EMI

Earthquakes and Megacities Initiative

A member of the U.N. Global Platform for Disaster Risk Reduction

EMI Topical Report TR-07-02

Progress Report

3cd Program

Urban and Megacities Disaster Risk Reduction

Manual of Sound Practices

UNDP

KOBE UNIVERSITY

EdM NIED Team-4

PROVENTION CONSORTIUM

PACIFIC DISASTER CENTER

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Printed in the Philippines by EMI
An international, not-for-profit, scientific organization dedicated to disaster risk reduction of the world's megacities

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Preface

EMI is dedicated to the reduction of disaster risk in complex urban areas. Recognizing the growing concern on the limitations of disaster risk reduction strategies in complex urban areas,EMI collaborated with different international institutions as well as local government agencies of different megacities all over the world and developed the Cross-Cutting Capacity Development (3cd) Program. This is a long-term, inter-disciplinary mechanism to assist megacities in the implementation of sound practices for disaster risk management. A collaborative effort with local partners, the 3cd Program is implemented through a mainstreaming model to incorporate disaster risk reduction in government policies.

The 3cd Program builds on EMI's experiences in dealing with a network of 20 megacities around the world through its Cluster Cities Program (CCP). The CCP acts as EMI's mechanism for understanding the gaps and needs within each city, for introducing sound practices, and for helping develop strategic approaches that have the support of local stakeholders. Field investigation and literature search are used to identify gaps, needs, and impediments to risk reduction and to document City Profiles and Sound Practices.

This Manual of Sound Practice is a result of EMI's efforts and collaborations with various institutions that aim to engage cities and stakeholders in proactively reducing their vulnerabilities and mitigating disaster risk due to natural hazards. Having access to demonstrated tools and practices provides a significant step forward to build capacity and ownership and change practices. EMI is contributing to reduce this gap through the production of this Manual and the online Megacities Disaster Risk Management Knowledge Base. These tools serve as a resource to practitioners, researchers, student and the community in their effort to implement sound disaster risk management practices in cities and promote the use of tried and tested sound practices in similar settings.

The goal is support local governments and organizations to shift from traditional disaster response orientation to a proactive risk reduction approach and help them mainstream disaster risk reduction by demonstrating the benefits of sound practices successfully implemented by cities around world.

Executive Summary

This Manual of Sound Practice and its online companion, the Megacities Disaster Risk Management Knowledge Base (MEGA-Know) ((www.emi-megacities.org/megaknow) comprise a disaster risk communication tool set that aims to facilitate the understanding of disaster vulnerabilities and risk to megacities and large complex urban areas. By identifying, compiling, and illustrating sound practices in disaster risk reduction that have been tested and implemented by different cities in different parts of the world, knowledge sharing opportunities among cities can take place and local governments can become aware of successful strategies that can be adapted to suit their specific needs and context.

The collection of sound practices and its dissemination through this Manual and MEGA-Know is a concrete contribution to the achievement of the goals of the Hyogo Framework for Action, specifically Thematic Area No. 3 – Use of knowledge to build a culture of safety and resilience at all levels. This whole effort of coming out with a Manual also hopes to aid the process of turning lessons learned into lessons practiced.

This Manual is composed of three sections, to wit:

Section 1 elucidates on the purpose of the Manual. It provides an overview of the programs and projects of EMI and its partners that act as a springboard for the identification and collection of sound practices in disaster risk reduction established in EMI's partner cities. These are the Cross-Cutting Capacity Development (3cd) Program and the Cluster Cities Project. The framework for mainstreaming disaster risk reduction and the Disaster Risk Management Master Plan (DRMMP) model recommended for megacities are elaborated as well.

Section 2 explains what a sound practice in disaster risk reduction in a megacity setting is, its principles, and objectives. The different types of sound practices are also enumerated. Some guiding questions on how to identify a sound practice are provided as well as the complete list of sound practices available online in MEGA-Know.

