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THE TECHNOLOGICAL CHALLENGE OF DISASTER MANAGEMENT PLAN FOR THE STATE OF MAHARASHTRA

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The Context

The Disaster Management Plan for the State of Maharashtra represents one of the most innovative and significant examples of what an imaginative and reform-oriented public administration can accomplish through its initiative and drive in the most exacting circumstances. It showed how synergy, shared goals and vision among different stakeholders could produce outstanding results in a limited time frame. The DMP is indeed a very positive demonstration of many of the management concepts advocated today.

It started in the grim and tragic backdrop of the Latur earthquake of 30th September 1993, which killed around 8,000 people. The damage to the living environment was colossal and irreparable. The State government received a big helping hand from the World Bank, which signed a MOU with the Government of India within a week of disaster, to support the rehabilitation efforts. The Maharashtra Emergency Earthquake Rehabilitation Programme was drawn up with a planned outlay of$ 300 million, and implemented over a period of four and half years. It is probably the largest rehabilitation programme in terms of households and the area covered. Nearly 250,000 families took part in the reconstruction programme, making it one of the most successful post-disaster recovery and reconstruction programmes.

In the development credit agreement the GOI signed with the World Bank, the preparation of disaster management plan for the state was mentioned as one of many outputs planned. It appeared as a subtext of the credit agreement. The agreement, and the entire credit negotiation preceding it, did not establish its critical importance. In (act, nothing happened on this front till one full year after the MEERP commenced. The first workshop, which was attended by the officials and experts, was organized in May 1995 almost a year after the World Bank loan became effective. The project authorities were totally preoccupied with the spadework required for this massive rehabilitation programme to get off. The May 1995 workshop inaugurated the process. However, there was a lull again for a year till mid-1996, when there was absolutely no progress in this area. The project was going through a very critical phase, with a number of destabilizing developments.

International Support

The MEERP acquired a steady course in mid-l996, and Disaster Management Plan as an activity picked up. Within the government, there was a growing commitment to his activity. The GOM appointed national and international consultants to assist in the preparation of these plans, with the Department for International Development (DFID) support. At this time, the UNDP evinced interest in strengthening this programme. The initial goal was to develop the state plan and pilot plans for six districts. The UNDP support made it possible to cover all the remaining districts of the state. The UNDP support also coincided with the GOl's decision to assist the state government in setting up a Centre for Disaster Management. The GOM located the Centre for Disaster Management in the Yashwantrao Chavan Academy of Development Administration (YASHADA), Pune, the apex training organization of the state government. It was envisaged that this centre would grow up in the process of preparing the disaster management plans for remaining 25 districts. The UNDP support was, therefore, made available for institution-building in the Y ASHADA, as well as for the preparation of district disaster management plans. The synchronized support of the World Bank, DFID, UNDP, GOI; and GOM to the Disaster Management Plan actually explains its far-reaching agenda.

The disaster management plans presented a risk assessment and vulnerability analysis, explained the command and coordination structure, set up the operating standards, created a resource directory, and laid down a mitigation strategy. These plans are area-specific, and they have been prepared on the strength of an impressive database created for all the districts. However, as we went along, it became clear that the plan documents need to be supported with the critical resources. The World Bank organized a review meeting of the Disaster Management Plan in Washington in June 1997, which was attended by the Bank officials, the DFID and UNDP experts, and the GOM officials. For three days, the GOM made

a full-scale presentation of all the plan documents. This proved to be a watershed event for the Disaster Management Plan.

The GOM's presentation received the complete approval and support of all the multi-lateral agencies. The World Bank immediately agreed to extend support for the setting up of the control rooms, communication network, and the GIS-based Disaster Management Plan for the entire state. The DFID decided to renew its support this activity through a fresh grant of £2.5 million. The Disaster Management PIan emerged from the shadow of the MEERP, to become a full-fledged programme. It entered into the implementation phase. It was the beginning of a challenge for us, for all these activities must be completed in a very limited time of one and half year, the period of credit left for the MEERP.

Implementation Activities:

In the government, the need for critical support to the disaster management functions of the district administration has been felt for a long time. However, there was an inadequate articulation of the support required. There was an occasional demand for a wireless network connecting the Collector to the sub-divisions and Talukas. It did not, however, lead to an organized move within the government for augmentation of the communication facilities. However, the planning for disaster management brought up prominently the operational requirements of the plan activities. There was an emphasis on setting up well-equipped control rooms. There was a general agreement about this facility among all concerned. The communication network was an essential facility required for operational support. While the government officials have been familiar with the support the VHF network would provide, the VSAT network came up as a matter of a new initiative. We looked for a communication network, which would provide connectivity between districts, divisions and the state headquarters, independent of the Department of Telecommunication lines. So, the VSAT network was an alternative suggested. However, in the government, there was no strong commitment to this activity, compared to the VHF network. It was thought that a feasibility survey of the VSAT network would be carried out. and a decision about it installation and commissioning would be taken later. However, when the World Bank agreed to support all the implementation activities proposed by the GOM, after the review meeting in Washington, we decided to commission the VSAT network.

The VHF and VSAT network would provide a very dependable communication network to the state and district administrators. It has been the common experience that whenever heavy rains take place in the state, the terrestrial line is the first casualty, and long-distance connectivity is lost. In a disaster situation, the communication lines with the district authorities and line departments, is the key to organizing response operations. So building these networks represented the first priority of the government.

The GIS-based Disaster Management Information System evolved out of the planning activities for disaster management. When we convened the first meeting of the Collectors for the preparation of plan documents, they made a suggestion that a GIS-based disaster management plan would be the most appropriate exercise. It would be the most helpful in planning response actions. The Collectors were of the view that planning evacuation and exit routes in case of natural or chemical disaster was much simpler, if the GIS support is available. The GIS would also help them locate their resources much better for the deployment in disaster-affected areas. At that time, the government had not even thought of using the GIS applications. In course of doing our rounds of divisional meetings, we visited the Maharashtra Remote Sensing Application Centre, Nagpur, which had done some work in developing the GIS-based applications. We saw the possibility of using the important tool for supporting the disaster management plans. We decided to prepare hazard maps for different kinds of hazards for all the districts. The hazard maps on 1:250,000 scale would show all the hazard-prone settlements, and the facilities like the Police Station, PHC, Fire Station etc. on the map. The road and rail network and the river system would also be shown on the map. These maps would give the Collectors a very accurate idea of the area and population affected, and how the resources could be reached to those who are affected.

Along the way, we realized that the GIS-based Disaster Management Information System would also be helpful in all kinds of planning and development efforts. So we started with the DMIS on 1:250,000 scale with the UNDP support, and once the World Bank gave its support, we decided to do it on 1:50,000 scale for all the districts except Mumbai. This became a detailed exercise for mapping of resources as well as socio-economic attributes.

Though these facilities have not been fully commissioned, the officials have started using them. In a number of districts, the Collectors used the wireless network during the floods last year. Similarly, a number of departments are using the GIS database for range of functions.

Intra-district VHF Communication Network

The decision to set up a semi-duplex VHF network for intra-district communication was taken after assessing all the other options in term of cost and reliability. The VHF communication network would provide a reliable and cheap means of communication, independent of terrestrial lines, between the district, sub-division, and. Talukas. It would provide a civil wireless system to the civilian administrators throughout the state at a cost of approximately Rs. 10 crores. The GOM commissioned a topographical survey of the entire state in course of preparing the feasibility study for the VHF network. The work was awarded through an international competitive bidding. As part of this network, a total of 600 base stations, 56 repeater stations, 190 mobile stations, and 150 hand-held sets have been installed: At present, the network has become fully operational in 11 districts. The construction and electrification of repeater stations, located on remote and inaccessible sites, took considerable time. The completion of repeater rooms by March-end will make the entire network fully operational throughout the state. In those districts, where the VHF network has been commissioned, it is working smoothly. It is planned that the regular staff would operate the wireless sets, and no additional post of wireless operators has been created. In all the districts, training programmes have been organized for the concerned staff. The GOM would maintain the network through an annual maintenance contract, after the warranty period is over.

Inter-district VSAT Network

To provide failsafe means of non-terrestrial communication, the GOM took a decision to set up the VSAT network, connecting the state headquarters with the divisional and district headquarters. In course of preparing the feasibility survey, the option of setting up an SCPC-DAMA system was selected. It was meant to be a closed user group, with two hubs, and 37 fixed stations. The main hub would be in Mantralaya in Mumbai, with a stand-by hub in the YASHADA, Pune. The network is capable of providing a variety of telecom services including voice, data, facsimile, and vide-conferencing. There is an exclusive transponder space for the VSA T network, which means that the GOM will not utilize the satellite resources on a shared basis with other users.

When the GOM was planning for the VSAT network, the INSAT-2D failed, and the DOT was not in a position to commit satellite resources to the GOM. With the approval of the DOT, the GOM approached the VSNL, and secured the transponder space in INTELSAT. It is a KU band network, which the GOM has been one of the firsts to install in the country. The procurement of the VSAT network was decided through an international competitive bidding. The commissioning of the network is in progress, and by March 15, six sites will start transmitting signals. The process of commissioning has been beset with commercial and shipping problems, as it is a highly import-intensive network. The VSATs in all the other districts will be commissioned by April-end.

Implementation Arrangements for VHF and VSAT Network:

The GOM appointed the procurement, engineering and system integration consultants for the installation and commissioning of both the communications networks. The choice of the consultants was MELTRON, a state public sector undertaking, on a sole source basis. Though the World Bank has reservations about a public sector undertaking being appointed a sole source consultant, the GOM insisted that the MEL TRON be appointed for this purpose. There were considerations of providing continuity and support to the entire activity on a sustained basis through a public sector undertaking. Considering that the implementing organization would fold up after the MEERP is completed, the support from a government organization like MELTRON to maintain the networks was considered essential.

The consultants prepared the bid document, organized the pre-bid conference, and evaluated the bids for the final recommendation. The VHF bidding process went off smoothly. However, there was re-bidding for the VSAT network, as all the tenders were either commercially or technically non-responsive. In the

second round of bidding, the decision could be taken after a lot of clarifications were obtained from all the bidders concerned. Incidentally, both the bids were awarded to the same contractor. This could have given the contractor the advantage of scale of operations. However, poor commercial support and inadequate managerial strength dogged the process of implementation.

E-mail Network

The GOM decided to utilize the VSAT connectivity in all the districts of the state to provide a closed-user group intranet e-mail to all the government officials in the state. To install the e-mail network, the GOM has decided to procure and install high-end server class computers, routers, modems, and hubs in Mantralaya, YASHADA and all the commissioners and collectors' offices. The GOM is organizing the necessary software support, which would also enable the staff to correspond in Marathi. The work on the e-mail network has just begun and it is expected to be complete by April 30. Though the procurement of e-mail network is an extension of the VSAT network, which is reimbursable by the World Bank, its cost will be borne by the GOM.

