

Disaster Management Initiative

The Government of Maharashtra (GOM) supported the development of a comprehensive disaster management program that included the development of response plans at the state and district levels; the identification of risks and vulnerability for each district and the state; and the identification of mitigation strategies and training at the state, district, and village levels. The GOM is now embarking on the next phase of this planning process to help villagers develop vulnerability identification and risk reduction strategies. Interest and commitment to the disaster management program at all levels throughout the state, from the chief secretary and chief minister to the district and village level, have contributed to the success of this far-reaching program.

In the initial working papers developed by the World Bank, the need for a disaster management program was recognized. An early document pointed out:

The principal purpose to engage in disaster management is to reduce vulnerability of the population and the built environment before disasters occur: to minimize life and property loss, enhance populations' resilience by providing development opportunities, and to ensure environmental viability for future generations.

Disaster management rests on the foundation of disaster preparedness planning, mitigation, and prevention, and is informed by the knowledge generated by research on earthquakes, floods, high winds, and other natural hazards. Disaster management cannot be viewed separately from environmental management, and jointly they must be integrated into the development activities of a country or a region. . . .

As a function of social and economic conditions of the population, disaster vulnerability cannot be successfully dealt with as a single-focus item on the policy agenda of most developing countries. Commonly, lesser developed countries can ill afford even the most urgent everyday development programs, such as access to safe water supply, basic health care and education to the majority of their citizens. . . neglecting vulnerabil-

ity reduction may be a costly choice, since disasters tend to bring about substantial destruction and significantly slow down the normal development process (World Bank, 1993, 57).

The development of a disaster management plan thus became an important independent thrust of the project.

Planning Process

1995 Disaster Management Conference

After an initial appraisal mission, the GOM and the World Bank team began the disaster management process by organizing a workshop involving all the relevant state government agencies, NGOs, central government representatives, and representatives from the private sector. With funding from the U.K. Overseas Development Administration (now called Department for International Development), an International Workshop on Disaster Management was held in May 1995. Approximately 60 representatives participated in two days of presentations and discussions that focused on developing ideas that would improve mitigation, response, and recovery at the state level.

Management Structure and Committees: Selection of Hazards

An action plan outlining a series of tasks that needed to be completed as part of the disaster management process was the result of the 1995 workshop. It identified products and appropriate agencies to be responsible for the products and specified a management structure for the process. A Disaster Management Council was formed, consisting of various secretaries and chaired by the Chief Secretary (secretaries are equivalent to state agency directors). There was also a working council with 11 deputy secretaries, an NGO representative, and a district collector.

The Disaster Management Council first met in January 1996 and outlined a structure for completing a disaster management plan for the state. Although

the action plan had originally identified 16 committees that would work on various aspects of the plan, the Disaster Management Council thought such a large number of committees would be too unwieldy, so they reduced the number to five committees, each addressing a major hazard in Maharashtra. The committee and chair of each are listed below:

Subject	Chair of the Committee
Floods and Cyclone	Secretary, Relief and Rehabilitation
Earthquake	Secretary, Earthquake Rehabilitation
Industrial and Chemical Hazards	Secretary, Industries
Road Accidents and Fire	Transport Commissioner
Epidemics	Secretary, Health

The decision to make the plan multihazard rather than focusing solely on the infrequent hazard of earthquakes was made early in the process. To be practical, the plan needed a broader constituency and a recognition of the generalizable aspects of mitigation and response for a range of hazards. The decision to focus on five hazards was made by GOM officials and the Disaster Management Council in consultation with some of the participants at the 1995 workshop. The broad approach to risk went beyond natural hazards and included road accidents and epidemics. This was an appropriate policy response in situations where scarce resources could not be narrowly targeted on a single infrequent hazard. Investment in risk reduction must be optimized over the range of relevant risks.

Each committee consisted of technical experts and NGO representatives in addition to GOM officials. The objective was to develop a plan through an active participatory process, and each committee encouraged participation from interested organizations and individuals. The committee meetings had widespread and enthusiastic participation. Each committee was to identify all existing plans, studies, and data sources related to disaster management for the particular hazard, and at the end of the process a significant body of expertise in each area would be identified (GOM, 1998).

