MITIGATION

Introduction

The Yokohama message emanating from the International Decade for Natural Disaster Reduction in May 1994 underlined the need for an emphatic shift in the strategy for disaster mitigation. It inter-alia stressed that disaster prevention, mitigation; preparedness and relief were four elements, which contribute to and gain from the implementation of the sustainable development policies. These elements along with environmental protection and sustainable development, are closely inter related. Nations therefore should incorporate them in their development plans and ensure efficient follow up measures at the community, sub-regional, regional, national and international levels. Disaster prevention, mitigation and preparedness are better than disaster response in achieving the goals and objectives of vulnerability reduction.

It would be evident from the table given in 1.1 that if we compare the disasters of similar magnitude in USA and Japan with that of India it is found that the loss of lives in USA and Japan are much less as compared to that of India. The factors influencing reduced loss is attributed to the better preparedness in USA and Japan.

Table 1.1: Comparison among India, Japan & USA on death in Earthquake of similar magnitude

Country/ Place	Date	Intensity of Quake	Human Lives Lost
USA			
Southern California	28.6.1991	6.2 M	2
Landers California	28.6.1992	7.3 M	3
Oregon	21.9.1993	6.4 M	2
Northridge, California	17-1-1994	6.9 M	60
Wyoming	3-2-1995	6.7 M	1
Central California	22-12-2003	6.8 M	2
JAPAN			
Hokkaido	25-9-2003	8.3 M	0
Kobe	16.1.1995	6.9 M	5530
Kamchatka	12-5-2005	7.3 M	0
Fukuoka	20-3-2005	6.5 M	0
Honshu	16-8-2005	7.2 M	0
INDIA			
Uttarkashii	20.10.1991	6.6 M	2000
Latur	30.9.1993	6.3 M	9475
Jabalpur	22.5.1997	6.0 M	39
Chamoli	29.3.1999	6.8 M	100
Bhuj	26.1.2001	6.9 M	13805

Source: UNDP (BCPR)

Mainstreaming of Disaster Risk Reduction in Developmental Strategy

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.

Accordingly, the Tenth Five Year Plan document has a detailed chapter on disaster management. The plan emphasizes the fact that development cannot be sustainable without mitigation being built into the developmental process.

Mainstreaming DRR involves incorporating disaster risk reduction into development policy and practice. It means radically expanding and enhancing disaster risk reduction so that it becomes normal practice, fully institutionalized within an agency's relief and development agenda. Mainstreaming has three purposes:

(a) To make certain that all the development programmes and projects that originate from or are funded by an agency, are designed with evident consideration for potential disaster risks and to resist hazard impact,

(b) To make certain that all the development programmes and projects that originate from or are funded by an agency, do not inadvertently increase vulnerability to disaster in all sectors: social, physical, economic and environment,

(c) To make certain that all the disaster relief and rehabilitation programmes and projects that originate from or are funded by an agency are designed to contribute to developmental aims and to reduce future disaster risk.

Mainstreaming DRR into the developmental plans is an important mandate of the Disaster Management Act 2005. Integration of disaster risk reduction measures into ongoing flagship programmes of Government of India is being used as an entry point for mainstreaming DRR in development plans. Steps for ensuring the incorporation of DRR into various ongoing programmes\plans are as follows:

a) Identification of key programme/projects of Government of India,

b) Identification of entry points within the programme for integration of DRR (structural, non- structural and other mitigation measures) at various levels viz. national, state and district levels,

c) Close coordination with concerned departments such as State Planning Commission and Finance Department for promoting DRR measures into development plans and policies,

d) Advocacy for allocation of dedicated budget for DRR within the departmental plans,

e) Preparation of guidelines for integration of disaster risk reduction measures into development plans of various departments at the district and sub-district levels.

Mainstreaming of National Plan and its Sub-Plan: Three committees constituted by Government of India are working for preparing the National Response Plan,

National Human Resource and Capacity Development Plan and Mitigation Plans by respective ministries who have been designated as nodal agencies for the disaster relating to their activities. The draft National Response Plan and National Human

Resource and Capacity Development Plan are ready. Certain rectifications and modifications are underway before it is presented to the National Executive Committee for its approval.