The GOM has assigned the procurement contract to the same contractor who is installing the VSAT network. The contractor would procure the hardware and peripherals and integrate them with the software being supplied by the GOM. It was realized that the extension in the scope of VSAT procurement to cover the E-mail would cut short the time required for a fresh bid consideration, and achieve synchronization. The capacity of E-mail network was sized, and the specifications for the servers, routers, and moderns fixed after extensive consultations with the technical experts. The entire architecture of the network was proof-checked, so as to verify its optimal functioning.

GIS-based Disaster Management Information System

The GOM decided to create the GIS-based Disaster Management Information System on 1:250,000 and 1:50,000 scale for all the districts of Maharashtra except Mumbai. The creation of DMIS is primarily meant to compile, store, and update information related to hazards, as it facilitates integrated analysis of the spatial and non-spatial data and generation of hazard maps relevant to districts in Maharashtra. The hazard maps include flood and epidemics, earthquake, accidents, industrial hazards, fire, cyclone, etc. The database, which would be made available in all the districts, will enable district officials to plan better for disaster preparedness, vulnerability analysis, and response plans.

The GOM assigned the work of creating the DMIS to the Maharashtra Remote Sensing Applications Centre (MRSAC), Nagpur. The MRSAC is the GOM's organization, specializing in remote sensing applications. The choice of the MRSAC was for several reasons. Firstly, the digitization of the spatial data would require a great deal of interpretation of the satellite imagery, which constituted the strength of MRSAC. Secondly, the MRSAC also has the necessary equipments and expertise in GIS. Thirdly, the entire database of districts need to be updated periodically, which only a government organization like the MRSAC could do on a regular basis non-commercially. The MRSAC's was one of the largest sole source consultancies approved by the World Bank.

The MRSAC was also appointed the procurement consultant for the computer hardware and software for all the districts. The GOM procured computers for all the Commissioners and Collectors, along with the GIS software of arcinfo and arcview. The procurement has been organized in a way that all the software upgrades available in the next five years would be made available to all the offices in the state. The MRSAC has organized training programme at the state and divisional levels. The district-level training programme for all the districts is likely to begin soon.

In the creation of the DMIS, following steps are involved:

- Creation of Base Maps
- Procurement of Satellite data
- Interpretation of Satellite data
- Collection and compilation of non-spatial data
- Computerization of spatial and non-spatial data
- Integrated analysis of spatial and non-spatial data and generation of hazard maps

- Transfer of digital data base to district authorities
- Development of shell query and Updation of facilities
- Training of district officials and assistance in implementation

The DMIS on 1:250,000 scale for all the districts has been completed. The digitization of data on 1:50,000 scale has been completed for 17 districts in the first phase of the activity, supported by the World Bank. In the next phase, which the DFID will support, the digitization of remaining districts will be completed. The elaborate query design too will be taken up in the next phase only.

The MRSAC secured the remote sensing data from the National Remote Sensing Applications Centre, and got it interpreted through a number of sub-contractors in the private sector. Once the thematic maps were made available, the experts checked these maps and validated it with the ground level findings. After the validation, the digitization of these maps would be done in the MRSAC, and the physical and socio-economic data attributed to the maps. Another round of validation takes place, before the database is finally approved. The important inputs in this exercise are the remote sensing maps and physical and socio-economic data. Further, it requires an intensive work to digitize these data, and validate them.

Though the primary objective of the DMIS is to plan for disasters, the database has been organized in such a way that it could be extensively utilized for resource planning. A number of departments, like the Water Supply, Water Conservation, PWD, Forests, etc. are using the database for their own applications. The MRSAC has decided to appoint one GIS specialist for every division, and one for Mantralaya, to provide all the hardware and software support to all the officers for developing and using GIS applications.

Control Rooms

To physically locate the communication network and GIS-based DMIS, it has been decided to set up control rooms in Mantralaya, divisional commissioners and Collectors' offices. The GOM has developed a standard layout for all the control rooms, and is organizing architectural support throughout the state to set it up. In most of the districts, the control room, equipped with all the facilities, has now been set up.

Facilitation

The GOM could seize upon the opportunity the MEERP offered for a very ambitious exercise in capability building in the area of disaster management, speaks of the initiative and drive of the PMU officials. Handling all these activities simultaneously, in addition to the main responsibility of rehabilitating the earthquake-affected, was an extremely demanding work. The biggest challenge was coordination with all 31 districts in implementation of these activities. It was just the determination to accomplish these objectives, and professional standards we set for ourselves, that saw us through the entire project.

There were a few significant organizational advantages. Firstly, there was the Central Implementation Group, headed by d the Chief Secretary, which took all the policy decisions in respect of the MEERP. There was no need to refer the decisions to any other office, once the CIG approved it. Our work was extremely simplified once the CIG approved all the implementation activities in one meeting. The support of the highest echelons of the GOM was crucial for these activities. For instance, the installation of E-mail network was an afterthought, and it required a great deal of spadework to fit it into the original procurement of the VSAT network. However, we could make it possible, because there was support available for this activity at the highest level in the government.

Secondly, the World Bank was very supportive of the Disaster Management Plan and related activities, which really strengthened our hands. The World Bank's involvement ensured that the procurement decisions are taken without undue interference. External support acts as a catalyst, when new activities are taken up, and the World Bank performed this role admirably.

Thirdly, all the procurement decisions were taken within the PMU. The PMU was technically competent to address all the issues of procurement and take decisions. There was no reference to the Planning & Finance Departments for these decisions.

Fourthly, the PMU was a small set up, headed by the Secretary, and supported by a Deputy Secretary, Financial Advisor, and Chief Engineer. It was a small cohesive group, which could think and act collectively. The smallness of team brought a lot of precision and clarity to the opportunities the MEERP presented.

In terms of design of the system, all the components are to be used in normal functioning. None of these activities is meant exclusively for a disaster situation. It would ensure that all the facilities are used extensively and maintained by the concerned authorities. The VHF, VSAT, and E-mail network are normal communication lines, to be used by all the responsible state functionaries. Their normal time functioning would provide sustainability to these systems. Besides, the GOM has also decided to provide a regular budget for these activities so that the aspects of maintenance are well taken care of.

Key Issues in Implementation

There are certain important issues that emerge through the implementation of these activities. Firstly, the importance of elaborate groundwork must be underscored. Before, we presented these Proposals to the government and the World Bank, we carried out a feasibility study for the communication network, showed what the GIS is capable of achieving, and presented these activities as an organized effort in the capability building of the state government Had these activities been taken up individually, the impact and visibility would not have been the same.

Secondly, there must be an organized effort within the government to appreciate the need for these critical facilities, and implement them as it happened in the present case. If the government as a collective is not committed to the implementation of these activities, there is little chance of such initiatives reaching their fruition. In our coordination with the Collectors, the issue of commitment to these activities came up time and again. Wherever there was less supervision and control over these activities by the divisional commissioners, the work suffered. Thirdly, the certainty of financial allocation for this activity, which was available through the World Bank's support in the present case, has been a great confidence-building factor.

Fourthly, the World Bank procurement procedures for the engagement of consultants and contractors have been very well-laid, which helped the matters. In the state government, the procedures for the appointment of consultants are very lengthy and tedious. The payment to these consultants is done through a very cumbersome procedure. Similarly, in the award of contract, there is scope for negotiations and rectification of major commercial and technical lapses. Such is not the case with the state government procedures, which gives a lot of scope for political interference and unprofessional considerations.

Fifthly, a government setup comprising administrators, procurement experts, engineers, financial managers, is more suited to take up these activities, with its diverse requirements, in comparison with a regular department with a conventional staff structure. When the GOM decided to take up E-mail network on the strength of VSAT connectivity, it was done through an innovative procurement procedure. It was done as an extension of the World Bank-supported VSAT network, though the GOM has supported the cost of installation and commissioning. These procedural innovations were possible because of the professional capacity of the PMU.

Finally, the level of commitment to accomplish the stated mission is extremely important. Through the course of the rehabilitation programme, the Earthquake Rehablitation Cell cultivated an image of efficiency and professionalism. To sustain this image of professionalism, it was important that the entire department shows a great deal of commitment to accomplish these tasks in a fixed time frame

Constraints

There were tremendous constraints in executing all the activities within a well-defined time frame. It was very difficult to task to attend to all the details of implementation, spread over the entire state. Besides, coordinating with six divisional commissioners and 31 collectors all over the state for a number of

activities required a great deal of time, effort, and tenacity. It was one of the biggest administrative challenges for us.

Some of the specific problems we faced in respect of individual components are as below:

VHF Network:

The biggest problem we faced was the inability of the contractor to abide by the implementation schedule. An activity, which we planned to complete in 100 days, has been performed in almost 400 days.

The second problem was setting up of the repeater stations in remote sites. Some of the sites suggested were under forestland, and situating a repeater site on this land became a serious problem for us. Some of the other repeater sites were to be located on hilltops, and constructing the room and electrifying them took a lot of time. It took almost a year to complete these 56 repeater stations allover-the state.

VSA T Network:

The VSAT network ran into all kinds of procurement problems. The contractors could not obtain the import license in time. Further, they could not open the Letter of Credit for a long time, and this delayed the whole activity considerably. Finally, there were shipping problems, delaying the delivery of antennas. The commercial management of the project left a lot to be desired.

The failure of INSAT-2D could have become one of the serious problems, which as mentioned above in the paper, was handled right in time.

The constraints in setting the up the VSAT network emanated from the inexperience of private sector in handling import-intensive assignments, such as the VSAT network. The concerned company's inexperience in handling international bids showed itself.

Control Rooms:

Though we organized three rounds of the architect's meetings all over the state for setting up the control rooms in all the divisional and district headquarters, the whole exercise of constructing and equipping the control rooms took about nine months. Though we advised the Collectors to set up control rooms by employing an architect from the market, in the government, there is a strong tendency to rely on the Public Works Department in the construction efforts, which delayed the erection and setting up of this facility.

GIS-based DMIS:

It was one of the best-organized consultancies and did all the work in the assigned time. However, the database that was to be compiled by the district administration and sent to the MRSAC took considerable time. As a result, the socio-economic attributes have not yet been ported on the database.

Conclusion

All these activities, when fully completed, will provide a new paradigm in connectivity and database availability in the state. The capability of all the state agencies in terms of dealing with the information flow, and decision-making will be significantly enhanced. However, it also requires continuous training and orientation of the officials at different levels. In all our activities, we have greatly emphasized the importance of training. In the final analysis, the toughest challenge lies in changing the attitude and mindset of the state functionaries.

MOVING FROM ASSESSMENT TO APPLICATION: AN INTERNATIONAL PERSPECTIVE

Shirley Mattingly, Urban Risk Management Advisor

I. INTRODUCTION

The goal of the Asian Urban Disaster Mitigation Program (AUDMP) is to reduce national disaster vulnerability of urban populations, infrastructure, lifeline facilities and shelter in Asia. AUDMP approaches this goal by focusing on the objective of establishing sustainable public and private sector mechanisms for disaster mitigation in Asia. The topic of moving from assessment to application is introduced in this way as a reminder of why we are all involved in the Program. We aim to reduce vulnerability, and our strategic approach is to develop sustainable public and private mechanisms for mitigation.