It should be noted that access to data can be a major issue in India. Some data, such as seismologi-

cal records, are collected by central government agencies. Other data, such as that relating to buildings, are collected by state and district level authorities. Still other data remain in the hands of research institutions and the private sector. Access to information can be a major challenge to plan developers because each agency tends to regard its collected data as proprietary. Thus, pulling together data sources for the various hazards was a challenging aspect of the planning process.

Since the GOM already had a comprehensive drought management program, they decided not to address drought as one of the primary hazards in the planning process, even though this is one of the most drought-prone areas of the world. While the GOM believed they could adapt some of their drought management strategies for other hazards in their plan (particularly the structure of the plan and the annual agency updates to review readiness), there was no need to create a committee to address this hazard in any detail.

After the Disaster Management Council was created and the committees had begun meeting, the GOM appointed consultants to help in the formulation of the plans. Together with the consultants the GOM decided on a structure for its plan, consisting of a risk and vulnerability assessment for the state, various types of response plans for all the districts and the state, and a mitigation strategy for the state. It was also decided that plans would be prepared by the national consultant for six districts (out of 31) on a pilot basis. These plans were to follow a similar format to that of the state plan. The United Nations Development Program (UNDP) provided funds for the preparation of plans for the remaining 25 districts, including Mumbai.

At the initial 1995 workshop there was a reluctance to focus on the Mumbai (Bombay) district for three reasons: its level of complexity and scale was not compatible with the other districts; the perceived emphasis in India is on helping rural populations and addressing rural problems, where most people live; there was sensitivity to the potential risk of creating panic among residents with any discussion of potential building collapses in earthquakes (in Mumbai there are typically a handful of collapses of old, taller buildings each year due to poor maintenance and age). This reluctance changed over time. Knowledge

and awareness of the importance of disaster management grew with the preparation of the state plan. In addition, serious flooding in Mumbai during the monsoons in August 1997 called attention to the need for a disaster plan, inspiring state and district officials to begin a concerted effort to focus on Mumbai. Funding from the Department for International Development of the U.K. was critical to the successful planning for Mumbai (Figure 50).

Documents

Three major documents were prepared:

- Risk and Vulnerability Analysis
- Disaster Management Action Plan (DMAP)
- Mitigation Strategy

Risk and Vulnerability Analysis

One of the first documents produced as part of this planning process was a risk and vulnerability assessment. The intent was to prepare the document for the state and then give the model to the districts so that district-level risk and vulnerability studies could be conducted with the more detailed data that was available at the district level. Formats and templates of the information requirements at the district level were prepared and discussed with district collectors and divisional commissioners at a workshop in January 1997 in Mumbai. Using these formats and templates, district collectors held a number of meetings to collect data. Coordinators were appointed to work with the district collectors to verify information and collect data.

The risk analysis for the state discussed the risk associated with each of the major hazards identified



Figure 50 Older building in Mumbai undergoing nonseismic-related repair and maintenance due to problems with corrosion.

as part of the planning process: earthquakes, cyclones, floods, epidemics, road accidents, fires, and industrial hazards. The GOM identified a number of factors contributing to this vulnerable status:

- **Economy.** Floods and cyclones can have a devastating effect on agriculture, so the primary economic sector comes under threat from these two hazards. The impact of the disaster may be more severe for women workers and wage laborers in the rural areas. The situation would be similar for male workers in urban areas.
- **Poverty.** The people most affected by a disaster are those with the most limited resources and little access to food and shelter. Poverty leads to vulnerable housing, since poor people primarily occupy the uninhabitable areas, hillside slopes, slums, settlements near stormwater drainage systems, etc. Lack of access to education can also make populations more vulnerable in the event of a disaster.
- **Social Structure.** Most of the poor in Maharashtra are from scheduled castes (generally landless laborers) and scheduled tribes (indigenous peoples), making them more vulnerable. “Scheduled” refers to castes that are enumerated in a schedule of the constitution. These castes and tribes have a lower rate of literacy as well as fewer job opportunities and fewer opportunities to participate in decisionmaking, particularly critical decisions related to mitigation and rehabilitation.
- **Urbanization.** Urbanization increases vulnerability because of high rates of incoming migration and the high population density. An increasing influx of poor immigrants to the state’s urban areas adds pressure on the existing infrastructure and land resources.
- **Infrastructure.** Warning messages are generally communicated through the mass media, which may not be accessible to all threatened populations. Poor road conditions and lack of public transportation make some remote villages particularly vulnerable, as they are either trapped or inaccessible.
- **Housing.** Construction materials, age, and poor maintenance contribute to the vulnerability of the housing stock.