It is expected that National Response Plan will be put in place once it is adopted by Government of India. It will pave the way for institutionalizing the response plan at three tiers as envisaged in the Disaster Management Act.

Similarly, the Capacity Development Plan, once approved and adopted will provide a roadmap for undertaking the capacity building for people engaged in different facets of disaster management and enhance the capacity at the individual, organizational as well as at the environmental levels.
Mitigation Plans have been submitted by the ministries of Defence, Mines (Geological survey of India), Department of Atomic Energy, Department of Agriculture & Cooperation, Railways and Water Resources, which are under examination and finalization. It is expected that once these mitigation plans are approved, the concerned ministry will undertake activities for taking the prevention and mitigation measures to address the hazard and risk involved in the activities of their sector. It would be the endeavor of the government to persuade the other ministries who have yet to bring their Mitigation Plans at the draft stage to take it further for approval and adoption.

National Disaster Mitigation Fund

Section 47 of the Disaster Management Act 2005 provides for constitution of National Disaster Mitigation Fund. The provisions of the Act are as under:

a) The Central Government may, by notification in the Official Gazette, constitute a fund to be called the National Disaster Mitigation Fund (NDMF) for projects exclusively for the purpose of mitigation and there shall be credited thereto such amount which the Central Government may, after due appropriation made by parliament by law in this behalf.

b) The National Disaster Mitigation Fund shall be applied by the National Disaster Management Authority.

The modalities of constitution of NDMF have been discussed by MHA with the MoF, Planning Commission and NDMA from time to time. A reference was made to 13th Finance Commission. The 13th Finance Commission has given its report and as per its recommendations: "Mitigation and reconstruction activities should be kept out of the schemes funded through Finance Commission grants and met out of overall development plan funds of the centre and the states."The issue is under consideration of

Ministry of Home Affairs with other concerned Ministries.

Measures taken for Prevention and Mitigation of Hazards

Risk of destruction and casualties associated with different disasters can substantially be reduced by introduction of prevention and mitigation measures. Mitigation is generally categorised into two main types of activities i.e. structural and 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. Non- structural 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 described below.

Earthquakes

India has been divided into five seismic zones according to the maximum intensity of earthquakes expected. Of these, zone V is most active and comprises whole of Northeast India, the northern portion of Bihar, western Uttar Pradesh hills, Himachal Pradesh and Andaman & Nicobar Islands.

Pace of Urbanization in India has been increasing. Many of the cities and townships including the national capital of New Delhi are located in zones of high seismic risk. Typically, the majority of the constructions in these cities are not earthquake resistant. Regulatory mechanisms are weak, thus any earthquake striking in one of these cities would turn into a major disaster. Six major earthquakes have struck different parts of India over a span of last 15 years. The following measures have been initiated for prevention and mitigation of such disasters:

National Earthquake Risk Mitigation Project (NERMP): Understanding the importance of the management of such hazardous situations caused by the earthquake, the Government of India has taken a national initiative for launching a project of 'National Earthquake Risk Mitigation Project (NERMP). The proposed project aims at strengthening the structural and non- structural earthquake mitigation efforts and reducing the vulnerability in the high risk districts prone to earthquakes. Necessary risk mitigation measures are proposed to be put in place in the highly seismic zones. NDMA, tasked with this project has prepared a Detailed Project Report (DPR) which is under consultation with all the stakeholders. The proposed components of the project include techno-legal regime, institutional strengthening, capacity building and public awareness etc.

National Building Code (NBC): The National Building Code of India (NBC), a comprehensive building code, is a national instrument providing guidelines

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

Box 1.1: Building collapse in Lalita Park, Laxmi Nagar, Delhi

There was an incidence of building collapse in Lalita Park, Laxmi Nagar, East Delhi on 15th November 2010. Several people lost their life and many injured in this incidence. Lt. Governor of National Capital Delhi appointed an inquiry commission by exercising of the power conferred by section 3 of the Commission of lnquiry Act, 1952 (60 of 1952) and read with the Notification No. F.2/4/66-UT dated 20th August, 1966, issued by Govt. of lndia, Ministry of Home Affairs.

Single member, namely, Sh. Lokeshwar Prasad, retired Justice of Delhi High Court has been appointed.

