

DISASTER RISK MITIGATION AND PREPAREDNESS

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 was inter-alia stressed that disaster prevention, mitigation, preparedness and relief are 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. Therefore, nations should incorporate them in their development plans and ensure efficient follow up measures at the community, sub-regional, regional, national and international levels. The Yokohama Strategy also emphasized that disaster prevention, mitigation and preparedness are better than disaster response in achieving the goals and objectives of vulnerability reduction. Disaster response alone is not sufficient as it yields only temporary results at a very high cost. Prevention and mitigation contribute to lasting improvement in safety and are essential to integrated disaster management.

The Government of India have adopted mitigation and prevention as essential components of their development strategy. 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 developmental process. Each State is supposed to prepare a plan scheme for disaster mitigation in accordance with the approach outlined in the plan. In brief, mitigation is being institutionalized into developmental planning.

The Finance Commission makes recommendations with regard to devolution of funds between the Central Government and State Governments as also outlays for relief and rehabilitation. The earlier Finance Commissions were mandated to look at relief and rehabilitation. The Terms of Reference of the Twelfth Finance Commission have been changed and the Finance Commission has been mandated to look at the requirements for mitigation and prevention apart from its existing mandate of looking at relief and rehabilitation. A Memorandum has been submitted to the Twelfth Finance Commission after consultation with States. The Memorandum proposes a Mitigation Fund.

The Government of India have issued guidelines that where there is a shelf of projects, projects addressing mitigation will be given a priority. It has also been mandated that each project in a hazard prone area will have disaster prevention/mitigation as a term of reference and the project document has to reflect as to how the project addresses that term of reference.

Measures for flood mitigation were taken from 1950 onwards. As against the total of 40 million hectares prone to floods, area of about 15 million hectares have been protected by construction of embankments. A number of dams and barrages have been constructed. The State Governments have been assisted to take up mitigation programmes like construction of raised platforms etc. Floods continue to be a menace however mainly because of the huge quantum of silt being carried by the rivers emanating from the Himalayas. This silt has raised the bed level in many rivers to above the level of the countryside. Embankments have also given rise to problems of drainage with heavy rainfall leading to water logging in areas outside the embankment. To evolve both short-term and long-term strategy for flood management/erosion control, Government of India have recently constituted a Central Task Force under the Chairmanship of Chairman, Central Water Commission. The Task Force will examine causes of the problem of recurring floods and erosion in States and region prone to flood and erosion; and suggest short-term and long-term measures. The Task Force will submit its report by December 2004.

Due to erratic behaviour of monsoons, both low and medium rain fall regions, which constitute about 68% of the total area, are vulnerable to periodical droughts. Our experience has been that almost every third year is a drought year. However, in some of the States, there may be successive drought years enhancing the vulnerability of the population in these areas. Local communities have devised indigenous safety mechanisms and drought oriented farming methods in many parts of the country. From the experience of managing the past droughts particularly the severe drought of 1987, a number of programmes have been launched by the Government to

mitigate the impact of drought in the long run. These programmes include Drought Prone Area Programme (DPAP), Desert Development Programme (DDP), National Watershed Development Project for Rainfed Areas (NWDPA), Watershed Development Programme for Shifting Cultivation (WDPSC), Integrated Water Development Project (IWDP), Integrated Afforestation and Eco-development Project Scheme (IAEPS).

Flood preparedness and response

In order to respond effectively to floods, Ministry of Home Affairs have initiated National Disaster Risk Management Programme in all the flood-prone States. Assistance is being provided to the States to draw up disaster management plans at the State, District, Block/Taluka and Village levels. Awareness generation campaigns to sensitize all the stakeholders on the need for flood preparedness and mitigation measures. Elected representatives and officials are being trained in flood disaster management under the programme. Bihar Orissa, West Bengal, Assam and Uttar Pradesh are among the 17 multi-hazard prone States where this programme is being implemented with UNDP. USAID and European Commission.

