EMI
Earthquakes and Megacities Initiative

Cluster Cities Series - Asia

EMI Proceedings Report PR-06-03

Disaster Risk Reduction of Mega-Urban Regions

EMI
Earthquakes and Megacities Initiative

KOBE UNIVERSITY
Research Center for Urban Safety and Security

International Strategy for Disaster Reduction

UNDP

PACIFIC DISASTER CENTER

PROVENTION CONSORTIUM

World Bank Institute

Asia Megacities Forum 2006
Nov. 3-4, 2006, Kobe, Japan

Regional Forum for Disaster Risk Reduction of Mega-Urban Regions

Contents

Organized by:

Earthquakes and Megacities Initiative (EMI)
Kobe University - Research Center for Urban Safety and Security (RCUSS)

With the support of:

Japan International Cooperation Agency (JICA)
Pacific Disaster Center (PDC)
ProVention Consortium
United Nations Development Programme/Bureau of Crisis Prevention and Recovery (UNDP/BCPR)
United Nations-International Strategy for Disaster Reduction (UN-ISDR)
World Bank Institute (WBI)

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INTRODUCTION

The Asia Megacities Forum 2006 (AMF 2006) was jointly organized by the Earthquake and Megacities Initiative (EMI) and the Kobe University Research Center for Urban Safety and Security (RCUSS), as a contribution to the implementation of the Hyogo Framework of Action (HFA). The HFA urges states, the United Nations International Strategy for Disaster Reduction (UN-ISDR), and international and regional organizations to take steps to reduce the emerging risks associated with the vulnerability of mega-urban agglomerations.

Held on 3-4 November 2006, the Forum was undertaken with the support of EMI's partners, namely, the Japan International Cooperation Agency (JICA), the Pacific Disaster Center (PDC), the ProVention Consortium, the United Nations Development Programme (UNDP), UN-ISDR and the World Bank Institute (WBI). It brought together EMI's partner cities and academic institutions in Asia, as well as representatives of international and regional organizations.

The AMF 2006 was held under the banner of the Cluster Cities Project, EMI's flagship program, which seeks to support the shift from the current post-disaster response paradigm to proactive mitigation, among a network of megacities worldwide. A similar forum was organized in Quito, Ecuador in June 2006 for EMI's city partners in the Americas cluster.

The Forum was conceived to provide the venue for a knowledge sharing experience on disaster risk reduction among megacities in Asia. It served as a continuation of EMI's efforts to respond to HFA's call for disaster risk reduction in mega-urban regions and provided the opportunity for strengthening network cooperation and advancing state-of-the-art knowledge. Twelve EMI megacity partners and observers participated in the Forum, with each partner city represented by a city officer and an academic research leader.

> The HFA urges States, UN-ISDR, and international and regional organizations to take steps to reduce the emerging risks associated with the vulnerability of mega-urban agglomerations.

The Forum consisted of two one-day workshops. Workshop 1 focused on the implementation of a competent disaster risk management (DRM) program in the context of megacities. Workshop 2 was devoted to advancing and improving knowledge- and experience-sharing among megacity partners.

In the First Workshop on 3 November, the participants were updated on how EMI's city partners participating in the 3cd program were implementing the Disaster Risk Management Master Plan (DRMMP) model. They also learned how the DRMMP model can be used by their own cities to put in place competent strategies and action plans to manage and reduce disaster risk. For this purpose, participants had hands-on learning sessions on MEGA-Learn, a newly developed set of tools, technologies and eLearning packages for megacities DRM.

Fig. 1. Participating Cities and Organizations

Asian Cities

1. Beijing, China
2. Delhi, India
3. Dhaka, Bangladesh
4. Istanbul, Turkey
5. Jakarta, Indonesia
6. Kathmandu, Nepal
7. Kobe, Japan
8. Manila, Philippines
9. Mumbai, India
10. Shanghai, China
11. Tashkent, Uzbekistan
12. Tehran, Iran

International Organizations

1. Asian Disaster Reduction Center
2. International Federation of Red Cross and Red Crescent Societies
3. International Labor Organization
4. International Recovery Platform
5. Pacific Disaster Center
6. ProVention Consortium
7. United Nations Development Programme
8. United Nations Environment Programme
9. United Nations Office for the Coordination of Human Affairs
10. World Bank Institute
11. World Health Organization

The Second Workshop held on 4 November, focused on sharing relevant experiences among cities. Disaster risk reduction (DRR) case studies of the Istanbul Earthquake Master Plan and the Kobe City reconstruction, following the 1995 Great Hanshin-Awaji Earthquake were presented, among others. A round-table discussion followed after all the workshop sessions, highlighting relevant initiatives and opportunities in disaster risk reduction.

Day 01 - 03 Nov. 2006
Opening Session

Antonio Fernandez, Prinicipal Scientist of EMI, formally opened the Forum and presented the program overview. Yasuo Tanaka of Kobe University-RCUSS, welcomed the participants on behalf of the organizers; followed by Shoji Nishijima, Director and Vice-President for International Affairs and Education, Kobe University, who briefly talked about the significance of the Forum in relation to the University's urban risk reduction research.

In his Video Address, Salvano Briceno, Director of the UN-ISDR Secretariat, highlighted the importance of megacities DRR in the Hyogo Framework of Action (HFA). He noted that "local authorities play the key role in guiding the way in which urban areas develop, how buildings are engineered, and are often ultimately responsible to decide on emergency procedures in case of disasters." He also highlighted some of the recent global initiatives in DRR, such as the UN Inter-Agency Task Force on Disaster Reduction's Global Platform for Disaster Risk Reduction and the World Bank's new Global Facility for Disaster Reduction and Recovery.

Fouad Bendimerad, Chairman of the Board of EMI, provided an overview of the Cluster Cities Project and the Cross-Cutting Capacity Development (3cd) Program. He explained how these initiatives continue to serve the DRM needs of large and complex urban areas, especially in terms of mainstreaming DRR into the daily functions and services of the city. He briefly introduced EMI's mainstreaming model, pointing out that the focus on local implementation, with the involvement of the central authorities and the participation of civil society, strengthens the weak link that has hindered implementation of DRR in the past.

Fig. 2. EMI's Mainstreaming Model

"[L]ocal authorities play the key role in guiding the way in which urban areas develop... and are often ultimately responsible to decide on emergency procedures in case of disasters." - *S. Briceno, UN-ISDR*

Session 1 - The Disaster Risk Management Master Plan (DRMMP): Component, Process of Implementation and Examples

Moderator: Amaryllis Torres
Rapporteur: Antonio Fernandez

The First Workshop consisted of three sessions which dwelt on the concept of a Disaster Risk Management Master Plan (DRMMP). The DRMMP is simultaneously a process, a framework, and a plan for megacities DRM, developed and promoted by EMI at the city level. Session 1 focused on the various aspects of the DRMMP, its components, process of implementation and application in Metro Manila, Philippines, and Kathmandu Valley, Nepal.

Shirley Mattingly, 3cd Program Director, referred to the DRMMP model as a framework for providing a solution to the dilemma faced by megacities in the event of a disaster. The model is a participatory process where the local stakeholders develop a sustainable master plan and agenda, consisting of legal, institutional, financial, social and technical elements. It has been adopted by the UNDP and promoted by the UN-ISDR and the ProVention Consortium. The DRMMP aims to integrate disaster risk reduction into the day-to-day business operation of the megacity and treats DRM as another city planning process.

Jeannette Fernandez, 3cd Component 1 Coordinator, outlined the various steps in the DRMMP implementation process consisting of: first, the assessment of risk and building on existing knowledge, and second, the empowerment of local stakeholders through the use of focus groups and the provision of tools to support decision-making and facilitate risk communication. Steps 3 and 4 are the execution of the DRMMP, and sustaining efforts already initiated, respectively. J. Fernandez noted that while disaster risk reduction poses a difficult challenge, it will benefit the city in the long run, in the form of improved governance, stimulated economy and safer environment.

The DRMMP Implementation in Metro Manila and Kathmandu were presented by Renato Solidum Jr., Director of the Philippine Institute of Volcanology and

Fig. 3. The Disaster Risk Management Master Plan (DRMMP) Framework

Seismology (PHIVOLCS) and Local Investigator (LI) of the 3cd Program in Manila, and Amod Dixit, Director of Nepal's National Society for Earthquake Technology (NSET) and 3cd LI for Kathmandu, respectively. The DRMMP of Metro Manila was developed through a highly inclusive and participatory process, involving local stakeholders and partners from the government, private sector, academe and civil society. It builds on the significant work already accomplished by variouslocal,national, and international initiatives, in particular the Metro Manila Earthquake Impact Reduction Study (MMEIRS) funded by JICA. R. Solidum described EMI's contribution as responding to the needs pointed out by MMEIRS, as prioritized by stakeholders in the August 2005 workshop, and translated into the 10 elements of the Metro Manila DRMMP.

> "Following the DRMMP process [has] enable[d] the City Government to enhance and improve its DRM activities and to make it consistent with local and international DRM standard practices."
>
> *- Makati City*

A. Dixit delineated the project structure in Kathmandu as consisting of the Kathmandu Metropolitan Council, NSET and a Program Advisory Group, working together to promote the planning objectives of the country. These objectives consist of reaching an agreement for a Comprehensive DRMMP, its process and action plans, which include pre- and post-event actions, and strengthening DRM capabilities within the Kathmandu Metropolitan City (KMC). The other objectives are to propose an adequate institutional structure as a pilot model for other municipalities to consider; and to integrate risk reduction activities in the Municipal Annual Plan.