As part of the planning process, the state and individual districts continue to collect data on risk and vulnerability. The data will help government officials prioritize limited resources, integrate with other priorities, and direct attention to the most vulnerable areas and population groups. Information regarding poverty alleviation policies will also be factored in, as they would reduce vulnerability. These include programs such as social welfare, employment for youth, and the development of social and economic programs for women and children in rural areas (GOM, 1998e).

Disaster Management Action Plans (DMAP)

As part of the disaster management planning process, a state Disaster Management Action Plan (DMAP) was prepared, along with corresponding plans at the district levels (GOM, 1998f). The action plans focus on the state and district emergency response actions, building on the need for coordination and effective information flow. The action plans also call for significant involvement on the part of NGOs and the private sector. An Emergency Operations Center (EOC) (“Control Room”) in Mantralaya, the GOM’s headquarters in Mumbai, was created as part of this plan.

At each district level, a District Control Room was organized in a similar fashion to the EOC. The flow of information is clearly prescribed for both disaster and normal conditions. The plan is to be disseminated at three levels:

- To central government departments, multilateral agencies, defense services, and state level officials.
- To district authorities, government departments, NGOs, and other institutions and agencies within the state.
- Through the mass media to the general public.

In addition to the dissemination of literature, the Relief Commissioner is to ensure that disaster response drills are conducted regularly and that the DMAP is updated annually. The Commissioner is to organize an annual conference for DMAP, where all concerned departments and agencies are to participate and give recommendations on specific issues.

Operating Procedure Guidelines and Standards for Monitoring is a separate document that includes procedures for warning, operating procedures for evacuation, and comprehensive operating procedures for the departments, as well as standards of service and specifications for relief camps, cattle camps, and feeding centers (GOM, 1998g).

Mitigation Strategy

The third major document prepared as part of the disaster management plan is the mitigation strategy for the state (GOM, 1998h). The goals of the mitigation strategy are as follows:

- To substantially increase public awareness of disaster risk so that the public will demand safer communities in which to live and work.
- To significantly reduce the risk of loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from disasters.

State officials (GOM, 1998d) pointed out that this is an appropriate time to launch a state-level effort because:

- The economic and social costs of recent large-scale disasters like the Latur earthquake are still a fresh memory.
- Significant technical know-how is becoming part of practical application.
- Mitigation is being recognized as an integral component of sustainable development.
- There is a growing awareness of the need to develop a multidisaster approach to mitigation.
- There is an ongoing United Nations Development Program (UNDP) to define the roles of the central and state governments for reducing the impacts of disasters.

The main elements of the mitigation strategy are as follows:

- **Risk assessment and vulnerability analysis.** This element of the mitigation strategy calls for further studies on risk and vulnerability, including the involvement of local communities in identifying their own vulnerabilities.
- **Applied research and technology transfer.** The strategy calls for expanding observational

and monitoring systems, particularly in areas of the region where data is scarce and risk is high. There is a great need to establish or upgrade observational equipment and networks, monitor the hazards, improve the quality of forecasts and warnings, disseminate warnings quickly through the warning system, and undertake simulated disaster management exercises.

- **Public awareness and training.** One of the most critical components of the mitigation strategy was the training needed for officials and staff at both the state and district levels. Training Needs Assessment exercises for different categories and levels of functionaries will help identify the gaps that training can address. The Center for Disaster Management at Yeshwantrao Chavan Academy of Development Administration (YASHADA) will play a pivotal role in this training for state and district level officials and officials from line departments, as well as provide training for major NGOs and private sector organizations. The upgrading and strengthening of this center is an important part of the mitigation strategy.

Efforts will also be made to build on the capacity of NGOs as resource groups for community participation, and to bring in the private sector, particularly the sugar cooperatives in Maharashtra, with their strong resource base, professional competence, and infrastructure facilities. The district administration will encourage the adoption of community-based mitigation strategies on the part of local self-governments, NGOs, private sector organizations, and businesses.