Earthquake Risk Mitigation

A comprehensive programme has been taken up for earthquake risk mitigation. Although, the BIS has laid down the standards for construction in the seismic zones, these were not being followed. The building construction in urban and suburban areas is regulated by the Town and Country Planning Acts and Building Regulations. In many cases, the Building regulations do not incorporate the BIS codes. Even where they do, the lack of knowledge regarding seismically safe construction among the architects and engineers as well as lack of awareness regarding their vulnerability among the population led to most of the construction in the urban/sub-urban areas being without reference to BIS standards. In the rural areas, the bulk of the housing is non-engineered construction. The mode of construction in the rural areas has also changed from mud and thatch to brick and concrete construction thereby increasing the vulnerability. The increasing population has led to settlements in vulnerable areas close to the river bed areas which are prone to liquefaction. The Government have moved to address these issues.

National Core Group for Earthquake Risk Mitigation

A [National Core Group for Earthquake Risk Mitigation](#) has been constituted consisting of experts in earthquake engineering and administrators. The Core Group has been assigned with the responsibility of drawing up a strategy and plan of action for mitigating the impact of earthquakes; providing advice and guidance to the States on various aspects of earthquake mitigation; developing/organizing the preparation of handbooks/pamphlets/type designs for earthquake resistant construction; working out systems for assisting the States in the seismically vulnerable zones to adopt/integrate appropriate Bureau of Indian Standards codes in their building byelaws; evolving systems for training of municipal engineers as also practicing architects and engineers in the private sector in the salient features of Bureau of Indian Standards codes and the amended byelaws; evolving a system of certification of architects/engineers for testing their knowledge of earthquake resistant construction; evolving systems for training of masons and carry out intensive awareness generation campaigns.

Review of building bye-laws and their adoption

Most casualties during earthquakes are caused by the collapse of structures. Therefore structural mitigation measures are the key to make a significant impact towards earthquake safety in our country. In view of this the States in earthquake prone zones have been requested to review, and if necessary, amend their building bye-laws to incorporate the BIS seismic codes for construction in the concerned zones. Many States have initiated necessary action in this regard. An Expert Committee appointed by the Core Group on Earthquake Risk Mitigation has already submitted its report covering appropriate [amendments to the existing Town & Country Planning Acts, Land Use Zoning Regulation, Development Control Regulations & Building Bylaws](#), which could be used by the State Governments & the local bodies there-under to upgrade the existing legal instruments. The Model Building Bylaws also cover the aspect of ensuring technical implementation of the safety aspects in all new constructions & upgrading the strength of existing structurally vulnerable constructions. To facilitate the review of existing building byelaws and adoption of the proposed amendments by the State Governments & UT administrations, discussion workshops at regional level in the country are being organized. It is expected that all planning authorities and local bodies will soon have development control regulations and building byelaws which would include multi-hazard safety provisions.

Development and Revision of Codes

There are Bureau of Indian Standard (BIS) codes which are relevant for multi-hazard resistant design and construction. These codes have to be regularly updated. An action plan has been drawn up for revision of existing codes, development of new codes and documents/commentaries, and making these codes and documents available all over the country including on-line access to these codes. [An Apex committee consisting of representatives of Ministry of Consumer Affairs, BIS and MHA](#) has been constituted to review the mechanism and process of development of codes relevant to earthquake risk mitigation and establish a protocol for revision by BIS.

Hazard Safety Cells in States

The States have been advised to constitute [Hazard Safety Cells \(HSC\)](#) headed by the Chief Engineer (Designs), State Public Works Department with necessary engineering staff so as to establish mechanism for proper implementation of the building codes in all future Govt. constructions, and to ensure the safety of buildings and structures from various hazards. The HSC will also be responsible for carrying out appropriate design review of all Government buildings to be constructed in the State, act as an advisory cell to the State Government on the different aspects of building safety against hazards and act as a consultant to the State Government for retrofitting of the lifeline buildings. Rajasthan, West Bengal and Chhatisgarh have already constituted these cells and other States are in the process.