Reflections on the Metro Manila implementation process were shared by Ramon Santiago, Director for Public Safety of the Metro Manila Development Authority (MMDA), and Violeta Seva, EMI Corporate Secretary and Consultant, Makati City; while reflections on Kathmandu implementation was discussed by Dinesh Kumar Thapaliya, Mayor of KMC. R. Santiago shared that MMDA has initiated several emergency programs to prepare Metro Manilans in the event of a disaster. He referred to MMEIRS as one of the most important studies to date. The study included 105 action plans, from which local stakeholders and EMI identified five major themes to be accomplished in three to five years. These are: the use of technologies for risk communication and awareness (ICT); incorporation of risk reduction criteria in comprehensive land use plans (CLUP); conduct of training needs assessment and capacity enhancement for DRM (TNA); mobilization of resources among NGOs and professional organizations in the DRM process; and the review of legal and institutional arrangements to improve DRM delivery (LIA).

V. Seva shared Makati City's experience

with the DRMMP process ever since the 3cd Program was launched in Metro Manila in 2004. Makati is one of the 17 local government units (LGUs) and the financial center of Metro Manila. One of Makati's contributions to the sound practices knowledge base is its Environmental Management Plan. Makati City has also organized its Command Control and Communication Operation Center and prepared a draft ordinance on the City's DRM system, in line with the overarching goal of the DRMMP, which is to mainstream disaster risk reduction in the daily operations of the City.

D. Thapaliya pointed out that KMC's strategy in dealing with hazards is to work in coordination with concerned authorities, international and local non-government organizations, community based organizations and local citizens. Among the identified concerns in the DRMMP of KMC are institutional setting of disaster management, development of mechanisms and capabilities for building code enforcement, development of emergency response plan, and the incorporation of risk reduction in its development plans.

Session 2A - 3cd Program: Tools, Technologies and Capacity Building Package

Moderator: Renato Solidum, Jr.
Rapporteur: Amod Dixit

Session 2A dealt with the 3cd Program's tools, technologies and capacity building programs,collectively packaged as MEGA-Learn, which has been developed by EMI in close collaboration with its international and local partners worldwide. With MEGA-Learn, EMI hopes to enhance the DRM capacity of megacities, improve disaster risk communication and, ultimately, strengthen stakeholders' ownership of the DRMMP process in EMI's partner cities.

After providing an overview of the Cluster City Project and the 3cd effort in DRMMP, F. Bendimerad. discussed the four web-based tools for megacities, namely, MEGA-Know, MEGA-Plan, MEGA-View and MEGA-Index, which would enable stakeholders to be involved in all stages of DRMMP, from risk assessment to mitigation and implementation. He underscored the need to conduct training which should be of international standard and acceptability.

J. Fernandez explained the MEGA-Index or the megacity indicators system for benchmarking, measuring progress and building ownership mechanisms for risk reduction. Together with EMI's partners at the Institute of Environmental Studies (IDEA) of the National University of Colombia-Manizales and the International Center of Numerical Methods in Engineering (CIMNE) of the Technical University of Catalonia, MEGA-Index was pilot-tested in Metro Manila in March 2006. Prior to this, the methodology has already been tested at the national level in 13 countries in the Americas.

J. Fernandez further described MEGA-Know or the Megacity Disaster Risk Management Knowledge Base, a web-

based knowledge management tool for information sharing and capacity building. The purpose of this initiative by EMI and the Pacific Disaster Center (PDC) in Hawaii is to share and exchange relevant and useful DRM information among the world's most complex and disaster-prone urban agglomerations. Conceived as a user-friendly eLearning tool, MEGA-Know helps to extend the use of sound practices and methods globally, in order to achieve more effective risk reduction and mitigation options in megacities.

With MEGA-Learn, EMI hopes to enhance the DRM capacity of megacities, improve disaster risk communication and, ultimately, strengthen stakeholders' ownership of the DRMMP process in EMI's partner cities.

As of September 2006, MEGA-Know contains 12 city profiles from megacities in Asia, Americas and the Euro-Mediterranean region; 45 sound Practices in different areas of disaster risk management; publications, discussion papers and fieldtrip reports, and a Contact Directory of city officials and researchers involved in 3cd Program. The sound practices in the knowledge base are classified by city, category of practice, and hazard type. MEGA-Know is also equipped with an internal search engine to facilitate the retrieval of information by keywords. By 2007, 20 megacities in the EMI network are expected to be included in the knowledge base.

In the same session, Jim Buika of PDC talked about the MEGA-View, known also as Internet-based Map Viewers. MEGA-View was developed as a GIS-based internet map, accessible from any computer with good internet access, developed through the joint effort of the PDC, EMI, PHIVOLCS and MMDA. J. Buika explained the Map Viewer tools, using the Metro Manila map as an example. The tools were based on the dataset culled from the JICA-sponsored MMEIRS study. Mega View is useful for planning, education, risk communication and management purposes.

Asteya Santiago, EMI General Manager, presented MEGA-Plan, which is an elearning course on risk-sensitive land use and urban planning. Developed by EMI, the MEGA-Plan is a blended eLearning course which is a combination of web-based training and a face to face workshop to be held at the end of the course. Its objective is to demonstrate how land use planning can be a means to modify the vulnerabilities of cities, and reduce risk disaster arising from natural hazards.

Katalin Demeter of the World Bank Institute (WBI) presented the WBI Distance Learning Program on Disaster Risk Management, which is being administered by EMI in the Philippines. She discussed the six online courses, where the general course is mandatory for all participants to complete, before proceeding to the five specialization courses. Having online access, web pages from the initial training program in progress were shown and explained.

Hossein Kalali of UNDP/BCPR and Ian O'Donnell of ProVention Consortium

offered their observations on the eL learning packages and tools. H. Kalali expressed his satisfaction, and of the UN's interest in and support to the above developments. He pointed to certain approaches that need to be considered in this regard. These are inclusiveness: country specificity within context; tools which should provide evidence-based rationale; and involvement of all decision makers, stakeholders, professionals, and the public. He added that while these tools are now being used in megacities, these could be used in other cities, and should also cover risks arising from human activities. Since government structure is unique in different places, H. Kalali said that the corresponding adjustments should be introduced.

Ian O'Donnell was likewise impressed with EMI's accomplishments in tools development, and expressed interest to see what could be done with these tools outside megacities and in other context and environments. In the question-and- answer portion, an observation was made that disaster management cannot wait for a long period of time to get integrated into the day to day operations of the government, the way environmental management took decades to be part of the daily operations of the government. Furthermore, land use training, which should mainstream disaster management, should not be regarded as sectoral, but as a multi-risk and holistic approach .

Session 2B - Hands-on Exercises on 3cd Program eLearning toolkit

Learning how to apply the various tools introduced in Session 2-A was the objective of Session 2B. For this purpose, computer clusters were set up to enable the participants to do hands on exercises with MEGA-Learn tools. Under the guidance of A. Fernandez, J. Buika and J. Fernandez, the participants tried their hand on doing the exercises. A discussion then followed among the participants, the tool developers and EMI's cluster's partners and experts, on the potential applications of the tools in their respective cities and organizations.

Day 02 - 04 Nov. 2006
Session 3 - DRMMP Applications: Case Studies and Experiences

Moderator: Yasuo Tanaka
Rapporteur: Jeannette Fernandez

Workshop 2, held on 04 November, was devoted to the topic, "How to advance and improve knowledge- and experience-sharing among megacities partners." Session 3 showcased the implementation and potential of the DRMMP in selected megacities in Asia. In this session, several cities (Istanbul, Tehran, Tashkent, Mumbai and Shanghai), which are all members of EMI's Asian cluster under the Cluster Cities Project, presented their respective experiences in disaster risk reduction. Metin Ilkisik of the Municipality of Istanbul updated the participants on the Implementation of the Istanbul Earthquake Plan. How disaster risk reduction is being implemented in Tehran was the question answered by Mazier Hosseiny of Tehran Municipality in his presentation. Disaster mitigation activities in Tashkent were described by Tursunbay Rashidov of the Uzbekistan Academy of Science at Tashkent. The presentations confirmed that disaster risk reduction is city-specific and closely related to the availability of human and financial resources. It is also related to the exercise of political will, an understanding of the benefits of investing in disaster prevention and mitigation, and the availability of community support.

The presentations showed that cities, such as Tashkent, are in the process of completing vulnerability and risk assessment needed in reducing disaster risks.

In the update of disaster management situations in various local government units, S.K Singh of the Greater Municipality of Mumbai reported on how the 2005 and 2006 floods have impacted on the Mumbai disaster preparedness plans. The preparedness of China megacities was discussed by Zhu Yuanqing of the China Earthquake Administration in Shanghai. Pariatmono of the Ministry of Research and Technology, Indonesia, reported on the current status of the Indonesian Tsunami Early Warning System and its relevance to megacities .

The presentations showed that cities, such as Tashkent, are in the process of completing vulnerability and risk assessment needed in reducing disaster risks. The story of Istanbul illustrates a case of mainstreaming DRM in its daily operations. After assessment has been done, and the municipality has claimed ownership, specific action plans will be implemented. Teheran and Shanghai have adopted approaches consistent with their own cultures and the interest of their authorities.

Teheran counts on a comprehensive DRMMP, where implementation is focused on strong and decentralized disaster management centers to bring them closer to the smaller administrative

units. On the other hand, Shanghai authorities are interested in disaster prediction and instrumentation to monitor seismic activities. Simultaneously, it is also investing in education, particularly of children and teenagers.

Mumbai and Jakarta discussed the lessons learned from recent disasters associated with flooding and tsunamis, respectively. In both cases, the need for a comprehensive DRM system with a multidisciplinary perspective was emphasized, along with the need for considering education, awareness raising, and implementation of early warning systems and mitigation actions to reduce future impact.