Section 3 presents a selection of 15 sound practices from the EMI partner cities of Bogota, Dhaka, Istanbul, Kathmandu, Kobe, Metro Manila, Mexico, Mumbai, Quito, and Tehran. The discussion of each sound practice includes the following:

- Type of hazard addressed
- Type of sound practice
- Summary
- Contribution to the Hyogo Framework for Action
- Synthesized description of the sound practice
- Relevance to practice.

The detailed disaster risk profile of the featured cities is exhibited as an appendix.

Acknowledgment

This publication would not have been possible without the generous and continuing support of EMI's international partner institutions such as the United Nations Development Program – Bureau of Crisis Prevention and Recovery, ProVention Consortium, Pacific Disaster Center, Kobe University, and the Earthquake Disaster Mitigation Research Center.

The authors would like to extend their heartfelt gratitude to all collaborating local and national organizations in different cities and countries that are partners in the Cross-Cutting Development (3cd) Program and Cluster Cities Project (CCP) of EMI, whose sound practices are featured in this Manual.

List of Acronyms

BUET	Bangladesh University of Engineering and Technology
CCCDP	Also 3cd; Cross-cutting Development Program
CCP	Cluster Cities Program
IIEES	International Institute of Earthquake Engineering and Seismology
EMI	Earthquake and Megacities Initiative
DM	Disaster Management
DRM	Disaster Risk Management
DRMMP	Disaster Risk Management Master Plan
DRR	Disaster Risk Reduction
EMPI	Earthquake Mitigation Plan for Istanbul
HFA	Hyogo Framework for Action
IMM	Istanbul Metropolitan Municipality
LGU	Local government unit
MEGA-Index	Megacities indicators system
PDC	Pacific Disaster Center
PEER	Program for the Enhancement of Emergency Response
PHIVOLCS	Philippine Institute of Volcanology and Seismology
SINAPROC	Sistema Nacional de. Proteccion Civil
SMART	Sustainable, Measurable, Achievable, Relevant, Timely
SP	Sound Practice
SPDMI	Strategic Plan for Disaster Mitigation in Istanbul
UN-ISDR	United Nations International Strategy for Disaster Reduction

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Why a Manual of Sound Practices in DRR?

Disaster risk reduction (DRR) is increasingly recognized as an important component for achieving sustainable development of cities and making progress towards the implementation of the Millennium Development Goals. However, its implementation is plagued by a multitude of impediments, including:

a) The management and reduction of disaster risk has been neglected in many cities, not rising as a priority of governments and donor agencies. Institutional arrangements and mechanisms for disaster risk reduction interventions are often weak hindering political commitment and institutional engagement. The situation resulted in a low level of knowledge and concern, pushing urban risk reduction down in the priority list of governments at all levels.

b) Multiple layers of intervention are required in institutional and organizational terms to actually implement and enforce viable policies and actions for disaster risk reduction and management.

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introduction

c) A multidisciplinary approach is required to assess the highly probable impacts of a disaster, such as the number of casualties and injured and property and infrastructure damage, which could then be exacerbated by vulnerable socio-economic conditions and lack of resilience of the people. Further, in many conditions a multiple hazards approach is necessary in order as one hazard may induce others, i.e. an earthquake can trigger landslides, liquefaction, and tsunami.

d) Policy makers and city managers require a clear understanding of disaster risks in order to make informed decisions and developed viable options for disaster mitigation strategies and options. Further, they lack access to demonstrated practices and tools that they can use as models in their own cities.

Box 1: PDC-EMI Partnership for Urban Risk Reduction

In 2005-2006, the Earthquakes and Megacities Initiative (EMI) and the Pacific Disaster Center (PDC), in alliance with other local, regional, and international organizations, teamed up to undertake the Cross-Cutting Capacity Development (3cd) Program to promote and implement a comprehensive methodology intended to mainstream disaster risk reduction into megacity policy and planning functions and processes.