National Programme for Capacity Building of Engineers and Architects in Earthquake Risk Mitigation

Two National Programmes for Capacity Building in Earthquake Risk Mitigation for [Engineers](#) and [Architects](#) respectively, have been approved to assist the State Govts in building capacities for earthquake mitigation. These two programmes are being implemented for training of 10,000 engineers and 10,000 architects in the States in seismically safe building designs and related techno-legal requirements. Assistance is being provided to the State/UTs to build the capacities of more than 125 State Engineering Colleges and 110 Architecture Colleges to be able to provide advisory services to the State Govts to put in place appropriate techno-legal regime, assessment of building and infrastructures and their retrofitting. These institutions will function as State Resource Institutions. Twenty-one National level Engineering and Architecture Institutions have been designated as National Resource Institutes to train the faculty members of selected State Engineering and Architecture colleges. 450 engineering faculty members and 250 architecture faculty members of these State Resource Institutions will be trained during the current year.

Training of rural masons

A programme to assist the States/UTs in training and certification of 50000 masons has been formulated in consultation with Housing and Urban Development Corporation (HUDCO) and the Ministry of Rural Development. The training module for masons to include multi-hazard resistant construction has also been prepared by an expert committee, and revised curriculum will be introduced in the vocational training programme of Ministry of Human Resource Development.

Earthquake Engineering in Undergraduate Engineering/Architecture Curricula

The role of engineers and architects is crucial in reducing earthquake risks by ensuring that the construction adhere to the norms of seismic safety. In view of this, the elements of earthquake engineering is being integrated into the undergraduate engineering and architecture courses. *The model course curricula* for adoption by various technical institutions and universities have been developed and circulated to the Universities and Technical Institutions for adoption in the undergraduate curricula. Ministry of Home Affairs is working with All India Council of Technical Education (AICTE) and Council of Architecture (COA) for introduction of revised curricula for engineering and architecture course from 2005-2006.

Hospital Preparedness and Emergency Health Management in Medical Education

Hospital preparedness is crucial to any disaster response system. Each hospital should have an emergency preparedness plan to deal with mass casualty incidents and the hospital administration/doctor trained for this emergency. The curriculum for medical doctors does not include Hospital Preparedness for emergencies. Therefore capacity building through in-service training of the current health managers and medical personnel in Hospital Preparedness for emergencies or mass causality incident management is essential. At the same time, the future health managers must acquire these skills systematically through the inclusion of health emergency management in the undergraduate and post graduate medical curricula. In consultation with Medical Council of India (MCI), *two committees have been constituted for preparation of curriculum for introduction of emergency health management in MBBS curriculum, and preparation of in-service training of Hospital Managers and Professionals.* Rajiv Gandhi University of Health Sciences Karnataka have been identified as the lead national resource institution for the purpose.

Retrofitting of Lifeline buildings

While these mitigation measures will take care of the new constructions, the problem of unsafe existing buildings stock would still remain. It will not be possible to address the entire existing building stock, therefore the life line buildings like hospitals, schools or buildings where people congregate like cinema halls, multi-storied apartments are being focussed on. The States have been advised to have these buildings assessed and where necessary retrofitted. The Ministries of Civil Aviation, Railways, Telecommunication, Power and Health and Family Welfare have been advised to take up necessary action for detailed evaluation and retrofitting of lifeline buildings located in seismically vulnerable zones so as to ensure that they comply with BIS norms, Action plan have been drawn up by these Ministries for detailed vulnerability analysis and retrofitting/strengthening of buildings and structures. The Ministry of Finance have been requested to advise the financial institutions to give loans for retrofitting on easy terms. Accordingly the Ministry of Finance had advised Reserve Bank of India to issue suitable instructions to all the Banks and Financial Institutions to see that BIS codes/bye laws are scrupulously followed while financing/refinancing construction activities in seismically vulnerable zones.