Session 4 - The 1995 Great Hanshin-Awaji Earthquake: Lessons to be Learned

Moderator: Ravi Sinha
Rapporteur: Kambod Amini

Session 4 was devoted to the lessons learned from the Great Hanshin-Awaji Earthquake after more than a decade of recovery. Makoto Matsushita from the Kobe City Government tackled the reconstruction and rehabilitation process from the perspective of the City. He presented a documentary depicting the difficulties encountered in disaster management and emergency response, more particularly in relation to the damages on roads and railroads which had a considerable impact on rescue and relief operations. An important aspect of the experience was the cooperation extended by the community in disaster management where records showed that about 1.2 million persons per day were involved in such activities, from search and rescue, to evacuation and shelter preparation.

The second paper dealt with the reconstruction and rehabilitation process from the Hyogo Prefecture perspective, presented by Masahiko Murata of the Hyogo Prefecture and Integrated Recovery Programme. He noted the importance of immediate response from the government, coordination, community involvement, livelihood assistance and urban planning, in the recovery of the prefecture.

Yasuo Tanaka of Kobe Unversity-RCUSS, concluded the session with a discussion of "Educating and Leaving a Legacy for Future Generation." He updated the participants on the recent developments on disaster risk reduction taking place at RCUSS, including a new model for DRM, which covered both technological (e.g.,

An important aspect of the experience was the cooperation extended by the community in disaster management, where records showed that about 1.2 million persons per day were involved in such activities, from search and rescue, to evacuation and shelter preparation.

fault rupture, ground conditions, damages, casualties) and sociological assessments (e.g., economic and social impacts).

Session 5 - Round-table Discussion on Strengthening Networks and Partnerships for Megacities Disaster Risk Reduction

Moderator: Friedemann Wenzel
Rapporteur: Asteya Santiago

The Round-table Discussion (RTD) in Session 5 focused on the importance of "Strengthening Networks and Partnerships for Megacities Disaster Risk Reduction." The session was organized to update the participants on relevant initiatives and opportunities in networking, and the types of partnerships that could help them in their DRR implementation. It also provided the venue for knowledge sharing specific to disaster risk reduction. The panelists were representatives of international and regional organizations which, by nature of their mandates, where in a position to provide support to risk reduction efforts in various cities. These were ProVention Consortium, UNDP/BCPR,PDC, WBI, UN-OCHA, ADRC,IRP, WHO and UNEP. They elucidated on their organization's perspectives and approaches, and contributions to partnerships and coalition-building within the context of urban risk disaster management. The common question addressed by all the panelists was how cities could benefit from their organization's programs, and how the different agencies can be meaningfully involved in DRM, without deviating from their respective mandates. The highlights of the consensus reached in the RTD were as follows:

1. UN agencies remain as strategic partners of EMI, providing legitimacy to its work;

2. There should be a framework or a big picture prepared by various institutions involved in disaster risk reduction – at present or in the future – to guide their specific inputs;

3. DRM and recovery systems may be developed and incorporated in the government's day to day operations, which could be upgraded in emergency situations;

4. There is need for more interaction among local governments which may be done through the internet and the conduct of e-conferences, among others. In addition to bi-annual meetings, there can be in-between meetings which other countries may host. An association of local governments may be harnessed for more active involvement in DRM, even before disasters actually occur;

5. There should be sharing of information even among non-member organizations and local governments, focusing among others, on further expanding membership; and

6. It is equally important to "learn by doing," as it is to continue training programs to increase learning.

Forum Discussion: Advancing and Supporting Disaster Risk Reduction in Megacities

Moderator: Shirley Mattingly
Rapporteur: Violeta Seva

The Forum Discussion focused on the theme "Advancing and Supporting Efforts in Disaster Risk Management in Megacities." This was devoted to generating inputs and suggestions on how to improve knowledge sharing, and identifying issues that can be the subject of more intensive discussions in future workshops. Among the important insights and suggestions of the participants are the following:

Amarylis Torres, EMI Trustee, identified two issues for serious consideration, namely, addressing the psychological needs of victims of disaster, and mainstreaming gender concerns in disaster risk management. Ravi Sinha of the Indian Institute of Technology, Mumbai, stressed the importance of networking and the need for frequent and closer interaction among all stakeholders and the United Nations agencies. He suggested that EMI further expand its reach to megacities by encouraging more information sharing among representatives of cities, decision makers, the scientific community and academicians. Harkunti P. Rahaya of the Institute of Technology, Bandung, Indonesia, highlighted the importance of public education and information communication, and suggested that EMI posts in its website, information on conferences, seminars and other activities or events happening worldwide in the area of DRR, and establishing web based talk groups.

Participants of the Forum Discussion.

Metin Ilkisik of the Istanbul Metropolitan Authority related their experience in reducing risks through "learning by doing," citing that they only had scanty knowledge of this field in the beginning, but in five years time, they have become more knowledgeable. His suggestion was for cities to continue developing training programs for planners, architects, engineers and local people. Tuty Kusukumati, Secretary of the Greater Capital Jakarta informed the Forum of their desire to incorporate DRR in the urban design of the new governor's five-year platform or agenda for 2007-2012. He volunteered to convince the governor of Jakarta to become a regular member of the Cities Forum, instead of being a mere observer.

J. Buika of PDC mentioned that the knowledge base of sound practices of megacities that EMI and PDC have

produced could be utilized by and replicated in other cities. The representative of UN-OCHA expressed interest to work with EMI, especially in the area of disaster response and preparedness. He informed the group that training activities and workshops are conducted regularly in the Asia Pacific Region. Harkunti of Indonesia appealed for the continuous support of U.N. funding agencies to provide assistance to developing countries to attend and participate in similar seminars and workshops. The UNEP representative advised EMI and the megacities to turn to UN agencies as strategic partners which could lend legitimacy to their projects. The representative of the World Health Organization credited the DRR framework for providing a strong foundation for collaboration among civil society, local governments and UN agencies.

Closing Session

F. Bendimerad delivered the closing remarks. He thanked everyone for a meaningful event. He noted that while EMI does not have all the answers to the questions raised during the Forum, with the inputs of the involved cities, EMI has developed a clear and unbiased understanding of the issues that confront the megacities in disaster risk reduction. He was proud that EMI has gained recognition of its credibility with the UN agencies because of its accomplishments and adherence to the principles of partnerships. Proof of this was its admission as a Full Member of the United Nations Inter-Agency Task Force for Disaster Reduction. He stressed that while response planning is important, there is an urgent need to identify specific actions that need to be scaled up.

Y. Tanaka of RCUSS, Kobe University, reiterated his appreciation of the enthusiastic response and participation of experts and representatives of the scientific community, planning offices and the academe. He affirmed that RCUSS will continue its partnership with EMI in the training of young professionals. A. Fernandez expressed expressed appreciation of the lively discussion and suggestions for further steps to be taken in the future by EMI and its partners.

PRESENTATION ABSTRACTS

The Disaster Risk Management Master Plan (DRMMP): Model and Components

By Shirley Mattingly
3cd Program Coordinator, Eearthquakes and Megacities Initiative

Disaster risk in big cities is impossibly complex, and local government and community leaders are often at a loss as to what to do. To meet this need, EMI and its partners have developed the Disaster Risk Management Master Plan (DRMMP) model, which provides a framework on which cities can build locally realistic solutions to disaster risk.

The DRMMP model comprises a methodology, a plan and a process for stimulating and motivating risk reduction policy development and implementation. It aims to establish the institutional and legal arrangements for a sound DRM system, and the integration of DRM into the ongoing governance, business, and economic processes in the city.

The DRMMP model comprises a methodology, a plan and a process for stimulating and motivating risk reduction policy development and implementation. It aims to establish the institutional and legal arrangements for a sound disaster risk management (DRM) system, and the integration of DRM into the ongoing governance, business, and economic processes in the city.

The model works through the empowerment of local stakeholders, providing a way for cities to solve their own disaster risk problems. Local governments, institutions, and communities make use of solid research and applications to understand the context and issues involved and to determine locally-appropriate organizational approaches for disaster risk reduction.

The local strategy involves incorporating DRM in the city planning process in order to mainstream risk reduction within local functions and services. DRM is promoted not as a separate issue, but a part of day-to-day business, working through collaborative partnerships among local institutions and stakeholders. By working together, the partners develop a consensus plan and implementation scheme that is appropriate to the city and its unique circumstances – cultural, economic, political, and social.

The plan then guides short-term awareness-raising, preparedness, and capacity-building activities, as well as investment decisions for long-term physical, social and economic development. The plan consists of a "menu" of priority actions which, overall, encompass the key and essential components of a sound DRM system and the processes necessary to implement and sustain the system. These components include: (1) risk identification and assessment; (2) legal and institutional system (governance); (3) capacity building and community preparedness (awareness, response, relief, recovery capability); (4) risk reduction and prevention (increased

safety and disaster resistance of buildings, critical facilities, operating systems and lifelines/infrastructure; land use and development controls) (5) financial protection (risk reduction financing, risk transfer, economic stability and sustainability; and (6) development and application of knowledge and technology (mitigation technology, warning systems, research and education).

This model represents and incorporates lessons learned from experiences in collaborating with partners from academia, government and communities. These experiences form the basis for EMI's development of megacity-specific, web-based, e-learning tools such as MEGA-Know, MEGA-View, MEGA-Index and MEGA-Plan.

The DRMMP is already attracting attention; it has been adopted by the United Nations Development Program and is promoted by UN-ISDR and the ProVention Consortium, among others.