- **Institutional mechanisms.** A permanent administrative structure needs to be identified to monitor developmental activities across departments and to provide suggestions for incorporating necessary mitigation measures. Existing bodies, such as the Chamber of Commerce, Confederation of Industry, and Agriculture Produce Market, will also be asked to promote mitigation measures among their membership.
- **Disaster management legislation and relief and rehabilitation policy.** Over the years, government efforts to regulate relief and rehabilitation after disasters have resulted in a number of

policy guidelines and orders. These need to be evaluated and brought together under more coherent disaster management legislation and relief and rehabilitation policy.

- **Incentives and resources for mitigation.** The mitigation strategy calls for making mitigation a priority in all state actions and linking it with incentives, grants, and loan programs. The state has proposed creating a Vulnerability Reduction Fund at the state level that can provide funding for mitigation activities.

The state has also called for research into the feasibility of disaster insurance, available not just for life but also for household goods, cattle, structures, and crops.

- **Land use planning and regulations.** The mitigation strategy calls for long-term disaster reduction efforts that aim at promoting appropriate land use in disaster-prone areas, particularly the formulation of land use policies for long-term sustainable development. Sensitivity to the use of land within a settlement is important.

Implementation Strategy

The GOM recognized early on that in order to facilitate long-term interest and commitment to the planning process, sustained institutional support would be required. This included developing an implementation strategy with several components or activities. These included:

- Establishment of the Emergency Operations Center (EOC) in Mantralaya and the District Control Rooms.
- Communication network for the state consisting of wireless (VHF) and satellite (VSAT) networks.
- Computerized Disaster Management Information (DMIS) using GIS applications.
- Community disaster preparedness programs, and training and support to regularly update the plans.

These activities to support implementation of the disaster management process were developed in a very short time frame (a year and a half), with the direct supervision and involvement of the officials who were simultaneously managing the rebuilding

project. Funding from the U.K. Department for International Development was used to support these implementation activities. Each of these activities is described in more detail below.

Emergency Operations Center (EOC)

As the center for decisionmaking under a unified command, the primary function of the EOC is to implement the Disaster Management Action Plan (DMAP), which includes coordination, policy making, operations management, data collection, record keeping, public information, and resource management (Figure 51). In a disaster, the EOC is under the direct control of the chief secretary, or any other person designated as the chief of operations. Under normal circumstances, the activities of the EOC are primarily the responsibility of the relief commissioner. Day-to-day activities include:

- Ensuring that all districts continue to regularly update the District DMAP and encouraging districts to prepare area-specific plans for areas prone to specific disasters.
- Identifying and interacting with the central laboratories, research institutions, and NGOs to evolve mitigation strategies and set up study groups and task forces for specific vulnerability studies.
- Serving as a data bank to ensure that due consideration is given to mitigation strategies in the planning process; identifying agencies and institutions for locating inventory items.
- Upgrading and updating the state DMAP according to changing situations in the state.
- Disseminating information about the state DMAP to other departments of the GOM and state-level agencies.
- Monitoring the training of state level officials, the private sector, and NGOs by YASHADA.
- Organizing post-disaster evaluation and updating the state DMAP accordingly.
- Ensuring that the warning and communication systems and instruments in the EOC are in working condition.



Figure 51 *The Emergency Operations Center in Mantralaya under construction.*

Communications Network

After conducting a feasibility study to identify the most appropriate communication network design, the GOM approved a plan to create a several-layered network. Each district will be linked to the subdivisional and taluka (subdistrict) headquarters through the VHF network.

A separate VHF network is being designed for Mumbai to meet the extensive needs of the city during disaster situations. A VSAT network is being designed to link Mantralaya (the seat of state government) to divisional and district headquarters. A by-product of the VSAT network is a statewide e-mail system, set up with funding from the GOM. Video conferencing facilities are also included as part of this communications network. Installation of these networks is currently under way and will soon be completed.