The terms of reference of the Commission is as under:-

1. To determine the immediate and proximate causes for the collapse of the building,
2. To determine the circumstances and sequences of events leading to the collapse of the building,
3. To fix responsibility, both individual and institutional, for the collapse of this building and for the building already built that are unsafe structurally in East Delhi,
4. to determine the administrative, procedural and statutory lapses of various departments and agencies to evaluate structural safety aspects of buildings already built or proposed to be built in East Delhi and to recommend remedial measures,
5. To recommend measures that will combat corruption and make concerted public servant accountable for construction of unsafe building.

It is expected the commission will come out with recommendations, which may be useful for framing policy and action to contain such mishaps in future.

Jammu & Kashmir Earthquake 2005- Retrofitting on walls and windows

Effective implementation of these codes has been a challenge. The Bureau of Indian Standards & National Design and Research Forum with the Institute of Engineers have organised series of brainstorming sessions and workshops to pave the way to inculcate the same into practice. As part of their continuous efforts, a workshop has been scheduled in the month of in May 2011 titled "Implementation of Standards in Infrastructural Development".

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

Earthquake and Seismic Zones: The entire Indian landmass, susceptible to different levels of earthquake hazards, referred to as Zone II to V as per the Seismic Zoning Map of India contained in IS 1893:2002 Fifth Revision

The general basis of the zones is as follows:

Zone V: Covers the areas liable to seismic intensity 1X and above on MSK (1964) Intensity scale. This is the most severe seismic zone and is referred here as Very High Damage Risk Zone.

Zone IV: Gives the area liable to MSK VIII. This zone is second in severity to zone V. This referred here as High Damage Risk Zone.

Zone III: The associated intensity is MSK VII. This is termed here as moderate Damage Risk Zone.

Zone II: The probable intensity is MKS VII. This zone is referred to as Low Damage Risk Zone.

Note: *In the revision of the Seismic Zone Map given earlier in the Vulnerability Atlas of India 1997, the seismic zone I has now been merged into Seismic Zone II and renamed as Zone II, Zone III has been extended to cover more areas in Maharashtra, Andhra Pradesh and Tamil Nadu. Zones IV and V have remained unchanged.*

It may be mentioned here that the new intensity scale, called as MSK Intensity Scale 1964, is much more detailed and quantitative in nature as compared to the Modified Mercalli (MM) though almost similar in intensity. Hence MSK has been used in place of MM in the classification of the seismic zones given above

Initiative by Ministry of Panchayati Raj: It releases funds under Backward Regions Grant Fund (BRGF) for meeting critical infrastructural gaps and other developmental requirements. The ministry has financed several district plans under the BRGF for construction of panchayat buildings, anganwadi centres, school buildings, class rooms, roads, bridges, culverts etc. and restructuring of State Institutes for Rural Development (SIRD) buildings, block resource centres, panchayat training centers etc. The ministry, vide its letter No. N-11012/35/2007- P&J, dated 2nd February 2010 has advised all the states that it is imperative for all such structures to be made disaster resilient in the line with the national vision of disaster management.

Cyclones

National Cyclone Risk Mitigation Project (NCRMP) Initiative: 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 in three phases in the cyclone prone coastal states and Union Territories, keeping in view the vulnerability of the states and their readiness with investment proposals.

Box 4.2: National Cyclone Risk Mitigation Project

Aim: 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.

Outcome: The project is expected to benefit 5.60 lac people in Orissa and over 5.50 lacs in Andhra Pradesh

Execution Authority: The National Disaster Management Authority (NDMA) has been designated as the implementing agency. The scheme is regularly monitored by NDMA and MHA.

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

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

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

Project cost: The total outlay of the project is `1496.71 crore. The World Bank is providing financial assistance equivalent to `1198.44 crore and contribution from the state governments is `298.27 crore (i.e. Orissa- ` 132.98 crore and Andhra Pradesh – `165.29 crore).

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 GoI in building the national capacity for implementation of a comprehensive coastal management approach in the country and piloting the integrated coastal zone management approach in states of Gujarat, Orissa and West Bengal.