During this period, a number of activities were sustained in Metro Manila, the Philippines, and Kathmandu, Nepal under the 3cd Program. It highlighted a framework that was broad-based and participatory and a process that supported the development and implementation of a set of action plans, an institutional structure required to sustain the planning process, and a suite of risk communication tools. The 3cd Program approach advocated for the institutionalization of risk reduction and risk management options within the local governments by utilizing the organizational structures already in place to promote and mainstream risk reduction.

This Manual of Sound Practice and its online companion, MEGA-Know, are two of the tools developed as part of the collaboration betweenEMI and PDC.

The complexity of the issues associated with the implementation of DRR often leaves policy-makers uncertain of its pragmatic application and benefits. The implementation is further challenged by limited human and financial resources and the overwhelming demands from day-to-day issues. There is thus a need to show through projects and programs already tried and tested elsewhere that DRR can be successfully adapted and implemented by local governments similarly endangered and that political capital can be preserved. By so doing, conditions to create an environment that promotes public policy agenda for disaster mitigation, prevention, and preparedness can be advanced. Further, practitioners and city managers can find the tools that will help them build confidence in preparing the DRR projects and programs for their cities.

This first-of-its-kind Manual of Sound Practice (MoSP), and its companion the online Megacities Disaster Risk Management Knowledge Base (MEGA-Know), comprise a communication tool set to, first, facilitate the understanding of complex problems

common to many megacities, and second, offer solutions that can be replicated in similar urban environments.

The MoSP is intended to improve the knowledge sharing opportunities between cities by bridging the yawning gap in the availability of demonstrated DRR practices that have been already tested and implemented by one city and that can be successfully adapted by another. The intent is to provide local governments and other institutions learn from one another by effectively facilitating the sharing of sound practices and disseminating these established sound practices in risk reduction. By having access to demonstrated practice, officials would be aware and cognizant of successful strategies and activities that can be adapted to their particular situation and organizational context.

In many cases however, government officials, city managers and disaster management professionnels need to be supported in their effort to mainstream disaster risk reduction activities into existing city programs and processes. Having access to demonstrated tools and practices provides a significant step forward but is often not sufficient because of limitations in technical and managerial skills and institutional weaknesses. Sustained effort is often required in order to build capacity and ownership and change practices. EMI is contributing to reducing this gap through its Cross-Cutting Capacity Development Program (3cd Program) and Cluster Cities Project (CCP) and has engaged in developing a set of tools specifically addressing the mainstreaming of DRR sound practices in the context of Megacities and other complex metropolises. The goal is support local governments and organizations to shift from traditional disaster response orientation to a proactive risk reduction approach.

Purpose of the Manual

Most large urban agglomerations in developing countries are characterized by overurbanization, unplanned land use, uncontrolled urban growth, environmental degradation, lax enforcement of building codes and regulations, inadequate compliance mechanisms for new constructions, and insufficiently maintained infrastructures, among others. Hence, this Manual's target users are primarily the government officials at the local level, particularly in megacities and complex metropolises[1] that face growing disaster risks due to high exposure to natural hazards and increasing vulnerabilities.

The Manual specifically aims to:

1) Provide city officials with sound practices to adapt to their own environment to enable them to expedite implementation of proven risk reduction programs
2) Serve as a resource to practitioners, researchers, student and the community in their effort to implement

Figure 1. MEGA-Know Home Page

sound disaster risk management practices in cities

3) Promote the use of sound practices in similar settings by raising the interest of local stakeholders, practitioners and officials,
4) Support local governments in mainstreaming disaster risk reduction by demonstrating the benefits of sound practices successfully implemented by cities around world.

MEGA-Know, the online DRM knowledge base companion of this Manual, presents sound practices in a format that facilitates the understanding of the context and priorities of each city and provides the risk profile of each city including information on the administrative systems and organizational structures. This eLearning tool is accessible at: www.emi-megacities.org/megaknow

The home page shows a map with the location of contributing cities. The City Profiles and Sound Practices are the main highlights of the website. The knowledge base includes discussion papers, fieldtrips reports, and methodological proposals from the Disaster Risk Management Library and contact directory of city officials, planners, researchers, emergency managers and practitioners involved in risk reduction and management. The "home" screen of MEGA-Know is shown in Figure 1.