In most of our projects, we find ourselves at a critical juncture. We have developed the local scientific and technological knowledge on which to base vulnerability reduction programs and, to some extent, we have shared the knowledge with other stakeholders in our cities. Now we need to get the knowledge applied in ways that actually do reduce vulnerability. As one of the project managers has said, We've got the science, we've done the science, now we need to take the science to the people.

Traditionally, especially in developing countries, knowledge of the hazards faced by a community, the vulnerability of structures and lives, and awareness of risk control measures has generally been limited to professionals and academics. However; the International Decade for Natural Disaster Reduction (IDNDR) and programs including the AUDMP have promoted awareness and urged many people and institutions to consider disaster reduction as something to be concerned about. In the last half of this decade, awareness is metamorphosing into comprehension of the problem, and this comprehension is generating eagerness to learn what can be done to reduce risk, thus setting the scene for transfer of technology and successful models and approaches for risk management and prevention.

II. CHALLENGES FACING CITIES

Today's cities face enormous challenges. Among these challenges are two closely linked issues: (I) degradation of the environment and the quality of life for city residents, and (2) rapidly increasing risk from natural and technological hazards. Inefficient household and industrial practices and modes of transportation are polluting water and air. Overcrowding, inadequate controls over land use and construction, and careless handling of hazardous substances exacerbate risk from natural and technological hazards. Urban populations are growing, uncontrolled or uncontrollable development is spreading into increasingly hazardous areas, and construction and maintenance of the infrastructure arc inadequate to provide basic services. In some cities, construction practices arc so poor that buildings and bridges collapse spontaneously, without any triggering event or apparent reason.

Human society--all over the world-continues to place itself at risk, often even when it knows better. Risk is growing at a much faster rate than the awareness, commitment, and capacity to deal with it. And many local governments throughout the world are not strong enough to take on leadership in risk management and prevention.

Cities all have unique circumstances and special challenges, but they also share-to some; extent-common challenges and difficulties:

- Inadequate budgets
- Inadequate public awareness and concern about hazards and risk, and
- Inadequate political will to make the hard decisions necessary to protect the environment and residents, limit growth in hazardous areas, and enact and enforce strong codes and construction quality control.

III. INTEGRATE WITH OTHER COMMUNITY GOALS AND OBJECTIVES

Institutionalizing risk management and prevention is a special challenge in developing countries. The programs and partnerships we develop must be stronger than the comings and goings of international experts or international funding, or the political fortunes of local elected leaders. We need to think in terms of selling disaster reduction as a package with other social and economic objectives important to a community. We must integrate it into a common agenda in ways that make sense in the local reality, and make risk management and prevention an issue that is easier to "own".

Everyone in a city is a stakeholder in risk management and prevention, but many people are not aware of the risk or do not regard it as important to their lives. A RADIUS (Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disaster, United Nations sponsored initiative for the International Decade for Natural Disaster Reduction, IDNDR) Project Workshop in Antofagasta, Chile, sparked the interest of a broad spectrum of people in hazard management. The workshop was convened to analyze and discuss the city's seismic risk. And one of the most enthusiastic participants was a representative of the local museum. Other participants represented such diverse institutions as the civil registry, insurance agencies, the port, and the minister of a church-people in touch with many other people in the community. They represent terrific potential advocates for risk reduction.

IV. APPLICATION'OF SCIENTIFIC AND ENGINEERING KNOWLEDGE TO CHANGE PUBLIC POLICY AND PUBLIC AND PRIVATE PRACTICE

To a large extent we know what to do to minimize risk and reduce potential disaster losses. Much attention has been focused on solving risk management and prevention problems through structural (engineering) methods, land use and technical approaches. Over the past decade, there have been rapid technological advances allowing us to build structures that are more resistant to wind, flood and earthquake, to strengthen existing buildings, and to harden critical lifelines against hazards effects.

Also, we have learned much about the social and economic aspects of disaster impacts, and what factors strengthen response and recovery capabilities. We have learned that disaster management and mitigation programs must meet certain criteria for success. For instance, they must:

• Address real problems
• Meet the needs of the users
• Recognize and be adaptable to the environment in which they will be introduced, and provide solutions that are implementable and sound; technically, economically, socially, and environmentally

We have learned that effective risk management and prevention depends largely on networks of individuals and organizations united by a common goal of protecting lives, livelihoods, investments, and the environment.

For technology to be integrated into practice, there must be dialogue between producers and users in multi-disciplinary groups. Over this past decade, the multi-sectoral, inter-disciplinary approach to dealing with society's issues, including environmental and hazards issues, has advanced significantly, providing a model that can lead to better and better utilized outcomes.

The real challenge in disaster management and mitigation has been less the science or the engineering, that is, acquiring the knowledge on which to act, but acting upon it, and changing policies, practices and priorities. One theme of the lDNDR is bridging gaps between science and engineering, and between science and engineering on the one hand and the public and public officials on the other. We have learned that achieving practical application of knowledge, be it about science, engineering, or good public policy, requires constant and concerted effort and multidisciplinary collaboration, learning to speak someone else's language, in a sense, and openly sharing information. Getting people with diverse backgrounds and interests together in the same room is often not easy. But it can be done and it needs to be done more than once.

Loss Estimation as a Tool to Provoke Action

In some cities with seismic risk, loss estimation methodologies are being applied as a tool to stimulate interest among public officials, other targeted audiences, and the public, in hazard mitigation. In the United States a public-private partnership has produced a standardized earthquake loss estimation model called HAZUS developed by private companies with federal funding and advisory input from local, state, academic and private sector participants HAZUS is a software program that uses mathematical formulas and information about local geology, building stock, economic data, and the expected size and -location of potential earthquakes to estimate earthquake losses. The model tan produce estimates of casualties, numbers of persons displaced, buildings damaged, damage to transportation systems and disruptions in utility systems.

Loss estimation methodologies like HAZUS are potentially a very useful tool for planning and for presenting critical information to assist in decision-making in both pre- and post-earthquake environments. They can help in planning response, relief, recovery and reconstruction, and help increase awareness and motivate action to reduce potential earthquake losses through heightened understanding. Work is proceeding in Taiwan as well as various cities in the U.S. to adapt HAZUS for use in disaster management and mitigation planning.

V. MODELS FROM INTERNATIONAL EXPERIENCE
The Quito Project

The Quito Project was a groundbreaking collaborative international project that brought together a very diverse local team in Ecuador with a very diverse international team to address seismic risk in Ecuador's capital city. The project was organized and conceived by a California scientist, assisted by a French mapping company, and backed financially by a Japanese geotechnical firm.

Jeannette Fernandez, Professor of Engineering at Quito's Escuela Politecnica Nacional and a key project participant, recently wrote about her experience in the following words:

In working with GHI on Quito's earthquake risk. I learned that engineers and scientists must work with the community's politicians. emergency response personnel and businessmen.

Jeannette currently shares Quito's experience in solving problems through continued participation with GHI (GeoHazards International, a nonprofit organization based in California), which started it all. Ecuador's President, Jamil Mahuad, Mayor of Quito at the time of the project, added:

I want to thank GHl for conducting this project with the greatest respect for the needs of Quito, and for the sensitivity with which you handled political matters related to earthquake safety plans.

These quotations provide clues to some of the successes of the Quito Project: effective Partnerships sensitivity to local institutions, and engaging the entire community in developing a consensus-driven process and action plans. A paper by Jeannette and collaborator Hugo Yepes provides insight into several of the strategies considered useful in achieving good results:[1]

- Working in multi-disciplinary teams
- Building partnerships among different countries and institutions, and
- Trying to find locally specific solutions

In this regard, one further quote from Jeannette is illuminating:

A lot of work has to be done directly with the lay community, trying to look for long term solutions through developing capacity and awareness in different target groups especially low-income groups in the city. This will bring in the long run not only vulnerability reduction, but also sustainable

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[1] Fernandez. Jeannette and Hugo Yepes, "Knowledge and Technotogy Transfer: Improving the Urban Seismic Risk Managemcnt in Quito-Ecuador,'' First International Earthquake and Megacities Workshop, September 1-4,1997. Seeheim, Germany, Release II, The United Nations University, p. 295.

development. SO, the capacity and desire of the local community to reduce their own vulnerabilities is the keystone for building sustainable solutions.[2]

Bogota Multidisciplinary Risk Mitigation Project

In the neighboring capital city of Bogota. Colombia. an ongoing partnership between the Universidad de los Andes, the National Institute of Geosciences, and the national and municipal governments has produced hazard and urban seismic risk assessments for Bogota. After obtaining data related to soil amplification using soil dynamic lab studies and analyzing strong-motion records of recent earthquakes, loss estimations were prepared for different types of buildings and lifelines systems. The loss estimations have been used in design of emergency response plans, for public information, and for education activities. They also have led to the study of new requirements for urban planning, seismic provisions in building codes, and reinforcement of key buildings.

Thus, the Bogota project has proceeded through a three-step process:

1. Evaluation of the seismic hazard and microzonation of the city
2. Estimation of earthquake loss scenarios
3. Formulation and application of mitigation measures for seismic risk.

In Colombia, the destruction of the town of Armero caused by the 1985 eruption of the EI Ruiz volcano resulted in national legislation establishing national and local level systems for disaster management, including establishing a requirement for Interinstitutional Committees for Risk Mitigation and Disaster Preparedness, headed by the elected governor or mayor. These committees are now the focus of efforts in risk reduction, prevention, and emergency response. In Bogota, a number of mitigation actions have been or are being carried out, including:

- Updating seismic code standards
- Evaluation of seismic vulnerability of hospitals and design of their rehabilitation and structural and nonstructural reinforcement
- Detailed evaluation of vulnerability of critical points of lifelines and emergency response plans
- Development of standards for design of urban gas networks.

In Omar's words, *this project is an example of a study in a developing area, where the political will and the agreement of the different institutions involved, constitutes the basis to get effective results; without a huge amount of financial resources as is usually required.*[3]

Los Angeles' Collaboration with Academic Institutions

One further successful model from my experience is a series of ongoing partnerships between the City of Los Angeles and local academic institutions such as the California Institute of Technology (CalTech) and professional engineering (and other) organizations, such as the Structural Engineers' Association of California. In the I980s Los Angeles established strong partnerships with scientific organizations to develop and utilize earthquake damage scenarios as tools for planning, training, and public policy decision-making.

In the 1990s, a collaborative partnership was established between the City of Los Angeles and a new consortium of universities, known collectively as the Southern California
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[2] Fernandez. Jeannette, op. cit. p. 296;
Fernandez, Jannette and Hugo Yepes " Knowledge and Technology Transfer: Improving the Urban Seismic Risk Management in Quito-Ecudor," First International Earthquake and Megacities Workshop, Sepetember 1-4 1997, Secheim, Germany, Release II, The United Nations University, p.295
[3] Cardona, Omar D., "Multidisciplinary Risk Mitigation Project or Bogota, Colombia." paper prepared for Earthquakes and Megacities Initiative (EMI) Twin Cities Meeting. March 14-16. 1999.

Earthquake Center, or SCEC, working together to unite science, engineering, and public policy. SCEC's scientists represent all the disciplines in the earth sciences. Before SCEC brought them together, in many cases the scientists did not really talk to each other, let alone talk to, engineers and bureaucrats. But now they have united around a common goal of coordinating research on the area's earthquake hazards and applying earth science to earthquake hazard reduction.