National Earthquake Risk Mitigation Project

An Earthquake Mitigation Project has been drawn up, with an estimated cost of Rs.1132 crore. The project has been given in-principle clearance by the Planning Commission. The programme includes detailed evaluation and retrofitting of lifeline buildings such as hospitals, schools, water and power supply units, telecommunication buildings, airports/airport control towers, railway stations, bus stands and important administrative buildings in the States in seismic zones IV and

V. The programme also includes training of masons in earthquake resistant constructions. Besides, assistance will be provided under this project to the State Governments to put in place appropriate techno legal regime. Startup activities for implementation of this project have already been initiated.

Acceleration Urban Earthquake Vulnerability Reduction Programme

An accelerated urban earthquake vulnerability reduction programme has been taken up in 38 cities in seismic zones III, IV & V with population of half a million and above. 474 Orientation programmes have been organized for senior officers and representatives of the local planning and development bodies to sensitize them on earthquake preparedness and mitigation measures. The training programme for engineers and architects are being organized to impart knowledge about seismically safe construction and implementation of BIS norms. So far 1088 engineers and 825 architects have been trained. For enhanced school safety, education programmes have been organized in schools, colleges and other educational institutions. This programme will be further extended to 166 earthquake prone districts in seismic zones IV & V. Awareness generation programmes, community and neighbourhood organizations have been started in these cities. These cities are also being assisted to review and amend their building bye-laws to incorporate multi hazard safety provisions. City Disaster Management Plans are being developed under the project. Nine Cities have prepared city Disaster Management Plans.

Mainstreaming Mitigation in Rural Development Schemes

Rural housing and community assets for vulnerable sections of the population are created at a fairly large scale by the Ministry of Rural Development under the Indira Awas Yojna(IAY) and Sampoorn Grameen Rojgar Yojna(SGRY). About 250 thousand small but compact housing units are constructed every year, besides community assets such as community centres, recreation centres, anganwadi centres etc. Technology support is provided by about two hundred rural housing centres spread over the entire country. The Ministry of Home Affairs is working with the Ministry of Rural Development for changing the guidelines so that the houses constructed under IAY or school buildings/community buildings constructed under SGRY are earthquake/cyclone/flood resistant; as also that the schemes addressing mitigation are given priority under SGRY. Ministry of Rural Development are carrying out an exercise for this purpose. This initiative is expected to go a long way in popularization of seismically safe construction at village/block level.

National Cyclone Mitigation Project

A project for Cyclone Mitigation (estimated cost Rs. 1050 crore) has been drawn up in consultation with the cyclone prone States. This project envisages construction of cyclone shelters, coastal shelter belt plantation in areas which are prone to storm surges, strengthening of warning systems, training and education etc. This project has also been given in-principle clearance by the Planning Commission and is being taken up with World Bank assistance.

Landslide Hazard Mitigation

A National Core Group has been constituted under the Chairmanship of Secretary, Border Management and comprising of Secretary, Department of Science and Technology, Secretary, Road Transport & Highways, and the Heads of Geological Survey of India and National Remote Sensing Agency for drawing up a strategy and plan of action for mitigating the impact of landslides, provide advise and guidance to the State Governments on various aspects of landslide mitigation, monitor the activities relating to landslide mitigation including landslide hazard zonation and to evolve early warning systems and protocols for landslides/landslide risk reduction. The Government have designated Geological Survey of India (GSI) as the nodal agency responsible for coordinating/undertaking geological studies, landslides hazard zonation, monitoring landslides/avalanches, studying the factors responsible and suggesting precautionary and preventive measure. The States/UTs have been requested to share the list of habitation close to landslide prone areas in

order to supplement GSI's on going assessment of such areas based on the Survey of India's Toposheet and their existing data base on landslide for the purpose of landslide hazard zonation being carried out by them. A national strategy for mitigating landslide hazard in the country is being drawn up in consultation with all the agencies concerned.