There are four components of this project:

(i) **Capacity Building:** It includes mapping, delineation and demarcation of the hazard lines, and delineation of coastal sediment cells all along the mainland coast of India.

(ii) **Piloting ICZM approaches in Gujarat:** This component will support capacity building of the state level agencies and institutions, including preparation of an ICZM plan for the coastal sediment cell that includes the Gulf of Kachchh and pilot investments.

(iii) **Piloting ICZM approaches in Orissa:** It provides for capacity building of the state level agencies and institutions, including preparation of an ICZM plan for the coastal sediment cells that include the stretches of Paradip-Dhamra and Gopalpur-Chilika, including a regional coastal process study, and pilot investments.

(iv) **Piloting ICZM approaches in West Bengal:** The project cost is ` 1425 crores ($285.67 million) and it is slated to be completed by 31 Dec. 2015.

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. NDMA has been entrusted to prepare a Detailed Project Report (DPR) on Flood Risk Mitigation Project.

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

Darbhanga Town Protection Wall *Source: Annual Report 2009-10, Ministry of Water Resources*

Raising & strengthening of Embankment on River, Burhi Gandak *Source: Annual Report 2009-10, Ministry of Water Resources*

Box 1.2: Flood Management Programme

Background: The FMP scheme was launched by Ministry of Water Resources under the central plan at a total cost of ` 8000 crores. The sanction of the scheme was been conveyed vide MoWR Order No. 5/7/2006-Ganga (Vol.II) / 4749-77 dated 28.11.2007.

Aim: The scheme provides financial assistance to the state governments for undertaking flood management works in critical areas during the 11th Plan period (2007-12).

Components:

(i) Critical flood control and river management works in the entire country (includes river management, flood control, anti-erosion, drainage development, anti-sea erosion, and flood proofing works besides flood prone area development programme in critical regions and restoration of damaged flood control/ management works).

(ii) The spillover works of on-going central plan schemes of Xth Plan would also be supported under this scheme during XI Plan.

Executing Authority: The FMP scheme has been implemented by Flood Control, Water Resources / Irrigation Departments of the state governments.

Under the programme, a total of 311 flood management work schemes of critical nature are included from 19 States for central assistance up to 31st March, 2010, out of which 117 works for

10 States are reported to be physically complete. It is expected that 1.33 billion hectares of flood prone areas have thus been restored and protected which will provide safety to about 12.89 million people during high floods.

Study of Land Contour by GSI

Geological Survey of India (GSI) studied the shape and material of the land getting inundated and generates data on area, shape, slope, infiltration and permeability of soil of the basin, drainage pattern, landform and longitudinal and cross profiles of the channels. On the basis of these studies, GSI produces flood hazard maps indicating prohibitive, Restricted, Cautionary and Flood Free Zones.

Significant flood related studies and recommendations made by GSI are as follows

- Brahmaputra Valley - A comprehensive geo-environmental database for environmental Management and flood control generated,
- Lower Banas sub-basin- selective irrigation to prevent rise of ground water table recommended,
- Kandi basin West Bengal- GSI recommended construction of small weirs to reduce impact of flood,
- Mokameh Tal area in the Ganga Flood Plain- rejuvenation of existing drainage channels to reduce flood problem recommended,
- Lower Damodar Basin- diversion along artificial canals and re-excavation of old river channel recommended,
- Landslide zonation map for Himalayan region,
- The contribution of snow melting to annual flood.

GSI's flood related studies are used by Central Water Commission, Water Resource Development Project Authorities, Urban and Rural Planning Authorities, Ministry of Environment and Forest and Ministry of Agriculture etc.

Droughts

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

programmes in drought mitigation.