This partnership took years to develop, but now it is thriving and provides mutual benefits, For instance, the City contracted with SCEC to provide site-specific earth science data for City seismic retrofit construction projects, and the scientists have worked with City planning and building officials in a program to explore options for implementing seismic zonation. Last year SCEC teamed up with a national laboratory in the U.S. to help get local government user input on high-technology tools the laboratory is developing for risk management use.

SCEC's Outreach Director Jill Andrews recently posed a question as to whether our (scientists, engineers, planners, etc.) joint efforts are actually giving rise to action. Are we raising public consciousness to the degree necessary to effect positive changes in legislation and public policy? Jill believes that we must improve the knowledge base of decision makers, building and design professionals, educators, media reporters and writers, and the public. She has defined six action principles, which I have adapted as follows.[4]

1. Investigate user concerns and requirements
2. Identify targeted users that have the capability to use the research products
3. Initiate engagement with users
4. Interact through constant and direct communication
5. Implement through ensuring feasibility and capabilities
6. Iterate; incorporate an iterative education process where both researchers and end users actively educate each other.

The results can be, in Jill's word, dramatic.

Other Current Initiatives-RADIUS and EMI

RADIUS (an acronym for Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disaster) is a United Nations sponsored initiative for the International Decade for Natural Disaster Reduction (IDNDR). It was created by the IDNDR Secretariat to focus on the methodology for seismic risk assessment of urban areas in its nine case study cities (including Bandung). Its objective is to produce practical tools for seismic risk assessment, based on the experiences in the case study cities. The tools planned for development include.[5]

1. A manual to prepare earthquake damage scenarios for urban areas
2. A graphic software for computer simulation as easier application of the manual
3. Case studies
4. A guide for simple assessment of buildings and houses, and
5. Documentary films.

The RADIUS projects are designed around a core partnership between local government and local academic or scientific institutions. They required the Mayor's endorsement for a city to participate. The projects work through some level of hazard and risk assessment, seek local input and consensus on the resulting scenarios, then through local collaboration, develop a local action plan. to address the threat. Unfortunately, that is where the project and its funding ends, without having really addressed implementation and how to sustain momentum.

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[4] Andrews, Jilt, "Encouraging Application or Earthquake Research Results; Southern California Earthquake Center Quarterly Newsletter, Volume 4, Number 2,1998, p. 30.32.

[5] Okazaki, Kenji, "Radius. A Seismic Risk Assessment Project for IDNDR; First International Earthquake and Megacities Workshop, September 1-4, 1997, Seeheim. Germany, Release II, The United Nations University. p. 319.

This kind of partnering and collaboration between local government and scientific and academic institutions is serving as the backbone of another international collaborative initiative determined to adapt this successful model to other cities at risk. The Earthquakes and Megacities Initiative (EMI), which focuses on large cities in the developing world with significant seismic hazard, employs this very approach.

EMI is an international scientific non-government organization dedicated to the acceleration of earthquake preparedness, mitigation and recovery of large urban areas. EMI grew out of a 1997 workshop in Germany organized by the International Lithosphere Program (ILP) and the World Seismic Safety Initiative (WSSI) to assess the state of knowledge in urban earthquake vulnerability reduction. The organization was created out of sheer will power and dedication of an international group of enthusiasts who were determined to make a difference in megacities at risk.

EMI is acting as a catalyst for the delivery of scientific and technical knowledge to end users with focus on developing capacity in megacities of the developing world. because we know that it is there that the effects of earthquakes can be especially devastating to the people, their economy culture, and environment. The initial projects in EMI's action plan are a Twin Cities Project to facilitate knowledge sharing and building local. capacity, and the organization of a Second International Workshop on Earthquakes and Megacities, to be held in Manila later this year. Twin Cities actually applies' two models proven successful in Los Angeles: the collaborative partnership between the City and SCEC, and an early 1990's memorandum of agreement between Los Angeles and Mexico City for emergency preparedness. EMI is coming just in time, as the IDNDR comes to a close but urban risk continues to grow.

Lessons from Maharashtra

In conclusion, it is revealing to reiterate several lessons presented by Mr. Krishna Vatsa's paper[6] for this session. The Maharashtra experience reinforces lessons learned (but not in every instance referenced) in the cases cited above. For instance, Krishna notes that:

[The Plan] showed how synergy, shared goals and vision among different stakeholders, could produce outstanding results in a limited time frame.

...it became clear that the plan documents need to be supported with the critical resources...the planning brought up prominently the operational requirements of the plan activities.

Though the primary objective of the DMIS {Disaster' Management Information System} is to plan for disasters, the database has been organized in such a way that it could be extensively utilized for resource planning. A number of departments, like the Water Supply...are using the database for their own applications.

It was just the determination to accomplish these objectives, and professional standards we set for ourselves, that saw us through the entire project.

The paper also notes the importance of: preparation and groundwork, an organized effort within the government to develop commitment for the project, and the value of strong professional capacity.

VI. CONCLUSION

Experience has shown that in order to get and keep risk reduction on the public policy agenda as an issue of importance to a city, it is important to team up, pool resources, and be persistent. Scientists, engineers, local officials, administrators, managers in private firms and voluntary organizations, educators, the media, and the public all share responsibility for making risk reduction happen in their city.

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[6] Vatsa, Krishna, "Technological Challenge of Disaster Management Plan for the State of Maharashtra.:

ENHANCING THE LOCAL POLICY AND INSTITUTIONAL FRAMEWORK: EXPERIENCE OF BANDUNG CITY IN STRENGTHENING THE LOCAL DISASTER MANAGEMENT INSTITUTION

K.S. Pribodi, P. Danusubrata, H.P. Rahayu, and E. Kertapati

Introduction

1. Bandung, the capital of the West Java Province, is located at the altitude varying from 670 to 1050 m above MSL, with a comfortable average temperature of 28.5 C and annual average rainfall of 2,045 mm. It covers an area 16,729 hectare and its population is approximately 2,4 million, with an annual average growth of 2,4% and average population density of approximately 11,000 thousands people per krn2. The Municipality of Bandung is chaired by a voted Mayor. Administratively Bandung Municipality is divided into 26 Kecamatan (sub-districts) and 139 kelurahan or desa (village unit), which are coordinated by 6 Adjunct Mayors.

2. In 1997, in collaboration with the Bandung Institute of Technology, the city is appointed by the Asian Urban Disaster Mitigation Program (AUDMP), run by the Asian Disaster Preparedness Center (ADPC), as the pilot project city for the Indonesian Urban Disaster Management Project (IUDMP), under a core funding from OFDA-USAID. The goal of the project is to reduce the city risks toward seismic disaster, by implementing risk mitigation activities.

3. This paper presents a showcase of the experience of the city in enhancing its local policy in disaster management and the institutional framework for its disaster management organization. The city, with the help of the IUDMP team for strengthening its Disaster Management Unit, which is called SATLAK PB, has conducted a process in identifying the needs for improving the emergency organization and its standard operating procedure. The process is then followed-up by a review of the existing organization, available legal documents and procedures, and a recommendation for improving and enhancing the units capacity and capability.

Hazard and Vulnerability Situation

4. There are 32 rivers flowing across Bandung, mostly in the north-south direction, which ends up in the Citarum river flowing east-west direction, at the southern boundary of the city, where the terrain becomes relatively flat, which resulted in flood hazards in this area. Bandung is also surrounded by many volcanoes (Mt. Tangkuban Parahu and Burangrang in the north, Mt. Patuha in the south, and Mt Guntur and Papandayan in the east). Bundung itself is located in the high plateau formed by an ancient lakebed, which is called the Bandung Basin. Several active faults could be found around the area, such as the Java Subduction, Sunda Strait and Cimandiri Seismic Source Zones, Baribis Faults and Bumiayu Faults Seismic Source Zones.

5. The fast growth of the city has resulted in very high densely populated areas in some parts of the city (up to 30.6 thousands people per km2). As the capacity in controlling the development has been very limited, vulnerable buildings as well as space planning can be found in the city. Fire hazard in these areas is high, shown by the very high number of fire incidents per year recorded by the City Fire Department Building material in Bandung varies from woods and bamboo, brick masonry, steel and concrete, but the most predominant type of buildings (in particular housings) are constructed using brick masonry and woods/bamboo. In many cases, the buildings are constructed not in accordance with seismic resistant building provisions, and thus prone to heavy damage due to earthquake.

   The spreading of slum areas in the densest parts of the city, where buildings and housings are accessible only through small foot-paths, worsens the vulnerability situation. These areas, when disaster strikes, are inaccessible to fire engines or emergency evacuation system.

6. Bandung is relatively a young city, growing from a small village in the 19th century to a big metropolitan city in the 20'h century. Before World War II, Bandung was a beautiful city designed for approximately 500.000 population, but in the 1970s, as the economic growth has been rising, the fastly growing population is not followed by infrastructure development. This imbalance has resulted in inadequately serviced city, and the environmental hazard is increasing quickly due to uncontrolled development. Notwithstanding its position in the seismic source zones of west Java, as Bandung has never experienced devastating earthquake in at least the past 100 years, there is no awareness at all to earthquake risks.

7. An interesting fact on the flood hazard in Bandung is that the community has become too accustomed to the routine inundation caused by annual flooding during .the rainy monsoon season, in such a way that community apathy has been noted and flood mitigation initiative for the community has been responded with more or less indifference.

Disaster Management Institutions

8. At the national level, disaster management activities is coordinated by the National Disaster Management Coordinating Board (BAKORNAS PB), a non-structural organization chaired by the Coordinating Minister of Social Welfare and Poverty Alleviation, under the Presidential Decree No. 43/1990. Members of the Board include Minister of Social Welfare, Minister of Home Affaires, Minister of Health, Minister of Public Works, Minister of Communication and Chief of Armed Forces. At the provincial government level and local government level (district level), this structure is replicated hierarchically (see Fig.l)

9. At the local level, the Municipality of Bandung has established its own Disaster Management Implementing Board (SATLAK PB), also a non-structural organization chaired by the Mayor, under the Mayoral Decree No. 360/SK.634- MAWIL HANSIP dated I December 1998. Members of the Board of Executive include Chief of Local Army Commander, Chief of Local Police and Vice Mayor. The Head of the Civil Defence Office is assigned as the Chief Daily Executive of the Board. Under the Chief, the Board is supported by the Secretary of the Board, which is assigned ex-officio to the Assistant of Development Administration of the Secretary of the Municipality. The Secretary of the Board acts also .as the officer in charge of the Emergency Operation Control Center, which consists of. 5 sections, i.e. Planning and Data Processing Section, Operation Section, Logistic Section, Information and Documentation Section and Rehabilitation and Reconstruction Section.

10. The Board has also as its members all the horizontal and vertical offices within the Municipality, including also the local military units, local companies of all the utility services, hospitals, and non government organizations such as the Boy Scouts, the Student Military Regiment, Red Cross, Business Community etc. (see Fig.2)

   At the operational level, 8 Special Task Forces were also set up directly under the command of the Chief of SATLAK PB, namely task forces for Health, Investigation and Evacuation, Emergency Response, Security, Social Aids, Information and Documentation, Shelter and Care, Reconstruction and Rehabilitation.