DRMMP Process of Implementation

By Jeannette Fernandez
3cd Component 1 Coordinator, Earthquakes and Megacities Initiative-Pacific Disaster Center-Escuela Politécnica Nacional

The Cross-Cutting Capacity Development Program (3cd Program) was developed by the Earthquakes and Megacities Initiative (EMI) in response to the growing need of large urban environments, particularly those in the developing world, for a process for disaster risk reduction (DRR).

The DRMMP framework was designed to mainstream DRR within local government functions and services, where DRM is not a separate issue, but rather a part of day-to-day business. It engages and supports local governments, together with practitioners, researchers, and the community, in DRR.

The process of implementing the DRMMP involves five steps. These are to assess, empower, sustain, monitor and evaluate.

To assess a megacity, 3cd builds on existing knowledge by reviewing previous studies and understanding competencies. At this point, the legal framework and institutional arrangements are analyzed to determine gaps and needs, resulting in profiles and sound practices.

The DRMMP framework was designed to mainstream DRR within local government functions and services, where DRM is not a separate issue, but rather a part of day-to-day business. It engages and supports local governments, together with practitioners, researchers, and the community, in DRR.

To empower the megacity, the 3cd program tries to ensure institutional commitment and political feasibility. For this purpose, the stakeholder's roles and responsibilities are clarified, and they are mobilized through focus groups to promote collaborative work. Risk communication tools are then used to further engage stakeholders and build local ownership. Finally, for megacity

empowerment, the DRMMP concept is developed, and priorities are set locally.

In order to execute the DRMMP, stakeholder's workshop and focus group meetings are conducted. A consensus on the DRMMP is reached, based on the stakeholders' inputs from the local context. It is then promoted, and the mainstreaming mechanisms are put in place.

To sustain the program, the 3cd Program banks on the ownership and capacity developed by the stakeholders. Local focus group is the mechanism to ensure knowledge transfer and long-term sustainability.

Finally, to monitor and evaluate, the 3cd Program requires periodic review, oversight and advice from the Program Implementation Team (PIT), integrated by the local and the international supporting teams. This allows integration and incorporation of any corrective action whenever required. Field trips are scheduled every three to four months to provide the opportunity for direct exchange between involved parties, advance the DRMMP implementation agenda, conduct specific seminars, workshops and other integrating activities, and plan next steps for a sustained process.

The 3cd Program offers a sound demonstrated experience through realistic applications. The DRM tools are megacity-specific, intended to raise the skills of professionals and decision makers, and provide management and monitoring mechanisms for DRR.

The main tool, called MEGA-Learn, was developed in partnership with leading research centers and other international organizations such as the Pacific Disaster Center (PDC), the International Center for Numerical Methods in Engineering (CIMNE), the World Bank Institute (WBI), Provention Consortium, the United Nations Development Program (UNDP/BCPR). It provides a menu that includes internet accessible Megacities KnowledgeBase, Map Viewers, a Megacity Indicators System, Risk Sensitive Urban Planning training modules, and other distance learning courses.

The 3cd Program offers a sound demonstrated experience through realistic applications. The DRM tools are megacity-specific, intended to raise the skills of professionals and decision makers, and provide management and monitoring mechanisms for DRR.

Realistic application of the methodology and tools have been done in Istanbul, and, most recently, in Metro Manila, Kathmandu, and Mumbai. This allows the PIT to improve the process and application through direct feedback from the end users.

DRMMP implementation typically takes between four to five years, depending, among others, on the availability of previous studies on risk identification and assessment, accessibility to human and financial resources, and political leadership.

In summary, the contributions of the 3cd Program to the involved megacities have

been to provide technical and managerial support; help facilitate consensus building and implementation process; bring in ideas and experience from other cities, and provide guidance on how to implement DRM plans and actions.

The challenges experienced have been in ownership enhancement; political commitment to institutionalize efforts; incorporation of the private sector and local NGOs in risk reduction efforts; and resources availability.

DRR can be seen as an opportunity to improve governance and build better institutions. It can stimulate the economy, improve trust between government and its citizens, improve knowledge and enhance structures, and, lastly, improve the safety and welfare of the citizens.

DRMMP Implementation in Metro Manila

By Renato U. Solidum, Jr., Ph.D.
Director, Philippine Institute of Volanology and Seismology, and Local Investigator, 3cd Metro Manila

In 2004, the Metro Manila Earthquake Impact Reduction Study (MMEIRS) conducted by Japan International Cooperation Agency (JICA), Philippine Institute of Volcanology and Seismology (PHIVOLCS) and the Metropolitan Manila Development authority (MMDA) came out with the conclusion that about 10 million people in the metropolis will be greatly affected in the event of a large magnitude earthquake (M7.2) originating from the West Valley Fault. If disaster risk mitigation is not done, the scenario earthquake would result in an estimated 33,500 deaths and 114,000 injuries from collapsed structures alone. Additional casualties may result from secondary hazards such as fire. Massive impact on lifelines, namely bridges, water supply, electrical supply and communication might occur.

Such massive scale of earthquake impacts is not unknown to the Philippines. The 1990 Luzon Earthquake, which affected a significant portion of northern Luzon and still fresh in the Filipino's minds, illustrates the scale of destructiveness a strong earthquake could inflict on communities. The MMEIRS master plan for earthquake impact reduction recommends 105 priority actions to be implemented over several years.One of the strategies to ensure implementation of the actions included partnering with the international NGO focused on urban risk reduction, the Earthquakes and Megacities Initiative (EMI).

Following the process implementation of the Cross-Cutty Capacity Development (3cd) Program of EMI, initial activity conduced was an assessment of the previous studies done on the metropolis, such as the EqTAP (by EdM-NIED in 2004), MMEIRS (by JICA, MMDA, PHIVOLCS in 2004), and the Marikina RVA (by PDC in 2004). Three pilot cities in Metro Manila, Quezon, Makati and Marikina, were selected for the implementation of possible risk reduction actions. Sound disaster risk reduction practices in the pilot cities were were also documented – accessible through the website,

Fig. 4. Ten Elements of the DRMMP of Metro Manila

1. Strengthen the Metro Manila Disaster Coordinating Council (MMDCC).
2. Promote the adoption of disaster management ordinances by each city and municipality.
3. Promote the revitalization of city/municipal barangay disaster coordinating councils.
4. Institutionalize disaster risk management within local government framework and financing.
5. Enhance lateral and vertical inter-agency and inter-governmental communication and coordination.
6. Enhance legal basis for disaster risk management at national level by updating/replacing PD1556.
7. Promote policies that encourage implementation of DRR and develop mechanisms for mainstreaming DRR within local government functions.
8. Promote local government mitigation planning through existing planning tools.
9.Conduct training needs assessments and develop capacity building programs.
10. Strengthen barangay preparedness level for disaster response and relief.

The second part of the implementation process was empowerment of the stakeholders in Metro Manila. Representatives of the Metropolitan Manila Disaster Coordinating Council and the pilot cities, EMI and its local partner institutions met to discuss and prioritize the 10 items proposed for action by EMI's 3cd Team out of the original MMEIRS actions. Five action items were then agreed for implementation under the 3cd Program: Information and Communications Technology, Land Use and Planning, Training Needs Assessment, Civil Society and NGOs and Legal and Institutional Arrangement. A sixth action item -application of disaster management Megacity Indictors - was added later.

To sustain the 3cd Program in Metro Manila, an organizational implementation structure, composed of the 3cd Program Implementation Team, the Local Investigator and six focus groups, was created. Field trips or visits of external EMI experts and regular meetings of local stakeholders through the focus groups, improve knowledge, sustain action and develop ownership of the 3cd Program.

Among the major accomplishments of the 3cd Program are (1) the implementation of the internet-based GIS Map Viewer for Metro Manila, including the conduct of a training workshop; (2) introduction of risk reduction in the land use planning of cities and development of a web-based training course on DRR for urban planners; and (3) incorporation of risk reduction and mitigationcriteria into the proposed DRM bill for the Philippines.

The challenges that have come up include

ownership transfer, political commitment to institutionalize efforts, and involvement of the private sector and local NGOs in risk reduction efforts.

EMI's contribution to the DRMMP implementation process has been to provide technical and managerial support, help facilitate consensus building, and bring in new ideas and relevant experiences from other cities

Implementation of the 3cd Program in Kathmandu

By Dinesh Thapaliya
Chief Executive Officer, Kathmandu Metropolitan City

Kahtmandu Metropolitan City (KMC), the capital of Nepal, has a land area of 51 sq km, with a population of .7 million (2001 census report), and an alarming annual population growth rate of 4.64 pecent.

The physical characteristics of KMC make it prone to such disasters as earthquakes, landslide, flood, epidemic and fire. Thus, the City government is currently preparing mitigation measures and planning activities which include mapping disaster prone areas and conducting information dissemination campaigns. Eventually, it hopes to integrate disaster mitigation measures within land use planning and its various instruments such as the National Building Code, road widening, resettlement and zoning.

Stakeholder's workshop in Kathmandu

The City acknowledges that disaster reduction activities will take a lot of time, resources and expertise. Although some efforts have already been initiated, a Memorandum of Understanding was also signed with the Earthquakes and Megacities Initiative (EMI) in 1995 in order to assist the City in establishing a disaster risk management process that would, ultimately, equip KMC with a disaster risk management master plan.

