to anticipate hazardous and unsafe situations and recommend the measures for safety of the personnel.

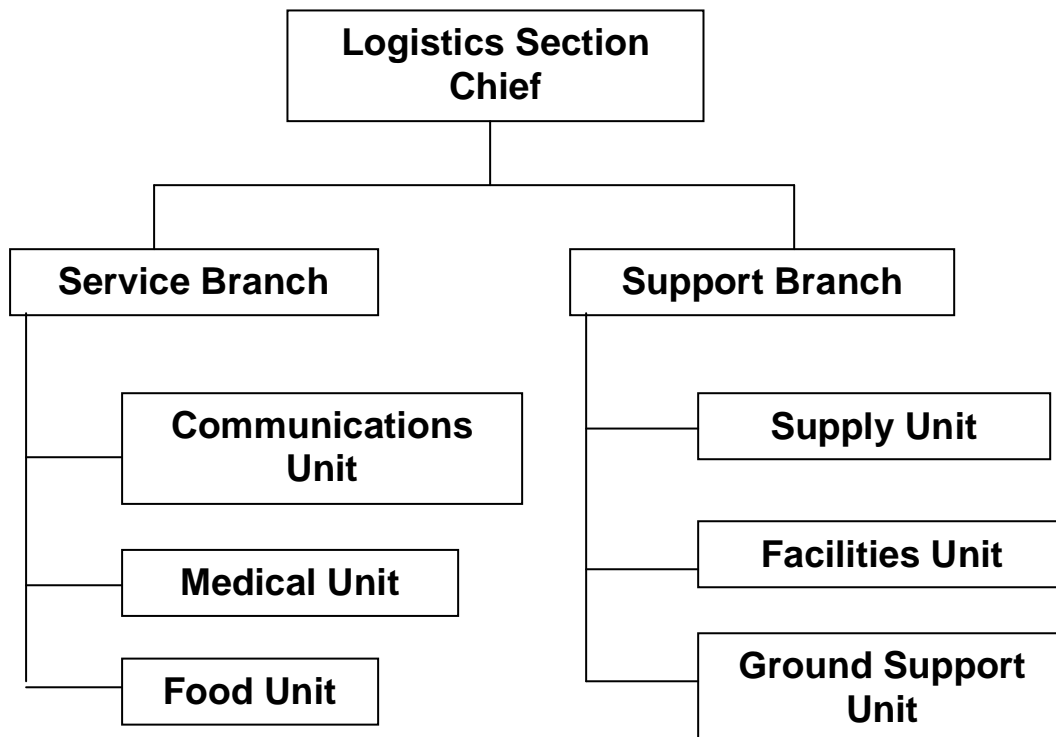
Additional organizational units with delegation of authority and power may be attached to each of these functional areas if needed. For examples, organizational structure of operations section may be as



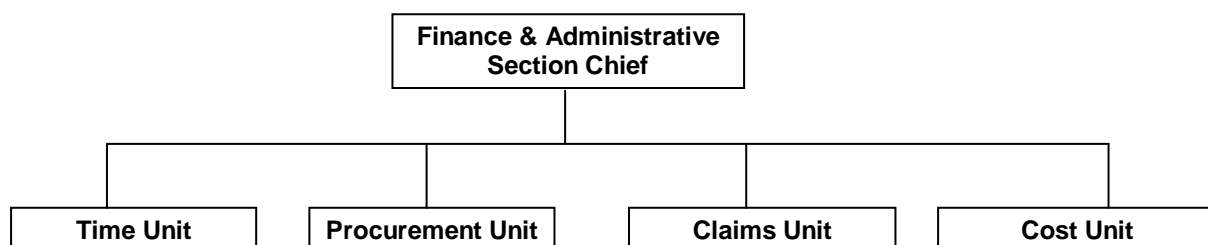
Planning section structure may be as



Structure of logistics section may be as



Finance & administrative section structure may be as



2.10 WHAT WE LEARNT FROM THIS UNIT?

Practical planning for disaster management needs to have proper strategies for risk and crisis management. Selection of genuine organizations, suitable for disaster management related activities at all levels, is essential for effective disaster management. A strong organizational framework is necessary for planning and timely response to crisis situation. The organizational structure for disaster management at all levels must have participation of central and state ministries and line departments; disaster management authorities and institutions; local governments and Panchayati Raj Institutions. Non-governmental organizations, community based organizations and community people should play supportive role in the process of assessment, planning and execution of plans.

The National Disaster Management Structure of India is formulated based on Disaster Management Act 2005. National Policy for Disaster Management was approved by the Cabinet of Government of India in 2009 to formulate the guidelines for disaster management activities in India.

We need practical disaster management plan to anticipate the probability of damage and disruption in the event of occurrence of a hazard and measures to be taken for mitigation of damage and disruption. The disaster management plan also takes care of wide range requirements for counter disaster activities. A practical disaster management plan addresses the whole scope of disaster management cycle including pre, during and post disaster management related activities.

Disaster management plan should have the scopes for hazard mapping & zoning; vulnerability assessment; capacity and needs assessments; assessment of resources and elements at risk; target and activities to be done; Incident Command System (ICS); command, priorities and coordination; contingency planning; assignments to individuals and organizations; legislations and policies; monitoring of progress; drill; and preparation of annual report and review of plan.

Incident Command System (ICS) is a systematic tool or standardized method, which guides us to have a strong and effective organizational structure for proper command, control and coordination. ICS is a management system that is flexible and adaptable to deal with any scale of natural as well as manmade hazard induced disasters.

2.11 PROBABLE QUESTIONS

1. Why we need a strong and effective organizational framework?
2. What is the role of CCS?
3. Elaborate Legal-Institutional Framework as per DM Act 2005.
4. Who are the members of National Executive Committee for disaster management?
5. Which central ministries deal with different types of disasters?
6. What is the role of CWC?
7. Discuss the objectives of DM plan.
8. Write the steps of DRR planning?
9. What do you mean by ICS?
10. What is the role of planning section in ICS?

2.12 SUGGESTED READINGS

1. Carter, W. N., Disaster Management: A Disaster Management Handbook, published by Asian Development Bank, 1991.
2. India: IDNDR & Beyond, NCDM Publication, 2000, pp 4, 6.
3. Manual on Natural Disaster Management in India, NCDM Publication, 2001, pp 8.
4. National Disaster Management Guideline, Published by Ministry of Home Affairs, Government of India, pp 30.
5. Chakrabarty, U. K., Industrial Disaster Management and Emergency Response, Published by Asian Books Pvt. Ltd., 2007, pp 190.

UNIT-3: PLANNING NEEDS AND EMERGENCY ACTION**UNIT STRUCTURE**

- 3.1 INTRODUCTION
- 3.2 OBJECTIVES
- 3.3 TOOL AND METHODS FOR HVCA
 - 3.3.1 WHAT IS HVCA?
 - 3.3.2 PROCESS OF HAZARD ASSESSMENT
 - 3.3.3 PROCESS OF VULNERABILITY ASSESSMENT
 - 3.3.4 PROCESS OF CAPACITY ASSESSMENT
 - 3.3.5 COMMON TOOLS FOR HVCA
- 3.4 APPLICATION OF GIS AND REMOTE SENSING
 - 3.4.1 REMOTE SENSING
 - 3.4.2 GEOGRAPHICAL INFORMATION SYSTEM (GIS)
 - 3.4.3 APPLICATION OF GEO-INFORMATION TECHNOLOGY IN DISASTER MANAGEMENT
- 3.5 DISASTER WARNING
- 3.6 EMERGENCY MANAGEMENT
- 3.7 EVACUATION ARRANGEMENT
- 3.8 EMERGENCY SHELTER
- 3.9 RECOVERY AND RECONSTRUCTION
- 3.10 MEDICAL EMERGENCY
- 3.11 EMERGENCY OPERATIONS CENTRE (EOC)
- 3.12 WHAT WE LEARNT FROM THIS UNIT?

3.1 INTRODUCTION

In the chapter ‘planning strategies’, we have discussed in detail about different aspects of disaster management planning. The term PLAN is defined as tentative course of action or scheme or method or programme or systematic arrangement of elements for the accomplishment of an objective. A practical disaster management plan addresses the issues related to both risk and crisis management. Hence, to formulate a disaster management plan, we must understand the parameters or factors associated with risk and crisis management.

How we can assess our risk? What parameters are involved with disaster risk? How we can mitigate disaster risk of a system? What to do to manage a crisis? These issues should be kept in mind at the time of planning for disaster management. Without addressing these issues, we can not achieve the objective of a disaster management plan.

In this chapter, we shall elaborately discuss about different issues, parameters and factors, which need to be addressed properly to achieve the goals of a practical disaster management plan.

3.2 OBJECTIVES

The major objectives of this chapter are

- To highlight the parameters, which are integral parts of risk assessment.
- To discuss the issues relevant to risk and crisis management planning.
- To discuss the issues relevant to emergency actions.

3.3 TOOL AND METHODS FOR HVCA

3.3.1 WHAT IS HVCA?

HVCA means, Hazard-Vulnerability-Capacity-Assessment. As we know, disaster risk of a system is directly proportional to hazard and vulnerability profiles of the system. Hence, the nature of damage and disruption in a system is also dependent on characteristic of hazards and vulnerability or unsafe conditions of the system. Again, the magnitude of damage and disruption depends on susceptibility of the unsafe conditions/elements at risk of the system to the probable hazards, to which the system is exposed. Because, the same hazard may have different damaging potentials to different unsafe conditions.

The capacity; means the resources, means and strength; required to mitigate the damage and disruption of a system under the impact of a hazard is dependent on nature of probable damage and disruption.

Hence, to estimate disaster risk of a system and prepare a plan for disaster risk mitigation, HVCA is essential. In a disaster management plan, there should be provisions for hazard, vulnerability and capacity assessment to estimate the risk accurately and determine the needs of resources, means and strength for effective disaster management.

3.3.2 PROCESS OF HAZARD ASSESSMENT

The spatial distribution of risk associated with a hazard in an area can be mapped based on specific information of characteristics and damaging potential of the hazard. Such hazard map facilitates the planners in identifying the locations prone to a particular hazard and risk factors (high, low, medium etc.) of these locations. Generally, colour codes are used in hazard map to show the risk factors associated with a particular hazard (*probability of damage and disruption under the impact of the hazard*) to different locations. Let us see the parameters involved in hazard assessment.

Warning sign of the hazard: It is essential to know, whether there are scientific or indigenous signs that may indicate the occurrence of the hazard at a particular place within a certain time frame. If there is no warning sign for a particular hazard, the advance forecasting of occurrence of the hazard may not be possible and magnitude of damage and disruption will be high. For this kind of hazards, disaster risk is always high. For example, flood has many warning signs, but earthquake does not have any warning sign. Hence, the damage potential of earthquake is much higher than flood.

Forewarning: This indicates the time between warning and occurrence of a hazard. If the forewarning period is less, the probability of damage and disruption may be high. If forewarning period is high, people may get enough time to take shelter in safe places along with their valuable assets. For example, earthquake has no warning sign and hence forewarning time is almost zero. Hence, the damage potential of earthquake is much higher than any other hazard for which forewarning time is relatively high.

Frequency: It indicates, how many times in a year a hazard may strike a particular area. Frequency of some hazards may be seasonal and known to the local population. For these hazards, the vulnerable community can make short time preparedness plan for damage mitigation. But, it is not possible to have a short time damage mitigation plan for the hazards having random frequency. For example, frequency of earthquake is random and hence, only long-term damage mitigation plan is possible for earthquake. We can make evacuation plan for flood hazard to mitigate loss and damage to life and property based on flood frequency analysis. But, frequency analysis is not possible for the hazards having random frequency.

Timing of occurrence of hazard: Whether the hazard occurs in a particular month or season of the year? If the timing of occurrence of hazard could be determined based on past records, then planning for both short and long-term damage mitigation is possible.

Duration: How long the hazard felt or stayed. If a hazard stays for long time, the magnitude of damage and disruption may be high. But, it again depends on other parameters of the hazard like forewarning, frequency etc. For example, duration for earthquake is very less, but damage potential is high due to lack of proper warning sign and random frequency. Duration of flood is comparatively long, but we can prepare ourselves for instant damage mitigation. Duration of drought is generally very long. Hence, it affects maximum population and it is difficult to have a cost effective risk mitigation plan for drought.

By obtaining the above-mentioned information, it is possible to determine the risk factors associated with a particular hazard in different locations of an area.

3.3.3 PROCESS OF VULNERABILITY ASSESSMENT

The concept of vulnerability and its assessment procedure are discussed in detail in the chapter 3 of Fundamentals of Disaster Management. Here, the main points relevant to vulnerability assessment are incorporated, here.

Vulnerability of a system implies unsafe conditions or elements at risk of the system, which are exposed to one or more hazards. These factors generally reduce the ability of the community to resist the hazard, cope with disaster and recover from the impact of hazard.

Vulnerability of a system may be Physical, Social, Economic, Motivational, Technical, Environmental, Political, Cultural, Educational, and Institutional. These factors generally play the role of catalyst and enhance the probability of damage and disruption in a system under the impact of a hazard.

On the other hand, there may be some hidden dynamic pressures related to socio-economic, socio-cultural and socio-political factors of the vulnerable community. These dynamic pressures are mainly responsible for creating unsafe conditions and thereby enhancing disaster risk of the systems. Simultaneously, the local unsafe conditions of a set-up may have many remote root causes.

Vulnerability analysis of a hazard prone area needs proper information about elements at risk and unsafe conditions of the area. It is also necessary to determine the dynamic pressures and root causes relevant to the unsafe conditions to study the progression of vulnerability factors.

The susceptibility of different unsafe conditions may vary for different hazards. Hence, the impacts of different hazards to an area may not be same. To understand the damage characteristics or impact factors of different hazards in an area, it is essential to study the susceptibility of unsafe conditions or elements at risk of the area to different hazards.

Genuine vulnerability assessment based on above-mentioned principle is necessary to determine the hazard specific disaster risk of an area.

3.3.4 PROCESS OF CAPACITY ASSESSMENT

The concept of capacity assessment and capacity building for disaster risk mitigation is discussed in chapter 6 of the Fundamentals of Disaster Management.

The term capacity implies the resources, means or strength, which enhances our ability to prevent disaster or mitigate loss and damage, or withstand with disastrous situation.

Resource may be physical, natural or human resource. Means may be ways, methods, techniques, methodologies and technologies. Strength means ability to do something in terms of physical, economical; organizational or moral strengths.

The capacity building process involves both structural and non-structural measures in terms of infrastructure, facilities, human resource, institutional and organizational strengths etc.

Capacity assessment is necessary to determine the needs for damage mitigation. Genuine capacity building based on proper needs assessment is essential for disaster risk reduction or mitigation of damage and disruption of a hazard prone area.

Capacity assessment involves determination of existing resources, means and strengths and assessment of further needs of these factors to mitigate disaster risk of a hazard prone area. Again, disaster risk is hazard and location specific. Therefore, prior to capacity assessment, hazard and vulnerability assessments are necessary.

3.3.5 COMMON TOOLS FOR HVCA

Some tools and methods are useful for collection and analysis of data and information relevant to HVCA. Some common methods and tools are described below.

Secondary data review: To get data and information related to hazards, vulnerability and capacity of a hazard prone area from research and academic organizations, government departments, library, NGOs, community members, news papers etc.

Direct observation: To observe the real world scenario of the hazard prone areas and make documentation of threats and vulnerability of the area. This involves field visit, interaction with community people, cross analysis of secondary data etc

Semi-structured interview: To collect data and information form vulnerable community based on group interview, focus group interview, individual interview and key-informant interview. This is useful for analyzing problem areas, vulnerabilities, capacities and perception of people towards disaster risk reduction.

Historical profile: To get information about past events, damage characteristics of past hazards, mitigation measures adopted and their success rate, present situation etc.

Hazard and resource mapping: To identify the hazard prone locations of an area and their risk factors, existing counter disaster resources etc.

Transact walk: To identify the hazard prone areas, evacuation sites, useful resources etc., and visualize the human interaction over physical environment.

Seasonal calendar: For making a yearly calendar showing the timing of occurrence of probable hazards and activities to be done to reduce impact of hazards.

Institutional and social network analysis: To show the role of key-organizations and vulnerable community in disaster risk reduction, and their relationship for better coordination.

Health and nutrition assessment: For genuine assessment of health and nutrition conditions of community members of all sections.

Livelihood and coping strategy analysis: To understand the livelihood opportunities of the vulnerable community and their strategies for coping with disasters.

Problem tree: To make diagrammatical representations of unsafe conditions, dynamic pressures and root causes.

Ranking: To determine the level of disaster risk (location and hazard specific) and set the priorities.

HVCA matrix: To summarize the relevant information of hazard, vulnerability and capacity for assessment of risk and planning for risk reduction.

3.4 APPLICATION OF GIS AND REMOTE SENSING

The remote sensing and GIS are the tools of Geo-Information Technology. Other tools of Geo-Information Technology are Global Positioning System (GPS), Information Technology (IT) and Communication Technology. Remote sensing and GIS are the most useful tools for

spatial data acquisition and data analysis. Planning for disaster risk mitigation needs proper and analysis of spatial data. Hence, remote sensing and GIS have great role in disaster management.

3.4.1 REMOTE SENSING

Remote means far away or distant. Sensing means sense, feel or observe. Remote sensing means acquiring information about an object by remotely installed sensor system without touching the object. It involves wide range of techniques for acquiring spatial information of earth with the help of sensors, like high-resolution camera, multispectral scanner, radiometer etc. installed in aircraft or satellite.

Measurement of any object from long distance to acquire information about the object needs a medium of interaction. In remote sensing, electromagnetic radiation is used as the medium of interaction. Interaction of electromagnetic radiation with an object takes place by means of reflection, scattering, absorption, transmission, emission or polarization. The sensor installed in the satellite detects the radiation after interaction with the object and subsequently send the information to the receiver placed on the earth. The characteristic of remote sensing data varies with structural, physical and chemical properties of objects. On analysis of remote sensing data, we can get significant information about the earth and its environment.

Using remote sensing sensor like camera we can get high-resolution image of an object, known as satellite imagery. Satellite imagery and aerial photographs are useful for hazard mapping and vulnerability analysis. Using satellite imageries and remote sensing based data over a certain period of time, it is possible to get many important information relevant to watershed and river network, sediment influx, human interaction to nature, water resources, geological characteristics, geomorphology, landuse mapping, soil survey, agriculture, forestry and other natural resources. The remote sensing based data and imagery also help us to study the changing characteristics of different parameters relevant to hazards and vulnerability. Such study has immense importance in risk assessment and planning for disaster risk reduction.

3.4.2 GEOGRAPHICAL INFORMATION SYSTEM (GIS)

The Geographical Information System comprises hardware, software, data and personnel to capture, store, update, manipulate, analyze and display of all forms of spatial and non-spatial geographically referenced data and information efficiently. Both spatial and non-spatial data can be analyzed and stored using GIS. Spatial data can be represented in the form of X and Y coordinates. The data base of non-spatial information like demographic, socio-economic etc. can be linked to spatial data.

GIS can be used for scanning and digitizing of analogue maps, analysis and input of image data like satellite imagery or aerial photograph, data transfer from other digital sources, direct entry of data etc. The basic data models for geographic data storage are raster (unit is a grid cell) or vector (unit is a coordinate pair, X and Y location). Raster data are mainly satellite data and scanned images. The vector data is captured through digitization of spatial data mainly in three forms

- Point: Installations like rain gauge stations, police stations, fire stations etc.
- Line: Roads, river network, railway lines, canals, fault lines etc.
- Polygons: Administrative boundaries, landuse and land cover maps, water bodies etc.

The Geographical Information System (GIS) is a useful tool for preparation of digital hazard maps. This also facilitates in generating separate digital layers for different hazards, overlaying of digital layers, preparation of database and linking database with digital layers, editing, analysis and management of data, comparison and display of hazard map in user-friendly mood.

The major advantages of GIS over conventional tools are

- Maps and databases can be updated with least efforts.
- Databases can be easily integrated with the digital maps, which facilitate the administrators in accessing relevant data and information instantaneously, as and when necessary.
- Geospatial data can be shared and exchanged freely.

3.4.3 APPLICATION OF GEO-INFORMATION TECHNOLOGY IN DISASTER MANAGEMENT

All the tools of Geo-Information Technology including remote sensing and GIS can be widely used in the field of disaster management. These tools are useful for

- ✓ Hazard mapping and vulnerability analysis.
- ✓ Risk assessment and risk modeling.
- ✓ Visualization of risk.
- ✓ Critical infrastructure and resource mapping.
- ✓ Early warning and monitoring.
- ✓ Emergency evacuation routing.
- ✓ Preparedness and evacuation planning.
- ✓ Vehicle and asset tracking.
- ✓ Damage assessment.
- ✓ Search and rescue operation.
- ✓ Rehabilitation and recovery.
- ✓ Situational awareness, networking and dissemination of information.

3.5 DISASTER WARNING

Disaster warning is the most important phase of the damage mitigation planning. Damage to our life and property could be minimized significantly by issuing warning for disaster like situation under the impact of a hazard. Most natural hazards have their own warning signs. By observing and analyzing these warning signs, it is possible to issue disaster warning for a particular hazard. To do this we need a comprehensive mechanism for collection of data, analysis of data and dissemination of warning at various levels.

Disaster warning is different from '*Forecast*' and '*Prediction*'. A forecast describes the current condition and does not anticipate the future developments, i.e., what will happen, if a hazard strikes our system. Prediction of a disaster specifies more clearly, with shorter time period, what is going to be happened. But, issuing warning is a complex process and usually constitutes a set of recommendations based on prediction of occurrence of a hazard and its possible impact on our system. The warning mechanism involves complex interactions between physical, technological and social systems. To issue a warning precisely and more correctly, careful observation and operation of all the three systems are mandatory.

For example, to issue a flood warning for a particular system we need to have

- ✓ adequate infrastructure, facilities and expertise to observe and analyze the data relevant to flood hazard, like rainfall, discharge etc.
- ✓ sufficient information about physical environment and social condition of the system for which the warning to be issued
- ✓ proper mechanism for dissemination of flood warning to various levels like administration, control room, local people etc.

A warning mechanism has basically two components,

- ✓ Recognition of the danger means occurrence of hazard and its impact to our system.
- ✓ Avoidance of danger by issuing advance warning about the danger. This facilitates the disaster management agencies and vulnerable community to take advance measures for mitigation of damage and disruption.