11. At the sub-district level, the structure is replicated also hierarchically down to the village level. At the village level, a Civil Protection Unit is established under the Head of the Village, which coordinates 10 Emergency Response Task Force Groups, i.e. First Aid, Stretcher, Evacuation, Shelter & Care, Communication, Early Warning, Search and Rescue, Field Engineer, Fire and Security. Personnel of the groups are consisted of (theoretically) trained volunteers from the village.

12. Up to now, there is no specific rescue unit established within Bandung for any kind of emergency situation. The rescue activities in Bandung (and in general in Indonesia) are used to be conducted by volunteers from the Red Cross, local community and special interest groups such as mountaineering or nature expedition clubs, scouts, medical students, and also police and military SAR Unit, including some trained personnel from the fire department.

Policy, Legal and institutional Framework at Local Level

13. There is no ordinance or law on disaster management at the national as well as the local level until now. However, although not put into a local ordinance (law), the above mentioned Mayoral Decree has provided, the institutional framework for a disaster management organization at the local level. As for policy statement and basic guideline on the task and responsibility of its each organization member, a Standard Operating Procedure for the Disaster Management Board has been established by the Mayoral Decree No 360/SK.638 dated 5 December 1998 has provided a policy and legal framework.

14. The standard operating procedure (SOP) contains a general description of disasters, objective and goals, legal basis, authority and responsibility and the procedure for disaster management at all three stages (pre-, during and post disaster events). It also contains a few description on administration and logistics, command and communication and reporting procedure. A provision on the establishment of an Emergency Operation Control Center and Rapid Reaction Team is also put in the document.

15. As there is no adequate, detailed guideline at the national level for the establishment of the local level disaster management organization, the Municipality had to address this gap by introducing original approach in the organization, by using the Ministry of Home Affaires directives on the organization of Civil Defence Units at the local level, in combination with the described national disaster management organization. However, the National Disaster Management Board has produced a simple general guideline for preparing the standard operating procedure at the local level. This guideline could provide valuable information on what to be addressed in the SOP, but it needs local adjustment based on local condition.

16. The basic policy adopted in the SOP is that emergency response and disaster management actions should be done first at the lowest administration level, i.e. at the village level, while reporting to the upper level of authority. Only when the local community is not able to respond to the disaster due to its magnitude, then ca l for additional support from upper level organization is forwarded.

Constraints at the Implementation Level

17. The weakness of the existing structure and procedure is that it was planned and designed with the during- and post-disaster event actions on the mind-set. In actuality, the Board never meets unless there is a major disaster. Coordination on pre-disaster activities is almost non existent As the organization is basically a non-structural grouping of various institutions and the set procedure is not based on an ordinance or law which provides sanctions over non compliance, there is a noted apathy among the member organizations of SATLAK PB. Reason for this apathy comes from the fact that each institution or organization has its own responsibility in its own function and that there is no resource allocated for its involvement in the disaster management organization, resulting in the lowest priority setting for disaster management at each organization, except for those directly related to emergency response like the Fire Department and the General Hospital with its emergency unit.

18. The non-existence of at least a permanent part within the disaster management organization (SATLAK PB) leads to the ineffectiveness of the organization, as there is no body who does the coordination, planning and organizational activities. The heart of the organization is actually the Secretariat of the SATLAK, but as it is said that it is not structurally built-in within the Municipality organization and not filled with permanent staffs, it has not been able to function. There is a tendency to say that there is not enough fund allocated for moving the organization, but in fact due to the non-existence of the permanent staffs, there is nobody who prepares plan and program which might mobilize the city funding for this organization. The Emergency Operation Control Center has not been able to be realized.

19. The weakness of the organization is worsened by the fact that horizontal coordination between all involved organizations is very weak and there is also lack of organizational leadership from the main function organizations of the SATLAK PB. Bureaucratic tradition has been a major impending factor to the development of the organization. All creative initiatives should pass bureaucratic

scrutiny of having to follow all the existing regulation and when there is no guideline or regulation available, then nothing can be done. This situation hampers the creative development of SATLAK PB. The SOP itself was drafted and prepared with little co-ordination and consultation efforts with the related institutions on their responsibility and tasks. The organization members were not involved in the decision making process for the establishment of the procedure and there was no socialization effort of the results due to lack of financing.

20. The described constraints lead to the understanding that the organization (SATLAK PB) might be effective only for emergency response and relief, while pre-disaster event stages will not be able to be coordinated effectively.

Institutional Strengthening Efforts

21. The IUDMP together with SATLAK PB set up an SOP improvement and socialization task force consisting of IUDMP team members and SA TLAK PB members represented by several staffs from the Local Civil Defence Unit and the Local Development Planning Board. The task force objective is to improve the SOP with an implementation guideline, to improve the structuring of the SOP document for easier understanding and more user-friendly format and to socialize the product to the concerned organizations.

22. At the outset of the task force activity, a draft document of the improved SOP is prepared by restructuring the existing document for better readability. The original document was structured using the traditional format of a decree, which is not readily understandable. The product was then presented at a socialization workshop, which was conducted at end of March 1999. The objective of the workshop is to promote the SOP document to the concerned organization members as well as to collect input for improving the SOP through a participatory process in reviewing the document.

23. The workshop has been very productive and by the end of the sessions, valuable input for the improvement of the SOP were obtained from most of the participants, which represented more than two thirds of the SA TLAK PB members. At the workshop, clarifications on the responsibility and task of each member were also suggested. At the core of the proposed improvement, it was suggested that the Secretariat/Emergency Operation Control Center (EOCC) be made operational by putting assigned personnels for its staffing. This will create a semi-permanent core structure within the organization, which is hoped to act as the motor for the effective functioning of the organization. The workshop was considered as successful as it was useful in gathering most of the SATLAK PB members in a meeting which discussed the future status, direction and operation procedure of the organization, thus socialization objective was achieved.

24. The task force is also expected to initiate the establishment of the EOCC within the organization. A building, separate from the Local Civil Defence Unit head quarter where the SATLAK PB activity is used to be coordinated from, has already been assigned for the future site of the EOCC. It is hoped that with the EOCC functioning, the SATLAK PB will operate effectively. As the budget requirement for the establishment of the EOCC might exceeds the present capacity of the Municipality, it is envisaged that the task force will prepare an EOCC development plan by defining the short term and mid term needs, programming initiative for its realization and commencing with the simplest practicable action to start its immediate operation without waiting for the whole plan to be completed.
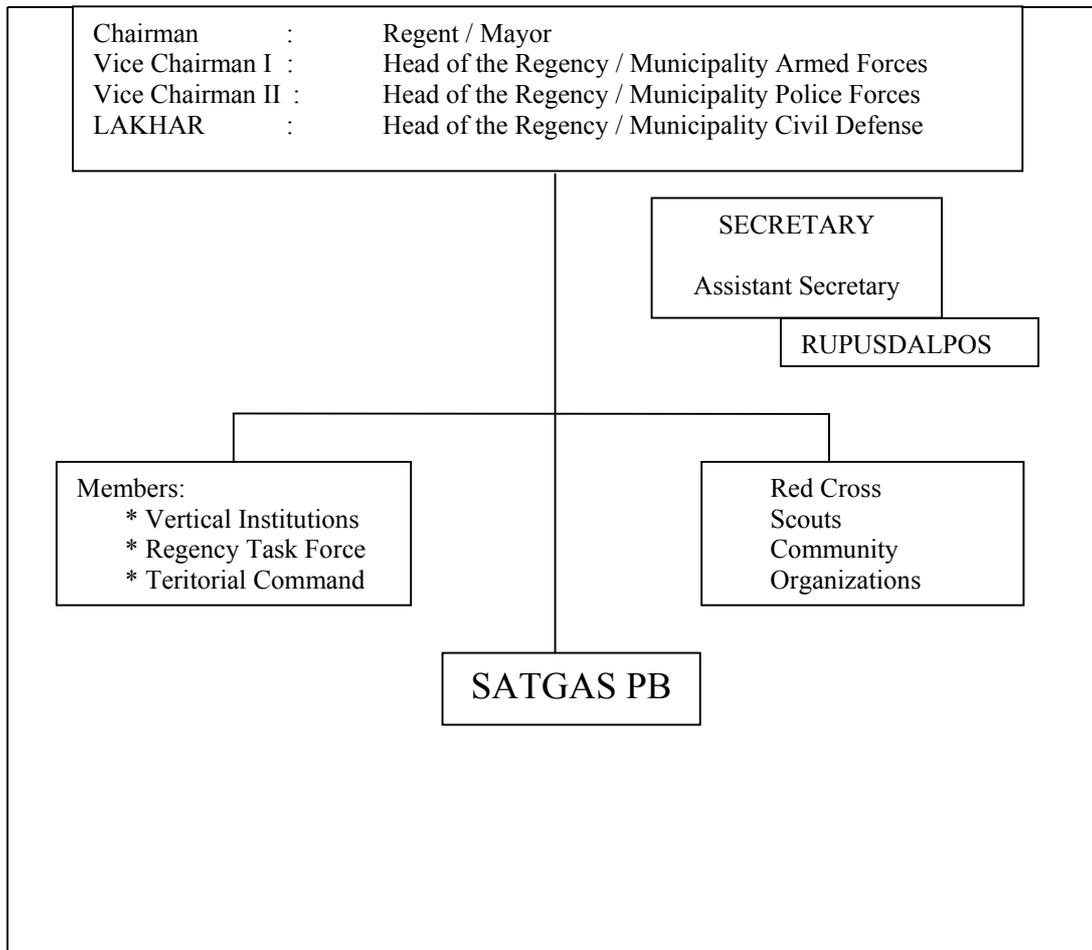
Concluding Remarks
25. The role of IUDMP in this initiative is to support the Municipality in strengthening its SA TLAK PB organization through active and participative collaboration with its members. The IUDMP is expected to bring new ideas to the disaster management organization, through creative interaction supported by scientific approach developed through project experience and net Working of its members with various disaster management experts at the national, regional and international level.

26. The initiative, when completed, will provide lessons learned and example for urban disaster mitigation activities throughout the country and the region. The process can be replicated in various city in Indonesia with more or less similar problems.

BAKORNAS PB ORGANIZATION CHART
Presidential Decree Number 43 /1990

HEAD OF BAKORNAS PB
Coordinating Minister of People's
Welfare and Poverty Treatment

MEMBERS.