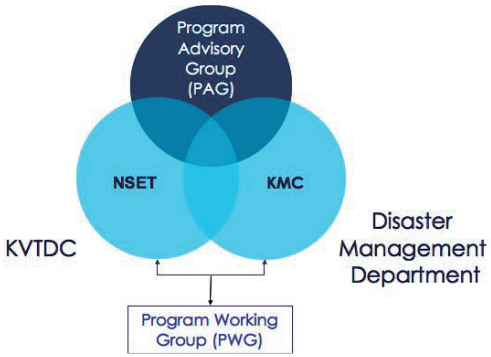
The components of the 3cd Program of EMI include the analysis of existing knowledge and practice, training and institutional practice, disaster risk assessment, and the development of a city-wide Disaster Risk Management Master Plan (DRMMP).

The workshops conducted during the first phase of the 3cd program have already pinpointed concerns that should be considered by KMC as the next steps to take. These include:

1. Institutional strengthening of disaster management;
2. Development of mechanisms and capabilities for Building Code implementation, enforcement, and quality construction;

3. Formulation of a city-wide emergency response plan;
4. Preparation of a ward level emergency response and evacuation planning;
5. Conduct of policy review and development to incorporate disaster risk reduction; and
6. Incorporation of risk reduction in land use and other development plans.

Fig. 5. 3cd Program Structure in Kathmandu



DRMMP Implementation in Kathmandu

By Amod Mani Dixit, Ph.D.
Executive Director, National Society for Earthquake Technology, and Local Investigator, 3cd Kathmandu

Kathmandu is one of the few megacities where seismic and geologic researches have been undertaken for over a century. However, it was only in the 90's that earthquake risks and the vulnerability of the Valley's people have been adequately acknowledged, and efforts exerted for earthquake risk reduction. The Kathmandu Metropolitan City, has, in fact, started to improve building code enforcement, conducted hearings for disaster risk management, held training and awareness programs and included disaster risk activities in its annual plans and budgets.

To date, local capacity in geographic information system (GIS), mapping, community mobilization and communication is adequately developed. There is also awareness of the need for a sustainable and comprehensive system of disaster risk management – one that focuses not only on response but on mitigation and preparedness ; and one that is supported by the appropriate institutional structure concerned with knowledge development.

While there is knowledge that cities need to be engaged in the implementation of disaster risk management, there is a need for a guide of how this can be done; how disaster risk reduction can be institutionalized; and what practical and proven tools and processes need to be put in place.

By the end of the 1990's, KMC started its relationship with EMI, which was formalized in 2001. In 2005, the City signed an MOU with EMI 3cd in its effort to replicate the sound model and process that it has, and learn from the wealth of experience available in cities. EMI is providing the technical assistance and guidance to implement a DRMMP supported by local and international partnerships.

The 3cd's specific objectives in Kathmandu include (1) formulating a Comprehensive DRMMP process and action plans that include both pre and post event action; (2) strengthening DRM capabilities within KMC; (3) establishing an adequate institutional structure as a pilot model for other municipalities to consider; and (4) integrating risk reduction measures in activities in the Municipal Annual Plans that the City has.

Reflecting on the Pilot Implementation of DRMMP Process in Metro Manila

By Ramon Santiago
Director for Public Safety, Metro Manila Development Authority

Metro Manila, the center of social, political, and economic activities in the Phlippines has experienced rapid urbanization from the 70's through the turn of the century. This has put a lot of strain on its resources, services and environment, giving rise to numerous concerns such as threats of disasters, especially that which is uncommon (such as an earthquake), and which has only been inadequately addressed.

Only after the 1990 killer quake (which damaged the northern part of Luzon Island) were earthquakes and their risks seriously considered. Several studies were then conducted, funded by international organizations, the most recent of which is the MMEIRS funded by JICA.

The MMEIRS gives details about the earthquake risks and hazards in Metro Manila and specific earthquake scenarios, and suggests one hundred and five (105) activities that Metro Manila can do to prepare for such situations. In response, the MMDA has developed a Master Plan that integrates all the necessary activities suggested concerning the different role players.

MMDA has recognized the need to promote the mainstreaming of risk reduction within the development planning processes at the national and local levels of governance. The shift in this direction puts in a vital mechanism for long-term development, and will save valuable resources while developing responsibility-sharing with the private sector.

EMI, together with its partners, has established a platform for achieving the foregoing. To date, EMI's tools under the DRMMP process of the 3cd Program are in its initial stage of operationalization in Metro Manila. MMDA, together with the three pilot cities, have already been exposed to tools like the Hazards Map Viewer, Risk Indicators, and Risk Reduction Training Modules.

The overall approach of EMI is much appreciated by the MMDA because it has helped develop confidence and the necessary inter-dependence and cooperation on the part of the local stakeholders.

While the initiative to make cities safer and secure against natural hazards has gained considerable ground, the challenge now is how these programs could be

further developed, institutionalized and sustained.

Makati City and the DRMMP in Metro Manila

By Violeta Seva
Consultant, Makati City, and General Secretary and Treasurer, Earthquakes and Megacities Initiative

Makati City, one of the 17 cities and municipalities within Metro Manila and widely acknowledged as the financial capital of the country , became officially involved as a pilot city in the EMI 3cd Program in August 2005. Makati has actively participated in all the 3cd activities in the DRMMP process through focus

Application of MEGA-View in Makati City's Command and Control Operation Center

group meetings, workshops, forum and trainings.

The tools introduced by EMI have been utilized in the City's activities, such as the internet map viewer which has been applied in the City's disaster operation center. The City has developed its City Environmental Management Plan and established the Command, Control and Communication (C3) Operation Center which is already in operation. A draft Ordinance on the Makati Disaster Risk Management System has been drafted, and emergency drills and exercises in public buildings have been conducted.

The lessons learned in the application of the DRMMP are as follows: (1) support and leadership from the Local Chief Executive and the City Council Members are key success factors; (2) cooperation and coordination with National Government Agencies is necessary to ensure horizontal and vertical integration in DRM endeavors; (3) assistance from international and local counterpart agencies and NGOs are vital in improving the technical and organizational capacity of the City Government in the delivery of DRM services; and (4) adhering to the DRMMP process enables the City Government to enhance its DRM activities and make it consistent with local and international DRM standard practices.

Makati City has, so far, been successful in undertaking its DRM activities within the framework of the DRMMP process. The City expects that future activities relating to DRMMP would further enhance the delivery of DRM services to its constituents and that it will be able to develop its own City Disaster Risk Management Master Plan through the DRMMP process. The City is prepared to fully support all stakeholders towards the full implementation of the DRMMP process in Metro Manila.

The MEGA-Know: Megacity Disaster Risk Management Knowledge Base

By Jeannette Fernandez
3cd Component 1 Coordinator, Earthquakes and Megacities Initiative-Pacific Disaster Center-Escuela Politécnica Nacional

As part of the efforts to bring information closer to the end user, and at the same time enhance capacity building for disaster risk reduction (DRR) and disaster risk management (DRM), both Earthquakes and Megacities Initiative (EMI) and Pacific Disaster Center (PDC) worked collaboratively to put together a Knowledge Base (KB) mechanism called the MEGA-Know.

The MEGA-Know is an internet-based risk communication tool containing organized materials relevant to megacities. Information is supported through the EMI's flagship programs, the Cluster Cities Project (CCP), the Cross-Cutting Capacity Development (3cd) Program, and the recently created Internship Program.

MEGA-Know provides access to five different data bases:

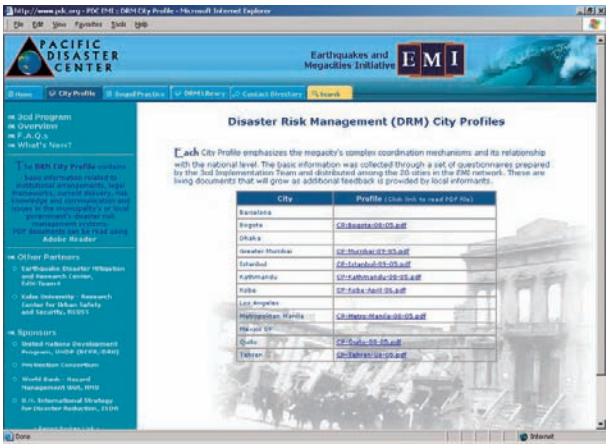
(1) City Profiles. The disaster risk management city profile (DRM-CP) contains basic information that allows a diagnosis of current situation, the identification of issues, and the design of a base line to initiate a process for the implementation of specific action plans to improve the City's DRM. By 2007, DRM-CPs for 20 cities within the EMI network will be completed.

(2) Sound Practices. A sound practice is any proven idea, program, technique, mechanism, method, practice or procedure for assessing, managing, reducing and transferring risk in complex urban areas. The practices address different hazards and can be grouped by city or by category of practice. Forty-five disaster risk reduction sound practices from 12 megacities around the world can currently be retrieved.

(3) Disaster Risk Management Library. Discussion papers, field trip reports and methodological proposals valuable to understanding the process behind the development of a DRMMP are downloadable.

(4) Contact Directory. This provides access to a network of city planners,

Fig. 6. The MEGA-Know Website



http://www.earthquakesandmegacities.org/megaknow

researchers, emergency managers and practitioners involved in risk reduction and management.

(5) Search. This powerful tool allows advanced search options where specific documents can be found by identifying keywords, making the MEGA-Know more user-friendly.

The collection of Sound Practices and its dissemination through MEGA-Know represents an important contribution to the ultimate goal of the Hyogo Framework of Action 2005-2015. This is because they facilitate the improvement and management of communication for risk reduction through capacity building at different levels. This tool is a part of a well-thought out strategy for Megacities put together by EMI and its partners.