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

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

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

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

- Implementation of water harvesting conservation, artificial recharge of ground water, traditional water harvesting and conservation, water saving technologies like drip and sprinkler irrigation systems, improved water saving farm practices, long term irrigation management etc,

- Working towards convergence of lessons learnt from studies carried out by multiple institutions working in related fields such as Central Research Institute for Dry land Agriculture (CRIDA), International Crop Research for Semi-arid Tropics (ICRISAT), India Meteorological Department (IMD), National Remote Sensing Centre (NRSC) and Indian Council for Agricultural Research (ICAR), etc,

- Exploring practices such as harvesting cereal crops for fodder, supplemental irrigation if feasible, and ensuring availability of seeds when alternative crops are beneficial with logistic support from state and district machineries,

- Maximising efficient use of available surface and groundwater in drought prone areas i.e. to resort to drip and sprinkler practices wherever possible, particularly for commercial crops including fruit orchards,

- Undertaking construction of water shed structures at the right place to enhance water recharge for life saving irrigation at critical stages of crop growth and during drought situations, and

- Using optimally the services of Village Resources Centre established by Indian Space Research Organisation, ICAR, State Agriculture University and other organisations towards management of drought.

Fire

A Centrally Sponsored Scheme for Strengthening of Fire and Emergency Service in the country was launched in November 2009 at an outlay of ` 200 crores. The overall objective of the scheme is to strengthen fire and emergency services in the country and progressively transform it into Multi-Hazard Response Force capable of acting as first responder in all types of emergency situations. As the scheme is to be implemented with the centre and state contributions for procurement of equipment (in the ratio of 75:25 and for north-eastern states in the ratio of 90:10) within the XIth Five Year Plan period, the state governments are to contribute ` 40.23 crore as their share.

The main components and activity wise progress under the scheme are given in Table 1.2 and Table 1.3.

Table 1.2: Components of the Scheme for Strengthening of Fire and Emergency Service

S. No.	Components	Funds (` in crore)
(i)	Procurement of capital items such as advanced fire tender, high pressure pump with mist technology, quick response team vehicle and search and rescue combi-tools.	178.12
(ii)	Awareness generation/ School safety programme	4.38
(iii)	Training of trainers in advanced courses of collapsed structure search and rescue and fire fighting at the NFSC, Nagpur	5.00
(iv)	Fire hazard and risk analysis	10.00
(v)	Project management and monitoring	2.50

Table 1.3: The activity-wise progress of Fire Service Scheme (March 2011)

Activities	Details	Present Status
Purchase of Capital Items	Purchase of advanced fire tender, high pressure pump with mist technology, quick response team vehicle and search and rescue combi-tools by the state governments.	More than 89% of total funds have been earmarked for purchase of capital items. The state governments are required to undertake the procurement as per prescribed specifications.
Fire Hazard and Risk Assessment	The study will attempt to identify the gaps in existing fire services in the country and evolve a futuristic strategy for bridging the gaps and taking steps for mitigating the impacts of a fire hazard.	Consultant is being appointed.

Training of Trainers	Capacity building of thirty fire officers in advance methods of search and rescue, medical first responders. These trained officers will further impart trainings to 750 other fire officials.	Thirty fire service officials have been trained at Fire Service College, UK in advance methods of fire fighting and urban search and rescue. These officials were initially trained in basic DM aspects at NIDM, New Delhi.
Awareness Generation/ School Safety Programme	Conducting awareness generation programmes with communities and schools on fire safety measures.	IEC materials were developed and circulated to all the State Fire Services. DGCD is to conduct awareness programmes in the states.

Fire Hazard and Risk Analysis of fire services in the Country: The MHA has proposed to undertake a study on fire hazard and risk analysis of fire services in the country. The aim of the study is to identify gaps in existing fire services and evolve strategies for mitigating impacts of fire hazards in the country. The outcome of the study will be used to formulate an action plan (state/UT wise) for augmentation and future development of the fire services along with the plan to source the funding for its implementation. As a part of study, the consultant would be required to organise visits to each of the fire stations and fire service organisations in the country and generate database through primary and secondary surveys. Govt. of India has prepared the list of Multi-Hazard districts. List of Multi-Hazard districts is shown in Table 1.4.