The essential conditions for effective warning are

- ✓ The warning system must be hazard resistant, so that it can function normally after initial impact of a hazard and give further warning about the expected physical consequences of the hazard and possible secondary hazards, which may cause further damage and disruption to our system.
- ✓ There should be dedicated warning system for a specific hazard with genuine expertise capable to study the warning signs of the hazard and issue warning for a possible disaster. Wrong and false warnings may cause artificial crisis and misuse of emergency services. On the other hand, continuous false warnings may divert attention of the disaster management agencies as well as vulnerable community from damage mitigation measures and self-preparedness.
- ✓ Warning system should be hazard and location specific. For example, warning systems for cyclone and tsunami should be located in coastal area. Flood warning systems must be installed in flood prone zones.
- ✓ Disaster warning should include some information about the area to be affected by a hazard, duration of hazard and nature of its impact. This is essential to guide the disaster management agencies for emergency services.
- ✓ Proper instrumental network facility for genuine recognition of danger and timely dissemination of its warning at various levels.
- ✓ Proper planning is required to determine, who to study and recognize the danger, who is authorized for issuing warning and how to disseminate information.
- ✓ More importantly, vulnerable community should be well aware about existing warning mechanism and sensitive to take timely and appropriate measures on getting warning for a possible danger.

3.6 EMERGENCY MANAGEMENT

Emergency management means immediate response to a crisis situation. This may include timely rescue, safe shelter, relief operation etc. A disaster management plan must have hazard and location specific emergency management plan. Emergency management plan should be prepared based on risk assessment. This is necessary because of

- ✓ All locations are not prone to same type of hazard.
- ✓ Damage characteristics of different hazards are different.
- ✓ Planning for emergency services depends on damage characteristics of the hazards.
- ✓ Equipment and skill required for rescue operation depend on nature of disaster, which may be different for different hazards.
- ✓ Planning for emergency management largely depends on physical environment of the vulnerable area and preparedness level of the local community.
- ✓ Emergency needs of the affected communities of different systems during disaster may not be same.
- ✓ Capacity building of the disaster management agencies in terms of skilled manpower and equipment for emergency management should be appropriately balanced to the emergency needs of the affected community.

Let us discuss few important aspects of emergency management.

- ✓ Planning for emergency management needs information relevant to spatial assessment of risk, characteristics of probable hazards, local vulnerability factors, socio-economic condition and capacity of vulnerable community, elements at risk including infrastructure and facilities, existing counter disaster resources, tools and equipments available with response forces, stock position of food and other emergency items, expected impact of hazards and nature of damage, needs of the vulnerable community,

safe locations and structures for shelter, health care services, alternative mode of communications etc. These information should be collected prior to disaster.

- ✓ Modern information technology is required for storage, manipulation and dissemination of information quickly and efficiently.
- ✓ Proper planning for emergency evacuation is necessary to ensure public safety during disaster.
- ✓ Preparedness for emergency services during disaster like large scale evacuation, distribution of relief material, temporary sanitation facility, handling of dead bodies and casualties, emergency health care, prevention of epidemic etc. for effective emergency management.
- ✓ Strong organizational framework for emergency services, networking and coordination among the organizations is essential.
- ✓ Timely procurement of essential emergency tools and equipment, training of response forces and volunteers are necessary.

3.7 EVACUATION ARRANGEMENT

Evacuation means shifting of people from a vulnerable area to safer location in organized way and prior to hazard struck the area, on getting advance warning for a danger, or during sudden disaster without any warning like earthquake.

The important phases of evacuation management are

- ✓ Warning for a danger by an authorized body
- ✓ Order to move the people and their valuable assets to safer location by any authorized person.
- ✓ Shifting of people to safer location.
- ✓ Evacuation centre management.
- ✓ Shifting of effected people to their original set-up or new places after the crisis period is over.

Important points of planning for evacuation

- ✓ Identification of safe locations and buildings for evacuation centres, shortest and safest routes to evacuation centres etc. prior to disaster.
- ✓ Construction of evacuation centres at safe locations and alternative routes, if these are not available.
- ✓ Identification of pick up points or assemble points for the people.
- ✓ Placement of road signs' along evacuation centre.
- ✓ Preparation of list of evacuees and evacuation schedules for making necessary arrangements like transport, volunteers etc.
- ✓ Provisions for evacuation of animals and other properties of evacuees.
- ✓ Evacuation committee among community members.
- ✓ Preparation of list of requirements during evacuation process like transport, fuel, food, water, medicine, road signs, alternative communication systems etc.

Criteria for evacuation centre management

Planning phase before evacuation

- ✓ Site assessment.

- ✓ Site selection, based on availability of water and sanitation facility, accessibility, available space, topography, drainage etc.
- ✓ Site planning (basic required facilities and routes).
- ✓ Training of officials and volunteers for evacuation centre management.
- ✓ Networking and resource generation.

Evacuation phase

- ✓ Registration and monitoring of the evacuees.
- ✓ Space allotment to evacuees.
- ✓ Maintenance of the centre (people, health, sanitation, garbage disposal etc.).
- ✓ Management of relief.
- ✓ Information sharing.

After disaster

- ✓ Safe return of the evacuees to their homes or to new places.
- ✓ Cleaning of the evacuation centre.
- ✓ Repairing of damages to evacuation centre.
- ✓ Networking, negotiation and advocacy with community members to find out alternative arrangements for better evacuation management.
- ✓ Planning for evacuation arrangement during next crisis.

3.8 EMERGENCY SHELTER

Many natural hazards like earthquake and hurricane generally cause sudden and massive destruction of buildings and infrastructures, resulting huge demand for alternative arrangements to give emergency shelter of the victims. Relocation plans of the government always face opposition from the evacuees. Making proper arrangements for emergency shelter is a difficult task from social as well as economic perspectives.

As per Ian Davis (*Davis, I. 1978, Shelter after disaster, Headington, Oxford: Oxford Polytechnic Press*), "Shelter should be considered as a process and not an objective". "Emergency shelter is also subject to process of evolution, change and mutation over time".

There should be realistic plans for permanent relocation of the vulnerable people and emergency shelter of the disaster victims. Both the processes may involve land acquisition, construction of hazard resistant structures as well as legal and financial matters. So, the national and regional governments have primary responsibility to prepare and implement such plans.

The process of emergency shelter starts with emergency evacuation of the victims followed by survey of the damaged houses, semi-permanent or permanent repairing of the houses for resettlement of the victims. The common needs for emergency evacuation and shelter are tents for temporary shelter, vehicles or other modes of communication, public buildings, hotels, mobile trailers, first-aid facility etc.

3.9 RECOVERY AND RECONSTRUCTION

Complete recovery of the original environment after a great disaster is not always possible simply by going through reconstruction or repairing of the damaged structures. Of course, we can have better environment by adopting suitable long-term plan based on codes and norms for sustainable development. It needs sustained efforts of both the government agencies as well as community members.

Reconstruction of buildings may be needed for resettlement of the disaster victims, if the damaged buildings are not repairable or suitable for resettlement. For some disasters, like erosion, resettlement of the victims to their original set-up is not possible. In that case, government must adopt relocation plan for resettlement of the victims, with the provision for hazard resistant sustainable development.

Reconstruction is a process, which is predictable and usually occurs on the same site over a certain period of time. Reconstruction phase has huge financial involvements and needs large-scale physical supports. The effected communities may need long-term and low-interest loans from government or other institutions for reconstruction of their damaged houses. So, in this process, both the effected community and government systems have significant roles.

The main advantage of the reconstruction or recovery process is that, we can introduce additional measures for hazard resistance and vulnerability reduction to make the new structures and development resilient to probable hazards. This may include change of site from high risk areas like river bank, low-lying flood prone areas etc.; implementation of hazard resistant structural codes; safety norms; non-structural measures for damage mitigation etc. But, this process may take sufficient time and the effected community may need temporary shelter. It is the responsibility of the government machinery to provide basic minimum facilities to the effected people during reconstruction period.

3.10 MEDICAL EMERGENCY

Disaster causes direct death and injury as well as many secondary health and medical problems. Hence, emergency medical service is the integral part of disaster management. The branch of study, which deals with death, injury and disease caused by natural and man-made disasters is called **Disaster Epidemiology**. The term **Mortality** depicts the rates of death. **Morbidity** implies rates of physical injury and disease.

Emergency medical service includes recovery and disposal of the dead bodies, rescue and care of critically injured persons, control of communicable diseases, caring the displaced population, counseling for stress and trauma, monitoring of food quality in relief camps etc.

A country may not have the capacity to deal with medical emergencies in case of a big disaster. So, international assistance may be required to deal with medical emergency for a big disaster.

During **impact phase** of disaster, mainly initial few hours of disaster, local medical facilities may also be affected and may not be in a position to render emergency medical service to the affected population immediately. This is the most difficult phase and proper planning is required to deal with medical emergencies in this period. This phase is called **Emergency-isolation phase**, where role of community self help groups is important. In this phase, existing trained manpower and medical supplies are used to deal with primary medical emergency.

Generally, after few hours the organized medical teams comprising trained doctors, nurses, medical orderlies and sanitary workers along with sufficient medical supplies reach to disaster-affected areas.

The **rehabilitation phase** of medical emergency involves repairing of damaged clinic and hospitals, sorting of newly supplied medicines and other medical items, encouraging the medical officials to return to the hospitals, caring of seriously injured persons, trauma counseling and treatment of close relatives of disaster victims and relief workers. Shortage of medical supplies is essential, because wrong and irrelevant medical supplies may pose serious threat. In many cases, non-governmental organizations and multinational drug companies dump time-expired and unnecessary medicines in disaster-affected areas.

3.11 EMERGENCY OPERATIONS CENTRE (EOC)

Emergency Operations Centre (EOC) is a central command and control facility, which is the critical part of the emergency management process and deals with emergency preparedness

and emergency management. EOC facilitates disaster management agencies to carry out response and recovery activities during an emergency smoothly. EOC is responsible for building up coordination amongst different agencies and making decisions to carry out operations for protecting life and property, maintain momentum of the organizations involved in emergency operations, and mobilize resources within the scope of applicable laws. It is also responsible to disseminate the decisions to concerned agencies and individuals at right time. Besides these, EOC may be involved in conducting training and meeting, information management and its communication etc.

Most EOCs have one person in command of the centre known as Emergency Manager and other staff as needed. Every EOC has its own Standard Operation Procedure (SOP) to deal with an incident or crisis. EOC is the major component of Emergency Coordination System (ECS) and functions within the scopes of ECS.

Emergency Coordination System is responsible for

- ✓ Field response.
- ✓ Incident coordination.
- ✓ Local coordination.
- ✓ Regional coordination.
- ✓ National coordination.

An effective ECS has

- ✓ Incident Control Point.
- ✓ Local EOC.
- ✓ Agency EOC.
- ✓ Regional Coordination Centre.
- ✓ National Coordination Centre.

The role of local and agency EOC is to provide coordination, directions and logistics support to the local control points and work under the control of EOC.

The main functions of ECS are

- ✓ Control.
- ✓ Operation.
- ✓ Planning intelligence.
- ✓ Logistics.

For smooth operation and effective emergency management round the clock, the EOC must have

- ✓ Communication equipment.
- ✓ Emergency response plan.
- ✓ Information display material like blue prints, maps, status board etc.
- ✓ List of Emergency Coordinators along with their role and responsibilities.
- ✓ Technical information .
- ✓ Resource data.
- ✓ Essential phone numbers.
- ✓ Back-up power supply.
- ✓ Life support systems, necessary equipment and supplies.

The EOC should be located in safe location, away from high-risk area.

3.12 WHAT WE LEARNT FROM THIS UNIT?

A practical disaster management plan must have the scopes to address the issues like, risk assessment, risk mitigation measures, emergency management etc. **Hazard-Vulnerability-Capacity Assessment** (HVCA) is the most important part of a disaster management plan. Some common tools of HVCA are secondary data review, direct observation, semi-structured interview, historical profile, hazard and resource mappings, transect walk, seasonal calendar, institutional and social network analysis, health and nutrition analysis, livelihood and coping strategies analysis, problem tree, risk ranking, HVCA matrix etc.

Remote sensing and GIS along with other Geo-Information Technologies are the useful tools for spatial data acquisition and data analysis. GIS is useful to capture, store, update, manipulate, analysis and display of all forms of spatial and non-spatial data. It is also useful for preparation, overlaying and display of digital layers for a multi-hazard prone area.

There should be enough scopes in a disaster management plan to deal with disaster warning mechanism, emergency management process, evacuation management, emergency shelter, recovery and reconstruction, medical emergency, EOC etc.

3.13 PROBABLE QUESTIONS

1. What do you mean by HVCA?
2. Mention the parameters of hazard assessment.
3. What is a seasonal calendar?
4. What are the scopes of GIS?
5. Mention few tools of Geo-Information Technology.
6. Differentiate between Warning and Forecast.
7. Mention the important phases of evacuation management.
8. Describe the process of emergency shelter.
9. What do you mean by Disaster Epidemiology?
10. Discuss the role of EOC.

3.14 SUGGESTED READINGS

1. Alexander, D., Natural Disasters, Published by ULC Press Ltd, London, 1993 (PP 374, 400, 406, 418, 432 444, 461).
2. Study material: Fourth International Course on CBDM, ADPC, 2000.
3. Chakrabarty, U. K., Industrial Disaster Management and Emergency Response, Published by Asian Books Pvt. Ltd., 2007 (pp 163, 168, 261).
4. Goswami, S. C., Remote Sensing Application in North East India, Published by Purbanchal Prakesh, Guwahati, 1997.
5. Emergency Operations Centre - Operational Guidelines, Provincial Emergency Program, Ministry of Public Safety and Solicitor General, Province of British Columbia, 2008.

UNIT-4: PREPARATION OF STATE AND DISTRICT LEVEL DM PLANS**UNIT STRUCTURE**

- 4.1 INTRODUCTION
- 4.2 OBJECTIVES
- 4.3 BACKGROUND
- 4.4 ROLE OF DIFFERENT AGENCIES IN DM PLANNING
- 4.5 CRITERIA AND GUIDING PRINCIPLES OF DISASTER MANAGEMENT PLAN
 - 4.5.1 CRITERIA
 - 4.5.2 GUIDING PRINCIPLES
- 4.6. SUGGESTED OUTLINE FOR PREPARATION OF SDMP
 - 4.6.1. THE FRAMEWORK OF THE PLAN
 - 4.6.2 COORDINATING AND MONITORING MECHANISM
 - 4.6.3 SECTIONS OF THE PLAN
 - 4.6.4 SUGGESTED OUTLINE OF THE SDMP
- 4.7 PREPARATION OF DDMP
 - 4.7.1 TECHNICALITY AND CONTENT
 - 4.7.2 CONTENT PRESENTATION
 - 4.7.3 SUGGESTED OUTLINE OF THE DDMP
- 4.8 WHAT WE LEARNT FROM THIS UNIT?
- 4.9 PROBABLE QUESTIONS
- 4.10 SUGGESTED READINGS

4.1 INTRODUCTION

Active participation of different government and non-governmental organizations as well as the community members is necessary in the process of formulation and proper implementation of disaster management plans at various levels. In chapter 01, we have discussed in detail about Disaster Management Act and Policy of India. These Act and policy were adopted by the Government of India for effective management of disasters in India.

In chapter 02, detail about concept of disaster management planning, strategies for formulation of a disaster management plan, support requirements for disaster management, provisions of risk reduction planning, organizational structure and legal-institutional framework in India for disaster management etc. are discussed.

In chapter 03, we have discussed about the issues and concerns relevant to a practical disaster management plan, including the methods and tools required for assessment and analysis of different parameters.

In this chapter, we shall discuss about principles and guidelines for formulation of state and district disaster management plans.

4.2 OBJECTIVES

The main objectives of this unit are

- To discuss about importance of state and district disaster management plans.
- To highlight the basic principles for preparation of disaster management plan.
- To discuss about the existing guidelines for preparation of state and district disaster management plans.

4.3 BACKGROUND

The Indian subcontinent is exposed to most of the natural hazards like flood, earthquake, cyclone, landslide, hailstorm, drought etc. About 68% landmass of India is drought prone, almost 60% landmass is earthquake prone, flood prone areas cover around 12% of landmass, about 8% of landmass is prone to cyclonic storm, landslide prone areas cover around 15% of the landmass.

EM-DAT: CRED database showed that, the number of people in India vulnerable to drought is much higher than any other natural hazards. Flood hazard also affects a sizable number of populations in India. Though, the frequency of earthquake is quite low, but it kills maximum number of people in India followed by storm. The alarming rate of crop damage due to flood, drought, storm etc. is also the major concern for the Government of India.

At the same time, the numbers of disastrous events, in particular hydro-meteorological disasters, are increasing day by day. The increasing trend of population affected by different natural disasters during last few decades is also a matter of concern. The damage to property and economic loss due to disasters are increasing alarmingly all over the world including India.

In view of the increasing trend of loss and damage to life and property due to disasters, particularly in the developing countries, the General Assembly of the United Nations designated the decade of 1990's (1990-1999) as the *International Decade for Natural Disaster Reduction (IDNDR)* for global cooperation to mitigate disaster risk.

During last few decades, many international and national agencies have undertaken a series of programmes for disaster risk mitigation. Different academic institutions have been conducting academic and research programmes on disaster management. But, even then the frequency of occurrence of natural hazards and their impacts are increasing year by year.

Most of the states and districts in India have relief centric disaster management plans, which give enough emphasis on post disaster emergency response activities. These plans are not formulated based on micro-level risk assessment of different hazard prone areas of the districts. As a result, risk management part is ignored in most of these plans. We know that, a complete disaster management plan has two distinct parts, risk management and crisis management. Moreover, planning for crisis management or emergency response is not possible without genuine risk assessment. In view of these, works are going on at various levels to find out comprehensive models for disaster management planning at national, state and district levels.

In 1999, the High Power Committee under the Chairmanship of Shri J.C. Pant prepared comprehensive model plans for disaster management at national, state and district levels. After Gujarat earthquake in 2001, the National Committee on Disaster Management was set-up to explore the scopes of practical disaster management plan and effective disaster mitigation mechanisms.

One year after the great Tsunami in 2004, the Government of India had enacted an Act called "Disaster Management Act, 2005 (No. 53 of 2005) for effective management of disasters in India. The Disaster Management Act. came into force considering the need for a paradigm shift in the approach of disaster management from relief centric approach to a proactive regime to give greater emphasis on prevention, mitigation and preparedness. This Act provided the scopes for creation of disaster management policy, formation of legal-institutional framework, preparation of disaster management plans at national, state and district levels.

The Union Cabinet of India approved the National Policy on Disaster Management (NPDM) in 2009. The NPDM was prepared in pursuance of the Disaster Management Act, 2005 with a vision to make India safe and disaster resilient.

The Disaster Management Act and NPDM have drawn the guidelines for preparation of state and district disaster management plans covering all the important aspects of risk and crisis managements.

4.4 ROLE OF DIFFERENT AGENCIES IN DM PLANNING

The Disaster Management Act 2005 of India defined the roles and responsibilities of different national and state authorities and bodies in formulating policies and plans for disaster management at national to local levels.

The **National Disaster Management Authority** (NDMA), for which the Prime Minister of India is the Chairperson, is responsible for laying down policies, plans and guidelines for timely and effective management of disaster situation and response to disasters. NDMA also lays down the policies and guidelines for other statutory authorities to formulate their own plans, with due emphasis on prevention, mitigation, preparedness, emergency response, rehabilitation and recovery.

The **National Advisory Committee**; comprising members having expertise in the field of disaster management and practical experience of disaster management at national to district levels provides academic and technical supports to NDMA in formulating plans and policies.

The **National Executive Committee** (NEC) having its members from the ministries of government of India, which have administrative control over national disaster management as well as other relevant fields, is responsible for formulating and implementing the disaster management plans as per National Disaster Management guidelines. The NEC is the coordinating and monitoring body for disaster management in India. The NDMA approves the national plan prepared by NEC.

As per section 23 of Disaster Management Act 2005, every state of India shall have a **State Disaster Management Plan** (SDMP). The **State Disaster Management Authority** (SDMA), for which the Chief Minister of the state is the Chairperson, has the responsibility of laying down plans and policies for effective management of disasters in the state, in pursuance with the guidelines of NDMA. The SDMP should be prepared in the line of National Disaster Management Plan. The role of **State Advisory Committee** (SAC), having members with practical experience in the field of disaster management, is to extend supports to SDMA and give recommendations for formulation of plan and policies at state level.

The responsibility of **State Executive Committee** (SEC) is to prepare and implement the State Disaster Management Plan (SDMP). The SEC prepares the SDMP as per guidelines laid down by the NDMA and in consultation with district and local authorities.

The **District Disaster Management Authority** (DDMA) is responsible for preparation of the **District Disaster Management Plan** (DDMP) and taking all measures for disaster management in the district in accordance with the guidelines laid down by national and state authorities. DDMA is the planning, coordinating and monitoring body for disaster management in the district.

Besides these authorities and bodies, the National Institute of Disaster Management and other academic and technical institutions of the country have the responsibility to extend research based academic supports to the central and state authorities and bodies in formulating disaster management plans at national to local levels. The concerned non-governmental and community based organizations have also significant role in the process of preparation and execution of disaster management plans.

4.5 CRITERIA AND GUIDING PRINCIPLES OF DISASTER MANAGEMENT PLAN

4.5.1 CRITERIA

As per Disaster Management Act 2005 and National Policy on Disaster Management 2009, in formulating disaster management plans at various levels the following criteria must be followed.

- ✓ The disaster management plan should give top priority on culture of prevention and preparedness instead of culture of relief.
- ✓ The plan should ensure that, the community is the most important stakeholder in the disaster management process.
- ✓ The plan should give stress on adopting state-of-the-art technology based and environment friendly damage mitigation measures.
- ✓ The disaster management plan should have close link with developmental planning process.
- ✓ The plan should have the provision to establish efficient legal-institutional framework and organizational structure for effective management of disasters.
- ✓ The plan should have scopes for creating early warning systems backed by fail-safe and information technology supports.
- ✓ The plan should have provision for productive partnership with print and electronic media for community awareness towards capacity building and damage mitigation approaches.
- ✓ The plan should give due stress on needs assessment of the vulnerable community for efficient response and relief operations.
- ✓ Reconstruction phase of the plan should give due emphasis on hazard resilient structures and habitats.
- ✓ Provisions should be there in the plan to bring back the affected community to a better and safer state than pre disaster state.

4.5.2 GUIDING PRINCIPLES

National Disaster Management Guidelines for preparation of SDMP derived some guiding principles. As per the guiding principles, the SDMP should be prepared based on following themes and conditions.

- The vulnerability of different parts of the state to different kinds of disasters.
- The measures to be adopted for prevention and mitigation of disasters.
- The manner in which mitigation measures shall be integrated with developmental plans and projects.
- The capacity building and preparedness measures to be taken.
- The roles and responsibilities of each department of the government of the state in relation to the measures specified above.
- The roles and responsibilities of different departments of the government of the state in responding to any threatening disaster situation or disaster.
- The state plan will be reviewed and updated annually.
- Appropriate provisions will be made by the state governments for financing the measures to be carried out under the state plan.
- Copies of the state plan will be made available to the departments of the government of the state and such department will draw up their own plans in accordance with the state plan.

Besides all these, the plan should be prepared through a participatory approach with the aims at strengthening the communities, elected local bodies and state administration's response and preparedness. The plan should have the scope for community based disaster management to ensure community's participation.