Dealing with Urban and Megacities Disaster Risk

Cross-Cutting Capacity (3cd) Program

EMI's Cross-Cutting Capacity Development or *3cd Program* constitutes a model for the implementation of structured and strategic disaster prevention and mitigation activities at the city level. The 3cd Program works towards the promotion and implementation of a comprehensive methodology intended to mainstream disaster risk management into megacity policy and planning practices through targeted and strategic actions. Local authorities are engaged into a process whereby DRM becomes a regular component of city planning and management. The process progressively leads to mainstreaming DRR within the city routine functions and provision of services by making use of mechanisms, resources, and organizations already in place and increasing them appropriately.

3cd Program's Framework for Mainstreaming DRR

EMI model for mainstreaming DRR starts with the premise that the implementation of disaster risk reduction has a significant local component. Cities and local institutions carry essential services towards their citizens and have the duty to implement the policies and programs of the national agencies.

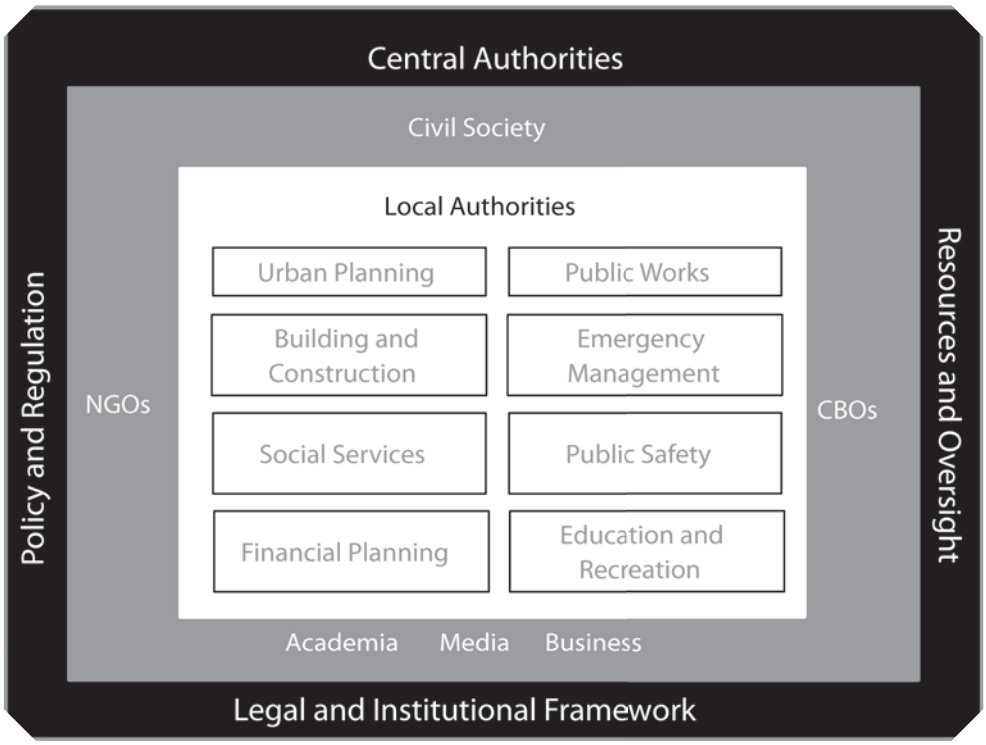


Figure 2. Local governments and institutions are at the center of the implementation of disaster risk reduction

In order to accomplish that role effectively, local governments and institutions need to be empowered not only with the responsibility but also with the authority and resources to invest in disaster prevention and mitigation. At the same time, local authorities must recognize that implementing DRR cannot be

done in isolation from other efforts and that they need a platform to interact with other stakeholders in the city, while coordinating their actions with provincial and national organizations. The latter not only provides human and financial resources but also the necessary legal and institutional frameworks to make local action effective. This is illustrated by Figure 2 that shows the major stakeholders in DRR work from the central down to the local authorities and vice-versa.