Table 1.4: List of Multi-Hazard Districts For Creation of Civil Defence Set-up

State	District
Assam	Bongaigon
Assam	Dibrugarh
Assam	Jorhat
Assam	Tinsukia
Delhi	North East Delhi
Delhi	South Delhi
Goa	North Goa
Goa	South Goa
Gujarat	Ahmedabad
Gujarat	Bharuch
Gujarat	Dangs
Gujarat	Gandhinagar
Gujarat	Jamnagar
Gujarat	Kachch
Gujarat	Mehasana
Gujarat	Narmada
Gujarat	Navsari
Gujarat	Surat
Gujarat	Vadodra
Jammu & Kashmir	Anantnag
Jammu & Kashmir	Badgam
Jammu & Kashmir	Jammu
Jammu & Kashmir	Poonch
Jammu & Kashmir	Rajouri
Jammu & Kashmir	Srinagar
Maharashtra	Mumbai
Maharashtra	Ratnagiri
Maharashtra	Thane
Punjab	Amritsar
Punjab	Bhatinda
Punjab	Faridkot
Punjab	Ferozpur
Punjab	Gurdaspur
Punjab	Hoshiarpur
Punjab	Jalandhar
Punjab	Ludhiana
Punjab	Patiala
Punjab	Ropar
Punjab	Sangrur
Rajasthan	Alwar
Rajasthan	Barmer
Uttar Pradesh	Agra
Uttar Pradesh	Allahabad
Uttar Pradesh	Baghpat
Uttar Pradesh	Bareilly
Uttar Pradesh	Bulandshahar
Uttar Pradesh	Ghaziabad
Uttar Pradesh	Gorakhpur
Uttar Pradesh	Jhansi
Uttar Pradesh	Kanpur (Nagar)

State	District
Uttar Pradesh	Lucknow
Uttar Pradesh	Mathura
Uttar Pradesh	Meerut
Uttar Pradesh	Moradabad
Uttar Pradesh	Muzaffarnagar
Uttar Pradesh	Saharanpur
Uttar Pradesh	Varanasi
Andhra Pradesh	Hyderabad
Andhra Pradesh	Vishakapattanam
Assam	Darrang Assam
	Golaghat
Assam	Kabri Anglong
Assam	Kakrajhar
Bihar	Begusarai
Bihar	Kathihar
Bihar	Patna
Bihar	Purnia
Haryana	Ambala
Haryana	Faridabad
Haryana	Gurgaon
Haryana	Hissar
Haryana	Jhajjar
Himachal Pradesh	Shimla
Jammu & Kashmir	Baramullah
Jammu & Kashmir	Doda
Jammu & Kashmir	Kargil
Jammu & Kashmir	Kupwara
Jammu & Kashmir	Leh
Jammu & Kashmir	Pulwama
Jammu & Kashmir	Udhampur
Jharkhand	Godda
Jharkhand	Sahibganj
Maharashtra	Raigarh
Maharashtra	Sindhudurg
Orissa	Baleshwar (Balasore)
Orissa	Bhadrak
Orissa	Dhenkanal
Orissa	Jagatsinghpur
Orissa	Kendrapara
Rajasthan	Jalore
West Bengal	Bardhaman
West Bengal	Birbhium
West Bengal	Darjeeling
West Bengal	East Mednipur
West Bengal	Howrah
West Bengal	Hugli
West Bengal	Jalpaiguri
West Bengal	Kolkatta
West Bengal	Murshidabad
West Bengal	West Mednipur

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. 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:

(i) The Environment (Protection) Act was enacted in 1986. Under the Act, two rules have been notified for ensuring chemical safety, namely,

(a) The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 (MSIHC) amended in 1994 and 2000;

(b) The Chemical Accidents (Emergency, Planning, Preparedness, and Response) Rules, 1996 (EPPR) under the Environment (Protection) Act, 1986.

(ii) 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.

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 and promotion of traditional and indigenous systems of medicines. 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 organisations and institutes. (Photo: A health camp at Akkarapettai Villager in Nagapattinam District-December 2004)

Post-disaster management of health, sanitation and hygiene services is crucial to prevent an outbreak of epidemics. The draft Public Health (Prevention, Control and Management of Epidemics, Bio-terrorism and Disasters) Bill prepared by the Ministry of

Health & Family Welfare is under consideration for enactment.

National Vector Borne Diseases Control Programme (NVBDCP) is the key programme for prevention/control of outbreaks/epidemics of malaria, dengue, chikungunya etc., vaccines administered to reduce the morbidity and mortality due to diseases like measles, diphtheria, pertussis, poliomyelitis etc. Two key measures to prevent/control epidemics of water-borne diseases like cholera, viral hepatitis etc. include making available safe water and ensuring personal and domestic hygienic practices are adopted.