4.6. SUGGESTED OUTLINE FOR PREPARATION OF SDMP

The National Disaster Management Authority (NDMA) has prepared an outline for preparation of State Disaster Management Plan.

4.6.1. THE FRAMEWORK OF THE PLAN

The framework of the plan should cover the following issues

- ✓ General issues including broad vulnerability profile of the state. It will also comprise other thematic issues like community based disaster management, medical preparedness, awareness generation, training needs analysis and development of a state Human Resources (HR) plan, knowledge management, early warning and forecasting system standards for relief, rehabilitation etc.
- ✓ Disaster specific issues and methodologies.
- ✓ Cross-cutting issues common to all situations in any disaster. It will specifically deal with implementation, monitoring and review arrangements.
- ✓ The plan will also address cross-cutting activities in DM, the vertical and horizontal linkages requiring coordination between the union, state and local governments on one hand and a host of government departments and agencies on the other.

4.6.2 COORDINATING AND MONITORING MECHANISM

This should include the following issues

- ✓ The role of elders, senior citizens and locally respected leaders.
- ✓ The role of the NGOs, self Help Groups and other Community Based Organizations.
- ✓ The role of women as active participants in disaster management including risk reduction, mitigation, preparedness and awareness generation.
- ✓ The role of urban and rural local bodies particularly gram sabhas.

4.6.3 SECTIONS OF THE PLAN

a) Operational, which should

- ✓ Take into account the socio-cultural aspects of the state, differential needs of all sections of the society, concerns of women etc.
- ✓ Be in harmony with national, state, district, block, village and community level plans and incorporate implementation strategies.
- ✓ Develop a baseline for determination of total and minimum acceptable level of risk.
- ✓ Capture all aspects of disaster management cycle.
- ✓ Include a reference to the components of the state Human Resource Development (HRD) plan for disaster management.
- ✓ Contemplate professional training for micro planning and develop inbuilt simulation techniques.
- ✓ Describe the role of the Emergency Operations Centre (EOC).
- ✓ Incorporate Medical Preparedness and Mass Casualty Management.
- ✓ Outline various life-line structures/infrastructure and highlight the arrangements for maintenance and management of these structures during disasters.
- ✓ Take note of the existing National Disaster Response Forces, which are established to help the state DM agencies in response activities.
- ✓ Consider coordinated response of municipal corporations during disaster.
- ✓ Include the essentials of a scientific approach in damage assessment exercise.

- ✓ Identify the emergency management problems.
- ✓ Give due emphasis on the mock exercises and drills.
- ✓ Describe the mechanism of convergence of existing national, state, district and local resources.
- ✓ Address logistic issues in preparedness, response, rehabilitation and recovery related matters.
- ✓ Incorporate the modalities for inter-state and inter-country coordination.
- ✓ Include the requirements of infrastructure, communication, training and HRD in a phased manner.

b) Administrative

- ✓ The plan must be in accordance with the development plans of the state five-year plan and in conformity with the State Disaster Management Policy.
- ✓ The systems and institutions for implementation of the plans must be clearly identified and spelt out.
- ✓ The plan should consider the scopes for public-private partnership, knowledge management etc.
- ✓ The plan should have the provision for documenting the indigenous local practices for disaster management.
- ✓ Scopes for regular updation of the resource inventory.
- ✓ The plan should consider inter-state and inter-district coordination issues.
- ✓ Provisions for utilizing the facilities of Disaster Management Cells and Administrative Training Institutes in developing disaster management related skills.
- ✓ The plan should clearly mention the interface with Panchayati Raj Institutes, NGOs, CBOs and community.
- ✓ Mechanism for regular updating of the plan should be there.

c) Financial

- ✓ The plan should be supported with necessary budget provisions for short, medium and long-term activities. The modalities for creation and utilization of State Disaster Response Fund and District Disaster Response Fund may be incorporated in the annexure of the plan.
- ✓ The plan must spelt out details about mitigation and capacity building measures and incorporate disaster management concerns into developmental plans.
- ✓ The plan should be a component sub-plan of the state's annual and five-year plans.
- ✓ The plan must have provision of adequate funds for acquiring required relief material, the forces to be engaged in relief operation, district and local authorities etc.
- ✓ The plan should furnish detail about scopes of external aid and nodal arrangement for coordination of external aid.

d) Legal

This section should cover the following issues

- ✓ The responsibility of the State Executive Committee; like coordinating and monitoring the implementation of national policy, national and state plans; providing information to NDMA relating to various parameters of disaster management; earmarking the funds for disaster management etc.
- ✓ Techno-legal regimes like amending building bye-laws, bringing in flood plain zoning legislation etc.

e) The process

This section should

- ✓ Designate the nodal department for coordinating formulation of the state plan.
- ✓ Identify the focal point in each relevant department, consisting of a core group of officers, and provide scopes for training to professionalize their approach.
- ✓ Involve administrative and technical institutions for providing technical support.
- ✓ Describe nodal department(s) for involvement of NGOs, CBOs, corporate sector, youth organizations, educational institutions, Panchayati Raj Institutions, urban local bodies, media and other stakeholders and the modalities of such partnerships.

- ✓ Outline the logistics management in all aspects of disaster from preparedness to recovery.
- ✓ Describe the consultative process with local authorities, district authorities and people's representatives.

4.6.4 SUGGESTED OUTLINE OF THE SDMP

Part I: General

Chapter I: *Introduction*. This chapter may comprise state profile (social, economic and demographic); vision, theme and objectives.

Chapter II: *Vulnerability Assessment and Risk Analysis*. This chapter may include history of vulnerability of the state to different types of hazards; hazard and vulnerability assessment; hazard mapping; threat of man-made disasters; district hazard profile; emerging concerns such as urbanization, environment degradation, population explosion etc.

Chapter III: *Preventive measures*. This chapter may include state specific natural and man-made disasters; early warning and its dissemination mechanism; prevention and mitigation plans; short, medium and long term structural and non-structural measures required to be taken for damage mitigation; nodal departments for each activities etc.

Chapter IV: *Mainstreaming DM concerns into developmental plans / programmes / projects*. This may include; economic and social infrastructure like irrigation, power, drinking water, sanitation, roads, buildings, schools, hospitals, housing, heritage, monuments etc.; elementals of impact assessment and risk reduction; classification of disasters and residual agenda means logistics management to be incorporated in respective SOPs.

Chapter V: *Preparedness measures*. This may include; resource availability with national and state agencies, government, private and civil society; community based disaster management; training, capacity building and other proactive measures; awareness generation; application of GIS; techno-legal regime; medical preparedness; knowledge management; fail-safe communication; mock drills and rehearsals etc. At the time of updating the plan, lessons learnt may be incorporated.

Chapter VI: *Response*. This chapter may highlight the issues related to; Incident Command System; Emergency Operations Centres; alert mechanism; disaster risk reduction framework; state act and policy; roadmap for risk management; yearly schedule for conducting mock drills; mechanism for activation of response plan upon occurrence of a disaster.

Chapter VII: *Partnership with other stakeholders*. This may include; the role of different organizations, institutions and media in different phases of disaster management, along with names and designations of nodal persons.

Chapter VIII: *Financial arrangement*. This may include; arrangement for funding of the different components of the state plan; provision of fund for specific mitigation projects; provision for State Disaster Response and Mitigation funds at state and district levels; SOPs of each department to make provision of fund for its own DM in its annual budget etc.

Part II: Disaster specific action plan

The chapters under this part should be based on probable hazards of the state.

Part III: Cross-cutting issues

This part may include the following chapters

Review and updation of the plans. The plan should include a schedule for submitting action taken reports confirming that their components have been duly updated.

Coordination and implementation. This may include; the tasks entrusted to various agencies involved in disaster management and coordination amongst these agencies; mechanisms of SDMA/SEC/DDMA for ensuring the active participation of concerned government and non-

governmental organizations; scopes of coordination of efforts amongst government departments and other stakeholders; acquisition and application of resources in accordance with requirements; monitoring mechanism; regular Management Information System for timely reporting etc.

4.7 PREPARATION OF DDMP

The model template prepared by the National Institute of Disaster Management (NIDM) suggested some general guidelines for preparation of a District Disaster Management Plan (DDMP).

4.7.1 TECHNICALITY AND CONTENT

a) General characteristics of DDMP

- ✓ It should be clear & precise.
- ✓ It should not be too much technical or verbose, so that everyone can understand.
- ✓ The year of preparation of the plan should be clearly mentioned to facilitate updation.
- ✓ It should provide flexibility in execution: seasonality of hazards and roles of DM agencies should be clearly mentioned.
- ✓ It should use all existing management information systems for maximum efficiency.
- ✓ It should mention about continuity in management in case of a change.
- ✓ It should maximize the resource utilization.
- ✓ It should include/link with the secondary/support plans such as specific departmental plans and industrial plans located in the district.
- ✓ It should be integrated with lower level plans such as Block or Village DMP and also with the State and National level policies and strategies.
- ✓ It should facilitate coordination at all levels.
- ✓ It should emphasize the training & practice, so that the plan is executed with precision.
- ✓ It should stress on the post-disaster evaluation and updation for continuous improvement of the same.
- ✓ The plan should also be technically competent with no errors.

b) Hazard, risk, vulnerability and capacity analysis

It is observed that, most of the district plans do not give due emphasis on hazard and location specific risk assessment, which needs in-depth analysis of hazard, vulnerability and capacity. Hazard, vulnerability and capacity assessment is essential to identify the locations prone to most damaging hazards vulnerability factors that make the people living in hazard prone locations susceptible to the impacts of hazards, capacity of the vulnerable community to mitigate damage and cope with the hazards. So, the provision of risk analysis through hazard, vulnerability and capacity assessment should be there in the district plan. It is equally important to understand the methodology of risk analysis for genuine risk assessment of the district. Because, planning for disaster management; which includes prevention, mitigation, preparedness, response and recovery; depends entirely on micro level risk assessments of the district. The district authority may take help from academic and research institutions for this purpose.

It is also important to study, whether the existing resources, manpower and equipments, are sufficient to deal with a emergency situation, in the event of a disaster. So, along with capacity assessment, needs analysis is also equally important to identify the requirement of resources. Resource inventory should be disaster specific. Further, the resource assessment should be based on reliable resources only, which are functional and efficient to deal with disaster. During preparation resource inventory, the dysfunctional or incapacitated resources should be excluded from the list. DDMP must take care of genuine risk and needs assessment for designing proper risk mitigation plan.

c) Maps and data

Data acquisition and preparation of latest hazard maps are essential for risk analysis and planning for risk and crisis management. The DDMP must have scopes to develop proper mechanism for collection of genuine data (spatial and non-spatial) from different sources and analysis of these data correctly. For multi-hazard prone zones, GIS technology may be used for preparation of digital hazard maps. A GIS based multi-hazard map facilitates the planners to prepare a practical disaster management plan, relevant to the real-world scenario of the district.

d) Standard Operational Procedures (SOPs)

Different government departments, involved in disaster management of the district, may have separate Standard Operational Procedures to deal with the incidents. So, the SOPs of different departments should be classified under the heads of mitigation, response, relief and rehabilitation. The plan should also highlight the common and hazard specific SOPs separately in a format. SOPs of Armed Forces for disaster response should co-ordinate with district administration for efficient functioning.

e) Linkage

One of the important aspects of disaster management is sustainable development. So, linkage of DDMP with developmental plans and projects of the district is important for proper implementation of hazard resistant codes and norms. Moreover, a developmental plan may have secondary negative impacts on life, property and environment. This may also enhance disaster risk to a particular area of the district by generating more unsafe conditions. Hence, every developmental plan must use disaster management plan as a resource for its own sustainability and reducing the negative impact on population, property and environment.

The DDMP should mention the roles of sub plans of different departments and organizations like fire, irrigation, water resources, electricity, agriculture, major industries, armed forces etc. in disaster management plan of the district. The plan should also highlight the mechanism of linkage amongst these sub plans for better result in search, rescue and relief operations.

The plan should highlight the linkage with the NGOs and other organizations involved in disaster management at district level. Mention should be made in the plan, how the community level volunteers and management teams are linked with the government disaster management systems for efficient response in the wake of a disaster.

f) The plan should have the scopes for regular updation of relevant data and information, drills, rehearsals, monitoring and evaluation. The plan should have clear guidelines for continuous updating, monitoring and evaluation of the plan.

g) Specific detailed plans for hazard specific prevention, mitigation, preparedness, response and rehabilitation should be incorporated in the plan.

h) Various forms, checklists and job-aides like damage assessment, reporting, regular checking of resources etc. may be included in the plan as annexure.

i) The response plan of the DDMP should give special emphasis on relief management.

j) The major responsibilities of the various functionaries may be put down under a separate head in the plan. A job chart and checklist for pre, during and post disaster functions would be useful.

k) Scope of getting services of senior citizens in disaster management related activities, may be in control room, should be there in the plan.

l) A clear note should be incorporated in the plan regarding financial, legal and administrative liabilities of the state government for proper execution of the DDMP.

m) The plan should have provision to give specific power to the district administration for taking immediate decision to manage a sudden crisis. In this regard, the financial administration should be absolutely clear and transparent.

n) There should be scopes of getting supports of the public representatives and corporate sector operating in the district in preparedness and other DM activities.

o) A mechanism for dealing with public grievances and media management should be there in the plan.

4.7.2 CONTENT PRESENTATION

a) To get quick grasp and increase the functionality of the plan, an abstract of the plan may be incorporated after the content page.

b) Wordy explanations and big paragraphs should be avoided for better understanding of the plan by all stakeholders.

c) To make the plan functional, theoretical explanations of certain issues may be provided in a support handbook.

d) Data and information should be presented in the form of pie chart, bar diagram, line diagram etc.

4.7.3 SUGGESTED OUTLINE OF THE DDMP

The National Institute of Disaster Management had organized a consultation workshop in 2004, attended by district and state administrations, Ministry of Home Affairs, NIDM and UNDP, to prepare a model template for district Disaster Management Plan. The workshop finally recommended a common template, after lots of consultation and analysis. The following is the structure of the model template.

A) DDMP

This chapter is basically abstract of the entire plan, reflecting all major aspects of the plan. This should be designed in such a way that the entire plan is understood in a glimpse.

B) Introduction

This chapter should include

- ✓ Necessity of the plan.
- ✓ Changing context of disaster management.
- ✓ Objectives of the plan.
- ✓ Departments responsible for development of DDMP.
- ✓ Year of preparation of the plan and when it is to be reviewed.
- ✓ All other information, that helps in understanding the context and relevance of the plan.

C) District profile

This chapter should provide an overview of the district in terms of its climate and weather; geographical and geological characteristics; topography, demography, river and road networks; critical infrastructure and facilities etc.

D) Hazard, Risk, Vulnerability and capacity analysis

This chapter should comprise the process and methodology of hazard and location specific risk assessment of the district. This should include hazard and vulnerability analysis of the district, multi-hazard mapping, capacity and needs assessment, impact analysis of the damaging hazards, elements at risk, susceptibility of elements at risk to different hazards, preparedness analysis etc.

E) Institutional mechanism

This chapter should include the structure of disaster management mechanism in the district, linkage of the plan with sub-plans of the other departments and organizations.

F) Mitigation plan

This chapter should highlight on

- ✓ Various ways and means for prevention of probable damaging hazards.
- ✓ Hazard specific damage mitigation measures.
- ✓ Sector specific mitigation plan.
- ✓ Structural and non-structural aspects of mitigation plans.
- ✓ Strategy for implementing codes, norms, regulations, legislations etc. for hazard resilient developments.
- ✓ Organizations and departments responsible for implementation of mitigation strategies.
- ✓ Indigenous mitigation measures and modalities for adopting these measures.
- ✓ Strategy to train-up the government and non-governmental cadres.
- ✓ Preparedness plan to deal with incident.

G) Response plan

The district plan should focus on

- ✓ Operational direction and coordination.
- ✓ Emergency warning and dissemination.
- ✓ Rapid damage assessment and reporting.
- ✓ Incident Command System.
- ✓ Search and rescue.
- ✓ Medical response.
- ✓ Logistic arrangements.
- ✓ Communication.
- ✓ Temporary shelter management.
- ✓ Law and order.
- ✓ Public grievances.
- ✓ Animal care.
- ✓ Management of deceased.
- ✓ Linkage with voluntary organizations and NGOs.
- ✓ Relief management plan etc.

H) Recovery and reconstruction plan

This chapter should highlight the plans relevant to

- ✓ Restoration of basic infrastructure.
- ✓ Reconstruction / repairing of buildings, infrastructure and facilities.
- ✓ Restoration of livelihoods.
- ✓ Medical rehabilitation etc.

I) Standard Operating Procedures and checklists

This chapter should include SOPs of different departments and organizations, clearly mentioning their roles and responsibilities during various stages of disaster management.

For examples, SOPs for DDMC, Information Management Team, Search and Rescue Team, Emergency Health Management Team, Relief Team, Transport Management, Infrastructure Management Team, Animal Management Team, District EOC. This may include SOPs of different departments like, Irrigation, Electricity, Agriculture, Police, Water Resources, Health, PWD, Telecommunication, PHE, Fire Service, Food and Civil Supply, Veterinary etc.

This should also include checklists for

- District Collector / Deputy Commissioner
- Various Disaster Management Teams
- District EOC
- Urban Local Bodies like Municipal Corporation etc.

J) Linking with the developmental plans

The basic aim of this chapter should be to aware the planners of developmental plans and projects about the location specific threat and vulnerability aspects, risk associated with the developmental project, impact assessment of the project etc. for incorporation and integration of damage mitigation components within the developmental project.

Mention should be made in this chapter about different existing and ongoing developmental plans/projects in the district and their linkage with DDMP in order to take appropriate measures for risk reduction.

K) Budget and other financial allocations

This chapter should include the references related to budget and other financial allocations made at district level for preparation and implementation of the DDMP.

L) Monitoring and evaluation

This chapter should mention the rules and regulations for

- ✓ Proper monitoring and evaluation of the DDMP.
- ✓ Post disaster evaluation.
- ✓ Regular **undation** of the plan.
- ✓ Uploading of updated plan in relevant disaster management network.
- ✓ Conducting periodic drills.
- ✓ Training of the personnel, involved in disaster management.

M) Annexure

This may include annexure of District profile; Resources; Checklists; Media and Information Management; Process of development of DDMP; Important contact numbers; Do's and Don'ts of possible hazards; Important Government Orders etc.

4.8 WHAT WE LEARNT FROM THIS UNIT?

The Indian subcontinent is exposed to most of the natural hazards like flood, earthquake, cyclone, landslide, hailstorm, drought etc. Since last few decades, central and state governments, government departments, different government and non-governmental organizations are involved in disaster management related activities. But, the numbers of disastrous events, in particular hydro-meteorological disasters, are increasing day by day. The

increasing trend of population affected by different natural disasters during last few decades is a matter of concern. The damage to property and economic loss due to disasters are also increasing alarmingly all over the world including India.

Most of the states and districts in India have relief centric disaster management plans, which do not cover entire disaster management cycle. In view of this, works were going on at various levels to find out comprehensive models for preparation of state and district disaster management plans.

The Disaster Management Act 2005 has made it mandatory for all the states and districts of India to have comprehensive disaster management plans, addressing all possible aspects of risk mitigation, emergency response and recovery. The National Disaster Management Authority (NDMA) has prepared an outline for preparation of State Disaster Management Plan in the line of National Disaster Management Guidelines.

The model template prepared by the National Institute of Disaster Management (NIDM), prior to the enactment of DM Act 2005, suggested some general guidelines for preparation of a District Disaster Management Plan (DDMP). This model template was prepared through a consultation workshop and in consultation with district and state administrations, academic and research institutions, Ministry of Home Affairs, UNDP etc.

4.9 PROBABLE QUESTIONS

1. Which agency prepares National Disaster Management Plan?
2. Which agencies are responsible for formulation of SDMP and DDMP?
3. Mention few important criteria of DM plan.
4. Write down three important themes / conditions of SDMP.
5. Which authority prepared outline for SDMP?
6. What points should be included under coordinating and monitoring mechanism of SDMP?
7. What are the themes of different chapters under part I of SDMP?
8. Mention general characteristics of DDMP?
9. What factors should be included in district profile?
10. Discuss detail about mitigation plan of DDMP.

4.10 SUGGESTED READINGS

1. National Disaster Management Guideline, Preparation of SDMA, Published by NDMA, Government of India, 2007.
2. District Disaster Management Plan - Model Template, Published by NIDM, Ministry of Home Affairs, Government of India, 2005.

UNIT-5: ENVIRONMENTAL MANAGEMENT FOR DISASTER RISK REDUCTION**UNIT STRUCTURE**

5.1 INTRODUCTION

5.2 OBJECTIVES

5.3 ENVIRONMENT, ECOSYSTEM AND DISASTER RISK

5.3.1 NATURAL ENVIRONMENT

5.3.2 ENVIRONMENTAL FACTORS

5.3.3 ECOSYSTEM

5.3.4 ENVIRONMENT AND DISASTER RISK

5.4 APPROACHES OF ENVIRONMENTAL MANAGEMENT FOR DISASTER RISK REDUCTION

5.4.1 ENVIRONMENTAL GOVERNANCE

5.4.2 INTEGRATED PLANNING

5.4.3 ENVIRONMENTAL MONITORING AND ASSESSMENT

5.4.4 ENVIRONMENTAL ADVOCACY, EDUCATION AND COMMUNICATION
NATURAL RESOURCE MANAGEMENT

5.4.5 ENVIRONMENTAL PROTECTION, ECOSYSTEM REHABILITATION

AND

5.4.6 INNOVATIVE ENVIRONMENTAL TECHNOLOGY

5.4.7 CAPACITY BUILDING FOR ENVIRONMENTAL MANAGEMENT

5.5 EIA AND DISASTER MANAGEMENT

5.6 POST DISASTER IMPACT ON ENVIRONMENT

5.7 INDUSTRIAL HAZARD MANAGEMENT

5.8 WHAT WE LEARNT FROM THIS UNIT?

5.9 PROBABLE QUESTIONS

5.10 SUGGESTED READINGS

5.1 INTRODUCTION

Human interference of the nature against the natural laws often results in environmental degradation. Similarly, unwanted pressure on environment caused by human activities like deforestation, pollution etc. and natural events like extreme dry weather may lead to environmental stress. Environmental degradation and environmental stress generally help to increase the frequency and intensity of many natural hazards. This is one of the reasons for increasing trend of disaster events and subsequent loss and damage to our life and property.

On the other hand, many developmental projects have negative impact on our environment. So, environmental management is the integral part of disaster management mechanism. This is also required to maintain balance in our bio-diversity and ecosystem.

In chapters 1 to 4 of this course, we have elaborately discussed about disaster management Act and policy of India; planning strategies and support requirements for disaster management; legal-institutional framework for disaster management; methods and tools for disaster risk assessment; needs for risk mitigation and emergency response planning; principles and guidelines for preparation of disaster management plans at various levels etc.

In this chapter, we shall discuss about principle, approaches, legal and other aspects of environmental management.