Figure 2 shows that effective mainstreaming takes place when DRR measures are integrated in the regular operations and responsibilities of the local government. This of course, is a long term process that requires a commitment towards decentralized authority and sustained development policies and processes done in a coordinated strategy and encompassing actions at all levels government (national, provincial and local) and the active involvement of the active agents of society and the community.

Disaster Risk Management Master Plan Model [DRMMP]

To carry out this mainstreaming concept in practice, a model for implementing specific DRR activities needs to be put in place. As a foundation to the model is a participatory planning and consensus building processes that enables major stakeholders and local authorities to prioritize actions leading to risk reduction. The prioritization process is critical because: a) resources are always going to be limited; b) selected actions need to be part of on-going planning activities of the city; and c) "buy-in" needs to be acquired from the key stakeholders in order to build sustainability mechanisms. These strategic and highly inclusive planning processes takes into consideration political will and feasibility, institutional arrangements that distribute authority for decision in the city, actual parameters of risks and vulnerability, availability of resources, constraints caused by a wide range of logistical and programmatic demands in the operations and planning of the city, and the arrival at a consensus for a process of execution of the plan. The 3cd Program has captured that process of planning is in model referred to as the Disaster Risk Management Master Plan (DRMMP). Figure3 shows the components of DRMMP. It should be stressed however that DRMMP is more of a process of planning to formulate a disaster risk reduction agenda, to define strategic components of the plan, and to develop the requirements to implement it in a sustained manner. Thus a DRMMP is specific to the conditions of a city and will need to be developed from a thorough understanding of the existing working parameters of each city and with the participation of all the stakeholders with the engagement of the city policy-makers and leaders.

The DRMMP must be developed on a solid understanding of the risks to the city, the vulnerability of its population, institutions, environment and infrastructure, and the physical and socio-economic impacts of hazards on the city. Without such understanding, the planning process could be based on false parameters and thus may not address the root causes of vulnerability in the city. Based on the risk elements, the DRMMP model guides stakeholders to look at DRR in a holistic manner but considering potential action plans along the four core categories of DRR, namely:

1. Response and Recovery,
2. Preparedness and Awareness,
3. Mitigation and Prevention, and
4. Capacity Building.

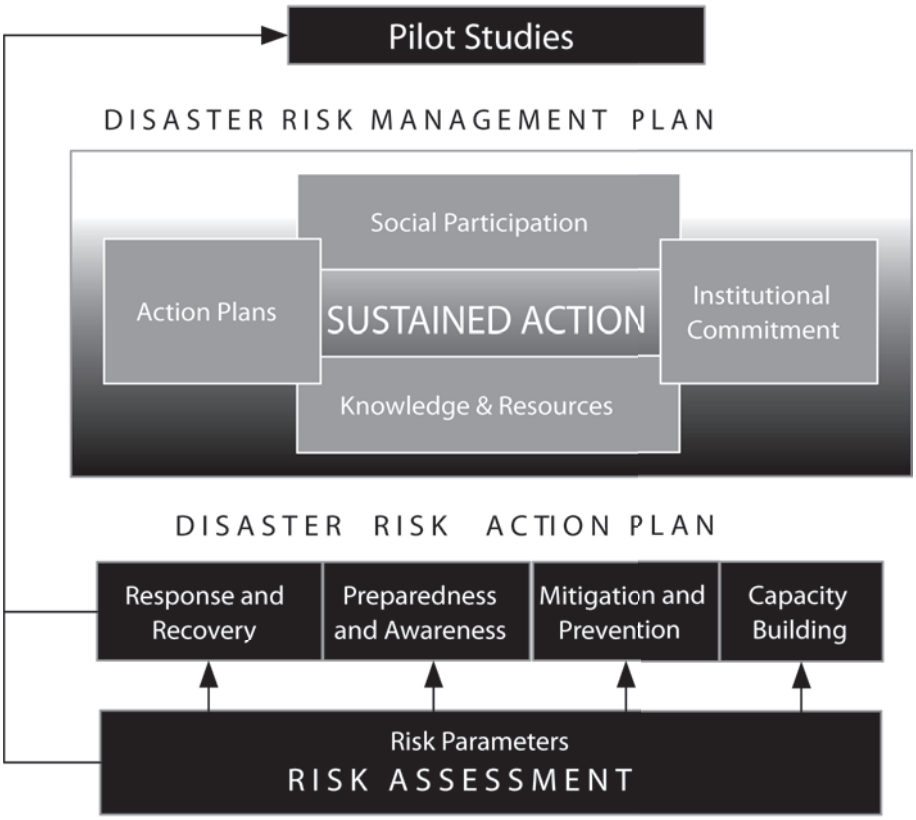


Figure 3. Disaster Risk Management Master Plan (DRMMP) Model

To arrive at these actions plans, the planning process encompasses the following key elements:

1. Obtain political and institutional commitments from key policy makers (e.g., mayor of the city and city council in many cases)
2. Understand current practice in disaster risk management in the city, its legal basis, institutional arrangements, decision-making processes and distribution of responsibilities and authorities; identify gaps and weakness and document the findings. This steps involves working with various government agencies and inter-action with stakeholders including academia, business and civil society organizations
3. Research and document past efforts in DRR and use them as a basis for building the DRMMP. It is essential not to repeat previous efforts but to build on them instead
4. Based on items 2 and 3 develop an initial strategy and the broad components of the DRMMP
5. Organize and undertake a

structured consultative process to obtain input and to engage the stakeholders in improving the initial strategy and determining a consensus plan of actions for the DRMMP that take into consideration the working conditions of the city and its risk reduction priorities

6. Provide mechanisms for sustainability and for measuring progress such as city-specific indicators, organization of multi-stakeholders focus groups, etc.

It is important to be strategic and opportunistic in the process of developing the DRMMP. It is also important to integrate the interests of the various stakeholders and to build ownership for each action item. The implementation of the DRMMP should be primarily the responsibility of the local government agencies and the local institutions, with the support of national and provincial governments and the participation of civil society. The implementation of DRRMP is developed elsewhere in EMI documentation (refer to www.emi-megacities.org/3cdprogram for more information)

The 3cd Program's methodological approach to DRR aims to contribute to solutions posed by the challenge of urban and megacities disaster risk. The concept of a Disaster Risk Management Master Plan (DRMMP) is introduced along with the framework of mainstreaming DRR that will guide those efforts to be integrated through current organizations and existing resources within the city.

In addition to this Manual and MEGA-Know, the 3cd Program provides a complementary set of tools for reducing disaster risk through urban planning, emergency management, and preparedness enhancement. This includes Internet-based Map Viewers (MEGA-View) to make hazards, vulnerabilities and risk information readily available to all relevant stakeholders. The Internet-base Map Viewer for Metro Manila is accessible at: www.emi-megacities.org/megaview.

Another tool being developed by EMI is the megacity indicators system (MEGA-Index). This tool promotes the understanding of the components of risk and enables the monitoring of policies related to disaster risk management adopted by the local government. This methodology is published by EMI in a separate report.[2]

EMI is also developing a companion manual termed "Manual of Implementation" that details the process of implementation of sound DRM practices in megacities and major metropolises. Readers are encouraged to review the documentation on the 3cd Program and the Cluster Cities Project existing in the EMI website as well as other relevant links that could be accessed through the website.

Therefore, collecting, documenting, and disseminating sound practices in DRR and putting them together as a Manual and an online knowledge

base is part of a structured knowledge sharing strategy for megacities. This particular tool set helps in setting the scene for the need to identify, understand and promote the implementation of sound DRR practices.