It is impossible to always prevent epidemics, but its impact can always be mitigated by anticipating them and by being prepared. Epidemic preparedness and response is a multi- sectoral and multi-agency activity. Health sector plays a lead role in preparing and executing the epidemic preparedness plan but need the expertise and support of other disciplines/sectors also. Planning process will *inter alia* require extensive review of health infrastructure, disease surveillance and response system, availability of laboratories, trained professionals, drugs, vaccines and equipment in the country, communication system, coordinating mechanism between different sectors and between the national and international agencies and legal issues.

Accordingly, Govt. of India launched Integrated Disease Surveillance Project (IDSP) in November 2004 to strengthen capacity at state/district levels to detect and respond to the epidemics in early rising phase. Under the project, the district and states have been strengthened by providing additional technical manpower (epidemiologists, microbiologists, entomologists), training of rapid response teams for outbreak investigation and control, strengthening of laboratories for detection of organisms causing epidemic prone diseases, and establishment of IT network for data compilation, dissemination and analysis. The states are at varying stages of implementation.

The key achievement of IDSP has been creation of capacity at sub-district/district/state levels to detect early warning signals and outbreaks of epidemic prone diseases so that they can be responded early. They collect weekly surveillance data, monitor disease trends and investigate rising in cases. About 85% of districts are reporting these data to Central Surveillance Unit through e-mail and more than 60% report through portal. The result is that states have detected and responded to more number of outbreaks after implementation of IDSP. For example, a total of 553 outbreaks were reported and responded to by states in 2008, 799 outbreaks in 2009 and 990 outbreaks in 2010. Earlier not many outbreaks were reported in the country by the States/ UTs.

Medical camp during Tsunami, 2004 in Nagapattinam, Tamil Nadu

Finally, a mention must be made about the International Health Regulations (IHR), 2005 which were adopted by the 58th World Health Assembly in May 2005 and came into force on 15 June 2007 (in India on 8 August 2007). IHR (2005) also provide us an opportunity to strengthen core capacities to detect, assess and notify and control all public health emergencies of international concern (PHEIC). These capacities will also help us to control endemic infectious diseases which may not spread to other countries.

Measures taken for Rail Safety

Several measures have been taken to improve safety of Rail Transportation which is summarised as below:

Special Railway Safety Fund (SRSF): Arising out of an important recommendation of Railway Safety Review Committee (RSRC) (Khanna Committee), to pull up the backlog of arrears for track renewals, bridges, rolling stock and signaling gear within a fixed time frame, a non- lapsable 'Special Railway Safety Fund' of ` 17000 crores was set up with effect from 01.10.2001 with a contribution from the Ministry of Finance and Railways. Works related to replacement / renewal of over-aged bridges, signaling gears and replacement of narrow gauge locomotives is ongoing.

Corporate Safety Plan (2003-2013*):* Railway Safety Review Committee (1998), in its report recommended that railways formulate a safety plan with the following broad objectives:

- To achieve reduction in rate of accidents per million train kilometers from 0.44 (in 2002-03) to 0.17 by the year 2013,
- Implement measures to reduce chances of passenger fatality substantially in consequential train accidents by 2013,
- Focus on development of manpower through major improvements in working environment and training to reduce the accidents attributable to human failure by 40

percent by 2013,

- Achieve safety culture on all fronts including maintenance depots, worksites, stations, controls etc.,
- Progressively achieve an environment of "fail-proof" from the present "fail-safe" system of asset failures by upgrading the systems by 2013, and
- Prioritisation of safety related projects.

It is estimated that index of accidents per million train kilometers would be reduced from 0.44 (in 2002-03) to 0.17 in 2012-13. Similarly, the performance indices targets have been laid down for track defects, coach defects/ failures, wagon detachments/ failure, poor brake power (goods), incidence of train parting (goods), motive power defects, signal defects/ failures, communication failures and OHE (Overhead Equipment) defects.

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,
- Gradual phasing out of derailment prone four wheeler tank wagons,
- Reduction in Thermit welded joints on rails, use of SPURT Cars for rail flaw detection,
- Track circulation for enhanced safety in train operations,
- Introduction of Self Propelled Accident Relief Medical Van (SPARMV) and Wheel Impact Load Detector (WILD).