5.2 OBJECTIVES

The objectives of this chapter are to

- Discuss about relevance of environmental management in disaster management.
- Highlight on different approaches of environmental management.
- Discuss about environmental impact assessment and its role in DM.
- Describe the possible impacts of disasters on environment.
- Discuss about industrial hazard management mechanism.

5.3 ENVIRONMENT, ECOSYSTEM AND DISASTER RISK

To understand the relationship between our natural environment and natural hazards, it is essential to have clear idea about composition and basic characteristics of natural environment.

5.3.1 NATURAL ENVIRONMENT

Our **Natural Environment** encompasses all biotic and abiotic elements of the earth. This also includes all living and non-living things occurring naturally on the earth. The **Environmental Capital** depicts all the resources of the earth. The environmental capital can be divided into many components,

- ✓ Complete **ecological units** including atmosphere, vegetation, microorganism, soil, rock system, natural phenomena etc.; that function as natural systems without human intervention and occur within their own boundaries.
- ✓ **Universal natural resources** and **physical phenomena**, like air, water, climate, energy radiation etc.; do not have particular boundaries. These do not have any relation with human activities.
- ✓ **Built environment** comprising the areas and components developed by human.
- ✓ **Negative factors** like pollution, contamination, desertification etc.; which have strong correlation with human activities.

5.3.2 ENVIRONMENTAL FACTORS

Environmental factors are mostly location specific and can be divided into the following groups.

Physiographic factors: The factors, which are associated with physical nature of an area and distribution of plants and animals in the area. These factors include topography, altitude, slope, drainage condition, degree of erosion etc. of the area.

Edaphic factors: These factors are related with physical, chemical and biological properties of soil; which have influence on the life of organisms. These factors mainly include water content, organic content, texture (size of soil particles), and pH (acidity or alkalinity of soil).

Climatic factors: These factors are related to weather of an area. These factors may be temperature, rainfall, light, humidity, and air movement etc. These factors also influence the life of organisms.

Biotic factors: These factors include all living components of the environment. Life of an organism may be affected by the activities of the biotic factors.

5.3.3 ECOSYSTEM

An **ecosystem** comprises biotic components or biological community of a locale as well as the physical and chemical factors that make up non-living or abiotic environment of that locale. The study of ecosystem mainly deals with the process of interactions between biotic and abiotic components of the ecosystem of a particular area. **Ecosystem ecology** is the field of

study, which deals with *energy transformations* and *biogeochemical cycling* processes of the ecosystem.

Let us discuss in brief about biotic and abiotic components of ecosystem.

Biotic components are the living elements that give shape to an ecosystem. All biotic components need energy to do work and food for proper growth. There are close interactions amongst biotic components themselves and between biotic and abiotic components. The biotic components consist of

Producers: Such as plants, which convert solar energy, to chemical energy mainly from sun light. Sun light is an abiotic component of ecosystem.

Consumers: Such as animals, which depend upon producers for food.

Decomposers: Such as bacteria and fungi, which break down chemicals from producers and consumers into simpler form for reuse in other purpose.

Abiotic components are the non-living components of the ecosystem on which the plants and animals are dependent for their growth and different activities. Abiotic components include *Light, Temperature, Water, Wind, Soil, and other physiographic factors*.

5.3.4 ENVIRONMENT AND DISASTER RISK

Most of the natural hazards have close relationship with environmental factors. Each component of our environment and ecosystem has certain role in disaster risk mitigation. On the other hand, environmental degradation often enhances the frequency and magnitude of natural hazards, thereby increasing impact of natural hazards to their exposures.

For example, *forest* is one of the important components of our ecosystem. **Deforestation** may lead to *change in climatic condition, large-scale soil erosion, denuded slope, desertification, high runoff of surface water, decrease in evapotranspiration losses, change in nutrient cycle and energy flow* etc.

Soil erosion in upper catchment areas may lead to sediment influx to riverbeds, which may cause decrease in carrying capacity of the rivers and thereby inundation in the alluvial plains during rainy season. Similarly, denuded slopes in hilly areas may increase the risk of landslides.

Deforestation and industrial pollution and production of greenhouse gases, together contribute to climate change. Climate change may cause global warming and melting of snow in the glaciers, **leading to** inundation of coastal areas. Change in climatic condition may lead to extreme dry weather and subsequently drought. Climate change may also be associated with change in local rainfall pattern, which in turn may increase intensity of rainfall within short period of time **causing** flash floods.

Removal of top soil by rainwater due to absence of vegetation may have negative impact on crop production, because top soil consists most of the important nutrients. Destruction of forest may have direct negative impact on our biodiversity also.

Mangroves, reefs and dunes are the natural barriers for cyclone, storm and tidal surges in coastal areas.

Wetland, which is a component of our ecosystem as well as environment, has great role in water storage, flood mitigation, shoreline stabilization, erosion control etc. Shrinkage of wetlands is one of the major factors for flash floods in both urban and rural areas.

Our *socio-economic* and *socio-cultural conditions* have strong casual relationship with environmental degradation and disaster risk. Environmental stress, like drought, encourages

people to migrate in urban areas. Overpopulation in urban areas often reduces the carrying capacity and lead to unsustainable development and hazardous environment.

Shifting cultivation is one of the livelihood options of many hill communities. This may lead to deforestation and subsequent disaster risk. Poverty and limited livelihood opportunities compel people to overexploit natural resources and cause damage to natural environment. On the other hand, poor people are compeled to live in environmentally degraded hazard prone areas and struggle for their survival.

In most of the cases, developmental projects and production industries have significant negative impacts on our environment. For example, hydraulic barrier like big dam may cause inundation of huge forest area and damage to bio-diversity. This may also change the flow pattern of the river system and enhance risk of flash floods as well as drought. Similarly, production industries may cause pollution, deforestation and other disturbances in our environment, resulting in severe health problems, low agricultural production, etc. For example, brick industries generally use huge volume of clay and fuel woods. This may cause damage to top soil, nutrients, forest cover etc. Industries dealing with inflammable and poisonous substances may cause many environmental problems and enhance disaster risk.

Many times, disasters create serious environmental problems and subsequently enhance risk of secondary disasters. For example, cyclone may damage huge forest cover. Oil spill due to accident of a ship may pollute seawater. Landslide may disturb the topography and geomorphological character of an area. Forest fire may be the reason of air pollution and desertification. Flood may contaminate drinking water sources. Unplanned recovery processes generally do not consider these environmental factors and vulnerabilities created by the disasters. Such recovery processes may contribute additional risk factors to the new set-up.

From our discussion it is now clear that, environmental factors like loss of natural resource, climate change etc. always enhance the vulnerability of the systems and make the community susceptible to natural hazards. So, there should be enough scopes of environmental management in disaster management plans for genuine disaster risk reduction of our systems.

5.4 APPROACHES OF ENVIRONMENTAL MANAGEMENT FOR DISASTER RISK REDUCTION

(This section is compiled from the report entitled “Opportunities in Environmental Management for Disaster Risk Reduction: Recent Progress”, prepared by the United Nations Environment Programme (UNEP) in collaboration with UNISDR, 2010)

Environmental management for disaster risk reduction is not confined to a specific set of measures. Rather, it is linked to some relevant practices, like climate change adaptation, ecosystem conservation etc. The **Hyogo Framework for Action (HFA)** for 2005-2015 was adopted in the World Disaster Reduction Conference held in the year 2005 at Kobe, Hyogo, Japan, by 168 Member States of the United Nations. This was adopted for integrated environmental and natural resource management approaches to mitigate disaster risk with due emphasis on appropriate management of fragile ecosystems. The **United Nations International Strategy for Disaster Reduction** (UNISDR) global programme for 2008-2009 was also aimed at ensuring protection of environmental services in coastal areas, mountain ecosystems, flood and fire-sensitive basins by enhancing capacities of national and local authorities.

Though, the approaches of different individuals and institutions for environmental management are different, but the common agenda of all these approaches is *sustainable uses of ecosystem services*, which compliments other socio-economic and political agendas. Few

basic approaches of environmental management for disaster risk reduction are described below.

5.4.1 ENVIRONMENTAL GOVERNANCE

This gives us opportunity to integrate the disaster risk reduction programme with environmental management by adopting clear policies, legal and regulatory frameworks, institutional structures etc. for environmental protection and sustainable resource management. Now, many countries have legislative and regulatory frameworks for integration of environmental management with disaster risk reduction.

For example, after 2004 tsunami, Sri Lanka prepared a roadmap for disaster risk reduction by addressing a range of environmental initiatives. Which includes, disaster impact assessment be a part of environmental impact assessment measures, monitoring of changes in hazard risk with changing environmental conditions, monitoring of nuclear radiation, preventing and improving response to oil spills, promoting soft engineering solutions for coastal protection, solid waste management, environmentally sound technologies for risk mitigation etc.

5.4.2 INTEGRATED PLANNING

Integrated planning for disaster risk reduction gives due emphasis on consideration of environmental factors in land use planning for both urban and rural areas. Integrated planning also provides a framework for identifying the areas highly prone to natural hazards and vulnerable populations. Such planning helps the planners to consider the impacts of loss of vital ecosystem and changing land use patterns to community's resistance against potential disasters. So, it can be considered as the basis for determining the risk reduction interventions. Post disaster recovery process also needs integrated planning for sustainable development, addressing the existing vulnerabilities and other environmental factors.

Practical land use planning has close interactions with environmental management systems and relevance for management of our ecosystem. Hence, it is the most useful tool for hazard specific disaster risk mitigation. Such a plan gives enough stress on watershed management, wetland management, forest management, protection of agricultural lands etc. and defines the criteria for all developmental activities based on local environmental conditions.

5.4.3 ENVIRONMENTAL MONITORING AND ASSESSMENT

Continuous monitoring of changing characteristics of the environmental factors and assessment of their impact on vulnerability and disaster risk of an area gives us opportunity to respond accordingly for disaster risk reduction and capacity building of the community.

Monitoring of the environmental factors, based on ground observation or remote sensing, may help us in assessing the onset of a hazard and issuing early warning for the threat. **For example**, monitoring of changes of forest cover in a particular watershed and subsequent rate of sediment influx to the river network may give us valuable information for assessing the flood risk in lower catchment areas of the watershed. Based on such information, we can take some corrective measures for flood risk mitigation by reducing sediment influx to the river network. Simultaneously, we can prepare ourselves to mitigate damage and disruption, in the event of a flood disaster.

Environmental monitoring mechanism also helps us in studying the trend of environmental degradation and its correlation with environmental stress, which may lead to a disaster situation. **For example**, deforestation may be the cause of extreme dry weather that may lead to drought or global warming which in turn may lead to melting of glaciers, change in rainfall pattern, flash flood etc.

By taking into account of dynamics of environmental degradation; through environmental monitoring in respect of different environmental components, and changing characteristics of natural hazards; we can develop some models for assessing hazard specific disaster risks in terms of different environmental components.

Based on environmental monitoring, we can make environmental assessment to analyze and report the current and future environmental conditions as well as to identify the drivers of environmental changes. Such environmental assessment gives opportunity to the planners for inclusion of environmental management practices in risk reduction plan.

5.4.4 ENVIRONMENTAL ADVOCACY, EDUCATION AND COMMUNICATION

It is essential for the decision makers, planners as well as community members to understand the role of environmental management in disaster risk reduction. Different countries may have different sets of codes, norms and regulations for environmental protection. But, decision makers and planners should have clear knowledge about dynamics of environmental degradation and correlation of the drivers of environmental degradation with disaster risk, for making the disaster management plans more interactive with environmental management practices.

Through *advocacy*, environmental managers can play vital role in providing information about policy briefs and contemporary issues, relevant to environmental degradation and its management practices, to the decision makers and planners of disaster management. Electronic and print media are the most useful tools for advocacy.

Another *important tool of environmental advocacy* is the *environmental education* through different modes of outreach programmes. Environmental education for disaster risk reduction should give stress on the issues related to human-environment interactions and environmental degradation, environmental management practices, natural resource management, global and national environmental policies, role of different stakeholders in environmental management etc. Seminar, workshop, awareness campaign, street drama, puppet show etc. may be the useful communication media for environmental education of all the stakeholders of disaster management.

5.4.5 ENVIRONMENTAL PROTECTION, ECOSYSTEM REHABILITATION AND NATURAL RESOURCE MANAGEMENT

As discussed earlier, a balanced ecosystem always reduces the intensity and impact of natural hazards and play important role in protecting vulnerable communities form natural threats. Our ecosystem consists of dynamic complex of plants, animal and microorganisms as well as non-living components that play supportive role for biotic components. The characteristics of natural hazards remain changing with environmental conditions.

So, *environmental protection* is the mandatory task for disaster risk reduction. Environmental protection needs investments in protected areas and implementation of land use regulations. Investment in protected areas; like reserve forests, wetlands etc.; has economic benefits also in terms of reducing disaster risk. Investment is also necessary to support the communities in protecting the environment and for adequate security measures. Similarly, implementation of land use regulation restricts the community from activities that may be the reason for environmental degradation.

Ecosystem rehabilitation means restoration of the destroyed or vanished components of the ecosystem to maintain balance between biotic and abiotic components of the ecosystem for reducing future disaster risk of our systems. The measures for ecosystem rehabilitation may include, post disaster clean-up, reforestation, pollution control, restoration of natural reservoirs and river system, slope stabilization in hilly areas, alternative agriculture processes and livelihood opportunities etc.

Natural resource management, by judicious use of natural resources and restoration of destroyed natural resources, is the most important aspect of environmental management. Poor natural resource management may disturb the stability of natural environment as well as ecosystem and enhance future disaster risk. On the other hand faulty risk mitigation measures and developmental projects may have negative impact on natural resources.

The examples of poor management of natural resources may be, excessive use of firewoods without replantation; excessive use of ground water without having provisions for recharging the aquifers; filling up the natural reservoirs; developmental activities in watersheds; disturbing the natural drainage systems etc.

5.4.6 INNOVATIVE ENVIRONMENTAL TECHNOLOGY

Environment friendly innovative technologies play vital role in natural resource management and environmental protection. Many private sector industries are now engaged in developing such technologies for reducing environmental stress and maintaining the equilibrium of ecosystems. Such technologies include green engineering solutions for energy, sanitation and water management; green building concept; waste management; bio-engineering solutions; eco-materials; alternative technology to control over production of green house gases; fuel efficient devices; non-renewable energy technology etc.

Such technologies may not be cost-effective and affordable by common people, but have long-standing affects on environmental management. Government support and subsidy are required for carrying out research and development works in this field and making the products/outcomes affordable to all section of people.

5.4.7 CAPACITY BUILDING FOR ENVIRONMENTAL MANAGEMENT

Capacity building in terms of human resources, financial resources and institutional development is extremely important for resisting environmental degradation and maintaining ecological balance. Academic and research institutions may play lead role in generating skilled human resources by conducting regular courses, trainings and other modes of education. Financial capability to deal with environmental problems can be achieved through plan grants, seed money or capital investment. Similarly, strong legal-institutional structure should be in place to deliver the services related to environmental management.

5.5 EIA AND DISASTER MANAGEMENT

With the growing population around the globe, the needs of people in terms of food, energy, shelter and other basic requirements are also increasing day by day. Rapid urbanization and industrialization are taking place all over the world to meet the basic requirements of the people. Simultaneously, government and private agencies are engaged in implementation of big projects and developmental activities.

Such man-made developmental activities have certain negative impacts on our environment and contribution to increasing trends of disastrous events. Production industries are mainly responsible for air and water pollution, emission of green house gases, man-made catastrophe etc. Rapid urbanization has significant contribution to environmental degradation and unsustainable developments. Big developmental projects are responsible for disturbing our ecosystem. As a result, the overall disaster risk of the communities due to natural and man-made hazards is also increasing significantly. The increasing trend of damage and disruption has definite negative impact on Gross National Product (GNP) and National Economy. *In the chapter Overview of Disaster Phenomena under Fundamentals of Disaster Management, we have discussed about trends of disaster phenomena and their impacts to physical and living exposures, production, economy etc.*

It is essential to study the environmental consequences of major developmental activities for environmental management. The **Environmental Impact Assessment (EIA)** is the best interdisciplinary and objective decision making tool for assessing all environmental consequences of any proposed major developmental activity prior to its implementation. The EIA facilitates the planners and decision makers to take appropriate decision about implementation of a project in terms of project site selection and process technology. This also helps in understanding the probable impacts of a particular developmental project to different environmental factors and gives the scope for modification in the proposed plan of

the project. EIA is also essential to study the disaster risk associated with a particular project and take appropriate measures for prevention, mitigation and preparedness.

The US National Environmental Policy Act (1969) started the process of development of EIA, mainly for major developmental programmes like, power projects, industrial installations, defence tests, housing sector etc. This was later adopted by many countries like Canada (1973), Australia (1974), West Germany (1975), France (1976) etc. In India, the Ministry of Environment and Forest had issued a notification on 27th January, 1994 regarding EIA of major developmental projects, which was later amended on 4th May, 1994.

The EIA process requires data and information related to three basic components. First component is project detail including site, process technology, and other relevant data. Second one is environmental status of the project site and its surrounding areas, which may include information related to air, water, land, biological, socio-economic, noise etc. Third component is public opinion regarding consequences of the project on existing environmental status. The process of EIA comprises identification, measurement, interpretation and communication of the impacts.

Environmental Impact Statement (EIS) based on EIA describes all possible influences of the project on environmental factors and quality of life. Hence, directly or indirectly, EIA helps us in determining the disaster risk associated with a particular project, including hazard and vulnerability. Obviously, EIA is one of the essential tools for disaster management planning.

For example, the impact parameters for EIA of River Valley Projects like big dams are identified as ecological system, physical system (meteorology, hydrology, water, air, soil etc.), and socio-economic system (demography, land use, agriculture, public health, historical and cultural places etc.). Hence, genuine EIA of river valley projects like big dams helps in determining both upstream and downstream impacts of the projects, including water quality, aquatic biodiversity, flow pattern of the rivers, sediment and nutrient regimes, erosion, flash floods, human habitats etc. as well as terrestrial ecosystem and socio-economic system.

There should be close interaction between project designers and EIA team to foresee the possible threats of the project to environmental factors including human habitat and take corrective and preventive measures in the plan. The probable measures may be related to safety and sustainability of the project, environmental protection, prevention or mitigation of the probable impact, restoration of affected environment, compensation by substitute resources etc.

5.6 POST DISASTER IMPACT ON ENVIRONMENT

Any big disaster causes significant damage to different environmental factors and creates many secondary problems related to these factors. Rapid Environmental Needs Assessment (ENA) in post disaster situation is required to analyze the impacts of disaster on our environment and set priorities to respond accordingly. There is a basic difference between EIA and ENA. EIA is required to assess the probable impacts of a developmental activity prior to the disaster, while ENA is essential to assess the actual impacts of a disaster on all components of our environment. But, in most of the cases, post disaster damage and needs assessments are confined to built environment only. It is necessary to understand the dynamics between a disaster, its impact on environmental factors and community's needs for post disaster response and sustainable development.

Let us see few examples of hazard specific post disaster consequences on environmental.

Flood may cause water contamination and related health problems; crop damage and subsequent food and livelihood problems; damage to natural water reservoirs and sand deposition to agricultural land; loss of land due to erosion; soil contamination and loss of nutrients; etc.

Earthquake may cause damage to natural landscape, vegetation and other physiographic components of environment; water contamination; waste accumulation; radiation hazard;

alteration of river network and subsequent flash flood; damage to productive systems; tsunamis and subsequent damage to infrastructure, fresh water sources, coral reefs, mangroves, soil etc.

Cyclone may cause severe damage to vegetation, human and wildlife habitats, fresh water sources, natural coastal defense system, offshore coral reefs etc.; soil contamination by saline water and subsequent loss of agricultural production; waste and debris accumulation followed by communication and shelter problems etc.

Landslide may cause damage to landscape, vegetation and other physical components; blockade to natural drainage system; contamination of water sources; mudflow etc.

Forest fire causes damage to forest products, wildlife habitats, biodiversity, ecosystem services, productive crops etc. It also encourages encroachment of forestland for settlement and agriculture.

Drought mainly causes damage to surface vegetation, water sources, productive systems and biodiversity. It also forces the people to migrate in other places and creates socio-economic problems.

So, post disaster environmental needs assessment should address

- ✓ Immediate affects of disasters on different environmental factors, which affected the status of natural environment for survival of its biotic elements.
- ✓ Environmental stress from recovery process like deforestation in the process of reconstruction.
- ✓ Negative impacts of response related activities and coping mechanisms, which may create new environmental problems.
- ✓ Institutional capacities to deal with post disaster environmental problems.
- ✓ Interaction between environmental needs assessment and recovery process.
- ✓ Standard reference for future post disaster environmental needs assessment.

5.7 INDUSTRIAL HAZARD MANAGEMENT

Industries are the major contributors of air and water pollutants and responsible for enhancing the disaster risk of climatic and man-made hazards. So, industrial hazard management is one of the important aspects of environmental management as well as disaster risk mitigation.

Let us first discuss about possible industrial hazards, which may cause unwanted pressure to our environment and damage to our health or life.

- ✓ An industry may create physical hazards like noise, vibration, heat, cold, pressure, radiation, dust etc.
- ✓ All industries have small or big risk associated with material used like Flammable/explosive materials, toxics agents etc.
- ✓ An industry may create biological hazards like pathogens etc.
- ✓ All industries have some sorts of risk associated with technical set-up like processing unit, electrical unit, ignition unit, storage, pipelines, tanks, etc.
- ✓ There may be health related hazards like workers and local people are exposed to radioactive substances, harmful waste material etc.

The characteristics of the industrial hazards are not same for different industries and depend on technical aspects, material properties and many other things. So, industrial hazard management process is also complex. Following are the few common steps of industrial hazard management.

- ✓ Identification of hazards i.e., types of threats associated with an industry.
- ✓ Assessment of characteristics of hazards i.e., assessment of intensity of probable hazards and their impacts within and surrounding areas of the industry.

- ✓ Advance assessment of any possibility of accidental release of flammable and toxic vapour cloud.
- ✓ Sound technical and engineering risk mitigation approaches to make all the elements of the industry relatively safe.
- ✓ Provisions should be there for accident control like emergency shutdown of the industry or a particular unit in the event of a threat.
- ✓ Safety measures for process system.
- ✓ Industry should have disaster management plan to adopt counter measures for damage mitigation and emergency response in the event of an accident.
- ✓ There should be proper warning mechanism to alert the industry people, local authorities and people living in the risky zone.
- ✓ Awareness of the vulnerable people about probable hazards and safety measures is most important aspect of damage mitigation.

In an industry, maximum accidental risk associates with the process system. So, process safety management plays significant role in reducing the accident related disasters. This requires,

- ✓ Active participation of all the employees to maintain safety of different units of the process system.
- ✓ Employees must have information relevant to safety of the process units.
- ✓ Analysis of hazards associated with process units by the experts is necessary.
- ✓ Training of the employees for safe operation of the process system.
- ✓ Strategy for making changes in process chemicals, technical aspects, equipment etc.
- ✓ Pre-startup safety review to assure process safety in case of any change or modification in the system.
- ✓ Mechanical integrity among different units is required for accident control.
- ✓ Strategies for incident investigation and emergency response.