1. Minister of Social Affairs
2. Minister of Home Affairs
3. Minister of Health
4. Minister of Public Works
5. Minister of Transportation
6. General of the Armed Forces

7. Governor whose region suffers from Disaster
8. Director General of Social Aid, Department of social Affairs as a Secretary also as a Member

Secretariat of
BAKORNAS PB

Working Groups of
BAKORNAS PB

Figure 1 Organization of the National Disaster management Coordinating Board

Chairman :	Regent / Mayor
Vice Chairman I :	Head of the Regency / Municipality Armed Forces
Vice Chairman II :	Head of the Regency / Municipality Police Forces
LAKHAR :	Head of the Regency / Municipality Civil Defense

SECRETARY

Assistant Secretary

RUPUSDALPOS

Members:
* Vertical Institutions
* Regency Task Force
* Teritorial Command

Red Cross
Scouts
Community
Organizations

SATGAS PB

Figure 2 Organization of Local Disaster Management Coordinating Board

CREATING OR IMPROVING THE DISASTER MANAGEMENT AND MITIGATION PLAN

Shirley Mattingly, Urban Risk Management Advisor

I. WHY PLAN?

Czech proverb: Misfortunes always come in by a door that has been left open for them.

Faced with the mere possibility of a landslide or flood or dam failure or toxic substance release occurring in their city or town", most people and institutions respond with indifference and denial. They have other things to do, other higher priorities. They tend to postpone doing anything about risk.

When disaster strikes or the threat is imminent, the demands facing a ci1y are obvious and compelling. People must be protected. Victims cared for. Basic services restored. Structures repaired and replaced. These and other tasks must be handled quickly and efficiently to avoid further losses and suffering. These tasks are not simple or easy, but they are predictable. But responding to an event is very different from responding to the less-than-immediate possibility of a disaster event.

To reduce disaster losses and achieve effective response takes planning, mitigation, and preparedness. It requires establishment of a solid legal and Institutional framework for carrying out responsibilities and creation of an organizational structure to facilitate the planning, mitigation and preparedness, and to coordinate response when the disaster occurs. Even a modest level of planning makes a difference. Planning and preparedness reduce the unknowns during an emergency, reduce confusion and the need to improvise. Preparedness evokes appropriate action. And it helps to think of preparedness, disaster management, and organization structures for disaster management as processes more than as products. They need to be dynamic' rather than static.

II. PLANNING AND DECISION-MAKING

Planning is both a learning process and a process to influence decision-making. Planning is an educational process in which the participants learn. When we study and take into account hazards information and vulnerability information, and a damage or loss scenario, we will have a much better idea of what will happen, what the impacts will be, when the incident occurs. If we know what will happen, we can make better decisions.

We make decisions every day that affect our environment and our level of risk. Decision-making takes place on different levels-at a personal, family, organizational, community, and national level. And through daily behavior as well as more formalized risk management and investment decisions. How people make decisions is based on many factors including their values. Therefore, if we want to influence a decision, we need to identify what is really important to the people involved-start with the goal and the users' needs and values, and keep these things in mind.

III THE PLANNING PROCESS

There are many different approaches that can be employed to develop a plan. What is most important is that the process follow the following principles:

1. The process should be inclusive, drawing input from as wide a range of stakeholders as possible.
2. The process should start by focusing on policies, objectives, and goals, which should be reached by consensus and clearly articulated.
3. The goals and planning process should be integrated with the city's overall strategies and programs; that is, hazard reduction, land use planning and emergency management planning should approached and debated in ways that are similar to, or the same as, other important issues and decisions in the community.
4. While consultants have a role, the major part of the work should ideally be done by persons in the government agencies. and other organizations who will have roles in carrying out the plan.

5.   The planning process should be considered as a continual cycle of:
- Planning
- Familiarization and training
- Drills and exercises to test the plan, and
- Plan revision and updating.

Countless plans have been prepared in a vacuum or a dark room, written by an individual or small team of like-minded people. These plans reflect a limited or even single point of view. Examples might be a land use plan drawn up by land use planners without public input, or an emergency response plan prepared by a response organizations, with no linkages to other organizations. Plans like these; have virtually no chance of guiding action or providing the basis for decision-making.

The initial development of a plan can be approached by:
- Getting the support of the mayor or chief executive
- Determining who will be responsible for initiating and overseeing the project and
- developing. a proposed "game plan."
- Convening interested and affected parties
- Deciding on goals, objectives, and scope and contents of the plan
- Establishing multi-disciplinary working groups or committees to work on specific
- sections of the plan
- Providing a mechanism for overall coordination of the work effort, setting and
- monitoring of milestones, and integration of the plan elements, and
- Achieving consensus and sign-off by the responsible parties.

Whatever the process, the starting point should be development of goals and policies.

IV. GOALS AND POLICIES AS THE STARTING POINT

Disaster management plans should be based in well-conceived policy and local reality. Policies, goals and objectives should be the first considerations in developing the disaster management and mitigation plan for a state or city. Plans, and the policies on which they are based, must be tailored to the area they serve and must be well grounded in the political, social, and economic realities of the area.

Existing national and local policies related to hazards management, environmental protection and land use, and other topics such as housing should be reviewed as an appropriate context for the disaster management planning effort. It is helpful to think in terms of sustainability of the city or community, that is, taking into consideration the five components of sustainable hazard management:

1. Environmental quality
2. Quality of life
3. Disaster resilience
4. Economic vitality, and
5. Equity (inter- and intra-generational)

This approach helps us see disaster management within the context of a wider arena of issues of concern to the city and its citizens.

For instance, existing National policies in Indonesia tie disaster management and mitigation to economic and developmental objectives and emphasize the importance of pursuing scientific knowledge (e.g. hazards mapping), mastering technology for disaster management (e.g. GIS, remote sensing), and improving organizational capabilities for response and rescue. Rather than simply endorse national policy statements, however, state and local planning teams should examine related state and local policies, establish linkages and ensure continuity between disaster management and mitigation policies and other policies that reflect the community's values

Policies should be developed through a thoughtful process involving as many stakeholders as possible. This process could take the form of a strategic planning workshop or series of workshops or meetings

that would develop, through facilitated discussions, clear and agree upon statements of disaster management policies, mission, goals, and objectives.

Once local policies are determined through consensus, it is often worthwhile for the mayor or other authorities to endorse them formally through a policy statement or other means. This then provides a sound basis for the plan's actions, strategies, and priorities.

V. SCOPE OF THE PLAN

The disaster management plan begins with careful evaluation of the hazards facing the community, their severity and frequency, and analysis of what elements (geographic areas, types of building construction, etc.) in the city are most vulnerable to the hazards or most at risk. The plan also considers what resources and capabilities are available in the city to reduce risk and protect against disaster, and establishes what institutions or organizations have responsibilities in regard to a broad range of disaster related functions.

The disaster management plan establishes institutional arrangements and may require that each involved organization establish its own plan~ or standard operating procedures. It explores a range of mitigation or risk control measures to address the community's hazards and risk, and provides for the setting of priorities for implementation of mitigation strategies. It covers preparedness, warning, and evacuation planning and procedures, response operations, and recovery and rehabilitation. It addresses the roles of non-governmental organizations, voluntary agencies. and the private sector and provides guidance for public awareness, information and education.

Every element of the disaster cycle merits pre-event attention and planning--long-term mitigation, preparedness, response, relief: recovery, rehabilitation and reconstruction While the range of interested parties and participants may vary, current thinking argues for strong linkages among the elements of plans or overall integration into a single. multi-faceted plan. All plans build on a foundation not only of goals and policies, but also of hazard assessment and determining what activities, institutions and structures are at risk from those hazards On the basis of the hazard and risk assessment, we can identify, evaluate select implement, and institutionalize long-term actions and programs to mitigate those hazards.

VI. PLANNING FOR LONG-TERM RISK MANAGEMENT AND MITIGATION

Whatever formal is selected for the disaster management plan, a key element to address in the plan is mitigation or risk reduction. Mitigation refers to efforts to reduce the actual or probable effects of a disaster on people, structures, economic and social systems, and the environment. Mitigation is an integral component of sustainable development.

Mitigation measures should take into account the various hazards faced by the community, including technological hazards, and they should protect the natural and cultural resources of the community. Potential mitigation measures should be evaluated for cost-benefit and should be consistent with the needs and priorities of the affected community--both those who will pay and these who will benefit. An effective mitigation program involves government, the private sector, and the community.

The term mitigation is often used to distinguish actions that have a long-term impact from those that are better defined as preparedness for, response to, and short-term recovery from a specific disaster.

VII. PLANNING FOR RESPONSE

Earthquakes and toxic releases and typhoons happen, posing immediate threats to lives and property. The immediate actions in response to a hazard event or the threat or an event, requiring preparation in the form of planning, training, interagency coordination and other tasks in order to minimize losses and suffering The basic steps in planning for emergency response are consistent for all hazards The currently accepted international practice is to undertake "generic" planning, focusing on assigning roles and responsibilities and building capabilities to carry .out those responsibilities regardless of type of hazard event. The specific and special circumstances surrounding different types of hazard event are then analyzed as the subject of more detailed planning and preparedness efforts. The results of this analysis

then are included in hazard-specific annexes to the city's or province's or even private company's emergency plan.

The basic steps in planning for response build on the hazard and vulnerability assessments and the results of any loss estimation studies conducted for or by the city or region. Following are some basics of emergency planning:.

- Assess your capabilities
- Use a team approach
- Keep the plan simple
- Identify resources needed to carry out each emergency response function
- Inventory sources and resources
- Assign responsibilities
- Build systems and capability for response
- Establish survivable communications systems
- Develop systems for alerting and warning and procedures for evacuation
- Develop search and rescue capability
- Coordinate planning with other levels of government, NGOs and private sector
- Establish systems for mutual aid
- Establish and train an organization capable of coordinated response
- Maintain response systems and capacity through drills and exercises

VIII. WHEN DISASTER STRIKES

Disasters occur whether we have adequately prepared or not. Some are slow to develop (slow onset); others occur without warning (rapid onset). When disaster strikes, individuals and organizations react; their reactions are guided by whether they know what to do, their degree of preparedness to take appropriate action, and other factors including their confidence in the safety of loved ones. Following are several issues to consider In the planning process:

- Will responders respond? Have basic home and work site preparedness issues been addressed?
- Maintaining operational capability
- Critical facilities
- Emergency power
- Communications
- Access to decision-makers and key staff
- Need for clear lines of authority and responsibility
- Need for mechanisms and organizational structure for coordination and command and control
- Emergency Operating Centers (EOCs) for coordination and management
- Management and safe and effective use of volunteers
- Damage assessment and resource allocation
- Emergency public information
- Outside help:
  - Evaluating and identifying needs
  - How to access resources belonging to others
  - Use of privately owned resources
  - Right to commandeer resources?

IX. PLANNING FOR RELIEF AND RECOVERY

Following are some of the basic issues to be considered in pre-event planning for post-event relief to victims and overall social and economic recovery of the community.

