

## Introduction

Prevention and mitigation contribute to lasting improvement in safety and should be integrated in the disaster management. The Government of India has adopted mitigation and prevention as essential components of their development strategy.

**Prevention:** Activities and measures to avoid existing and new disaster risks. Prevention (i.e., disaster prevention) expresses the concept and intention to completely avoid potential adverse impacts of hazardous events. While certain disaster risks cannot be eliminated, prevention aims at reducing vulnerability and exposure in such contexts where, as a result, the risk of disaster is removed.

**Mitigation:** The lessening or minimizing of the adverse impacts of a hazardous event. The adverse impacts of hazards, in particular natural hazards, often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions.

There are two types of mitigation: Structural & Non structural

**Structural mitigation:** refers to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant protective structures and infrastructure.

**Nonstructural mitigation:** refers to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk with related impacts.

The Government of India has adopted several mitigation measures for reducing the risk of being affected by disasters. These measures are being implemented by the concerned ministries. Some of these initiatives are given below.

## Earthquakes

### National Earthquake Risk Mitigation Project (NERMP):

- Understanding the importance of the management of such hazardous situations caused by the earthquake, the Government of India has taken a national initiative for launching a project of 'National Earthquake Risk Mitigation Project (NERMP). The proposed project aims at strengthening the structural and nonstructural earthquake mitigation efforts and reducing the vulnerability in the high-risk districts prone to earthquakes.

### National Building Code (NBC)

- The National Building Code of India (NBC), a comprehensive building code, is a national instrument providing guidelines for regulating the building construction activities across the

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country. The salient features of the revised NBC include meeting the challenges posed by natural calamities.

## Building Materials & Technology Promotion Council (BMTPC)

- The BMTPC undertook projects for retrofitting of life-line structures for generating awareness among the people as well as various government agencies about the need and techniques of retrofitting.
- It has earlier carried out seismic strengthening and retrofitting of the sub-district hospital in Kupwara in Jammu & Kashmir, 442 structures in Gujarat and primary school buildings at Thanu, Block Raipur and Dehradun.
- The experience on these retrofitted buildings is aimed to help people at large and the policy makers in particular in working towards reducing the vulnerability of lakhs of existing public and private buildings, thereby protecting most number of people in case of future earthquakes.



Jammu & Kashmir Earthquake 2005- Retrofitting on walls and windows

## Cyclones

### National Cyclone Risk Mitigation Project (NCRMP)

- Recurrent cyclones account for a large number of deaths, loss of livelihood opportunities, loss of public and private property, and severe damage to infrastructure, thus reversing the developmental gains whenever disasters occur. In order to reduce the loss of life and properties in the events of future calamities, the NCRMP has been launched by MHA.



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- The scheme aims to upgrade cyclone forecasting, tracking and warning systems, build capacity in multi-hazard risk management and to construct major infrastructures including multi-purpose cyclone shelters and embankments.

## Integrated Coastal Zone Management Project (ICZMP)

- The Government of India under the aegis of Ministry of Environment and Forest (MoEF) has launched the ICZMP. The objective of the project is to assist Government of India in building the national capacity for implementation of a comprehensive coastal management approach in the country.



Multi-purpose Cyclone Shelter, Kendrapada, Orissa

## Floods

### National Flood Risk Mitigation Project (NFRMP)

- NFRMP has been envisaged for mitigation or reduction in risk, severity or consequences of floods. It aims at ensuring that arrangements are in place to mobilize the resources and capability for relief, rehabilitation, reconstruction and recovery from disasters besides creating awareness among vulnerable communities.

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## Flood Management Programme

- Management of water resources is primarily the responsibility of the state governments hence the state governments are engaged in flood management work since the independence of the country.



Darbhanga Town Protection Wall

Source: Annual Report 2009-10, Ministry of Water Resources

Darbhanga Town Protection Wall.