Disaster Risk Management Programme

A *Disaster Risk Management Programme* has been taken up in 169 districts in 17 multi-hazard prone States with the assistance from UNDP, USAID and European Union. Under this project, the States are being assisted to draw up State, district and Block level disaster management plans; village disaster management plans are being developed in conjunction with the Panchayati Raj Institutions and disaster management teams consisting of village volunteers are being trained in various preparedness and response functions such as search and rescue, first aid, relief coordination, shelter management etc. Equipment needs for district and State Emergency Operation Centres have been identified by the State nodal agencies and equipment is being provided to equip these EOCs. Orientation training of masons, engineers and architects in disaster resistant technologies have been initiated in these districts and construction of model demonstration buildings will be started soon.

Under this programme Disaster Management Plans have been prepared for 8643 villages, 1046 Gram Panchayat, 188 blocks and 82 districts. More than 29000 elected representatives of Panchayati Raj Institutions have already been trained, besides imparting training to members of voluntary organizations. About 18000 Government functionaries have been trained in disaster mitigation and preparedness at different levels. 865 engineers and 425 architects have been trained under this programme in vulnerability assessment and retrofitting of lifeline buildings. 600 master trainers and 1200 teachers have already been trained in different districts in disaster preparedness and mitigation. Disaster Management Committees consisting of elected representatives, civil society members, Civil Defence volunteers and Government functionaries have been constituted at all levels including village/urban local body/ward levels. Disaster Management Teams have been constituted in villages and are being imparted training in basic functions of first aid, rescue, evacuation and related issues. The thrust of the programme is to build up capabilities of the community since the community is invariably the first responder. During the recent past, it has been experienced that the capacity building of the community has been very helpful even in normal situations when isolated instances of drowning, burns etc. take place. With the creation of awareness generation on disaster mitigation, the community will be able to function as a well-knit unit in case of any emergency. Mock drills are carried out from time to time under the close supervision of Disaster Management Committees. The Disaster Management Committees and Disaster Management Teams have been established by notifications issued by the State Governments which will ensure that the entire system is institutionalized and does not disintegrate after the conclusion of the programme. The key points being stressed under this programme are the need to ensure sustainability of the programme, development of training modules; manuals and codes, focused attention to awareness generation campaigns; institutionalization of disaster management committees and disaster management teams, disaster management plans and mock-drills and establishment of techno-legal regimes.

Awareness generation

Recognizing that awareness about vulnerabilities is a sine qua non for inducing a mindset of disaster prevention, mitigation and preparedness, the Government has initiated a nation-wide awareness generation campaign as part of its overall disaster risk management strategy. In order to devise an effective and holistic campaign, a steering committee for mass media campaign has been constituted at the national level with due representation of experts from diverse streams of communication. The Committee has formulated a campaign strategy aimed at changing peoples' perception of natural hazards and has consulted the agencies and experts associated with advertising and media to instill a culture of safety against natural hazards.

Apart from the use of print and electronic media, it is proposed to utilize places with high public visibility viz. hospitals, schools, railway stations and bus terminals, airports and post offices,

commercial complexes and municipality offices etc. to make people aware of their vulnerabilities and promote creation of a safe living environment.

A novel method being tried is the use of government stationery viz. postal letters, bank stationery, railway tickets, airline boarding cards and tickets etc. for disseminating the message of disaster risk reduction. Slogans and messages for this purpose have already been developed and have been communicated to concerned Ministries/agencies for printing and dissemination. The mass media campaign will help build the knowledge, attitude and skills of the people in vulnerability reduction and sustainable disaster risk management measures.