- Restoring services
  - Include procedures, coordinated with utility companies, in response plans
  - Prioritize services and areas for restoration of services, taking into account inter-dependencies among various services and the needs of critical facilities such as hospitals
  - Be prepared to start repairs immediately

- - Repair and reconstruct lifelines and facilities in such a way to resist further damage and avert further disruptions (rebuild better; build in mitigation)
- Assessing damage to public and private facilities
  - Using volunteer engineers
  - Need for training in rapid damage assessment
  - Levels of assessment vary according to purpose, e.g. assessing safety to damage assessment for insurance recovery
- Plan to inspect and post unsafe buildings.
  - Be prepared to post buildings and restrict entry
  - Train building officials and engineers in inspecting damaged buildings
  - Set priorities ahead of time for structures to be inspected immediately and by most highly skilled engineers (E.g. dams, power plants, hospitals, hazardous materials sites, schools and other large occupancies)
  - Determine responsibilities for inspection
  - Establish standard forms, procedures, and records (preferably computerized) of inspections
- Plan for debris removal and disposal
  - Early on, debris removal must be coordinated with rescue efforts
  - Clear important access routes first, then other streets
  - Identify disposal sites
- Establish programs for short-term recovery
  - Establish authority to make decisions during early recovery
  - Accommodate increased demands on local services and financing needs
  - Administer processes for repairs and rebuilding
  - Assist local businesses to plan and organize themselves for recovery

- Plan sites for temporary housing (Address the gap between emergency shelter and permanent housing
- Plan for long term recovery
  - Standards for repair and reconstruction
  - Setting and changes in land use
  - Financing, etc.
  - Psychological recovery, especially for children

X. THE PLAN

The plan should be organized in a format that makes sense to, and is easy to follow for, those who write it and those who will use it. The best plans have the following characteristics; they:

- Reflect the community and its social, economic and political realities
- Are simple, easily understood, and clearly organized
- State clear policies, objectives and operational priorities
- Define responsibilities, authorities, and operational relationships
- Provide systems for multi-organization coordination
- Provide timely and accurate information to decision-makers and the public
- Involve non-governmental and community-based organizations, and
- Are recognized and accepted by all involved organizations and the community.

What do you do with the plan once it is completed plans are meaningless if they are completed and put on a shelf to gather dust. The process is what counts; it must be ongoing continuous and have vitality.

DISASTER MANAGEMENT PLAN FOR STATE OF MAHARASHTRA: AN EVOLUTIONARY PROCESS

Krishna S. Vatsa

Whenever there is a big calamity in developing countries, the need for developing and operationalizing a disaster management plan is strongly articulated in the media. At the time of occurrence of calamities, the political and administrative classes also express their intentions to have a disaster management plan in place on a long-term basis. However, as the relief operations wind up and the perceived severity of calamity eases, the long-term priority of preparing the disaster management plan recedes into background. The immediate priorities of administration take over. After some time, the idea of preparing and supporting the disaster management plan is conveniently shelved. There have been very few efforts at learning and capacity building on a long-term basis. Unfortunately, it has been the case in most of the developing countries.

External Initiative

What makes the difference in these cases is the presence of external initiative. In India, there have been two major calamities in the recent past, Latur earthquake in 1993 and Andhra Pradesh cyclone in 1996, in which the World Bank came forward to support the state governments in their post-disaster reconstruction efforts. In both the projects, the disaster management plans have been an integral part of the project implementation. In no other reconstruction programme in India supported by the state or central government, or even independently, the disaster management plan has been taken up as an ambitious activity. Recently, the Government of India could take up a programme of capacity building in disaster management only with the support of the UNDP, which reiterates the importance of role multilateral agencies can play in promoting the activities related to disaster management plan. While this paper deals with the development of disaster management plans and related activities under the Maharashtra Emergency Earthquake Rehabilitation Programme (MEERP), it is important to acknowledge the importance of international initiative in this area. The support of multilateral agencies provided the overall context in which the entire range of disaster management activities under the MEERP could be organized.

While making a case for strong international initiative in the disaster management planning, the need for continuous learning and strategic innovations must be emphasized. In case of two reconstruction projects in India, Maharashtra Emergency Earthquake Rehabilitation Programme (MEERP) and Andhra Pradesh Cyclone Reconstruction Project. Support by the World Bank, there is a significant difference in term of emphasis placed on the disaster management activities in the development credit agreement. In case of the MEERP, the preparation and equipment of disaster management plan was one of several activities mentioned in the development credit agreement. There was no special or independent emphasis placed upon this component. However, in the course of implementation, the commitment of stakeholders, which comprise the Government of Maharashtra, World Bank, Department for International Development, U.K. Government, and the UNDP, transformed this activity into a major project, which had its great significance independently of the primary activity of the earthquake rehabilitation. The presence of multilateral agencies in the MEERP and their continuous

encouragement and support extended an opportunity to the Government of Maharashtra to take an organized initiative in the area of disaster management planning. So the disaster management plan activities under the MEERP have been evolutionary in nature. The MEERP's experiences in this area gave a head start to the Andhra Pradesh Cyclone Reconstruction Project, which included the disaster management plan as one of the most important project sub-components upfront. The Cyclone Reconstruction Project has many innovative features such as development of sophisticated models for coastal plain management and mitigation fund. While the success of these distinctive features of the Cyclone Reconstruction Project depends upon their effective implementation, it could be said that the learning experiences across different national and international experiences could be consolidated and refined, while taking up new international initiatives.

Development of Disaster Management Plan under the MEERP

While it was agreed that the state government would prepare a disaster management plan. details about the scope or the time frame of the activity were not available. In the beginning, the overriding priority was to commence the rehabilitation of earthquake- affected people, and the project concentrated on this objective. There were other constraints. There was no precedent available for an organized activity of this nature, Some of the disaster management plans, which were available at district level, dealt primarily with floods, and were mere address books. Therefore, to develop a process of preparing the disaster management plan, a workshop was organized in May 1995, almost one year after the project commenced. The workshop yielded a few action points: there would be a state disaster management plan, and four such plans at the district level. These disaster management plans would be multi-hazard, and cover all natural, industrial and chemical disasters. The workshop also recommended formation of 15 committees, to be organized along functional lines, which would suggest the details of the programme. It was also agreed that the national and international consultants would be appointed for the preparation of these plans.

Council, Committees and Consultancies

In the next six months, there were changes in the project personnel. The project also faced serious difficulties on account of a very motivated litigation. So there was little progress in plan preparation in this period. In January 1996, the Disaster Management Council (DMC) was formed. It is an apex consultative body, chaired by the Secretary, Planning, for the disaster management plan. The DMC in its first meeting decided that instead of four districts, six districts- one each from six divisions of the state- be taken up for the preparation of district plans. It also decided that the drought be dropped from the list of hazards to be dealt with, for its manifestation takes place over a long time frame, and the state government has had adequate experience in dealing with drought-like situations for a long time. The numbers of committees was also reduced from 15 to 5, and were constituted hazard-wise.

The committees, which after July 1996, had meetings attended by the consultants, experts, government officials, and the NGOs. The committees helped us in getting a broad consensus on the hazard-wise planning. They were also useful in locating the reference documents and relevant database, which was relevant for carrying out risk analysis and vulnerability assessment. However, the committees had their own limitations. Firstly, the committees concentrated upon hazards, and could not differentiate much between the operational needs of a state plan and the district plan. Secondly, though the committee members came forth with their own experiences and information in meetings, it was not possible to finally develop a structure of plan in these meetings. It required deliberations in a smaller group, in a more focused way. The familiarity with the administrative set-up in which these disaster management plans were to be made operational was not very strong among the members of these committees.

At the district level, there was a different mechanism of consulting officials and the NGOs. Firstly, meetings of district collectors, the head of district administration, were conducted at the state and divisional level. The Collectors were briefed about the structure of the district plan and the information to be included in this plan. In all the districts, one District Coordinator appointed for six months assisted the collector. The District Coordinator was responsible for collecting the data at the district level. The coordinator also organized the meetings at the district level, in which a number of officials and NGOs participated.

The state government also appointed the consultants for the preparation of the disaster management plans. One of the difficulties the government faced was the lack of established expertise in this area in the country. It was also necessary that the consultant must have sufficient familiarity with the state, and should be able to give his commitment for extensive consultations with all the agencies in the state. took more than six months to get suitable candidates for the national consultancy. The international consultancy was much simpler, as the World Bank informally suggested their names to the state government. The international consultants had a much smaller commitment, in comparison with the national consultants, and their services comprised discussing the broad structure and details of the plan, and getting the best practices information and literature available at the international level. The DFID, U.K. supported these national and international consultancies.

While the consultants are very useful in processing the information, developing formats and producing the documents, a great deal of brainstorming must take place within the government itself. The responsibility for the final shape of the documents must rest with the government officials. The consultants may be good resource persons, but their limitations are obvious. They may find it difficult to access the information from a number of agencies departments. It also requires a continuous follow-up with the field- level offices, which only the government officials can do effectively. Since the disaster management plan has a great deal to do with the command and coordination structure, the knowledge of inter-departmental relations and hierarchical structure are important. Most of the consultants do not have adequate familiarity with the administrative set-up and working practices within the government. Besides, the consultants do not always have a very good sense of what is practicable in the administrative context. So the government officials must work very closely with the consultants to prepare a plan which is comprehensive as well as practicable. They must also take the responsibility for the quality of data and organization of plan.

The UNDP Support for the Centre for Disaster Management

So the exercise began with the disaster management plan for the state and six districts. The remaining districts were to prepare their plans subsequently. However, the UNDP's support provided an excellent opportunity to the government to take up these districts simultaneously. Almost at the same time, the state government received assistance from the central government to set up a Centre for Disaster Management. This Centre was located in the Yashwantrao Chavan Academy of Development Administration (YASHADA); Pune, which is the apex training organization of the state government. It was decided that the Centre for Disaster Management would prepare the disaster management plans for remaining 25 district plans, in consultation with the Collectors. The Centre for Disaster Management would acquire experience and insight in this area through this study. This Centre has been functioning in the YASHADA with a small staff, and has now prepared the plans for all the remaining districts.

The Centre for Disaster Management has been set up to provide institutional support to the activities related to disaster management. The state and district plans must be updated on a regular basis. There must also be a continuous programme of training, orientation, and simulation exercises in disaster management, which will be taken up by the Centre. The policy and training support, to be made available through this centre, is thus a very important part of the entire activity.

The Structure & Organization of Disaster Management Plans

The international consultants helped in firming up the structure of disaster management plan at the state and district level. The plan would uniformly be in three parts at the state and district level: (i) Risk Analysis & Vulnerability Assessment, (b) Response Plan, and (c) Mitigation Strategy. The state plan would, however, be different from the district plan in terms of the details of information, scale of response, and mitigation strategy. In case of state plan, all the three parts have been organized in separate volumes. In district plans, these plans are organized in only two volumes. At the district level, there is no mitigation strategy. Instead, a mitigation plan has been developed, comprising structural measures, which has been integrated with the response plan.

The state and district plans begin with an overview of physical, administrative and demographic features. It is followed by a risk assessment of all the hazards at the state level or for the district concerned, and a vulnerability assessment of the population in terms of key socio-economic variables such as economy, poverty, social structure, housing, infrastructure, urbanization, etc. A capability analysis of the district has been carried out, based on the resources available in a district. However, this analysis has not been undertaken at the state, as it is difficult to make get a complete inventory of resources at the state level.