Raising & strengthening of Embankment on River, Burhi Gandak

Source: Annual Report 2009-10, Ministry of Water Resources

Raising & strengthening of Embankment on River, Burhi Gandak.

## Landslides

- In view of challenges caused by landslides, the ‘National Landslide Risk Mitigation Project’ (NLRMP) launched. It aims at strengthening the structural and non-structural landslide mitigation efforts, reducing the landslide risk and vulnerability in the hilly districts prone to landslides and mud flows and minimize the risks arising out of disasters in landslides.



Doria Bridge, Assam, India

Photo: Shantanoo Bhattacharyya

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### Tsunami

- The Tsunami of 26th December 2004 caused extensive damage to life and property in the States of Tamil Nadu, Kerala, Andhra Pradesh and UTs of Puducherry and Andaman & Nicobar Islands (A&NI).
- One of the natural measures which could be adopted for mitigating the impact of tsunami is using shoreline tree cover. Tree plantation is a cost-effective long-lasting means of tsunami mitigation in comparison to the artificial barriers. Some locations of Indian Ocean where Tsunami struck in 2004 remained almost intact because the existing coconut palms and mangroves trees absorbed the tsunami's energy.



Natural Mitigation- Sand dune- Pogainallur village

Natural Mitigation- Sand dune- Pogainallur village  
Nagapattanam, Tamil Nadu



Natural Mitigation- Mangroves - Tamil Nadu

Natural Mitigation- Mangroves - Tamil Nadu

### Droughts

#### Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India

- It released a manual for drought management in November, 2009. It focuses on plans which take into account all capabilities of the state to address the impact of drought i.e., focus on mitigation measures, tapping newer technologies, enabling the systems adapt to the new legal framework and including improvement and area development programmes in drought mitigation.

#### National Institute of Agriculture and Extension (MANAGE), Hyderabad

- It has been identified to launch a National Project for Integrated Drought Monitoring & Management.

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## **Drought Prone Areas Programme (DPAP) and Desert Development Programme (DDP)**

- These programmes aim at drought proofing and minimizing desertification of fragile areas in humid regions often affected by severe drought conditions and desertification.

## **National Rainfed Area Authority in the Ministry of Agriculture**

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

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

- Implementation of water harvesting conservation, artificial recharge of ground water, traditional water harvesting and conservation, water saving technologies like drip and sprinkler irrigation systems, improved water saving farm practices, long term irrigation management etc.,
- Maximizing efficient use of available surface and groundwater in drought prone areas.
- Undertaking construction of water shed structures at the right place to enhance water recharge for life saving irrigation at critical stages of crop growth and during drought situations, and
- Using optimally the services of Village Resources Centre established by Indian Space Research Organization, ICAR, State Agriculture University and other organizations towards management of drought.

## **Forest Fire Management:**

- Fire prevention, detection and suppression activities are state subjects. The Central Government has been formulating policy, planning and financing the states from time to time. Forest Protection Division of Ministry of Forests is responsible for the forest fire management at the central level.
- The Joint Forest Management Committees have been given the responsibility to protect the forests from fires.
- The Central Government has issued the National Forest Fire, Prevention and Control guidelines and has also worked on a National Master Plan on Forest Fire Control.

## **Oil Industry**

- In the oil industry, the disaster management plan is maintained at the area level and covers a wide aspect (since their activities are likely to affect local people also).
- Oil companies have established their Crisis Management Plan at the company level and at the HQ level also with specialist to deal with fires and other identified hazards.



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- In oil companies, it has been observed that international players for rescue and recovery operations are also hired at very short notice at cater to the specific requirements.