Disaster Awareness in School Curriculum

Disaster management as a subject in Social Sciences has been introduced in the school curriculum for Class VIII & IX. The Central Board of Secondary Education (CBSE) which has introduced the curriculum runs a very large number of schools throughout the country and the course curriculum is invariably followed by the State Boards of Secondary Education. Teachers are being trained to teach disaster management Syllabus for Class X is being finalized and will be introduced in the course curriculum soon. The State Governments have been advised to take similar steps vis-à-vis their school boards. Several Provincial Governments have already introduced the same curriculum in Class VII. Ministry is working with the Council of Board of School Education (COBSE) to facilitate inclusion of disaster management in public education in all 39 School Boards in the country.

Information, Education and Communication

In order to assist the State Governments in capacity building and awareness generation activities and to learn from past experiences including sharing of best practices, the Ministry of Home Affairs has compiled/prepared a set of resource materials developed by various organisations/institutions to be replicated and disseminated by State Governments based on their vulnerabilities after translating it into the local languages. The voluminous material which runs in about 10000 pages has been divided into 4 broad sections in 7 volumes. These sections cover planning to cope with disasters; education and training; construction toolkit; and information, education and communication toolkit including multi-media resources on disaster mitigation and preparedness. The Planning section contains material for analyzing a community's risk, development of Preparedness. Mitigation and disaster management plans, coordinating available resources and implementing measures for risk reduction. The model bye-laws, DM Policy, Act and model health sector plan have also been included. Education and Training includes material for capacity building and upgradation of skills of policy makers, administrators, trainers, engineers etc. in planning for and mitigating against natural disasters. Basic and detailed training modules in disaster preparedness have been incorporated along with training methodologies for trainers, for community preparedness and manuals for training at district, block, panchayat and village levels. For creating a disaster-resistant building environment, the Construction Toolkit addresses the issue of seismic resistant construction and retrofitting of existing buildings. BIS Codes, manuals and guidelines for RCC, Masonry and other construction methodologies as also for repair and retrofitting of masonry and low-rise buildings have been included.

IEC material seeks to generate awareness to induce mitigation and preparedness measures for risk reduction. Material and strategies used by various States and international organizations, including tips on different hazards, have been incorporated along with multi-media CDs on disasters. The material has been disseminated to all the State Governments/UT Administrations with the request to have the relevant material, based on the vulnerability of each district, culled out, translated into local languages and disseminate it widely down to the village level.

Special Focus to Northeastern States

A special focus is being given to North-Eastern States and the Andaman & Nicobar Islands. The North-Eastern Council has been made the nodal agency for the NE States. The NEC has been provided with a resource person/advisor in disaster management. A detailed presentation on the vulnerabilities of the NE region and the need for comprehensive disaster management plan has

been made in the Governing Body of NE Council. An action plan has been drawn up by NEC and a declaration namely "Shillong Declaration" has been adopted by States in the NE region for integrating disaster management with development planning. 140 officials and non-officials have been trained in disaster management to act as resource persons for the NE region. State and district level sensitization and training programmes are being carried out.

The various prevention and mitigation measures outlined above are aimed at building up the capabilities of the communities, voluntary organisations and Government functionaries at all levels. Particular stress is being laid on ensuring that these measures are institutionalized considering the vast population and the geographical area of the country. This is a major task being undertaken by the Government to put in place mitigation measures for vulnerability reduction. This is just a beginning. The ultimate goal is to make prevention and mitigation a part of normal day-to-day life. The above mentioned initiatives will be put in place and information disseminated over a period of five to eight years. We have a firm conviction that with these measures in place, we could say with confidence that disasters like Orissa cyclone and Bhuj earthquake will not be allowed to recur in this country; at least not at the cost, which the country has paid in these two disasters in terms of human lives, livestock, loss of property and means of livelihood.

Tips on Earthquake Resistant Building

[Essential Earthquake resistant Provisions in Masonry Buildings](#)

[Short Guide for home Owners for Building Houses using Reinforced Concrete framed Construction](#)

[Short Guide for home Owners for Building Houses using Load Bearing Masonry Construction](#)

[HOME](#)