Lastly, this effort is made as a contribution to the Hyogo Framework for Action (HFA). EMI efforts are focused towards local implementation and on promoting the role of local governments and local institutions and enabling them to become effective actors in disaster risk reduction. In particular, this document fits as a contribution to HFA thematic area 3: *Use of knowledge to build a culture of safety and resilience at all levels* as well as FHA thematic area 2: *Reducing the underlying risk factors*.

EMI's Cluster Cities Project

The Cluster Cities Program (CCP) is the mechanism that EMI has established to strengthen the network of scientists, practitioners, managers, and planners involved in disaster risk reduction and management in megacities and metropolises. From across the various sectors within the city, and among cities clustered in particular world regions, as well as among the world regions established under CCP, the project provides a platform for large cities all over the world to engage one another in a sustained learning process. It provides a much-needed venue for key city officials to directly interact with one another and share ideas and sound practices in a collaborative and communicative learning exchange. Further, the

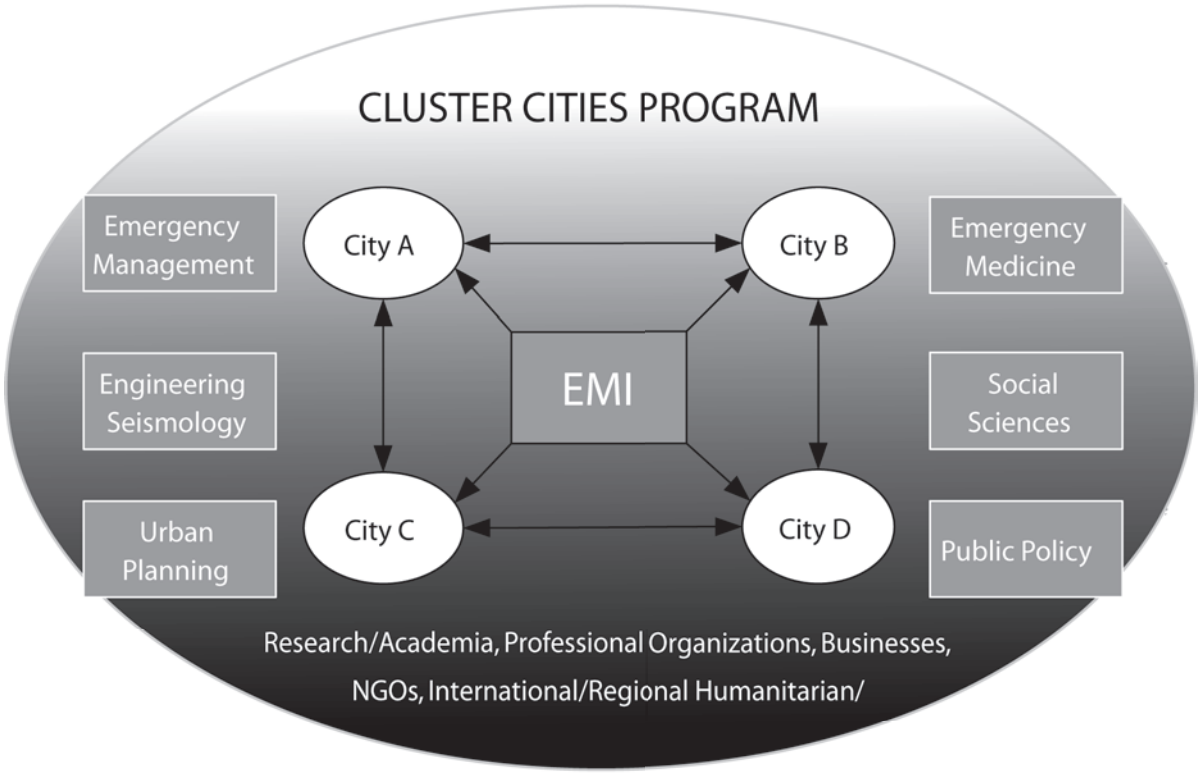
Box 2: Current Risk Reduction Status in Seven Megacities