## **Chemical Disasters**

- The MOEF has taken the following measures towards developing a Regulatory Framework for Chemical Safety:
  - The Environment (Protection) Act was enacted in 1986. Under the Act, two rules have been notified for ensuring chemical safety, namely,
  - The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 (MSIHC) amended in 1994 and 2000;
  - The Chemical Accidents (Emergency, Planning, Preparedness, and Response) Rules, 1996 (EPPR) under the Environment (Protection) Act, 1986.
  - The Public Liability Insurance Act 1991, amended in 1992 and the Public Liability Insurance Rules 1991, amended in 1993 require maximum hazard units to procure an insurance policy and deposit an equal amount in the Environment Relief Fund to provide immediate relief to victims of chemical accidents.

## **Prevention of Disasters in Mines**

- The Directorate General of Mines Safety (DGMS) examines from each and every application for underground and surface mining from all considerations.
- The officers of the DGMS from time to time inspect the mines to assess the implementation of the measures and suggest modifications, etc.
- For the new projects and re organizational projects, it has become compulsory to get environmental clearance from the Ministry of Environment and Forests (MOEF) and for this the mines are required to develop their Environmental Management Plans (EMPs) in which the problems of the mine fires are adequately addressed as the mine fires have considerable environmental impacts.

## **Epidemics**

- The Ministry of Health & Family Welfare is instrumental and responsible for implementation of various programmes on a national scale in the areas of prevention and control of major communicable diseases.
- This ministry also assists states in preventing and controlling the spread of seasonal disease outbreaks and epidemics through technical assistance.
- It is actively involved in disease diagnosis during epidemics and outbreaks, operational research, manpower development, advisory role and other multifarious activities towards prevention and control of a cascade of epidemic prone disease of larger public health importance in collaboration with National Institute of Communicable Disease (NICD) and external organizations and institutes.



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## Measures taken for Rail Safety

- Measures taken to reduce Derailments: Several measures have been taken to reduce the derailment such as replacement of over-aged tracks, bridges, gears and rolling stock.
- Measures taken to reduce Collisions; Similarly, several measures are under implementation for reducing the incidents of collision which may be summarized such as; Extensive training to train operations staff; Improved maintenance and safety checks; Improvement in design of rolling stocks.
- Measures taken to reduce level crossing accidents: Following measures are underway to reduce accidents arising out of crossing them - Social awareness programmes have been launched in rural areas through divisions; Construction of Road Over Bridges (ROBs)/Road Under Bridges (RUBs) at level crossing; Manning of unmanned level crossings.
- Measures taken to reduce fire accidents: Following measures have been taken to reduce the fire accidents - Provision of fire retardant material in new coaches and retro-fitting in existing coaches; Emergency exits have been introduced in coaches to reduce fatalities etc.

## Road

- The main thrust of accident prevention and control across the world has been on the four “E” s, namely, (i) Education (ii) Enforcement (iii) Engineering (iv) Environment and Emergency care of road accident victims.
- The measures taken by Government of India to reduce the risk of road accidents are include:
- Road Engineering: These are design/specification related aspects of roads and highways to enhance road safety.
- Enforcement: The state governments and UTs are to take measures for enforcing the statutory provisions provided under the Motor Vehicles Act, 1988 and the Central Motor Vehicle Rules, 1989.
- The enforcement measures under the said statute provides for inspection, licensing and verification of fitness of vehicles.
- Education and Training: These primarily involve spreading road safety awareness and imparting training to drivers.
- Faster relief and evacuation of road accident victims: In order to reduce the trauma and probability of death and disability associated with the road accidents, National Highway Accident Relief Service Scheme has been initiated which provides for supply of cranes and ambulances to states/UTs and NGOs for relief, rescue and evacuation of accident victims to the closest medical center and for clearing the accident site.

## Civil Aviation

- The Directorate General Civil Aviation (DGCA) has the regulatory responsibility for aviation safety.





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- Its mandate is to ensure the highest level of safety in the Indian Aviation System by employing International Civil Aviation Organization (ICAO) standards and recommended practices.
- India's State Safety Programme (SSP), DGCA is to maintain an integrated set of regulations and activities aimed at enhancing aviation safety.

## **Reference**

- Disaster Management in India, Ministry of Home Affairs, Government of India.