The MEGA-View: Megacity Web-Based Map Viewer

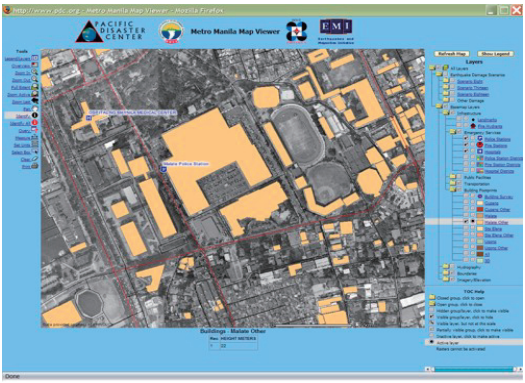
By Jim Buika
Senior Manager, Pacific Disaster Center, Hawaii

MEGA-View is an Internet-based risk communication tool co-developed by EMI and the PDC. It is currently being implemented as a prototype for earthquake disaster risk reduction in Metro Manila, Philippines. The tool was developed in partnership with a multi-agency, stakeholder focus group, led by PHIVOLCS and MMDA.

As one of the tools developed to assist megacitygovernments in implementing sound disaster risk management practices, MEGA-View communicates risks to decision-makers by providing access to local-level Geographic Information System (GIS) data and attributes over the Inernet.The extensive data sets used for Metro Manila were based on the JICA-funded Metro Manila Earthquake Impact Reduction Study (MMEIRS) in 2004. PDC and EMI incorporated additional enhanced data sets provided by PHIVOLCS and MMDA.

MEGA-View is based on GIS which is an organized collection of computer hardware and software designed to capture, store, update, manipulate, analyze, and display information. The advantage of MEGA-View is that it provides users with a pre-designed project. The user does not have to store data locally. Data is dynamic, and real-time and even large datasets are available, managed in a remotely-accessed database. Since it is also web-

Fig. 7. Sample Application of MEGA-View in Metro Manila



http://www.pdc.org/metromanila

based, the user does not have to buy GIS software. The only user requirement is a computer with a web browser, making it accessible from anywhere. An online training manual is also available, making it more user-friendly.

The MEGA-View can answer a variety of questions such as: how earthquakes of a certain magnitude or intensity affect Metro Manila; how many people would be affected; what the impact on infrastructure will be; where the critical facilities/public places are; what the risk to them is; and where the emergency response facilities are located.

The purposes of MEGA-View are to increase awareness about public safety and disaster risks, and to deepen people's understanding of risk and vulnerability. It is useful for preventing damages and lowering risks prior to a disaster; mapping emergency responders during emergencies; and supporting post-disaster recovery processes. Communication of risk leads to proactive and prioritized risk reduction planning and preparedness.

MEGA-View brings understanding of risks to researchers, practitioners and stakeholders. It is intended for planning officials, educators, scientists, decision makers, emergency responders (police, fire etc.) and others involved in emergency management.

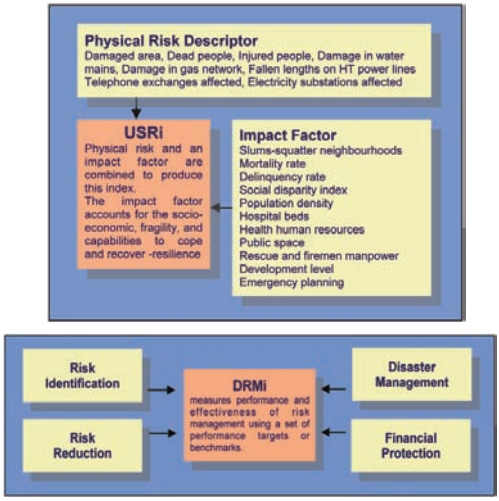
MEGA-view can be accessed at www.pdc.org/metromanila. A user identification and password are required and are available through PHIVOLCS.

The MEGA-Index: Megacity Indicators System

By Jeannette Fernandez
3cd Component 1 Coordinator, Earthquakes and Megacities Initiative-Pacific Disaster Center-Escuela Politécnica Nacional

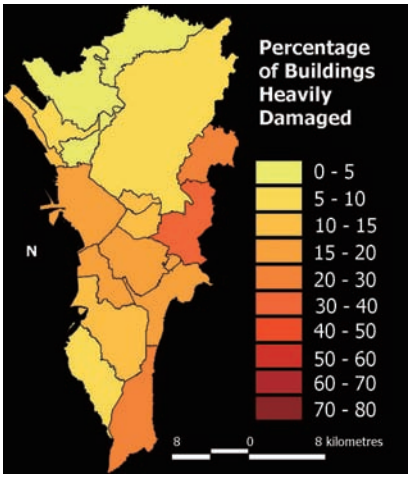
The MEGA-Index or the Megacity Indicators System (MIS) is one of the outputs of EMI in risk communication. It is a tool that promotes discussion on appropriate strategies and concrete actions that cities can devise for risk reduction and management. MEGA-Index helps enhance ownership among city stakeholders, and assists in policy development, decision-making, and monitoring effectiveness of specific options adopted.

Fig. 8. The Two Main Components of MEGA-Index



EMI, together with its partners at the National University of Colombia, Manizales, and the International Center of Numerical Methods in Engineering (CIMNE) of the Technical University of Catalonia, a pilot application to investigate, develop and test the MIS tool was initiated in Metro Manila in March 2006. Three methodological workshops were held between the Barcelona Team (Indicator's Experts) and the 3cd Program Implementation Team (PIT), while three different activities, accompanied by secondary research, were also implemented in Metro Manila.

Fig. 9. Sample Result from the Pilot Application of MEGA-Index in Metro Manila



Two sets of indices comprise MEGA-Index. These are the Urban Seismic Risk Index (USRi) and the Disaster Risk Management Index (DRMi). The USRi is an index used to evaluate seismic risk in a comprehensive manner through the combination of a physical risk index and an impact factor that takes into account the socio-economic and resilience capabilities of the unit of analysis. It is used because risk requires a multidisciplinary evaluation that incorporates the expected physical damage, the number and type of casualties or the economic losses, and the conditions related to social fragility and lack of resilience.

On the other hand, DRMi is a composite index that measures the performance level on risk management, taking into account organization, development and institutional actions to reduce vulnerability and loss in case of hazardous events; and the preparedness for response in case of crisis and recovery. The four key policy areas that DRMi is based on are risk identification, risk reduction, disaster management and governance and financial protection.

Weights are obtained through an Analytical Hierarchical Process (AHP) based on the local stakeholders' feedback. The AHP is a technique used for decision making with multiple attributes. It allows the decomposition of a problem into a hierarchy to ensure that the qualitative and quantitative aspects of the problem are incorporated in the evaluation process. During the process, opinion is extracted systematically by means of pair-wise comparisons. AHP allows for the application of data, experience, insights, and intuition in a logical and detailed way within the hierarchy as a whole.

Once components of risk and the suitable

policies are identified through the MIS, specific activities and action items could be incorporated in the city's Disaster Risk Management Master Plan (DRMMP). Through this, MIS enhances ownership by city stakeholders, and assists in policy development, decision-making, and monitoring the effectiveness of adopted options.

Physical risk descriptors to estimate the USRi were taken from the Metro Manila Earthquake Impact Reduction Study (MMEIRS) damage scenarios, while the aggravating factors were obtained from the city's statistics and other social indicators available. All 17 Cities of Metro Manila were studied, with focus on the pilot cities of Makati, Marikina and Quezon.

As a result of the sample study, i.e. for the aggravating coefficient, highest weights were given to 'population density', followed by 'slum areas' and 'social disparity'. This illustrates the stakeholder's belief that the key element to minimize overall risk is through the reduction of population concentration in specific areas and by poverty alleviation.

The results of the USRi revealed components that will help city stakeholders decide future courses of action to mitigate either physical or socio-economic risk. The other specific findings include the expected physical damage, the number and type of casualties, and the economic losses.

The DRMii showed the trend/growth in the city's efforts to manage risks. Moreover, it enabled the depiction of disaster disk management at any scale, allowing the establishment of "performance targets" and, therefore, the comparison and identification of outcomes of decisions and actions.

For instance, in Metro Manila, where DRM within the period of 1985 to 2006 was studied, significant advancement was shown in the disaster management index, which included emergency response, recovery and rehabilitation. Performance in the last 20 years have been significant in aspects related to the systems, provision of equipment, and execution of mock drills, community preparedness and preparation of reconstruction process. Major challenges relate to maintaining sound and permanent coordination procedures among local authorities, the community and the organizations in charge of providing public services.

Another aspect to consider in boosting disaster management at the city level was to provide the cities not only with contingency plans and warning systems but also well staffed and organized emergency centers, etc. On the other hand, governance and financial protection linked to DRM showed the least progress in the two decades. It would, therefore, be necessary to look for higher and more permanent budgetary allocation of funds, improve community-based social protection networks, promote obligatory insurance for public assets and propose incentives to stimulate insurance in the private sector.

The MEGA-Plan: Training Course on Risk-Sensitive Land Use Planning

By Asteya Santiago, Ph.D.
General Manager, Earthquakes and Megacities Initiative

MEGA-Plan is a specialized blended training course on land use planning that is risk-sensitive. It aims to demonstrate how land use planning can be used as a means to modify vulnerabilities and reduce disaster risks of cities and urban areas exposed to natural hazards. It seeks to demonstrate how the function and process of land use planning can be utilized to modify vulnerabilities of cities and reduce risk of natural disasters by mainstreaming risk reduction objectives. Risk-sensitive land use planning combines the assessment of hazards, vulnerability and risk, with the standard planning process. It is only when risk assessment is undertaken can land use planning that seeks to reduce risks, have a factual and scientific basis. Hence, the training modules of MEGA-Plan focuses on the risk assessment of natural hazards, e.g. earthquakes and floods, and on the application of risk assessment results in managing and planning land use, particularly in the urban area.