The response action plan is primarily a clear enunciation of command and coordination structure at the district and state level. The disaster manager at the state level would be the Chief Secretary or the Relief Commissioner, depending upon the severity of disaster. In the city of Mumbai, the Additional Chief Secretary, Home would function as the disaster manager, whereas in the districts it is the Collector, who would perform this role. All the departments/agencies, whose details are mentioned in the action plan, report to the disaster managers. It also lays down the specifics of control room functioning in case of an

emergency, and how the specified departments would organize their resources and assist the disaster manager. The action plan also has an inventory of resources, which must be updated frequently.

The disaster management plans at the state and district level are predicated on the active preparedness and participation of a number of government departments and agencies. So it was necessary that we evolve the operating procedures and guidelines for these department. In addition to this, it was also important that the services these departments /agencies must deliver during a disaster situation be standardized for them. These departments must be adequately familiar with their roles and responsibilities in respect of disaster management. The standards of service, operating procedures and guidelines have, therefore, been put together in a separate volume, which would accompany both the state and district plans.

One of the most effective ways to handle a disaster to collect the information at the earliest and use it for the purposes of relief and rehabilitation, as well as for briefing the media. The availability of information without loss of time is a very good indicator of the efficiency and effectiveness of the government. The immediate damage assessment is a very crucial exercise, but the format for recording these assessments are not available. It is generally done through a subjective recording of facts, called Panchanamas, which is inaccurate most of the time. To avoid these difficulties, and maintain the information flow from the districts to the government, a number of reporting formats have been included in the disaster management plan. These reporting formats are to be used at different periodic intervals by the district administration. The objective now is that the Collectors in their handling of disasters must use the reporting formats.

The mitigation strategy and plan are long-term guiding principles of a disaster management plan. The measures suggested in the mitigation strategy must be made an integral plan of the state regulations and infrastructure planning. However, it is easier said than done. It requires a continuous advocacy of cost-effectiveness of these measures, which is not possible without a strong institutional set-up. There must be a large corpus available as mitigation fund, which could be utilized for all the activities related to mitigation. The state government must also initiate disaster management legislation, conferring duties and responsibilities of the government agencies a legal obligation. However, the progress in some of these directions would depend upon the initiatives taken by the central government. It is time the Government of India devotes its greater attention to the institutional strengthening at the national level in the area of disaster management, rather than dealing with the central assistance in relief administration.

To regulate the functioning of control rooms, the key facility for disaster management, the manuals for the Emergency Operations Centre and Divisional/ District Control Rooms have been prepared. These manuals will be useful guides for those doing their rounds of duty in control rooms. These manuals also carry a brief inventory of resources, which could be referred to by the control room functionaries.

Constraints of a Government-oriented Activity

Whenever there is a disaster, the national and local governments, even in developed countries, are called upon to shoulder major responsibilities of the relief administration. There is a strong political aspect to the process of disaster management, which cannot be overlooked in a competitive democracy. The disaster management plan must, therefore, be prepared in the context of the administrative set-up of the government. A plan, which is removed from the state institutions, is not likely to be very effective and practical. While it is a correct approach to encourage the NGOs' and community participation in relief administration, it may be acknowledged that these community institutions cannot substitute the responsibilities of the governments. If we prepare the disaster management plans, following a 'bottoms up' approach, involving communities and NGOs, we may not get the most effective disaster management plan. It may also be stated, based on the experiences of relief and rehabilitation in Maharashtra, that the government has to play a vital role in co-ordinating the activities of the NGOs and community-based organizations. It results into a better utilization of the NGOs' and community resources. The process of disaster management planning in Maharashtra has been characterized by the awareness of the strengths of the government and non-government sectors. So while there is a strong emphasis on the NGOs' role in disaster management, the prime role of the government departments and agencies in disaster situations has been clearly established.

One of the biggest difficulties the state government faced was the availability of relevant data at the state and district levels. It took a great deal of persuasion with the Collectors to get the data related to different departments at the district level. The Collectors too had to pursue with all the departments for getting the information. There were other logistical problems related to availability of computers, compatibility of software, organization of data in uniform formals. etc. Some of these problems arose due to lack of information culture at the district level and unavailability of skilled resources to deal with an exercise of this nature.

Disaster Management plan for the City of Mumbai

The disaster management plan for the city of Mumbai presented its own challengcs The city of Mumbai has two districts: the city of Murnbai and Mumbai sub-urban. Though the exercise for Mumbai started in the format of district plans. it was immediately clear that this format would not be an appropriate one. In Mumbai, it is the Municipal Corporation, which is responsible for all the disaster management functions. The Municipal Corporation also runs all the essential services, i.e. fire brigade, hospitals, ambulances, etc. The Collectors do not have the normal jurisdiction of a district in the city of Mumbai, nor do they command resources in a corresponding manner to perform these functions. However, on the basis of a few experiences it was also evident that even Municipal Corporation also cannot be fully effective during the emergency situations, unless it co-ordinates with other agencies in the city. The Police in the city of Murnbai function independently of the Municipal Corporation. Similarly, the Railways, which run the main commuters' service in the city, are a central government agency. After considerable discussion on some of these co-ordination issues in the city, which took a serious turn in some of the emergency situations, it was decided that the co-ordination functions would be assigned to one of the senior most official of the state government, Additional Chief Secretary, Home. The ACS, Home is the controlling officer for Mumbai Police, and his seniority over the city officials enables him to access the services of all the agencies.

There was another issue related to the administrative units in the city, which would carry out the plan implementation. In the districts, the administrative set-up is different. The Taluka is the most effective administrative unit, and Tehsildar would carry out all the administrative functions. However, the city of Mumbai is divided into 23 wards for delivery of services, and the Ward Officers are the most effective resource managers at the ward level. So in addition to a plan for the city of Mumbai at a macro level, ward- level plans for all 23 wards of the city too have been prepared. In the districts, the planning exercise has been done at the district level assuming that the district plan would .cover the entire emergency situations in Talukas (Ideally, there must be Taluka-level plans). However, the disaster management plan for the city of Mumbai would not have a great application value, unless it is supported by the ward-level plans.

The state level plan and six district disaster management plans taken up by the national consultants have been finalized and printed. The drafts of remaining district plans are now ready, and in the month of May, these plans will be finalized. A draft of Mumbai disaster management plan has been circulated among all the agencies and NGOs to elicit their comments and suggestions. Based on the feedback, the final plan for the city will be printed. One of the biggest challenges before us is the dissemination of these plans. It is important that all the departments and their important functionaries at the state and district level are familiar with the instructions in these plans. It requires a concerted effort to reach these documents to as many people as possible. These documents must also be circulated nationally to the other state governments, as this is an effort first of its kind in the country. In the next few months, we shall concentrate upon the dissemination of these documents. It must also be backed by training programme at the state and district level. In May, we have scheduled a training programme of all the Divisional Commissioners and Collectors of the state.

Strategie Requirements of the Activity

Organizing the preparation of disaster management plans in district after districts could be very repetitive and tedious. It is not a very visible activity. There are always skeptics around, who call these activities largely academic. Certainly, there is an element of abstraction, and the results are not immediately available. In these circumstances, it is a challenge 10 maintain the level of interest in this activity. There are many ways of sustaining tile interest. The first is that those who are responsible for the preparation of

these plans must believe in what they are doing. Their commitment and sincerity of purpose about this exercise should never be in doubt. Secondly, it is necessary that political support for this activity must be secured. In the state government, it has always been. always our effort 10 bring disaster management on the agenda of political executives, and persuade them 10 express their support for the disaster management plan.

The government organized two international workshops on disaster management, one in the beginning in May 1995 and the other in the concluding stage in July 1998 10 plan and project these activities. These events were primarily political and media events, through which the top political functionaries endorsed the disaster management plan activities. The most important strategy must be to provide visibility and operational support to the programme through the acquisition of hardware. We pursued this strategy very aggressively under the MEERP, which has brought a remarkable success to this programme. Further, a scheme of incentives must be built into the whole programme. Within the state, there should be a best practice competition among the districts in disaster management. There should be a fellowship programme, through which the outstanding professionals in disaster management could be sent for advanced training in leading organizations of the world. The state government must recognize the NGOs, CBOs and citizens working in this area through conferring honour upon them.

Hardware Vs. Software

Once the quality and standard of the disaster management plan received the approval of international agencies, the World Bank, the DFID, and the UNDP, we could put an implementation plan in place. The implementation plan included setting up of the Emergency Operations Centre in the state headquarters, control rooms in the divisional and district headquarters, an intra-district VHF network and an inter-district VSAT network for the entire State, and the GIS-based Disaster Management Information System. The World Bank approved these activities for the implementation under the MEERP. After receiving the approval of the state government at the highest level, these technology-intensive activities were taken up. These activities have given the disaster management plans a very practical dimension. These accomplishments also add to the capabilities of the state in a very visible way. As a result, the legitimacy and purposefulness of the disaster management plan as an activity has been fully established.

Since the World Bank has supported the MEERP, it was possible to support the equipment of disaster management plan through credit made available by the Bank. The other international agencies do not share this approach. Under this project, the DFID and the UNDP support have been available for the plan documentation, training, simulation, preparation of case studies, which could be classified as software. All the international agencies extend the software support to the national or local governments, which are aimed at stronger institutional support. better training facilities, risk and vulnerability studies, etc. While the importance of software support can not to be denied, the hardware support enhancing the technological capabilities of the governments are equally important. It is time the international agencies consciously decide to include some of the hardware components in their assistance programme for disaster management plans.

It could be said that the MEERP has emphasized these technology-intensive components much more than the human resources and community aspects of the plan. The impression is simply because the World Bank agreed to support the State government for these activities with its credit. Other international agencies would not have been so forthcoming in their support. However, if there is a perceived imbalance in the nature of activities, the state government is planning a series of community vulnerability reduction programmes across the state. The government has also decided to take up an extensive training programme at all the administrative levels, and develop training literature for this purpose. The DFID is supporting the state government towards these activities for the next three years.

Institutional Support within the State Government

The international agencies have played as catalysts in promoting the initiatives of the state government in the preparation and implementation of the disaster management plans. It could lead to an apprehension that once the International agencies withdraw their support, these activities could completely stop. It must be said that there have been very conscious efforts to sustain these activities at the institutional level in the government. One of the decisions has been to set up a Disaster Management Cell within the

government, which would be responsible for all the disaster management activities. The Cell would maintain control rooms, communication network, and update the Disaster Management Plans. It will have staff and a regular budget to discharge these responsibilities. The Disaster Management Cell will network with many institutions in the state, which include the Collectors and the Centre for Disaster Management, YASHADA for maintaining the control rooms and updating disaster management plans, the Maharashtra Remote Sensing Applications Centre, Nagpur for maintaining the GIS-based Disaster Management Information System, with communication sector organizations for the VHF and VSAT network. The state government has already agreed to provide the budgetary support for these activities.

The disaster management plan for the state of Maharahtra is not an ordinary government Programme. It has demanded great commitment, imagination, and meticulous groundwork on part of those who were associated with it. It has also asked for continuous effort at securing the acceptability of the plan documents in the government and non-government sector. In our case, it was even more difficult, since our primary mandate "'as the rehabilitation of earthquake-affected people. The disaster management plan was a secondary objective. That we never allowed it to become a subsidiary activity was due to our firm belief in the long-term impact of the disaster management plans activity.