Measures taken to reduce Collisions; Similarly several measures are under implementation for reducing the incidents of collision which may be summarised such as;

- Extensive training to train operations staff
- Improved maintenance and safety checks
- Improvement in design of rolling stocks
- Installation of Anti Collision Device (ACD). ACD has been installed on 1900 Route kms. of Northeast Frontier Railway Railway and 800 route kms. on Konkan Railway Corporation Limited and put under trial. Decision has been taken to extend ACD to Southern Railway, South Central Railway and South Western Railway on a trial basis.

Measures taken to reduce level crossing accidents: Railway track have been jig jagging across the country side have rendered vulnerability profile of the people living near tracks very high. 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 with Train Vehicle Units (TVUs) > 1 lakh, limited use subways to replace level crossings,
- Manning of unmanned level crossings,

- Interlocking and provision of phones at level crossing gates,
- Trial of Train Actuated Warning Device (TAWD).

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-fitment in existing coaches,
- Emergency exits have been introduced in coaches to reduce fatalities,
- Provision of electrical fire sensing and extinguishing system in rolling stock and stationary installations,
- Provision of electrical fire sensing and extra quashing system in rolling stock and stationary installations.

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 summarised as follows:

I. **Road Engineering:** These are design/specification related aspects of roads and highways to enhance road safety. The National Highway Authority of India (NHAI) is ensuring usage of road safety furniture and has taken a number of steps to enhance safety of road users. The safety measures are inbuilt in the projects during design, construction, operations and maintenance.

II. **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.

III. **Education and Training:** These primarily involve spreading road safety awareness and imparting training to drivers. The initiatives undertaken in the field of training are refresher training for heavy vehicle drivers and providing financial assistance to states/UTs for setting up model driving schools to turn out well trained drivers.

IV. **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 centre and for clearing the accident site.

V. Another measure is medical care in which financial assistance upto ₹ 1.50 crores was provided to the state government hospitals located on national highways for upgradation and strengthening of emergency facilities

VI. **Road Safety Audit:** The specific aim of the road safety audit is to minimise the risk and safety of accidents on the national highways and expressways.

Civil Aviation

The Directorate General Civil Aviation (DGCA) has the regulatory responsibility for aviation safety. 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. Mindful of India's State Safety Programme (SSP), DGCA is to maintain an integrated set of regulations and activities aimed at enhancing aviation safety.

DGCA implements proactive and as far as possible predictive strategies, for encouraging all stakeholders and service providers to understand the benefits of a safety culture, which are based on an inclusive reporting culture. DGCA fosters and assists stakeholders in developing comprehensive Safety Management Systems (SMS) and develops preventive safety strategies for the aviation system in an environment of a "just culture". DGCA works with service providers in a cooperative and collaborative manner to help them develop and establish their safety management systems.

The responsibility for coordination and search and rescue (SAR) with other agencies is, however vested with the Airports Authority of India (AAI) under the Airports Authority of India Act, 1944, as amended by AAI (Amendment) Rules, 2003.

The SSP is based on comprehensive analysis of the States Aviation System, safety policies, risk management, safety assurances and permission.

An appropriate legislative framework in safety management has been implemented in India in accordance with ICAO Standard and Recommended Practices (SARPs). For carrying out ICAO functions, India has three layers of legislation - the Aircraft Act 1934 which is the primary legislation, the secondary Aircraft Rules, 1937 and the tertiary Aircraft (Carriage of Dangerous Goods) Rules, 2003.

The DGCA has released a series of Safety Management System-Civil Aviation Regulation (SMS-CARs) about operational regulations and implementation policies for the applicable service providers.

Conclusion

Effective planning and focus on prevention and mitigation would greatly help in ensuring that the hazards do not transform itself into disasters and the coping capacities of the vulnerable population is greatly increased. This would again need systematic planning and coordination to ensure that the Disaster Risk Reduction is constantly promoted and mainstreamed in the regular programmes of each department. Recently planning commission has constituted a committee for inclusion of DRR measures in the 12^{th} five year plan.