5.8 WHAT WE LEARNT FROM THIS UNIT?

Environmental management is required to reduce unwanted pressures to the environment and maintain ecological balance.

To understand the relationship between our natural environment and natural hazards, it is essential to have clear idea about composition and basic characteristics of natural environment. Our environmental capital consists of ecological units, universal natural resources and physical phenomena, built environment, and negative factors like pollution, contamination, desertification etc. Physiographic factors, edaphic factors, climatic factors and various **emission features**.

An ecosystem comprises both biotic components or biological community and non-living or abiotic environment. Biotic components are the living elements that give shape to an ecosystem. All biotic components need energy to do work and food for proper growth. Abiotic components are the non-living components of the ecosystem on which the plants and animals are dependent for their growth and developmental activities.

Most of the natural hazards have close relationship with environmental factors. Each component of our environment and ecosystem has certain role in disaster risk mitigation. On the other hand, environmental degradation often enhances the frequency and magnitude of natural hazards, thereby increasing impact of natural hazards to their exposures.

Few basic approaches of environmental management for disaster risk reduction are Environmental governance; Integrated planning; Environmental monitoring and assessment; Environmental advocacy, education and communication; Environmental protection, ecosystem rehabilitation and natural resource management; Capacity building for environmental management.

Environmental Impact Assessment (EIA) is the best interdisciplinary and objective decision making tool for assessing all environmental consequences of any proposed major developmental activity prior to its implementation. The EIA facilitates the planners and decision makers to take appropriate decision about implementation of a project in terms of project site selection and process technology. Environmental Impact Statement (EIS) based on EIA describes all possible influences of the project on environmental factors and quality of life.

Any disaster causes significant damage to different environmental factors and creates many secondary problems related to these factors. Rapid Environmental Needs Assessment (ENA) in post disaster situation is required to analyze the impacts of disaster on our environment and set priorities to respond accordingly.

Industries are the major contributors of air and water pollutants and responsible for enhancing the disaster risk of climatic and man-made hazards. So, industrial hazard management is one of the important aspects of environmental management as well as disaster risk mitigation.

5.9 PROBABLE QUESTIONS

1. What do you mean by environmental capital?
2. Describe edaphic factors of environment.
3. Define Ecosystem.
4. Describe biotic components.
5. Give one example of interaction between environment and disaster risk.
6. Mention few common approaches of environmental management.
7. What do mean by EIA?
8. What is EIS?
9. Mention the possible post disaster impact of flood on environment.
10. Mention few common steps for industrial hazard management.

5.10 SUGGESTED READINGS

1. Opportunities in Environmental Management for Disaster Risk Reduction: Recent Progress, Global Report, UNEP, 2009.
2. Gupta, A. K., EIA and Disaster Management, Reading Material: Training Programme on Environment and Disaster Management, NIDM, 2010.
3. Siddiquie, A., EIA of River Valley Projects, Reading Material: Training Programme on Environment and Disaster Management, NIDM, 2010.
4. Environmental Needs Assessment in Post Disaster Situation, A Practical Guide for Implementation, UNEP, 2008
5. Chakrabarty, U. K., Industrial Disaster Management and Emergency Response, Published by Asian Books Pvt. Ltd., 2007, pp 98.
6. Environment and Disaster Risk –Emerging Perspectives, UNEP publication, ISDR, 2007.

UNIT-6: RISK, LOSS AND NEEDS ASSESSMENT**UNIT STRUCTURE**

6.1 INTRODUCTION

6.2 OBJECTIVES

6.3 CONCEPTS AND IMPORTANCE OF RISK, NEEDS AND LOSS ASSESSMENTS

6.3.1 RISK ASSESSMENT

6.3.2 NEEDS ASSESSMENT

6.3.3 LOSS ASSESSMENT

6.4 APPROACHES OF RISK AND NEEDS ASSESSMENTS

6.5 CATEGORIES OF LOSS ASSESSMENT

6.5.1 WHY WE NEED LOSS ASSESSMENT?

6.5.2 CATEGORIES OF LOSS ANALYSIS

6.6 APPROACHES OF LOSS ASSESSMENT

6.7 WHAT WE LEARNT FROM THIS UNIT?

6.8 PROBABLE QUESTIONS

6.9 SUGGESTED READINGS

6.1 INTRODUCTION

Risk, needs and loss or damage assessments are the most important and interrelated aspects of disaster management planning. The main objective of disaster management planning is capacity building of the vulnerable community as well as disaster management agencies for disaster risk mitigation, emergency response and recovery. Again, capacity-building process of a vulnerable community is dependent on nature of risk associated with the community i.e., the nature of threats as well as the vulnerable conditions of the system in which the community is living. So, planning for capacity building of a community needs genuine risk assessment of the system.

Needs assessment has two-way connections with capacity assessment (*which is part of risk assessment*) and post disaster damage assessment. Capacity assessment facilitates us to assess our immediate needs to prevent hazards or mitigate damage and disruption due to hazards or prepare for coping with disaster situation. Loss or damage assessment gives us idea about our needs for emergency response and recovery of the original environment or even better environment for survival of the community.

So, pre and post disaster needs assessments based on risk assessment and loss assessment are essential for the planning of capacity building, both for pre disaster risk mitigation and post disaster emergency response and recovery.

In the chapters of *Fundamentals of Disaster Management*, we have discussed in detail about concept of disaster risk, process of risk assessment including hazard and vulnerability assessments, disaster management principles, procedure of capacity assessment etc.

In this chapter, we shall specifically highlight the aspects of risk, needs and loss or damage assessments.

6.2 OBJECTIVES

The major objectives of the chapter are

- To discuss about the importance of risk, needs and loss assessments.
- To highlight the issues related to risk and needs assessments.
- To describe the approaches of loss assessment.

6.3 CONCEPTS AND IMPORTANCE OF RISK, NEEDS AND LOSS ASSESSMENTS

6.3.1 RISK ASSESSMENT

The foundation of the disaster management planning is risk assessment. *Risk assessment* of a system facilitates the planners to understand the probability of harmful consequences or damage and disruption resulting from the impact of a natural or man-made hazard and respond accordingly to reduce the impact of the hazard to vulnerable community.

As discussed in the *chapter 01* under *Fundamentals of Disaster Management*, disaster risk of a system is proportional to many relevant parameters of the hazard to which the system is exposed and internal vulnerable conditions of the system. Genuine risk assessment addresses physical, material, technological, social-economical, socio-political, organizational, motivational as well as environmental issues related to the system as well as the community. Because, all these factors have significant role in enhancing or reducing the disaster risk of the system.

Risk factors of different locations of a specific hazard prone area may vary with location specific characteristics of the hazard; vulnerability or unsafe conditions associated with the locations and communities; and capacity of the community to prevent, mitigate or cope with disaster. So, a specific disaster management plan may not be suitable for all the vulnerable locations.

Therefore, to formulate a disaster management plan for making the vulnerable communities resilient to disasters, hazard and location specific risk assessment is the mandatory task. A disaster management plan for a hazard prone area would not be effective in reducing damage and disruption, if it is prepared without proper risk assessment.

6.3.2 NEEDS ASSESSMENT

Needs assessment is a systematic method of identifying the unmet as well as future needs of the vulnerable community for making the community less susceptible to the hazards and enhance preparedness level of the community to deal with post disaster situation. It also helps in measuring the extent and nature of needs of a particular vulnerable community in terms of resources, means and strength.

As discussed earlier, needs assessment has close interactions with pre disaster risk assessment and post disaster damage assessment. Needs of a community to resist a hazard or cope with the impacts of the hazard depends on the nature of threats as well as capacity of the community. Needs of vulnerable community also depends on the extent of community's susceptibility to the hazard. So, needs assessment is the most important aspect of planning for capacity building for making the vulnerable community less susceptible to hazards or resilient to disasters.

Similarly, post-disaster needs assessment in terms of physical, economical and environmental factors is essential for rapid and effective recovery process.

Therefore, needs assessment is the integral part of a disaster management plan. Without proper needs assessment, we can not develop suitable resources, means and strength for risk mitigation, preparedness, emergency response and recovery.

6.3.3 LOSS ASSESSMENT

A disaster may lead to loss of life, damage of infrastructure and facilities, disturbances in ecosystem, environmental problems and many negative consequences on our socio-economic factors, health, psychology, production, livelihood opportunity etc. There may be primary and

secondary losses. A disaster may have many secondary or a chain of affects on our systems and community.

Loss assessment is a method of either assessing probability of damage in a system due to a probable threat before the occurrence of disaster or estimating the actual loss in a post disaster condition. Assessment of the magnitude of probable damage and disruption in a system under the impact of a hazard gives us scope to assess our needs and develop capacity accordingly to mitigate damage and disruption. Similarly, assessment of actual losses due to a disaster in terms of all the components mentioned above is necessary to respond accordingly for regaining or recovering the losses.

Post disaster loss assessment is the indicator for post disaster needs assessment. So, scopes for genuine estimation of probable losses based on risk and capacity assessment before disaster as well as actual losses after disaster should be part of disaster management plan.

6.4 APPROACHES OF RISK AND NEEDS ASSESSMENTS

To understand the approaches of risk and needs assessment and relationship between these two, let us take one example of risk assessment.

Consider a multi-hazard prone district, say X. The district is in high seismic zone and many parts of the district are prone to flood hazard. For our sample study, let us divide the district in few sectors like locations A, B, C, D etc. We have to determine the risk factors of these sectors for flood and earthquake hazards.

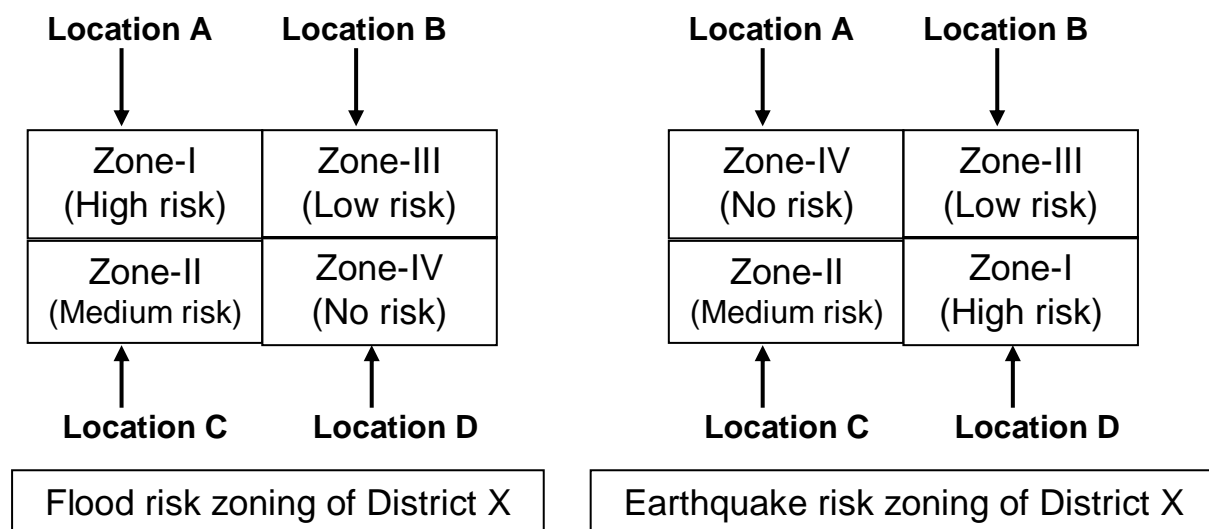


Fig. 6.1 Example of flood and earthquake zoning

Suppose, for flood hazard, location A has high risk, location B has low risk, location C has medium risk and location D is risk free. For same area, location D has high risk of earthquake damage, location C has medium risk, location B has low risk and location A is almost risk free.

The main force of flood hazard, i.e., rainfall is same all over the area (district X), but flood risk (*probability of damage and disruption*) in different locations are not same. Similarly, probability of occurrence of earthquake, *in terms of magnitude of earthquake*, in and around the area is same. But, the probability of damage and disruption in different locations (*intensity of earthquake*) of the area is not same. What may be other factors, which are the determinants of flood and earthquake risk of different locations?

If we consider the case of flood hazard, the determinant factors of flood risk may be

- ✓ The frequency of inundation, i.e., how many times in a year flood hazard strikes a particular location.
- ✓ The magnitude of inundation, i.e., flood level or level of inundation, which is related to volume of water entered in the location.
- ✓ Duration of inundation, i.e., how long flood water stays in a particular location.

All the three factors mentioned above are related to hazard characteristics and other spatial factors of the area like altitude, river network etc. The other factors may be

- ✓ Whether there is any early warning mechanism for flood hazard.
- ✓ Settlement pattern and developmental activities in the area.
- ✓ Existing flood resistant devices in the area and their status in terms of sustainability.
- ✓ Preparedness level of the community living in the area, including the alternative adjustment processes.
- ✓ Counter disaster resources available.
- ✓ Socio-economic condition of the community etc.

The factors mentioned above are related to vulnerability profile of the location/community and capacity of the community.

For earthquake, hazard characteristics are same for all the locations. In case of an earthquake, the magnitude and duration of earthquake will be same for all the locations. Frequency of earthquake is random and can not be determined in advance. So, we have very little to do with earthquake hazard itself. In this case, the locational and community vulnerability factors play major role in magnitude of damage and disruption. Hence, along with probability of occurrence of earthquake (pre determined), the vulnerability factors are to be analyzed for determination of earthquake risk in a particular location. The vulnerability factors may be related to

- ✓ Spatial characteristics of the entire area.
- ✓ Soil quality of the location.
- ✓ Developmental activities and settlement pattern in the location.
- ✓ Preparedness level of the community.
- ✓ Status of counter disaster resources.
- ✓ Socio-economic conditions of the community etc.

So the basic parameters, which we need to study for determination of risk factors of a particular location are

- ✓ Location specific hazard characteristics, which included the force, frequency, magnitude, duration etc. of a hazard.
- ✓ Vulnerability factors of the locality as well as the community living in the locality.
- ✓ Capacity of the community as well as counter disaster resources, in terms of resources, means and strength. Capacity also included preparedness level of the community.

Based on genuine assessment of hazard, vulnerability and capacity; we can determine the hazard specific risk factors of different locations. For this, we have to determine the risk factors of every components separately based on their status of risk, i.e., high, medium, low etc. and weightage.

In **figure 6.1**, intentionally we have categorized the **location A** as zone-I in flood risk zoning and zone-IV in earthquake risk zoning. It means, in location A, probability of damage and disruption due to flood hazard is very high and due to earthquake is negligible. Similarly, location C is categorized as zone-II for both the flood and earthquake hazards. In location C, probability of damage and disruption due to flood and earthquake is medium. Generally, it happens everywhere. Let us discuss briefly the reasons behind these.

Damage and disruptions due to earthquake are mainly related to magnitude of earthquake as well as unplanned and haphazard structural developments and other unsafe conditions in the locality. Planners of cities and mega cities always consider the hazard zoning maps as foundation for preparation of master plans. Obviously, they do not recommend any flood prone areas for town or city. Though, there are codes and norms for earthquake resistant developmental activities including safety and security, but, in most of the cities these are not properly implemented. Moreover, population explosion is also contributing to unsafe conditions for earthquake damage in urban areas. So, most of the cities and mega cities in high seismic zone have high risk of earthquake damage. Simultaneously, frequent occurrence of flash floods in urban areas is related to the violation of master plans and haphazard developmental activities. But, most of the times, these flash floods do not cause severe damage to life and property.

On the other hand, majority people live in high flood prone areas under compulsion due to their poor socio-economic condition and alternative livelihood opportunity. Generally, they do not build an environment, which is susceptible to earthquake hazard. But, they may have the risk of earthquake induced flood, depending on spatial characteristics of their locality. Failure or absence of flood resistant devices and lack of preparedness of the community for timely response are mainly responsible for large-scale damage and disruption in high flood prone areas. Semi urban areas, which do not have proper master plan, may have both flood and earthquake risk factors due to haphazard and unsustainable developmental activities.

Needs assessment is essential for estimation of required resources, means and strength of the vulnerable community as well as disaster management agencies to deal with a disaster situation. Needs of the community and disaster management agencies depend on the nature and magnitude of damage and disruption caused by hazards. Damage characteristics of different hazards are different. Magnitude of damage and disruption is also dependent on vulnerability factors and existing capacity of the community and disaster management agencies. So, risk assessment is the integral part of needs assessment.

The needs assessment mechanism includes

- ✓ Identification of actual needs of a particular community and disaster management agencies to deal with a particular hazard induced disaster.
- ✓ Determination of existing capacity of the community and disaster management agencies capable to deal with the disaster.

The following issues to be addressed properly for genuine needs assessment

- Identification of actual problems associated with the vulnerable community.
- Determination of nature and size of the problem areas.
- Identification of needs to deal with the problem areas.
 - ✓ By asking the vulnerable community.
 - ✓ By consulting professionals and other stakeholders.
 - ✓ By reviewing scientific knowledge.
- Selection of useful and cost effective measures for solution of the problems. Many times, it may not be possible for government to fulfil the needs of the community and disaster management agencies as per their requirements.
- Plan for implementation of the needs.
- Resource implications and outcome of the plan.

Needs assessment also includes the post disaster needs for recovery and reconstruction. Post disaster needs assessment requires analysis of the actual loss and damage to our physical elements, economy and environmental factors due to a disaster. And then, identification of required resources, means and strength for reconstruction of the physical structures and recovery of the natural environment, which is suitable for survival of the living elements.

6.5 CATEGORIES OF LOSS ASSESSMENT

6.5.1 WHY WE NEED LOSS ASSESSMENT?

Assessment of economic, social and environmental losses in a system due to disasters is related to the probable or actual magnitude of damage and disruption in the system. So, damage assessment is the indicator of loss assessment. Loss assessment may be hypothetical or actual.

Loss assessment is integral part of disaster management planning. Advance assessment of probable losses due to damage and disruption in a particular system, in the event of a disaster, helps the planners and decision makers to plan accordingly for mitigation of disaster risk. Similarly post-disaster loss assessment, in terms of economical, social and environmental losses, is essential to take immediate measures for recovery of the situation and make plan for mitigation of affects of future disasters.

In brief, we can underline the importance of loss assessment as mentioned below

- ✓ It gives us idea about probable losses in a particular system prior to occurrence of a disaster and respond accordingly to mitigate the damage and disruption. This can be achieved by doing genuine risk and capacity assessments of the system. In this case, government and non-governmental organizations as well as community members can take part in the process of assessment, planning and implementation of plan for damage mitigation.
- ✓ Post disaster damage assessment facilitates us to estimate the actual economic, social and environmental losses and plan accordingly for recovery of these losses. The government disaster management agencies have major role in this process. Community members and non-governmental organizations can play the role of facilitators.

Determination of **Annual Average Damage (AAD)** is essential for estimation of annual average loss assessment. Determination of hypothetical or actual AAD for different hazard prone areas is required for

- cost-benefit analysis of the existing damage mitigation plans;
- finding out the alternative mitigation strategies, in case the existing mitigation strategies are not efficient and cost-effective;
- setting up the priorities of works for loss mitigation in different areas on risk factors and relative weightage of AAD of these areas.

6.5.2 CATEGORIES OF LOSS ANALYSIS

We can carry out two kinds of loss analysis.

Event loss analysis: The loss associated with the damage and disruption of a particular disaster. This helps us to make cost benefit analysis of damage mitigation plan relevant to a particular disaster. For example, one embankment is constructed to mitigate flood damage in a particular area. The area has to face severe damage and disruption due to breaching of the embankment resulting in severe economic, social and environmental losses. In this case, the investment made for preventing flood hazard become a futile exercise. Rather, it enhances the magnitude of damage and disruption in the area. The cost benefit analysis of the investment for damage mitigation can be achieved from the event loss analysis, i.e., form the benefits of the mitigation measures for which the investment was made. If the existing hazard resistant devices are not useful and cost-effective, alternative mitigation strategies should be drawn-up, which will be capable to resist hazard and mitigate damage.

Annual Average Damage (AAD): We can estimate probable or actual Annual Average Loss (AAL) form AADs caused by all the disasters over the years. Analysis of hypothetical or actual AAD is more important than *event loss analysis* for doing the cost-benefit analysis of

mitigation plans. Because, a particular type of disaster may not repeat for the second time in a year and it is always difficult to predict about the future events, mainly in case of natural hazards. From risk analysis of a particular location, we can assess the nature and impacts of probable hazards to the location, and also the vulnerable conditions of the locations. Simultaneously, valuable inputs about counter disaster resources and damage mitigation strategies for the location may be obtained from capacity assessment. From risk and capacity analysis, we can estimate the hypothetical AAD or AAL for the location. On the other hand, actual annual average loss can be estimated from the past records of actual annual damages for few years.

To calculate event loss or annual average loss, we must understand the damage components.

There may be two kinds of losses.

Direct loss, which is related to the damages due to direct interactions with the hazards. For example, any natural and man-made hazard may cause direct damage to our life, infrastructure, facilities, communication system, crops, forest, production industries, hazard resistant devices, etc. These are the visible living and physical elements of our system and can be identified easily.

Indirect loss, which may be caused by the hazard induced disaster but not form direct interaction with hazards. For example, damage to a bridge may cause communication disruption for the community not directly affected by the disaster; huge volume of sand deposition in fertile agricultural land by the flood may result loss of production; industrial disaster may cause long standing pollution and health related problems; earthquake damage may lead to psychological problems in the community; disasters may create insecurity in livelihood opportunity; etc.

Moreover, some elements of our systems can be brought, sold and judged monetarily. As such, a building, a bridge, crop in a particular area, an industry and many physical components have certain value in terms of money. We can make loss assessment directly for these elements.

Some elements are there in our systems, the values of which can not be measured in terms of money. But, these may have significant contribution in total disaster loss, mainly in social and environmental loss. For examples, we can not measure the loss of human life in terms of money; there is no specific indicator to measure the loss of production, livelihood etc. in terms of money; no specific method is in place to measure the economic loss due to pollution etc.

So, both the direct and indirect losses have two more sub-categories

Tangible loss: This is the real economic loss due to direct or visible physical losses caused by a disaster. Tangible losses are associated with the elements having monetary values like infrastructure, facilities, crop, industries, livestock and other physical elements of our systems. To some extent, analysis of tangible loss, either hypothetical or real, is easier, because the elements of losses are visible and accessible.

Intangible loss: This is associated with the losses due to damage to the elements, which can not be judged monetarily or brought and sold. This may be related to different social and environmental factors. For example, a disaster may severely affect our livelihood opportunities, socio-economic and socio-cultural conditions, ecosystem, health etc. For which the government may need to make additional investments.

So, disaster loss analysis should be based on both tangible and intangible losses associated with the direct and indirect damages to physical, social and environmental components of our systems.