The objectives of the training course are to (a) enhance the participants' professional knowledge and comprehension in the theoretical and practical linkages between land use planning and disaster risk reduction, (b) increase comprehension of disaster risk assessment and their capacity to integrate it in the land use planning process, and (c) advance the participants' skills in the application of land use planning tools and techniques for disaster risk reduction. The target participants include middle to upper-management city/municipal/ provincial elected officials; city/municipal/provincial/ national government officers involved in land use/urban planning, development planning, disaster management, and public works; private sector professionals in construction, real estate, utilities, and public works are also targetted.

The course is designed to run for 12 weeks, and contain content modules on the following topics: Overview of natural disasters, hazards and development; Seismic risk assessment; Flood risk assessment; and Land use planning for sustainable disaster-resistant cities. A module on Learning Application contains the task modules for each session, which includes practical exercises and assignments that progressively provide guidance in updating or preparing a land use plan that incorporates risk reduction objectives.

As a blended course, MEGA-Plan will employ both web-based learning and face-to-face methods. The learning platform, called MEGA-Learn, is already functional, but more functionalities are still being developed to provide communication tools, among others. MEGA-Plan is now stored in an Internet server which can be accessed and worked online directly on the screen, downloaded, or printed. Different multimedia and interactive elements enhance the active use of the learning materials. The face-to-face component consists of a production workshop where participants will have the opportunity to learn through mutual assistance. MEGA-

Plan will be ready for implementation in mid-2007.

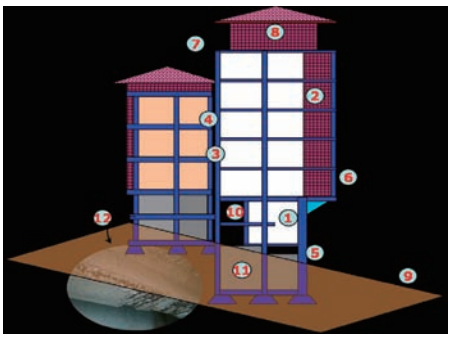
Update on the Implementation of the Istanbul Earthquake Master Plan

By O. Metin Ilkisik
Advisor to Lord Mayor, Istanbul Metro Municipality, Turkey

On 17 August 1999, a destructive earthquake of 7.4 magnitude struck the Kocaeli Region killing more than 25,000 people and destroying hundreds of buildings and structures in 50 seconds.

Following this devastating event, consensus was reached among technical groups and the Metropolitan Municipality of Istanbul to seriously explore the needed actions to reduce future disaster risks to the City. One of the priority activities decided on was the reduction of the vulnerability of existing building stock. For this purpose, different techniques for vulnerability evaluation (e.g. rapid screening method, and detailed analysis of critical structures) were considered.

Fig. 11. Street Survey Inspection Points in Istanbul



The pilot project areas chosen for the phased evaluation of more than 100,000 buildings were Zeytinburnu, with its mix of housing, business and socio-economic complexities; Fatih, known for its historical value; and Kucukcekmece. The studies showed that roughly 18% of the Istanbul building stock (around 216,000 structures of 1,200,000 in total) can be expected to have poor or bad condition.

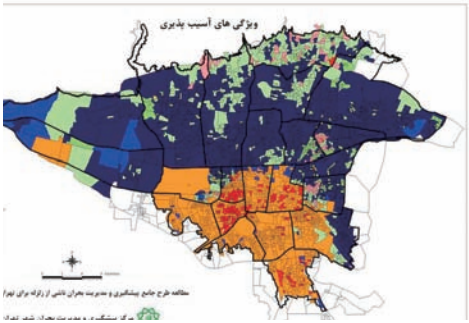
The proposed actions were the following: a) comprehensive urban plan to improve the quality of the structures and b) a comprehensive urban process that looks into the community needs, its safety, and renewed economic activities. The other proposals to avoid the disruption of activities in selected areas and incurring additional costs were: a) relocating people while the works are being executed; b) shutting businesses; c) rebuilding, repairing or building new apartment houses; d) improving complex old legal systems; and e) shifting from traditional options to more creative ones.

How would the DRMMP be Implemented in Tehran?

By Maziar Hoseini, Ph.D., P.E.
Director, Tehran Disaster Mitigation and Management Organization, Municipality of Tehran, Iran

The City of Tehran is considered by seismologists as a high risk area because of its location along an active tectonic zone. In fact, the City had experienced a

Fig. 12. Vulnerability of Buildings in Tehran



number of destructive seismic events. The most recent and very serious one was the Bam Earthquake in December 26, 2003. This disaster cost tens of thousands of lives and tremendous damage to buildings and structures.

What adds to Tehran's vulnerability to seismic risk is it's development history, demonstrated by a build-up of improvements toward the existing faults. This aggravates the threat to structures, lifelines and, more seriously, to its population of about eight to twelve million, cramped in its 720-square kilometer land area.

Because of the high seismic vulnerability of Tehran, JICA and the Tehran Disaster Mitigation and Management Organization (TDMMO) conducted in 2000 a Microzoning project which attempted to analyze and estimate damage and casualties in Tehran in events of varied seismic disturbances. Results of the studies showed devastating scenarios.

Given these results, the TDMMO, with the assistance of JICA, devised strategies and proposed action plans (2005 to 2017) geared toward making Tehran "a model and prototype of safety and strength for megacities in developing countries."

Under risk management are the major programs which include the preparation of microzonation maps, the evaluation of geotechnical hazards, and the assessment of the vulnerability of buildings and lifelines.

As a decentralized disaster management organization, TDMMO implements action plans within the Master Plan, according to three priority aspects: mitigation, preparedness, and response. Mitigation aims to improve structural design and construction of new buildings, including the retrofitting of existing ones; the application of land use and other urban planning tools; and the enhancement of TDMMO capacities. For preparedness and education, the enhancement of communication options and building emergency response capacity are the key elements. For response, the establishment of specialized bodies and emergency measures are the main concerns.

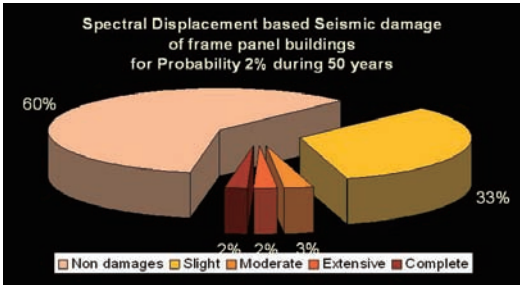
Disaster Mitigation Activities in Tashkent

By Tursunbay Rashidov, Ph.D. and Elena Kuzmina
Professor, UASIMSSS, Tashkent, Uzbekistan

For the past century, large cities and settlements located in the Central Asian region, including the metropolitan cities of Ashgabat and Tashkent, have been

damaged by destructive earthquakes. Regional geological and seismological researches predict a high level of seismic hazard for these territories, including areas where the population density is very high. This situation poses imminent danger to people's life, health, and safety of their property, considering the great concentration of population in these areas, and the high vulnerability of many buildings and other engineering structures.

Fig. 13. Expected Spectral Displacement in Tashkent



To mitigate possible hazards, the City Government of Tashkent and a group of scientists have developed a seismic risk mitigation strategy based on the assessment of probable residential building damages. For the project, inventory of buildings has been executed using digital satellite images, maps, questionnaires, and the existing data of City authorities. Securing estimates of seismic damages of buildings and number of injured have been carried out based on the displacement method developed by Prof. Nuray Aydinoglu of the Department of Earthquake Engineering - Bogazici University, Kandilli Observatory and Earthquake Research Institute (KOERI). This sought to secure a visual illustration of probable losses after a city has been hit by a strong earthquake. This will enable local governments to identify which area is most at risk, and which one needs improvement of strategy and upgrading of management of risks.

The ultimate goal of the project is to provide a description of possible seismic losses as background for development and operationalization of measures for seismic risk mitigation. Among the specific objectives of seismic risk reduction strategies are (1) to increase the level of public understanding of risks; (2) to reveal the vulnerable units of city infrastructure and, consequently, conduct the possible reconstruction of these areas; (3) to investigate the seismic resistance of existing and future buildings, using advanced seismic protection methods; (4) to develop the necessary legislation and improve the seismic design codes; and (5) to raise stability of lifelines such as medical establishments, fire stations, and institutes of management and communication.

How the 2005 and 2006 Floods have Affected Mumbai's Disaster Preparedness Plan

By Shree Kant Singh
Additional Municipal Commissioner, Municipal Corporation of Greater Mumbai, India

Mumbai, the financial capital city of India, covers an area of about 437.71 square

kilometers, houses a population (2001 Census) of about 11.9 million, and has a density of 27,209 people per square kilometer. Not unlike most metropolitan cities, majority of the population of Mumbai reside in the suburbs and commute daily to the City Proper for work. This situation gives the City, particularly Ward "A", a daytime population of 4,500,000 and a night time population of 200,000.

Flooding in Mumbai.

As a coastal City surrounded by the Arabian Sea and the Thane Creek, Mumbai has a massive reclamation area, much of it close to sea level. During high tide, flood gates are closed to stop the ingress of sea water, resulting in water logging and the occurrence of floods during monsoon seasons.

In July 2005, an unprecedented 944 mm heavy rainfall caused major flooding in Mumbai. The heavy rains which submerged most part of the City created chaos as thousands of people were stranded at work and in school, due to the abrupt disruption of the operation of most public transportation and other basic social services. Around 445 people lost their lives in the flashfloods and landslides, and 194 others died due to various deluge-related illnesses. A number of people were also afflicted with water-borne diseases such as gastroenteritis, hepatitis and leptospirosis.