Disaster Management Information System

As part of the overall approach to disaster management, the GOM decided to create a Geographic Information System (GIS)-based Disaster Management Information System (DMIS) to assist in the management and monitoring of disaster situations, as well as to assist in understanding hazard and risk at the state and district levels. The Maharashtra Remote Sensing Applications Centre (MRSAC) in Nagpur has been assigned to create this system, which will be used for data collection, formatting, storage, manipulation, transmission, updating, analysis and query development, and network/communications linkages. In addition to its use for hazard and risk assessment and organizing response operations, the DMIS will have a great functional value for resource and development planning in each district. It is the first comprehensive database of its kind to be developed in Maharashtra. This information system will be expanded and continued

with funds from the Department for International Development, U.K. (DFID).

Training for Disaster Management

In 1995, midway through the rebuilding project, a Center for Disaster Management was established at YASHADA in Pune, with funding support from the Natural Disaster Management Division, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India (GOI). YASHADA is the primary training center for GOM officials, providing training in a range of administrative, management, and policy topics. In addition, the United Nations Development Program funded YASHADA to coordinate the preparation of the response plans for 25 districts in the state. Plans are now under way to strengthen YASHADA's capability as a training center in disaster management. One of its primary responsibilities will be to review and update state and district disaster plans. It will also serve as a documentation center for disaster management, promoting research. A series of case studies of different disaster experiences in India will be prepared for the training exercises.

YASHADA will also be involved in the following activities:

- Upgrading training technology.
- Updating methodologies for risk analysis and vulnerability assessment.
- Refining methodologies for training at the center and at the community (district, village) level.
- Identifying appropriate training institutions and setting up disaster-management training programs in these institutions.
- Identifying resource persons for participating in training programs and simulation exercises.
- Providing training on information and communication systems.
- Preparing methodologies for training needs assessment and community needs assessment.
- Preparing training materials and training modules, including A-V aids, case studies, discussion outlines, simulation tools, games, materials, and handouts.

YASHADA is currently in the early phases of the training needs assessment. Some of the work that will be conducted in the next phase (needs assessment, development of training courses for response plans at state and district levels, etc.) will be supported by funding from the DFID.

International Workshop in 1998

To showcase the disaster management initiative with its many components, the GOM organized an international workshop in July 1998. This workshop included presentations by some of the organizations that had been involved in the rebuilding project, such as NGOs and government contractors, as well as government agencies responsible for various aspects of disaster management. It provided an opportunity for the government to officially release the document *Earthquake-Resistant Construction and Seismic Strengthening of Non-Engineered Buildings in Rural Areas of Maharashtra – Manual* (GOM, 1998a), as well as all the planning documents prepared as part of the disaster management component. High-ranking government officials from Mumbai and the state government, including the Chief Minister and the Chief Secretary, participated and gave their support for continued involvement in disaster management.

A particular focus of the workshop was on the problems and planning efforts under way in Mumbai. A draft of the Mumbai plan was unveiled at the workshop and further drafts have incorporated some of the workshop discussion. An ongoing initiative exists to address the disaster management requirements of this megacity. This work will continue outside MEERP. The GOM is committed to the development and maintenance of an effective disaster management plan for Mumbai (Figure 52). Private sector corporations have expressed interest in being involved in the disaster planning efforts and there is an effort to link Mumbai's planning with other efforts around the world, particularly through the RADIUS project (a Japanese government and United Nations project that is supporting the preparation of risk and vulnerability assessments in several cities around the world).



Figure 52 Downtown Mumbai, portions of which sit on reclaimed land. Traffic congestion, including auto and rail, can be a major problem even without a disaster.

Program Sustainability

With the conclusion of MEERP and the dismantling of the exceptional financial and administrative provisions of this project, the GOM recognizes that it is critically important to establish sustainable institutional commitments to earthquake risk reduction be established.

To that end, a Disaster Management Unit (DMU) will be permanently established under the Secretary for Relief and Rehabilitation, and a budget for such has been allocated. Three principal activities will be supported by the DMU:

- Mitigation assessment and training system (including a network manager, DMIS experts in remote sensing, and GIS for disaster management at the district level).

- Expanded disaster management training for administrators and professionals including assistance to YASHADA and global networking.
- Community level integration emphasizing local initiative and participation. Even in the rural areas local governments will be encouraged to issue building permits (not previously done) with the requirement that the provisions of the manual for earthquake-resistant construction (GOM, 1998a) be followed.

The success of the disaster management initiative in Maharashtra reflects the strong and consistent support of the highest level of state government and the exceptional administrative skills and leadership of the GOM project managers.