6.6 APPROACHES OF LOSS ASSESSMENT

Following basic data and information are required for pre disaster hypothetical loss assessment.

- ✓ The types and characteristics of probable hazards. Because, the damage characteristics vary with types of hazards, its frequency of occurrence in a particular area, magnitude of hazards, duration of stay means how long the hazard can exists, types of its exposures etc.
- ✓ The living and non-living elements or resources exposed to the hazards and their susceptibility to different hazards. Because, damage potentials of different hazards to a particular element are not same. As such, flood may not cause damage to a particular building, but the same building may collapse under the impact of a moderate earthquake. If a place is prone to both flood and earthquake, the cost of such buildings will have to be considered for loss assessment.
- ✓ Elements are at risk to probable hazards. Some elements, like buildings, infrastructures, facilities, production units etc. may be already in unsafe conditions and may collapse under the impact of probable hazards. These may be included directly in damage assessment.
- ✓ Information related to direct and indirect losses of probable hazards, including tangible and intangible losses. Suppose, an area is multi-hazard prone, means the area may be exposed to more than one hazard. In this case, we must find out the possible direct impacts of these hazards to different elements of the area as well as consequential affects of these hazards in post disaster situations.

We have to follow some logics or methodology for genuine collection and analysis of data for loss assessment. The steps may include

Step 1: Before starting the process of collection of data, we have to determine the purpose of the loss assessment. Why we are going to conduct loss assessment for a particular system? Whether it is pre disaster loss assessment for adopting damage mitigation strategies or post disaster loss assessment for reconstruction and recovery planning.

Suppose an area is prone to multi-hazard. The purpose of loss assessment may be for cost-benefit analysis of proposed hazard resistant devices or developing cost-effective mitigation strategies. For example, the area is prone to flood and earthquake. The purpose of loss assessment may be to prepare a scheme for construction of an embankment to protect this area from flood and carryout the cost-benefit analysis of the scheme. The process will include assessment of magnitude of probable damage due to flood hazard, calculation of corresponding economic loss due to damage, investment needed for construction of embankment and analysis of proportional benefit of the investment against the scheme.

The purpose of loss assessment may be to assess the economic loss associated with probable damage of physical elements in the area in the event of a high magnitude earthquake. This may be required for cost-benefit analysis of damage mitigation strategies like demolition and reconstruction of vulnerable structures, retrofitting of weak building, enhancement of safety measures, widening of lanes etc. So, the data acquisition process should be relevant to the purpose of loss assessment.

Step 2: Process of data collection. To finalize the process of data collection, few questions should be kept in our mind. What kind of data we need to achieve our goal, means the purpose of the loss assessment? Who will be engaged in data collection? How we will be able to collect data? Who are the stakeholders of the process? Who will analyze the data? Who will be the beneficiary of the project?

Step 3: Identification of the study area and finalization of time frame of the entire process of loss assessment. The select study area should be highly prone to one or more hazards and

there is possibility of huge damage and loss in the area in case of a disaster due to occurrence of a particular hazard. For example, an area is flood prone, but there is no valuable resource in the area. In this case, there is no need of any investment for flood resistant devices. Loss assessment for this area is also meaningless.

Another important factor is finalizing the time frame of the assessment. The process of loss assessment should be completed within a certain period to facilitate the planners to formulate and implement the damage mitigation strategies before next disaster.

The time frame for post disaster needs assessment by conducting post disaster damage and loss assessments should be very short for timely preparation and implementation of the recovery plans.

Step 4: The type of assessment we are looking for. Whether it is pre disaster hypothetical loss assessment or post disaster needs assessment of a disaster-affected area based on actual damage assessment. The type of assessment is also related to the purpose of the loss assessment.

Step 5: Information about hazards and their assessments. The magnitude of damage and quantity of loss in a particular hazard prone area is directly proportional to frequency, magnitude, duration and other characteristics of the hazard. So, for genuine loss assessment in a particular vulnerable area, information related to probable hazards and their damage potentials to different living and physical elements is essential. As such, flood can cause damage to certain elements of a system like crop, animal etc., but earthquake can not do much harm to these elements. The loss assessment should be hazard specific.

Step 6: Identification of the elements (physical and living) in the system, which are at risk, and susceptibility of these elements to different hazards. As mentioned in step 5, the damage potentials of all the hazards to their exposures are not same. Moreover, some elements in the system may be unsafe and vulnerable to different hazards. For example, a weak building may collapse due to a moderate earthquake, while all other buildings may remain unaffected. So, for genuine risk assessment, it is essential to identify the elements, especially physical and living elements, which are not safe against probable hazards.

Step 7: As we discussed earlier, total loss in a system due to a disaster includes both tangible and intangible losses. Therefore, for proper loss assessment, it is necessary to determine the probability of direct and indirect losses including tangible and intangible losses. Based on expected threats in our system, we can predetermine the direct impacts of the hazards, means nature of damage, in our system and consequential affects of the disaster to socio-economic, socio-cultural, health and environmental factors.

Step 8: Assessment of total loss. This can be obtained by summarizing the unit losses means the financial loss associated with individual elements. In assessing total loss, we may face some problems in analyzing the intangible losses, which can not simply be judged monetarily. In this case, we may consider the approximate value of investments to be required for recovery of intangible losses.

Step 9: The total expected or actual loss may be beyond the limit of burglary provision for damage mitigation and recovery plans. In this case, only potential losses associated with the damage of essential elements of our system, which are also unavoidable, may be considered for damage mitigation and recovery plans.

Step 10: To prepare a comprehensive disaster management plan, we may need to assess the hypothetical or actual *Annual Average Loss (AAL)* based on *Annual Average Damage (AAD)* for all the hazards. A hazard specific damage and subsequent loss assessment may not be a good index for allocation of the annual budget for risk mitigation, emergency management and recovery process.

Step 11: Cost benefit analysis of the risk mitigation projects. While planning for risk mitigation projects, it must be ensured that, the investments related to damage mitigation or

hazard resistant projects should give proportional benefits to the vulnerable communities. So, the cost of risk mitigation projects should be determined based on assessment of total expected loss due to different hazards and expected benefits of the project.

Step 12: Preparation of loss assessment report for a particular area, based on assessments of different agencies, and presentation of the report in right platforms.

6.7 WHAT WE LEARNT FROM THIS UNIT?

Assessment of needs for capacity building has close links with risk and damage assessments. Risk assessment determines the probability of harmful consequences of natural or man-made hazards to a system. Loss assessment of a system, based pre disaster risk assessment or post disaster actual damage assessment, gives us idea about hypothetical or actual economic loss associated with the hazards or disasters.

Needs assessment is a systematic method of identifying the **unmet** as well as future needs of the vulnerable community for making the community less susceptible to the hazards. Needs assessment is essential for estimation of required resources, means and strength of the vulnerable community as well as disaster management agencies to deal with a disaster situation. The needs assessment mechanism includes (i) identification of actual needs of a particular community and disaster management agencies to deal with a particular hazard induced disaster; (ii) determination of existing capacity of the community and disaster management agencies capable to deal with the disaster.

Loss assessment can be done by considering event loss or Annual Average Loss. To calculate event loss or annual average loss, we must consider the damage components related to direct and indirect losses. Analysis of total economic loss must include both tangible and intangible losses. There are some standard procedures for loss assessment. We must follow a standard method for genuine loss assessment. The common process of loss assessment starts with finalizing the purpose of assessment and ends with preparation of assessment report. The method also includes careful selection of study area, determination of type of assessment, types of data and information required, technique of data collection, analysis of loss, cost-benefit analysis etc.

6.8 PROBABLE QUESTIONS

1. What do you mean by needs assessment?
2. Mention the importance of needs assessment.
3. What do you mean by loss assessment?
4. Is there any relationship between damage and needs assessment? If yes, how?
5. What factors to be considered for genuine needs assessment?
6. Define tangible loss.
7. What do you mean by event loss?
8. How we can estimate annual average loss?
9. Give few examples of intangible losses.
10. Write down the common steps of loss assessment.

6.9 SUGGESTED READINGS

1. *Disaster Loss Assessment Guidelines*, Australian Emergency Manuals Series, Part III, 2002.
2. *Post Disaster Damage and Need Analysis*, ADPC, Bangkok, 2000.
3. *Review of Post Disaster Needs Assessment and Methodologies*, UNDP, IPR, 2007.

DEM 203: PLANNING FOR RISK AND CRISIS MITIGATION

UNIT-7: URBAN, VILLAGE AND SCHOOL DM PLAN

UNIT STRUCTURE

7.1 INTRODUCTION

7.2 OBJECTIVES

7.3 NEEDS OF URBAN, VILLAGE AND SCHOOL DISASTER MANAGEMENT PLANS

7.4 PREPARATION OF SCHOOL, VILLAGE AND URBAN DM PLANS

7.4.1 SCHOOL DISASTER MANAGEMENT PLAN

7.4.2 VILLAGE DISASTER MANAGEMENT PLAN

7.4.3 URBAN DISASTER MANAGEMENT PLAN

7.5 COMMON FLOOD MITIGATION PRACTICES

7.6 GENERAL GUIDELINES FOR EARTHQUAKE RESISTANT DESIGNS

7.7 WHAT WE LEARNT FROM THIS UNIT?

7.8 PROBABLE QUESTIONS

7.9 SUGGESTED READINGS

7.1 INTRODUCTION

In the chapter-5 under *Fundamentals of Disaster Management*, we have discussed in detail about different aspects of disaster management, including pre disaster risk mitigation and post disaster emergency response and recovery. Other chapters of *Fundamentals of Disaster Management* covered the issues related to the parameters associated with disaster management planning and their assessment procedures. Different approaches of hazard, vulnerability and capacity assessments are discussed in chapters 2, 3 and 6.

Detail about planning strategies, planning needs and emergency actions are discussed in chapters 2 and 3 under *planning for risk and crisis management*. The criteria, guiding principles and suggested outline for preparation of State and District Disaster Management Plans are highlighted in chapter 4 of this course. Planning for disaster management at micro levels is more important for adopting genuine damage mitigation measures and effective emergency response.

In this chapter, we shall discuss the importance and methods of micro level planning especially planning for urban areas, villages and schools. Common issues and concerns relevant to urban, village and school disaster management plans will also be highlighted in this chapter.

7.2 OBJECTIVES

The major objectives of this chapter are

- To discuss about the importance of micro-level planning, mainly for cities, villages and schools.
- To highlight the issues and approaches of urban, village and school disaster management planning.
- To describe the common damage mitigation practices relevant to flood and earthquake hazards.

7.3 NEEDS OF URBAN, VILLAGE AND SCHOOL DISASTER MANAGEMENT PLANS

The main aim of any disaster management plan is to address the issues related to threats and vulnerability of a system and suggest the ways to prevent hazards, mitigate damage, prepare the vulnerable community for coping with disasters as well as emergency response and recovery.

The damage potential of natural and man-made hazards depends on the status of exposures and overall environment of the systems. The hazard characteristics and vulnerability factors of different systems may not be same. Hence, **macro** level disaster management plan, without addressing the risk factors of **micro** level systems, may not be suitable for risk mitigation and emergency response.

The different aspects of disaster management, which should be properly addressed in a disaster management plan, are

- Prevention of external hazards by hazard resistant devices or techniques. A particular hazard resistant device may not be able to resist all types of hazards. For example, an embankment can resist flood hazard but not cyclone, fire, landslide etc.
- Damage mitigation by eliminating or reducing internal vulnerability factors, i.e., unsafe conditions of the system. Vulnerability factors or unsafe conditions of a system are dependent on status of individual elements or components (physical and living) of the system. To reduce vulnerability of the system, we have to make the individual elements of the system safe and resilient against hazards.
- Preparedness of the vulnerable community for coping with disasters. This is largely dependent on the socio-economic and socio-cultural conditions of the community living in the system.
- Capacity building of the community as well as disaster management agencies for emergency response and recovery. This is dependent on threats and vulnerability of the system.

So, the characteristics of local environment involving physical and living elements, threats, status of the risk of individual elements, available counter disaster resources, socio-economic and socio-cultural conditions of the community etc. of a system play vital role in planning for disaster management.

Now if we consider three different types of systems, a city, a village and a school. These are the part of a macro system like a district or a state. A school may be considered as an element or a component of a micro system like city or village. For risk reduction of a macro systems like a district, we must have plan to reduce the risk factors of its micro systems like cities and villages. To reduce the disaster risk of a city or village, there must be plan to make its components like a school safe and sustainable.

Question is that, why we need to have separate disaster management plans for schools, villages and cities. Because, the local environment, threats, vulnerability, dynamic pressures and root causes of all the problems in cities, villages and schools are not same.

A school may have following determinant factors of disaster risk

- ✓ Natural threats or hazards like flood, earthquake, landslide, cyclone etc. These are location specific hazards and may be same for villages and schools.
- ✓ Man-made threats like fire, hazardous chemical, radioactive and toxic substances etc.
- ✓ Environmental and health hazards due to poor sanitation facility, contamination of drinking water, poor state of ventilation etc.
- ✓ Unsafe conditions related to space, building, fittings and fixtures, classroom arrangement, laboratory set-up, exit points, electricity etc.
- ✓ Dynamic pressures due to political interference, poor financial state, negligence of government in developing required infrastructure and facilities etc.
- ✓ Static elements like buildings, furniture, equipments etc.
- ✓ Dynamic elements like students, teachers and staff.

The determinant factors of disaster risk of a village may be

- ✓ Natural hazards, as applicable for the individual elements of the village like a school.
- ✓ Man-made threats like fire, civil unrest, technological faults associated with hazard resistant devices etc.
- ✓ Environmental and health hazards are related to sanitation and drinking water facilities, sewage system, garbage disposal, lifestyle of the community etc.
- ✓ Physical vulnerability related to land use and settlement pattern, infrastructure and facilities, river network, hazard resistant devices, agriculture, production etc.
- ✓ Social vulnerability related to socio-economic, socio-cultural and socio-political conditions of the community; livelihood opportunity; adjustment processes etc..
- ✓ Motivational vulnerability related to attitude, belief, fighting spirit, awareness etc.
- ✓ Dynamic pressure related to poverty, livelihood, migration, government support mechanisms, conservation of forest etc.
- ✓ There may be some root causes of these vulnerability and dynamic pressures like poor leadership and lack of social representation in government systems, violation of land use regulations, misuse of natural resources etc.
- ✓ The dimension of static and dynamic elements in a village is bigger than a school.

The determinant factors of risk of a city or urban area may not be same to a village.

- ✓ The natural threats are location specific and hence dependent on hazard zoning.
- ✓ Man-made hazards are mainly related to haphazard and unsustainable structural developments including road and drainage network, depletion of ground water table, production industry, accidental fire, civil unrest, road accident, electricity etc.
- ✓ Environmental and health hazards are related to pollution, sanitation and sewage systems, garbage disposal, water supply, biological and radiation hazards etc.
- ✓ Physical vulnerability may be related to overcrowded and unsafe buildings and infrastructures, vertical development, poor drainage network, narrow roads and lanes, poor state of basic facilities and counter disaster resources, misuse of water bodies, human settlement in hazard prone locations, poor state of road safety measures etc.
- ✓ Social vulnerability may be related to large-scale migration, economic polarization, unequal participation of community members in damage mitigation activities, self-centeredness, socio-cultural degradation, profit-centric activities of NGOs and CBOs, political interference in developmental activities etc.
- ✓ Motivational vulnerability factors are obviously related to negative attitude of the people towards safe and sustainable development.
- ✓ Dynamic pressures are related to overpopulation, unemployment and insecure livelihood opportunities, violation of land use planning, corrupt practices, environmental degradation etc.
- ✓ The root causes of all these problems may be lack of proper master plan or violation of master plan, violation of land use regulation, violation of hazard resistant codes and norms, ineffective government planning and regulatory bodies etc.

From the above discussion, it is clear that, the determinant factors of disaster risk of a city, a village and a school are not exactly same. Hence, the approaches of disaster risk mitigation and emergency response for these systems should be different.

7.4 PREPARATION OF SCHOOL, VILLAGE AND URBAN DM PLANS

The hazard and vulnerability characteristics of schools, villages and urban areas are quite different. The environment of urban areas and its vulnerability factors are much complex than

a village or school. In section 7.3, we have briefly discussed about the possible threats, vulnerability and elements at risk for school, village and urban area. Now, we shall highlight the major issues related to school, village and urban disaster management plans.

7.4.1 SCHOOL DISASTER MANAGEMENT PLAN

The preparation of a school disaster management plan broadly covers the following issues.

- Sensitization meeting of all the stakeholders of the school, like principal, teachers, administrative staff, student representatives, parents, representatives of local NGOs and CBOs etc. The school can invite few experts and representatives of disaster management agencies. This is the first step of formulation of the plan and necessary to discuss about, potential threats of the school, needs of a disaster management plan, how to make a plan, who should be involved in preparation of the plan etc.
- Formation of School Disaster Management Committee having different wings like coordination committee, awareness committee, response group etc. mentioning their roles and responsibility in preparation and implementation of the plan. The School Disaster Management Committee may comprise
 - ✓ Principal or Head Master as chairperson
 - ✓ Vice-Principal and heads of all sections of the school.
 - ✓ Local controlling officer of the school.
 - ✓ Few parents.
 - ✓ Few students having skills and organizational capacity for cooperation, awareness and emergency response.
 - ✓ Representatives from local disaster management agencies like police, fire service, civil defence, health department etc. as well as corporate sector, NGO, CBO etc.
- Preparation of plan covering
 - ✓ Potential hazards or threats are associated with the location and other components of the school. A school may be located in flood and earthquake prone area. Whether the school is in high land or what is the probability of inundation. Whether the school building is resilient to flood and earthquake hazards. Whether the communication network like road is safe from flood hazard. Whether there are any threats of fire, landslide etc.
 - ✓ Unsafe conditions with the structure and different elements of the school. For examples, the school building is in flood-affected location. The building may not be earthquake hazard resistant. Lack of safety measures for hazardous substances in the laboratories. Exit points are not safe and cluttered with debris. No fire extinguishers are there in the laboratories and close to fire sources. No power back up system exists. Possibilities of electrical short-circuit. Arrangement of fittings and fixtures are not safe. And other likely factors, which may enhance the risk of the school.
 - ✓ A sketch of the school showing master plan of the school, building plan, all the class rooms and laboratories, vulnerable class rooms and laboratories, evacuation routes, emergency exits safe places for taking shelter, fire extinguisher and electrical installations, drinking water points etc. should be included in the plan.
 - ✓ Resource inventory including list of human resources like skilled students and students; list of material resources like fire extinguishers, stretchers, ropes, ladder, first-aid, tools, communication system, battery operated power and communication systems, staff room, class rooms; laboratories; etc. of the school; open area and

play ground of the school; tents for temporary shelter; local counter disaster resources; local emergency response groups etc.

- ✓ Hazard and resource maps showing hazard prone locations of the area and critical resources available in the area.
- ✓ Existing safety measures for prevention of probable hazards.
- ✓ Probable risk factors.
- ✓ Damage mitigation strategies and safety measures including both structural and non-structural measures.
- ✓ Emergency response plan to deal with an untoward incident, including evacuation plan for children and handicapped students.
- ✓ Training and mock drill of the students and staff to enhance their skill in responding to an emergency situation.

Following considerations should be made in developing a school disaster management plan.

- ✓ It should be precise and mention should be made about the role and responsibility of all the students and staff of the school.
- ✓ The plan should have flexibility to function effectively, even in case of absence of any key person on the day of incident.
- ✓ It should clearly mention the measures to be taken for prevention of threats or accidents and preparedness plan for responding to any such threats.
- ✓ The plan should describe the decision-making process and incident command system of the school. These are required for genuine implementation of damage mitigation and response plans.
- ✓ The plan should prepare in consultation with all the stakeholders of the school. This is required to consider all the parameters of risk and make it understandable for students and staff of the school.
- ✓ There should be provision of educating the students, staff and parents about the plan, so that they can discharge their duties as and when required.
- ✓ To make the plan effective and workable all the times, provision should be there to review the plan once in a year. This is essential to analyze the drawbacks of the plan and review the plan according to the changing characteristics of hazards, vulnerability and other relevant parameters of risk.
- ✓ The plan should have scope for coordination with other disaster management agencies. Because, the school may not have enough resources to formulate the strategies for damage mitigation and emergency response. Moreover, during an emergency, the school will need the outside supports for emergency response.
- ✓ The plan should highlight the strengths and weaknesses of the school as well as its students and staff in dealing with probable incidents. This is essential for making the policies relevant to safety, security, resource mobilization, training, media management etc. and linking the plan with district disaster management plan.

7.4.2 VILLAGE DISASTER MANAGEMENT PLAN

The parameters of risk associated with a village are much higher than a school. To formulate effective disaster management plan for a village, provisions for proper risk assessment followed by planning for risk mitigation, emergency response and recovery should be incorporated in the plan.

A village may be located in a multi-hazard prone zone, but all the locations of the village may not be prone to all the hazards. The vulnerability of the village may be related to physical, socio-economical, socio-political, organizational, environmental factors. Disaster risk of the village is also dependent on the capacity and preparedness levels of the local community. So, to prepare a village disaster management plan, we need various kinds of data and information. Let us discuss common principles of village disaster management plan.