Arising from this destructive event, local authorities, through the Disaster Management Office, designed a preparedness and mitigation plan to reduce the impact of flooding in the next monsoon season. These plans were categorized into (1) Flood Control Arrangement, (2) Enhancement of Response Mechanism, (3) Improvement of Flood Warning System, and (4) Procurement of Flood Rescue Equipments.

Disaster Preparedness of China's Megacities

By Zhu Yuanqing
Deputy Director and Research Professor, Earthquake Administration of Shanghai, China

Shanghai is China's largest city, with an area of about 6,787 square kilometers and a population of about 19 million, which includes close to three million floating population.

Due to the people's increasing awareness and concern for public safety and stability of the community, Shanghai, for the past few years, has been investing in earthquake disaster prevention and reduction

program. This includes earthquake early warning system and a disaster prevention scheme.

For earthquake monitoring and prediction, three specialized networks and instrumentations have been put in place within the City. These are the (1) Earthquake Monitoring Networks consisting of 33 stations, (2) Strong Motion Networks (20 stations with real-time), and (3) one full Earthquake Precursor Network, which includes more than 60 different instruments. The use of microseismicity to better understand major seismicity is being promoted, and an emergency response plan made available to different stakeholders.

Education campaigns which include conduct of drills, holding of periodic competitions to test citizen's earthquake knowledge, and the encouragement of visits to the earthquake museum, are the options available to the community, particularly children and teenagers.

Fig. 14. Planned seismic borehole stations in Shanghai

Future efforts are focused on a variety of activities, including ocean bottom observation, boring holes with adequate instrumentation, and the development of an early warning system. Other activities include an earthquake safety project for the city (City-Group), and the provision of guidelines for housing in the country side which currently does not have any regulation for their construction.

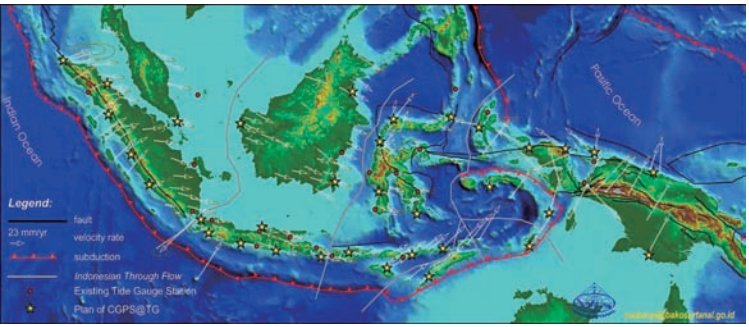
Current Status of Indonesia Early Warning Systems and its Relevance to Megacities

By Pariatmono
Assistant to Deputy Minister, Ministry for Research and Technology, Indonesia

Indonesia, a country with more than 17,000 islands, 245 million people and 81,000 kilometers of coastline, is prone to earthquakes due to its complicated plate movement. Every year, there are about 460 earthquakes with magnitudes greater than 4.0. As a result, tsunami disasters have become a frequent and almost annual occurrence in the country. During the Aceh Tsunami in December 26, 2004, 132,000 were confirmed dead, 37,000 were missing, 572,000 were displaced and 1.3 million homes were destroyed. The total losses reached the amount of US$ 4.5 billion. During the Pangandaran Tsunami in 2006, another destructive tsunami disaster, the absence of a tsunami warning was cited as one of the reasons for the high number of victims.

In response to the tsunamis, the Indonesian government formed the Reconstruction and Rehabilitation Agency (BRR) and ordered the Ministry of Research and Technology to coordinate different agencies in the development of tsunami warning systems in Indonesia. The elements for the early warning systems include: (1) Seismic Monitoring, (2) Database of Tsunami Modeling, (3) Sea-level Monitoring, (4) Information and Communication Technology, (5) Crustal Deformation Monitoring, (6) Geospatial Information, (7) Community Preparedness, and (8) Capacity Building.

Fig. 15. Crustal Deformation Modeling in Indonesia



Based on paleo-tsunami research and studies on the trend of earthquakes in the country, it was forecasted that Padang, a coastal city in Indonesia with 901,488 people, might be the next site of a tsunami disaster. To prepare, the government disseminated public information materials, launched national and local media campaigns, developed hazard maps and evacuation routes, conducted earthquake and tsunami drills, and increased the awareness of government officers on the disaster that may occur.

Bali also conducted a tsunami drill in December 26, 2006. Included in the drill's plans were findings from numerical models indicating that tsunamis are expected to arrive 40 minutes after the quake and that the expected height of the waves that may hit Denpasar Coast is 5 meters. Compared to other exercises, the local government of Bali was directly involved in the drill and all people in the area, including high-level officers, took part in the evacuation process. A VIP evacuation plan was already formulated and escape buildings identified. Lastly, Bali now makes use of effective warning devices like sirens and the radio (FM RDS).

Eleven Years after the Hanshin-Awaji Earthquake: Recovery and Reconstruction Process of Kobe City

By Makoto Matsushita
Chief Manager, Waterworks Department, Kobe City

Kobe, a beautiful port city situated along the north coast of Osaka Bay, was hit by the Great Hanshin-Awaji Earthquake at 5:46 AM on 17 January, 1995. The earthquake brought heavy damage to houses, buildings, roads, railways, port

facilities, water and gas supply, and transportation system. A total of 4,600 people died and 14,700 were injured, and the total damage estimated to have amounted 6.9 trillion Yen.

During the 11-year restoration process, the infrastructures (water system, gas supply, power supply) were the priority in the first few stages. Two methods were devised to speed up the restoration process, namely: the Land Re-Adjustment (composed of 11 projects) and the Urban Redevelopment (composed of two projects). "Citizen Participation" became a key factor in the restoration, and it was the first time in Japanese history that volunteers became a vital part of disaster management. For a safer city, the importance of reconstructing earthquake-resistant infrastructure was emphasized. Stronger sewage system pipes were laid out, better transportation networks were developed, and primary schools which functions as evacuation areas were retrofitted and equipped with better tools.

Kobe's experience in the disaster and in the restoration is valuable in the area of disaster prevention. Recently, the K-TEC or the Kobe Technical Experts Co-operative Association, composed of officials and engineers from the City of Kobe opted to transmit their expertise to the younger generation and other experts. Members of the K-TEC advocate 'comprehensive' disaster mitigation policies. They possess the knowledge of all the engineering aspects of the 'city management'. The K-TEC is ready to offer their expertise to raise the quality of life in Asian megacities.

The Great Hanshin-Awaji Earthquake: Message for Recovery from Kobe City

By Masahiko Murata
Recovery Expert, Hyogo Prefecture and IRP

The Great Hanshin-Awaji Earthquake in January 17, 1995 resulted in a catastrophe which left more than 6,433 deaths and 249, 180 collapsed buildings within the Hyogo Prefecture.In many other places, many people were also injured, and billions worth of properties and institutional structures were damaged as an aftermath of the disaster. Within two months after the destructive earthquake, the Hyogo Prefectural Government formulated the Priority 3-year Infrastructure Plan to immediately respond to the people's recovery needs. This constitutes the first part of the 10-year "Hyogo Pheonix Plan" or the Great Hanshin-Awaji Earthquake Reconstruction Plan.

Kobe citizens after the earthquake.

Within this reconstruction plan, the local government conducted needs coordination for rehabilitation process, as well as an environment-safe debris removal. The

reconstruction of essential lifelines (e.g. electricity, telephone, water, gas, sewage), and urban infrastructures were also fast-tracked.

Ten years after the earthquake, the Hyogo Prefectural Government, together with the local governments, citizens, companies, NGOs and other parties completed the 10-year Reconstruction Over-all Verification in January 2005. The lessons learned from the earthquake, the difficulties experienced during the entire recovery/restoration and reconstruction process, based on the countermeasures taken, including the recommendation for the future of the Hyogo prefecture were presented. The Report specifically featured discussions on (1) the immediacy of response by the government, (2) the coordination among organizations, (3) the preparedness capacity of people and organizations, (4) community and voluntary activities, (5) needs assistance for self-sufficient livelihood to affected people, and (6) the importance of urban planning. Also included were lessons derived from the reconstruction experience such as the collection, storage and preservation of materials provided by the quake victims, and the compilation of reports on the recovery of each sector.

Education and Legacy of Kobe Earthquake

By Yasuo Tanaka, Ph.D.
Professor, Kobe University - RCUSS

The Research Center for Urban Safety and Security (RCUSS) of Kobe University presented its new model for Earthquake Risk Management. The model consists of three main pillars, namely, (1) Risk Assessment, (2) Risk Management, and (3) Risk Communication, encompassing both the technological and sociological aspects of earthquake risk. The needed hardware, software and "human-ware" for an effective application of the model were also identified for each pillar.

Fig. 16. RCUSS Earthquake Risk Management Model

RCUSS further reported its recent projects and programs in the field of disaster risk education. One of these is the JICA Group Training Program: Mitigation Strategy for Mega-Urban Earthquake Disaster (2004-2008), which is a training program for specialists responsible for earthquake disaster mitigation in different urban areas of the world. Another is the Ministry of Environment's project for Good Practices in Education: Creating a Culture of Disaster Reduction and Preparedness (2004-2007), which is being undertaken in collaboration with different universities in Kobe, other local governments, and non-government organizations.

Asia Megacities Forum 2006
Nov. 3-4, 2006, Kobe, Japan

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   Prepared by Dr. Antonio Fernandez, Dr. Amod Dixit, Ms. Jeannette Fernandez, Dr. Kambod Amini Hosseini, Dr. Asteya Santiago, and Ms. Violeta Seva
3. Presentations and/or Papers
4. Abstracts
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5. Program of Activities
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