- The plan should have location specific information of the village like village name, Gaon Panchayat, Block, Sub-division, District, State etc.
- Year of preparation of the plan should be mentioned clearly for further review of the plan.
- Information related to population pattern, demographic characteristics and household detail of the village should be incorporated in the plan.
- Information related to spatial characteristics of the surrounding areas of the village including watershed and river network, geographical area of the village, land pattern (High land, low land, agricultural land etc.), land use pattern, cropping pattern, fresh and drinking water sources, irrigation facilities, livelihood opportunities, resource inventory (physical, human, material, counter disaster, organizational, hazard resistant devices, medical, academic, administrative, professional, financial, communication facilities, etc.), safe places for shelter, storage facilities, industries, alternative adjustment mechanism etc. should be incorporated in the plan.
- Hazard assessment by means of multi-hazard map showing hazard prone locations of the village; types of hazards and severity of hazards in these locations; settlement pattern, cropping pattern and valuable resources in the hazard prone locations etc. Information related to frequency, magnitude, duration, forewarning of the probable hazards should be mentioned in the plan.
- History of past disasters in the village including nature and sequence of occurrence of hazards and their impact on physical, living and environmental components.
- Vulnerability assessment including unsafe conditions related to location, settlement pattern, housing, infrastructure, facilities, communication system, cropping pattern, production, livelihood, environmental factors etc.
- Identifications of elements at risk, like buildings, infrastructure, communication facilities etc.
- Location and hazard specific risk analysis of the village based on hazard, vulnerability and capacity assessment. For example, some select locations of the village may be flood prone. But, the disaster risk of these locations will depend on frequency and magnitude of inundation, duration of inundation, local unsafe conditions, elements at risk and their susceptibility to different hazards, available, hazard resistant devices, preparedness of the community etc.
- Mitigation strategy should be integral part of the plan to reduce the probability of damage and disruption in the village under the influence of probable hazards. The damage mitigation measures should be relevant to the problem areas and vulnerable conditions of the village. Hence, risk assessment is essential for formulating the mitigation strategies. Mitigation strategies may be short term or long term. In both the cases, suitable structural and non-structural measures for prevention of hazards and reduction of unsafe conditions of the village; agencies responsible to implement the measures; time frame for completion of the scheme; requirement of fund and source of fund etc. should be mentioned clearly. Say for example, to minimize the magnitude of damage and disruption in a flood prone location of the village, we may need to

- ✓ Construct an embankment.
 - ✓ Relocate the population to safe locations.
 - ✓ Change the housing pattern.
 - ✓ Arrange alternative communication systems like raft, boat etc.
 - ✓ Adopt alternative agriculture.
 - ✓ Arrange safe drinking water and sanitation facilities.
 - ✓ Develop high land for emergency shelter.
 - ✓ Arrange evacuation centres with minimum basic facilities for survival.
 - ✓ Procure equipments and tools for emergency response.
 - ✓ Support the vulnerable communities financially through insurance or compensation for adopting damage mitigation measures.
 - ✓ Aware and train-up the vulnerable communities.
 - ✓ Implement the land use regulation strictly.
 - ✓ Manage watersheds for reduction of sediment influx to the rivers etc.
- Along with damage mitigation strategies, there should be emergency response plan to deal with an emergency situation. This should include the existing mechanism for rescue and safe shelter of the victims; further needs to enhance the capacity of the vulnerable community as well as disaster response forces for effective rescue and safe shelter of the victims; mechanism for smooth relief operation (procurement, safe storage and distribution of relief materials); training of the volunteers; coordination with NGOs and CBOs for rescue and relief; resource inventory and resource mobilization mechanism; role and responsibilities of response forces, disaster management agencies and community members; list of trained volunteers, NGOs, CBOs; incident command system etc.
 - Early warning mechanisms for probable hazards. This may include the mode of studying the warning signs of different hazards like flood, cyclone etc.; issue of warning for probable disasters; agencies or persons responsible for issuing warning; support requirements for early warning mechanisms etc.
 - In general, villages do not have proper medical care facilities to deal with pre and post disaster health related problems. A village disaster management plan should address the issues and concerns of health and first-aid related matters of the village. This should include nature of regular health related problems of the community (*malaria, water borne disease etc.*); post disaster hazard specific health related problems (*flood may cause water borne diseases, earthquake may lead to injury/bone fracture etc.*); existing health care facilities in and around the village; proposed scheme for development of proper health care facilities to deal with both regular and post disaster health related problems etc.
 - A disaster may cause severe damage to life and property. Disasters also create water and sanitation related problems. The plan should highlight the existing and proposed mechanisms for carcass disposal, debris removal, management of water and sanitation problems etc. in the village in the event of a disaster.
 - Damage assessment by RRA or PRA methods, involving the affected community members, is necessary to take immediate decision for rehabilitation of the affected population. A disaster may cause severe damage to household properties, crops, animals, production, livelihood opportunities etc. The affected community may not be able to bear the burden of the loss and manage basic minimum requirements for their survival. In this case, the affected community may need physical, material and

financial supports from government and non-government agencies for their rehabilitation. A village disaster management plan must address the issues relevant to damage potentials of the probable hazards, nature and magnitude of expected damage; community's capacity to mitigate the damage or cope with the situation; supports requirement from external agencies etc.

- The plan should have the provisions for training, mock drill, village contingency fund, inter village cooperation etc. for effective disaster management.
- Scopes for yearly review of the plan based on outcome of the plan is essential to make the plan more effective.

7.4.3 URBAN DISASTER MANAGEMENT PLAN

The process of identification of natural hazards for urban areas may be same as that of a village, because, natural hazards are location specific. But, the process of analysis of the impact of hazards in urban areas is much more complex than a village system. In general, the spatial characteristics and demographic pattern in a village do not change rapidly with time. But, in urban areas, these factors are dynamic in nature.

Initially, there may be a master plan for a city, defining the developmental and settlement patterns based on geographical, geological and climatic conditions as well as contour and hazard maps of the of the area; local environmental factors and natural resources; socio-cultural and socio-economic conditions; carrying capacity of the area; natural drainage facility etc. But, due to population explosion and other reasons, people violate the master plan by changing the spatial characteristics and topography of the area; destroying the natural drainage facilities and other valuable natural resources; filling-up the low lands and water bodies; vertical, haphazard and unsustainable developmental activities etc. So, vulnerability analysis for the urban areas is the most difficult task as the unsafe conditions and dynamic pressure remain changing all the times.

For example, the reasons for flood in villages and urban areas are different. Flood in a village may be due to inundation by river water or migration of water from other sources. In that case, the village must be located in low-lying flood prone area. Flood resistant devices can prevent this kind of flood.

Flash floods in urban areas occur mainly due to accumulation of rainwater. In that case, the location of the city may not be in flood prone zone. But, shrinking of open space, vertical development, lack of drainage system or barriers in drainage system, filling up of water bodies and low lying areas etc. may be the reasons of flash flood. We have very little alternatives to prevent this kind of urban flood.

Similarly, a city and a village may be located in same seismic zone. But, the probability of damage and disruption in city is much higher than the village under the impact of an earthquake. Many unsafe conditions of the urban system may even play the role of hazards. As such, a weak high-rise building may collapse in absence of earthquake. Storage of inflammable substances in densely populated area may be the cause of fire hazard. Barrier in drainage system may be the cause of flash flood.

The steps for urban disaster management plan are more or less same to that of a village. But, the method of risk assessment and planning for risk reduction, emergency response and recovery is much complex than a village disaster management plan. Let us see some general issues of urban disaster management plan.

- Any urban system has the disaster risk associated with natural hazards, human-induced natural hazards, technological hazards, environmental hazards etc. Out of which, some hazards may be location specific, but some are not. In urban risk assessment process, it is essential to cover all these hazards and study their damage potentials based on frequency of occurrence, magnitude and duration of stay in different locations. For example, the damage potential of an earthquake may not be

same for different localities of a city. The intensity of earthquake is dependent on ground vibration as well as status of structural development. Ground vibration is related with soil quality, because the earthquake waves amplify in loose or sandy soil. So, to determine the impact of probable hazards in an urban area, micro- zonation is essential.

- Vulnerability factors in urban areas are mainly related to human interference to natural environment and unsustainable development. The root causes of these vulnerability may be migration and overpopulation, lack of proper planning and legislation, ineffective planning and regulatory bodies, socio-economic and socio-political factors, lack of clear policy for industrialization in urban areas, lack of land use planning or violation of land use planning, violation of codes and norms for hazard resistant structures and safety measures etc. The prevailing and consequential unsafe conditions and their root causes should be identified for vulnerability analysis of different localities.
- Capacity assessment in terms of physical, material, human, organizational and other resources relevant to prevention of hazards and vulnerability reduction must be done carefully.
- Identification of the existing resources, which are at risk and may collapse under the impact of hazards or may not be functional during disaster, is necessary.
- Risk analysis for different localities based on hazard-vulnerability and capacity assessment should be done for risk reduction planning.
- Determination of benchmark for acceptable risk of different localities, which could be managed with existing capacity or by enhancing capacity of the disaster management agencies and community upto a certain level, is essential to decide for relocation of the vulnerable community to a safer locality.
- Integration of risk assessment in urban development planning and management process is essential for sustainable development and disaster risk mitigation.
- Damage mitigation strategies relevant to the risk assessment of different localities in terms of structural and non-structural measures should be adopted in advance to avoid large-scale damage and disruption.
- Strategies for capacity building of the disaster management agencies and vulnerable communities in terms of skilled manpower, equipment, tools etc. is necessary for effective emergency response.
- Cost- benefit analysis of various prevention and mitigation measures is necessary for budget allocation to implement these measures.
- The urban disaster management plans should be linked to district and state disaster management plans.

7.5 COMMON FLOOD MITIGATION PRACTICES

Let us first highlight the main points related to types and damage potential of floods.

- Regular seasonal floods (low and high magnitudes), which may occur within 3 – 6 months in a year and stay for few days to months, have the potential to cause damage to infrastructure, crop, livelihood, production etc. and displacement of affected population depending on their Frequency, magnitude (level of inundation), duration of stay and forewarning.
- Flash floods, which occur within short time, sometime even without any forewarning, and may stay for few hours to few days, have the potential to cause large-scale damage and disruption.

- Urban floods, which may be flash flood or regular flood depending on the locational and vulnerability characteristics of the area, have the potential to cause large-scale damage and disruption to infrastructure, facilities, services etc.
- Coastal floods, which generally occur due to cyclonic storm and stay for few days, have the potential to cause large-scale damage and disruption to all the elements of the coastal areas.
- Flood, which are related to slow onset from sustained rainfall and may occur for the period of 3-6 months in a year, have very low potential to cause damage and disruption.

The damage potentials of all the floods are dependent on water level, response time and duration of floods as well as vulnerability pattern of the area. Following common approaches may be useful to mitigate the flood damage.

- Flood zoning based on flood data of few decades in terms of nature, frequency, water level, duration, damage characteristics etc. of the floods.
- Land use planning based on flood zoning and application of land use regulations.
- Watershed management to control runoff, soil erosion and sediment influx.
- Structural measures, like embankment, dykes, adequate drainage facility etc. for prevention of flood hazard.
- Indigenous coping mechanisms developed by the vulnerable communities.
- Preparedness of the vulnerable community to mitigate flood damage and emergency response (rescue, emergency shelter, relief etc.).
- Early warning mechanisms (indigenous or scientific) to give advance warning of floods at various levels.
- Practical response plan based on needs assessment to conduct rescue and relief operations smoothly during emergency period.
- Monitoring of status of the flood resistance devices and changing characteristics of vulnerability for remedial measures.
- Planning for alternative adjustment processes, livelihood opportunities, safe drinking water, sanitation facility, health care etc.
- Incident command system for flood disaster response, strategy for horizontal and vertical coordination among different organizations.
- Awareness of vulnerable communities about their role in implementation of flood disaster risk mitigation practices.

7.6 GENERAL GUIDELINES FOR EARTHQUAKE RESISTANT DESIGNS

General principles for earthquake resistant structures are equally applicable for school, village, city and any other systems located in the seismically sensitive zones. Strict adherence of these principles helps in mitigating damage and disruption to a large extent.

- Planning, layout and design of the buildings and infrastructure, including site selection and design of foundations, should be as per standard codes of earthquake resistant structures based on seismic zoning map, soil characteristics, slope stability, geographical and geological characteristics of the area, importance of the building etc.
- Structures should be able to deflect or deform to a considerable amount without collapse under the influence of earthquakes. Design of the structures and quality of the materials used in construction have vital role in this process.

- Resisting elements of the structures like shear walls should be provided evenly, side-to-side and top-to-bottom. All elements of the structure must be tied together for transmission of earthquake forces across the connections.
- Construction of heavy structures in wet or soft soils should be avoided. Foundation of the structures should be well connected to original hard soil or rock system.
- Special safety measures for fire hazard, fittings and fixtures etc. should be taken for non-structural damage mitigation.
- During design of a building, special emphasis should be given to maintain symmetry (to avoid torsion), regularity, simplicity and isolation of the buildings within the acceptable limit and avoid overhangs, heavy mass at the top, open ground storey etc.

7.7 WHAT WE LEARNT FROM THIS UNIT?

The hazard and vulnerability characteristics of schools, villages and urban areas are quite different. The vulnerability factors of urban areas are much complex than villages and schools. Hence, there should be separate disaster management plans for schools, villages and urban areas. These plans should have links with district and state disaster management plans.

A process for preparation of school disaster management plan involves sensitization meeting of all the stakeholders; formation of School Disaster Management Committee; preparation of plan; identification of potential hazards or threats; identification of unsafe conditions within the school; resource inventory; hazard and resource mapping; risk analysis of the school; existing safety measures; damage mitigation strategies; emergency response plan; training and mock drill etc.

The village disaster management plan should include location specific information of the village; year of preparation of the plan; population pattern; demographic characteristics; household detail; spatial characteristics of the surrounding areas of the village; land use pattern, cropping pattern; water resources; irrigation facilities; livelihood opportunities; resource inventory; safe places for shelter; storage facilities; industries; alternative adjustment mechanism etc.

The village plan should have the provisions for hazard assessment; study the history of past disasters; vulnerability assessment; identifications of elements at risk, location and hazard specific risk analysis; formulation of mitigation strategy; emergency response plan; early warning mechanisms; health care facilities; carcass disposal; debris removal; management of water and sanitation problems; damage assessment; training and mock drill; yearly review of the plan.

The method of urban disaster management plan is to some extent same to that of a village disaster management plan. But, the hazard analysis for an urban area should include natural hazards, human-induced natural hazards, technological hazards, environmental hazards etc. Vulnerability factors in urban areas are mainly related to human interference to natural environment and unsustainable development. The prevailing and consequential unsafe conditions and their root causes should be identified for vulnerability analysis of different localities. In addition, capacity assessment and identification of elements at risk are essential for risk analysis of the urban areas.

The urban DM plan should also include determination of benchmark for acceptable risk; integration of risk assessment with urban development planning; damage mitigation strategies; strategies for capacity building of all the stakeholders; cost-benefit analysis of various prevention and mitigation measures etc.

7.8 PROBABLE QUESTIONS

1. What are the major aspects of disaster management plan?
2. Why we need separate plans for school, village and urban set-up?

3. Mention few determinant factors of disaster risk of a school.
4. Who should be the part of School Disaster Management Committee?
5. Write three general criteria of School Disaster Management Plan.
6. Mention few important measures for damage mitigation, relevant to a village system.
7. Mention few common hazards of urban areas.
8. What may be the reasons for urban floods? Write few points.
9. Write down few important flood mitigation practices.
10. Mention few important points of earthquake resistant design.

7.9 SUGGESTED READINGS

1. *General Concepts of Earthquake Resistant Design*, IAEE Manual, Chapter 3, 2004.
2. *Manual on Natural Disaster Management in India*, Published by NCDM, New Delhi, 2001.
3. *Flood Disasters: Learning from Previous Relief and Recovery Operations*, ProVention Consortium, ALNAP, 2008.
4. *School Disaster Management Plan*, Report of GoI-UNDP DRM Programme, 2009.

UNIT-8: COUNTER DISASTER RESOURCES AND THEIR ROLES**UNIT STRUCTURE**

8.1 INTRODUCTION

8.2 OBJECTIVES

8.3 COUNTER DISASTER RESOURCES

8.4 INTERNATIONAL RESOURCES

8.5 NATIONAL COUNTER DISASTER RESOURCES

8.5.1 GOVERNMENT COUNTER-DISASTER RESOURCES

8.5.2 NON-GOVERNMENTAL RESOURCE ORGANIZATIONS

8.5.3 ACADEMIC AND RESEARCH INSTITUTIONS

8.5.4 CORPORATE AND FINANCIAL SECTORS

8.6 WHAT WE LEARNT FROM THIS UNIT?

8.7 PROBABLE QUESTIONS

8.8 SUGGESTED READINGS

8.1 INTRODUCTION

The counter disaster resources are the resources, which are useful and essential for effective management of disasters. As we know, the complete process of disaster management involves risk management and crisis management. For which, we need to analyze the risk factors of the systems, and formulate and execute the plans for prevention of hazards, damage mitigation, preparedness to cope with disasters, emergency response and recovery.

Again, we need skilled and efficient manpower having expertise in the relevant fields of disaster management, equipments, tools, facilities, fund etc. for genuine assessment, planning and execution of the disaster management plans. Naturally, only skilled manpower without having required infrastructure, facilities and fund can not contribute significant in the process of disaster management. Hence, the organizations, which are responsible for assessment, planning and execution of the disaster management plans, are treated as counter disaster resources. These organizations may be controlled by national and state governments; international and national non-governmental agencies; autonomous academic and research institutions; corporate bodies; financial organizations etc.

So long, in different chapters under “*Fundamentals of Disaster Management*” and “*Planning for Risk and Crisis Management*”; we have discussed in detail about the concept of disaster risk and its assessment processes; parameters involved in risk assessment process; planning methodology including prevention, mitigation, preparedness, emergency response and recovery; planning needs; coping mechanism; CBDM practices; preparation of SDMA and DDMA etc.

Here, in this chapter we shall discuss about the important counter disaster resources or the concerned agencies/organizations responsible and capable to contribute in the process of disaster management and also their roles and responsibilities.

8.2 OBJECTIVES

This major objectives of this chapter are

- Identification of international and national agencies/bodies engaged in disaster management related activities.
- Status and capacities of these agencies/bodies in handling disaster management related activities.

- Roles and responsibilities of different organizations in the process of disaster management at various levels.

8.3 COUNTER DISASTER RESOURCES

Counter disaster resources are the organizations (national or international) having capacity to assess the disaster risk; prepare plan for disaster management; take appropriate and timely measures for prevention of disaster, damage mitigation, preparedness, emergency response and recovery of the situation.

The evaluation of national and international resources can be made based on

- ✓ The ability of the organizations to carry out disaster management related activities smoothly and efficiently. The capability of an organization depends on the nature of duties and responsibilities; quality of manpower; availability of required equipments, tools and facilities; financial status etc.
- ✓ Response time or availability of the resource organizations in the disaster affected area. Some organizations have the responsibility to respond immediately after disaster to carry out rescue and relief operations. At the same time, some organizations may take sometime to respond to a disaster situation. Depending on the role and responsibility of the organizations; we can identify, locate and mobilize the resource organizations.
- ✓ Durability of the resource organizations. Some organizations have the ability to carryout their designated task for long time, while some organizations may not be able to continue operations for longer period. The durability of the organizations depends on nature of duties, local environment and damage characteristics in the disaster affected area, quality of manpower, equipments, tools, facilities etc.
- ✓ Operational integrity means whether the resource organization has the ability to complete its task timely, efficiently, smoothly and without supervision form the coordinating authority.

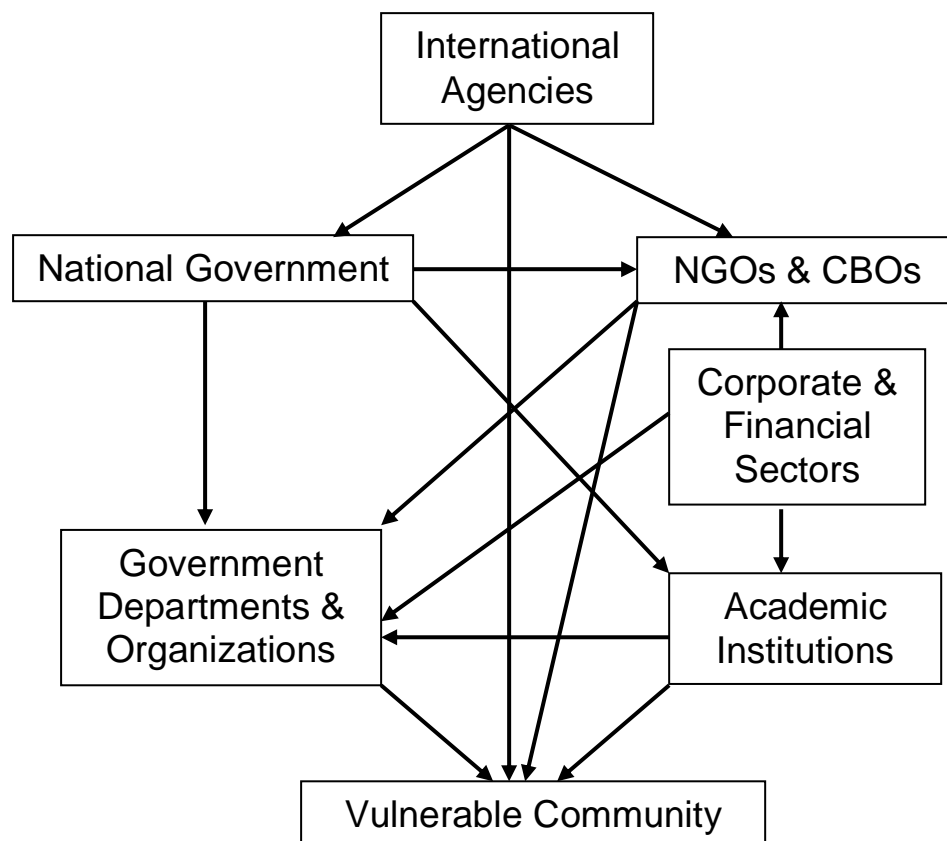


Fig.: Coordination mechanism among different resource organisations

8.4 INTERNATIONAL RESOURCES

There are many organizations, which are directly involved in international cooperation for disaster risk mitigation and effective response. These organizations are working as support systems of different national governments. The major roles and responsibilities of these international resources or organizations are

- ✓ To provide expertise and required facilities, including equipments and tools, to different countries for developing plans for disaster management and implementation of the plans in terms of prevention of hazards, damage mitigation and preparedness.
- ✓ To monitor the warning signs of potential hazards and issue the warnings for probable disasters. For example, study of warning signs of tsunami and issue the warning for possible tsunami in a region covering one or more countries, needs support from such international agencies.
- ✓ To provide physical and material supports for rescue and relief operations in the disaster affected country, on request of the national government. This may include, skilled manpower, equipment and tools for rescue of the victims; material like tents for emergency shelter; foods, medicines etc.
- ✓ To assist the national government in post disaster damage assessment, including aerial survey.
- ✓ To provide material and financial supports to national agencies for recovery of the emergency facilities; rehabilitation of the affected population; reconstruction of the houses, important buildings, infrastructures etc.; sustainable agricultural programmes etc.

The jurisdiction of international support in a country depends on the national policy for international cooperation of the country. The national government generally considers its own capacity to deal with disasters; political implications of accepting supports from certain international agencies; needs and suitability of international resources dealing with a particular disaster; bilateral or multilateral agreement with the donor agencies etc. in accepting supports from international agencies.

Let us discuss about the role of few important international agencies in the field of global disaster management activities.

United Nations Development Programme (UNDP): One of the important goals of UNDP is to provide assistance to the disaster-prone nations in contingency planning for disaster risk mitigation with special emphasis on the measures relevant to damage mitigation, prevention and preparedness.

International Organisation for Migration (IOM): Established in 1951, this agency has been dealing with the issues and concerns of refugees and internally displaced persons.

Food and Agriculture Organisation of the UN (FAO): This organisation is responsible for assessing the global food supply problems and providing early warning of future food crises.

United Nations Children's Emergency Fund (UNICEF): This agency works for the issues relevant to survival, development and protection in terms of health, education, water, sanitation, hygiene and protection.

World Food Programme (WFP): This is the principle supplier of relief aid mainly food to the disaster affected nations.

World Health Organization (WHO): The responsibility of WHO is to take effective measures for reducing the burden of disease and disability all over the world. It is also

responsible for monitoring health related problems and setting standards for health related issues.

International Federation of Red Cross and Red Crescent Societies: It is the world's largest humanitarian organization working for improvement of the status of lives of vulnerable people. It provides assistance to the disaster affected nations for health emergencies, relief activities, strengthening the capacities of national agencies to carry out disaster management related activities.

International Committee of the Red Cross (ICRC): It is the member of the International Red Cross and Red Crescent Society. It provides physical rehabilitation and upgrades professionalism in humanitarian assistance programmes.

Other leading international organisations, which are actively associated with the global disaster management programmes,

- Office for the Coordination of Humanitarian Affairs (OCHA)
- Office of United Nations High Commissioner for Human Rights (OHCHR)
- United Nations High Commission for Refugees (UNHCR)
- CARE International
- Handicap International
- Health Volunteers Overseas (HVO)
- IMA World Health
- International Rescue Committee (IRC)
- Médecins Sans Frontières (MSF)
- Oxfam
- Rehabilitation International (RI)

8.5 NATIONAL COUNTER DISASTER RESOURCES

The national counter disaster resources include central and state government ministries dealing with disaster management related activities; disaster management authorities; concerned line departments, sections and organizations under central and state governments; corporate sector; financial sector; academic institutions etc.

The major responsibilities of different national counter disaster resources are

- ✓ To formulate legislation and guidelines for effective management of disasters within the country.
- ✓ Preparation of disaster management plans at various levels, national to community levels.
- ✓ Hazard and location specific disaster risk assessment of the country through Hazard-Vulnerability-Capacity analysis of different hazard prone areas.
- ✓ To take appropriate measures, including capacity building of the DM agencies and vulnerable communities, for prevention of hazards, mitigation of impact of the hazards by reducing vulnerability factors of the hazard prone areas, preparedness to mitigate damage and cope with disasters, emergency response including rescue and relief operations etc.
- ✓ To prepare and implement rehabilitation and recovery plans based on damage and needs assessments.
- ✓ To provide material and financial supports/compensation to the vulnerable/affected communities for adopting risk mitigation measures and sustainable development.

- ✓ To carry out research work and case studies for development of suitable technology and technology transfer relevant to damage mitigation and emergency response.
- ✓ To educate and aware vulnerable communities about disaster risk and risk mitigation measures.
- ✓ To deal with the health related problems including water and sanitation.
- ✓ To develop and adopt early warning mechanisms for different natural hazards for mitigating disaster loss.
- ✓ Documentations of the disaster events to analyze the effectiveness of the existing DM plans and hazard resistance devices. This is essential for reviewing the disaster management plans based on ground reality.
- ✓ To maintain coordination and cooperation amongst different national and international counter disaster agencies.
- ✓ To deal with all other issues relevant to different aspects of disaster management of the country.

8.5.1 GOVERNMENT COUNTER-DISASTER RESOURCES

In India, the Disaster Management Act 2005 has defined the legal-organizational framework to carry out disaster management related activities at various levels. The roles and responsibilities of different agencies are also briefly defined in this Act. At the same time, the National Policy for Disaster Management covers the operational guidelines for national resource organizations. In chapter 01 under *Planning for Risk and Crisis Management*, we have discussed in detail about the roles and responsibilities of Nodal Ministries, Disaster Management Authorities, Advisory Committees, Executive Committees, National Disaster Response Force, NIDM etc. Let us discuss the roles and responsibilities of some other important government organizations/departments.

Police: The state police departments have great role in preventing offences, providing security to affected population and maintaining law and order in the disaster affected areas. The state police departments have many advantages in helping the disaster-affected communities on first call. State police departments have wide network, connecting most of the villages. The departments are well equipped with reliable communication systems and other facilities. Police personnel are generally trained to face the tough situations and familiar with geographical conditions of the localities. Most importantly, they are familiar with the socio-cultural, socio-political and socio-economic conditions of the vulnerable communities. The state government may constitute State Disaster Response Force (SDRF) with trained and skilled police personnel for emergency response operations during disasters. One of the important mandates of NDMA is to enhance the training facilities of SDRF to upgrade the skill and know-how of the personnel for rapid search and rescue operation, medical first response etc.

Army and paramilitary forces: The armed forces play important role in disaster management, especially during and after disaster. Armed forces are well equipped with trained and skilled manpower, specialized equipment and tools, modern communication and transport facilities etc. Generally the armed forces take part in evacuation, rescue, arrangement of essential services, distribution of relief materials and other essential supplies to disaster affected areas, quick recovery of essential facilities including communication facility, management of relief camps, medical aid etc.

The paramilitary forces (BSF, CRPF, CISF, ITBP, RPF, NSG, RAF, Territorial Army, Assam Rifles, Coast Guard etc.) are directly under the control of Government of India. The state governments need to have clearance from concerned ministry of central government to utilize the services of army and paramilitary forces in a crisis or emergency situation, if the situation is beyond control of state disaster resources. More importantly, in extreme emergency, only

the District Collector / Commissioners have the authority to requisition the support of army and paramilitary forces on a written request.

Similarly, the Air Force has a great role in resource mobilization including transportation of response forces; aerial survey of damage and disruption in disaster affected areas; rescue of marooned people, air dropping of relief materials etc.

Civil Defence: Most of the States and Union Territories in India have Civil Defence services. Civil Defence activities are primarily based on voluntary services by trained volunteers. The volunteers are trained by Deputy Controllers, Medical Offices and Civil Defence Instructors. The district administration generally takes the help of Civil Defence volunteers in rescue and relief operations during emergency period.

The jurisdiction of Civil Defence spread over Headquarter Service, Warden Service, Communication Service, Casualty Service, Fire Fighting Service, Rescue Service, Welfare Service, Salvage Service, Corpse Disposal Service, Depot & Transport Service, Training Service, Supply Service. The Civil Defence is well equipped with reliable telecommunication facilities, VHS sets, HF Radio, electronic solid state APP Equipment (EARP), Wireless Controlled ARP (W-ARP), Centres Control of Sirens (CCS) etc.

Fire services: The fire services, presently known as Fire and Emergency Services in India, are directly involved in pre disaster risk mitigation and emergency response activities especially rescue operation. The Disaster Management Act 2005 designated the Department of Fire Services as one of the most important counter disaster resources to deal with the issues relevant to natural and man-made disasters. The fire services are responsible to assist the planners to plan for *fire prevention* in the buildings and infrastructure, in terms of location, approach road, surrounding activities, storage of hazardous material and other fire safety measures, and also monitor the implementation of the plan. Another responsibility of Fire Services is *Fire Protection*, by means of alerting the occupants of the buildings about existing threats of fire and educating them about emergency fire fighting measures like smoke detection and fire alarm systems, fire extinguisher, water storage tanks with pumping arrangements etc. The personnel of fire services are also involved in conducting mock drills. For all these activities, it is extremely important to enhance the capacity of the fire services in terms of skilled manpower, equipment, tools, transport and other required facilities.

Department of Agriculture: Food is the most essential item for our survival. Natural disasters like flood, drought, cyclone etc. cause maximum damage to existing crop and crop production resulting in scarcity of food. So, department of agriculture has important role to play for undertaking survey for risk assessment of crop damage and adopting sustainable agricultural programmes at vulnerable areas. The department is responsible to issue early warning for food shortage/crop damage and educate vulnerable communities about hazard resistant crop varieties; alternative agricultural opportunities; process of safeguarding the crops, livestock and agricultural equipments from disasters etc. The department is also responsible to support the affected communities in terms of restoration of agriculture; providing seeds, livestock and equipment; monitoring future threats etc. For sustainable agricultural programmes, coordination and cooperation among the departments of agriculture, water resources/flood control and irrigation are extremely important.

Medical and health services: Health risk assessment of the vulnerable communities based on ground survey and measures for health risk reduction are the prime responsibilities of these services. The medical and health services are also responsible to take initiative for providing ambulance facility; emergency medical care of affected population; providing medicines and medical supplies in disaster prone areas; controlling epidemic/spread of diseases; maintaining the standards of sanitation facilities; checking the quality of drinking water; assisting the government in procuring emergency medicine

and medical supplies; providing death certificates to relatives of the victims; maintaining coordination with other agencies engaged in emergency response etc.

Public Works Department (PWD): This department is primarily responsible to develop and implement technical standards for hazard resistant sustainable structural development based on hazard zoning. All disasters cause more or less damage to our buildings, infrastructures and facilities. The PWD is supposed to assist the designers to design the structures as per hazard resistant standard codes and monitor the construction activities. The PWD may directly be engaged in construction of government buildings, roads, bridges etc. In post disaster situation, the PWD takes part in damage assessment, restoration of road communication and other essential facilities, repairing of damaged buildings and infrastructures, removal of debris etc.

Public Health Engineering (PHE): The prime responsibilities of the PHE are needs assessment for drinking water and sanitation facilities and installation of these facilities as per the needs of the vulnerable communities. It is the duty of PHE to provide safe drinking water and sanitation facilities to vulnerable areas before disaster and monitor the operational standards of these facilities. In post disaster situation, the PHE may be engaged in providing water purifiers to the affected communities and restoring the water and sanitation facilities.

Electricity department: Faults with electric power line and sub-stations, electrical short circuit, operational faults of electrical equipments etc. often cause fire hazard and large-scale damage and disruption. Electrical safety is one of the major aspects of disaster management. At the same time, disaster may cause significant damage to power generation and communication systems, disrupting the power supply for long time. It is the duty of electricity department to ensure electrical safety at all levels and uninterrupted power supply during emergency period. This department is also responsible to monitor the public safety measures at domestic level and assess the risk factors. The top priority of the department during an emergency should be restoration of the power supply by repairing the damaged components of electrical networking system. For example, the Power Grid Corporation of India has mobile towers for temporary restoration of power supply in the event of damage to high-tension power line.

Meteorological department: This department plays important role in studying weather related information and issuing early warning for climatic and hydrological hazards. The department has their own state-of-the-art facilities for monitoring and analyzing the meteorological data. The department has tie-up with broadcasting services to broadcast the warning and other weather related information.

Land and survey/revenue: Land use planning is one of the most important aspects of disaster risk reduction. This department generally keeps records of land and land use related matters, including maps and other spatial information of different localities. Based on ground survey, this department demarcates the areas suitable for human settlement, cultivation and other developmental activities.

Forest department: Forest is one of the important components of our ecosystem and it has great importance in maintaining balance of our ecosystem as well as controlling the climatic conditions, rainfall pattern, surface runoff, soil erosion, sediment influx etc. The department of forest is responsible to make survey of forest covers, monitor the changing pattern of forest covers, take necessary steps to protect forest covers, take measures for reforestation in degraded forest lands, formulate plans and guidelines for forest conservation, render advice and assistance to common people for proper use and reproduction of forest resources etc.

Social welfare department: This department keeps records of socio-economic and socio-cultural conditions of the vulnerable communities and takes measures for overall capacity building of the communities. This department also takes part in relief operation especially providing food, cloth and household supplies; management of evacuation centres, providing assistance for temporary shelters of the disaster victims etc.

Transport department: During a crisis, the district administration may need large numbers of vehicles for mobilization of response forces and transportation of emergency materials. The district administration generally does not have transport facilities to meet such huge demand. This transport department maintains the record of different types of vehicles and transportation facilities in a particular district and assists the district administration in requisition of vehicles for emergency use during disaster.

Planning and finance departments: Haphazard and unsustainable developmental activities lead to unsafe conditions and enhance the disaster risk. Planning for developmental projects like town, cities, industries, power projects etc. needs to address the principles of disaster management for reducing probability of damage and national economic loss. At the early stage of planning, it is essential to assess the risk and impact factors associated with the developmental projects; identify possible measures to be taken and determine the criteria for damage mitigation. The national and state planning commissions/bodies may play lead role in this matter. The planning bodies may go for cost benefit analysis of the developmental projects to convince the finance department for approval and release of fund.

The responsibility of the finance department is timely release of funds for proper implementation of the projects related to damage mitigation, capacity building, emergency responses, compensation, reconstruction, rehabilitation etc. This department is also responsible to crosscheck the utilization of funds based on audit reports and review the process of funding accordingly.

The other government departments/organizations, which may contribute to their resources, means and strength for disaster management are Department of Foreign Affairs, Civil Aviation, Attorney General, Custom and Excise, Department of fisheries, Posts and Telecommunications, Department of Statistics, Geological Survey of India, Central Water Commission, Food Corporation of India, Department of Public Relation etc.

8.5.2 NON-GOVERNMENTAL RESOURCE ORGANIZATIONS

The government resource organizations need assistance of non-governmental resources in all phases of disaster management process. The non-governmental organizations may also directly take part in the process of disaster management, particularly in capacity building and emergency response, following certain guidelines of the national government. Non-governmental organizations may also be the constituents of the organizational structure of national disaster management system, depending on their field of works, capacities, contributions and achievements in the field of national or regional disaster management etc. Though, the role of non-governmental organizations can not be specifically defined, but, in general these organizations may contribute in the following fields.

- ✓ Assisting the government resources in ground survey and collecting data and information for hazard-vulnerability-capacity assessment.
- ✓ Preparation of hazard and resource maps.
- ✓ Keeping records of community's own resources like boat, vehicle, volunteers, survival kits, equipments, tools etc.

- ✓ Needs assessment of the vulnerable communities for capacity building and preparedness for coping with disasters.
- ✓ Assisting the government resources in the process of capacity building of the vulnerable communities.
- ✓ Documentation of disaster scenario and monitoring of the changing pattern of vulnerability and disaster risk of different hazard prone areas.
- ✓ Conduct case study on indigenous alternative damage mitigation and adjustment processes of different communities.
- ✓ Educate vulnerable communities about other scientific approaches of damage mitigation and adjustment processes.
- ✓ Supporting the government organizations in rescue and relief operations.
- ✓ Assisting the government resources in post disaster damage assessment.
- ✓ Providing relief materials and medical supports to the affected communities.
- ✓ First-aid training for vulnerable communities.
- ✓ Management of relief camps, including discipline, smooth distribution of food and other essential items etc.
- ✓ Extending supports for safe drinking water and sanitation facilities.
- ✓ Assisting government resources in transportation of relief material in the marooned areas.
- ✓ Educating and supporting the affected communities for alternative livelihood opportunities.
- ✓ Supporting the government resources in conservation and management of natural resources.
- ✓ Donation of blood for critically injured persons.
- ✓ Development low cost technology for hazard resistant and damage mitigation devices.
- ✓ Identification of dead bodies, carcass disposal, debris removal, tracing of missing persons etc.

A case study

Mr. Aurobindo Behera, Managing Director, Orissa State Disaster Management Authority had done a case study on NGOs response in 1999 Orissa Super Cyclone, which killed thousands of people and lakhs of livestock, destroyed huge numbers of buildings, infrastructures and facilities. (Source: Behera, A. *Government - NGO Collaboration for Disaster Reduction and Response: The India (Orissa) Experience*, Regional Workshop on Networking and Collaboration among NGOs of Asian Countries in Disaster Reduction and Response, 20-22 February, 2002).

In this cyclone the NGOs contributed their resources in three phases.

Immediately after cyclone, about 40 national and international NGOs formed an emergency response network viz., “Orissa Disaster Mitigation Mission” for coordinating with government resources and conducting relief and restoration works. They provided valuable information to the government institutions about the problems faced by the affected communities. Many NGOs established community kitchens and provided foods to lakhs of affected population. NGOs also took part in clearing the debris from the roads, cleaning the water sources, carcass disposal. Many NGOs were involved in providing temporary shelter

material, running mobile health camps, providing medical aid to the affected communities, establishing trauma care and legal aid centres.

Some international and national NGOs participated in the *short-term rehabilitation programmes*. They started food for work programmes to support the disaster-affected people for their survival. They also participated in restoration of damaged properties and basic facilities; damage and needs assessment; agricultural rehabilitation; rehabilitation of orphan children; running temporary schools for displaced children and providing text books; trauma care; conducting workshop for all the stakeholders including the affected people to identify the problem areas and future plan; formation of village development committees etc.

As a part of their *long-term rehabilitation activities*, NGOs active in Orissa tried to restore or generate the livelihood opportunities for the cyclone-affected communities; provide material support for recovery of production and other income generating mechanism; promote micro credit especially to women; provide dwelling units to poor families; construct schools and cyclone shelters etc. Many NGOs took part in massive plantation programme in the worst cyclone hit areas.

8.5.3 ACADEMIC AND RESEARCH INSTITUTIONS

Academic and research institutions play great role in generating human resources, technology development and technology transfer, conducting training and awareness programmes; supporting disaster management agencies in planning for risk mitigation etc. In India, the Disaster Management Act 2005 provided the scope of establishing National Institute of Disaster Management as a nodal academic institution of the country, supported by the state Disaster Management Institutes and Administrative Training Institutes. The major role of academic and research institutions associates with the pre disaster risk management activities. In post disaster scenario, these institutions can play the supportive role of government and non-governmental disaster management agencies. Let us highlight few common responsibilities of academic institutions.

- ✓ Academic and research institutions can directly take part in the process of risk assessment of the vulnerable areas including hazard mapping, micro zonation etc. For risk assessment, we need to analyze data and informations related to location specific geographical, geological and climatic factors; hazard characteristics and their possible impact on exposures; local vulnerability factors; resources at risk; land use pattern; existing hazard resistant mechanisms; community's capacity to mitigate damage and disruption; unsustainable resources and livelihood opportunities; alternative adjustment mechanisms adopted by the vulnerable communities etc. Now, many higher learning institutions including IITs are working on risk assessment, hazard zoning, risk modeling etc. These institutions are getting supports from the central and state governments and their organizations. For example, the National Remote Sensing Centre, a constituent of Indian Space Research Organisation, has been providing remote sensing based earth observation data including satellite imageries to support the research programmes on risk assessment. IMD and CWC are providing meteorological and hydrological data. Other government organizations involved in survey and resource inventory are also providing necessary data and information.
- ✓ Suggest suitable and cost-effective measures for risk mitigation. In this regard, the institutions may try to develop cost-effective technology and devices for reducing the impacts of probable hazards.
- ✓ Conduct regular courses on disaster management to generate required manpower for disaster management agencies.
- ✓ Conduct case studies and documentations on disaster scenario of different hazard prone areas.
- ✓ Conduct training for trainers; seminars, workshop, awareness programmes etc.
- ✓ Support the government organizations in planning for disaster management.

- ✓ Participate in emergency response and relief operations.
- ✓ Conduct damage and needs assessments and support the government agencies in preparing the recovery plans.

8.5.4 CORPORATE AND FINANCIAL SECTORS

The constituents of different corporate and financial sectors are now very much involved in supporting the government and non-governmental organizations working in the field of disaster management. Let us discuss important roles of corporate and financial sectors in disaster management.

- ✓ As part of *Corporate Social Responsibility (CSR)*, many companies are now contributing for capacity building and economic development of the vulnerable communities; creating healthy and safe working conditions; minimizing disaster risk by reducing the negative impacts of their activities on environment; supporting disaster management agencies in disaster risk mitigation etc.
- ✓ The corporate sectors are involved in post-disaster relief, rehabilitation and recovery activities. For example, after 1999 orissa cyclone and 2001 Bhuj earthquake, the *Confederation of Indian Industries (CII)*, *Federation of Indian Chambers of Commerce and Industry (FICCI)*, *PHD (progress, harmony and development) Chambers of Commerce and Industry* and other industries came out with different programmes to help the affected population as well as the government DM agencies. In 2001, the CII, with its direct and indirect members (industrial and corporate houses), constituted the *Disaster Management Committee* to advice and assist its member industries for taking appropriate measures to reduce the technological and industrial disasters. After 2004 great tsunami, the CII has set up Tsunami Relief Fund and deputed volunteers to manage distribution of relief materials.
- ✓ *Public-Private Partnership (PPP)* provides the scope for joint venture of government and private sector industries to contribute in the field of disaster management and support its associated programmes.
- ✓ Banking sector can play important role by providing long-term loans to vulnerable communities at low interest rate for risk mitigation measures, alternative livelihood opportunities, rehabilitation and reconstruction.
- ✓ The Insurance companies may provide opportunities to the vulnerable communities to have the facilities of property insurance, health insurance, crop insurance etc. on low premium rates.
- ✓ Financial organizations may support the Self-Help-Groups (SHGs) to deal with the low cost financial services related to livelihood and financial empowerment of the vulnerable communities.
- ✓ Financial organizations can support the poor vulnerable communities, to improve their living standard, through micro credit facility.

8.6 WHAT WE LEARNT FROM THIS UNIT?

The counter disaster resources are the organizations, departments, authorities, institutions etc. having capability to contribute in the field of disaster management based on their field of expertise and nature of works. These resources may be government controlled, non-governmental and community based organizations, academic and research organizations, corporate and financial sectors.

The evaluation of national and international resources can be made based on their ability to do work in the field of disaster management, availability in the disaster prone area, durability and operational integrity.

International resources are directly involved in international cooperation for disaster risk mitigation and effective response. These organizations work as support systems of different national governments. The jurisdiction of international support in a country depends on the national policy for international cooperation of the country.

The national counter disaster resources include central and state government ministries dealing with disaster management related activities; disaster management authorities; concerned departments, sections and organizations under central and state governments; corporate sector; financial sector; academic institutions etc.

The government resource organizations may be Police, Army and Paramilitary forces, Civil Defence, Fire services, Department of Agriculture, Medical and Health services, Public Works Department (PWD), Public Health Engineering (PHE), Electricity department, Meteorological department, Land and survey/revenue, Forest department, Social welfare department, Transport department, Planning and finance departments etc.

The government resource organizations need assistance of non-governmental resources in all phases of disaster management process. The non-governmental organizations may also directly take part in the process of disaster management, particularly in capacity building and emergency response, following certain guidelines of the national government.

Academic and research institutions play great role in generating human resources, technology development and technology transfer, conducting training and awareness programmes; supporting disaster management agencies in planning for risk mitigation etc.

The corporate and financial agencies have also great role to play in the field of disaster management as part of their Corporate Social Responsibility and Public-Private Partnership programmes.

8.7 PROBABLE QUESTIONS

1. What do you mean by Counter disaster resources?
2. Discuss the methods for evaluation of counter disaster resources.
3. Discuss important roles of international resource organizations.
4. Mention few names of international resource organizations.
5. Discuss major responsibilities of national counter disaster resources.
6. Discuss the roles of three important government resource organizations.
7. How NGOs can contribute in the field of disaster management?
8. What are the major responsibilities of academic and research organizations?
9. Discuss the role of CII in disaster management.
10. What do you mean by Corporate Social Responsibility?

8.8 SUGGESTED READINGS

1. Kumar, S. *Role of NGOs in Disaster Management*, Disaster Risk and Vulnerability Conference, Mahatma Gandhi University, Kerala, 2011.
2. *National Disaster Management Guideline: Role of NGOs in Disaster Management*, National Disaster Management Authority, 2010.
3. Carter, W. N. *Disaster Management: A Disaster Management Handbook*, Asian Development Bank, Bangkok, 1991.
4. *Disaster risk management and the role of corporate sector – the Indian perspective*, CII and Ministry of Home Affairs, Government of India, 2006.