EMI used the 2005 Hyogo *Framework for Action*, developed by the United Nations International Strategy for Disaster Reduction (UN-ISDR) to study risk reduction practices in seven megacities around the world. The seven cities studied include: Metro Manila, Mumbai, Kathmandu, Istanbul, Tehran, Bogota, and Quito

The investigation showed the following findings:

- Only two cities have explicit disaster risk reduction strategies.
- Only three cities have dedicated budget and staff allocation for risk reduction activities.
- Risk reduction, prevention and mitigation criteria are very incipient in the cities development plans.
- All of the cities have adopted competent codes and standards for construction, but they all struggle with weak enforcement ad implementation mechanisms.
- The private-public institutional links are sporadic or non-existent.
- The role of the civil society is also intermittent lacking means of sustained engagement in the city planning process.

Ref. Fernandez et al (2005), Comparative Analysis of Disaster Risk Management Practices in Seven Megacities (www.emi-megacities.org/megaknow).



project serves as a test-bed for the development of the DRM tools and for testing them in collaboration with local practitioners. The CCP is a network for improving practices and for demonstrating the value and feasibility of DRR. Such demonstrations are much needed as, in practice cities have significant difficulties in understanding their options for DRR and putting them in place. Demonstrated practices can then be disseminated widely to other cities through other networks such as UN organizations and local government organizations. The CCP serves as avenue to disseminate sound DRR practices and motivate and inspire local authorities to mainstream DRR and implement sound practices in their respective cities.

A Contribution to the Hyogo Framework for Action

During the World Conference for Disaster Reduction held in Kobe-Japan from 18 to 22 January 2005, and organized by the UN-ISDR[3], 168 countries adopted the Hyogo Framework for Action (HFA) 2005-2015, building the resilience[4] of nations and communities to disasters, as a guiding DRR framework for the next decade. The single most important outcome of HFA is ***"….substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries."***

The collection of Sound Practices and its dissemination aims to make an important contribution to the ultimate goal of the HFA. Table 1 summarizes the contribution of EMI and its partners through the 3cd Program and the CCP program to the overarching goal of the HFA and more specifically to Thematic Areas No.3 related to the use of Knowledge to build a culture of safety and resilience at all levels.

Further, to show their commitment to DRR, eleven of EMI partners cities and several partner organizations signed a declaration during a special session on urban disaster risk reduction organized by EMI and its partners during the WCDR. This declaration stipulates their support for HFA and their dedication to implement disaster risk reduction in their cities. A copy of the first page of the declaration is shown in Appendix 2.

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[1] Typically cities with population of more than 1 million

[2] Application of Indicators in Urban and Megacities Disaster Risk Management – A Case Study of Metro Manila, EMI Topical Report TR-07-01.

[3] http://www.unisdr.org/eng/hfa/docs/final-report-wcdr-english.doc

[4] Resilience: "The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures." UN/ISDR. Geneva 2004.

Table 1. Contribution of 3cd Partnership to HFA Thematic Area 3: Knowledge Management

Key Activities	Characteristics	Contribution of 3cd Partnership
Information management and exchange	**a.** Provide easily understandable information specially in high risk areas **b.** Strengthen networks among disaster experts, managers and planners across sectors and between regions **c.** Generate dialogue among scientist, practitioners and stakeholders **d.** Promote the use and application of ICT for DRR **e.** Develop user-friendly directories, inventories, information sharing systems, exchange of good practices and technologies **f.** Dissemination of information for land use and urban development **g.** Disseminated international standard terminology related to DRR	• Documentation and databases on hazards, vulnerabilities, risks, organizational structures and legislation for DRR. A disaster risk management library is accessible through MK[5] • A network of 20 megacities including researchers and practitioners has been working together since 1998[6] . A contact directory is available in MK[7] • Bi-annual exchange among regional networks, periodic multi-stakeholder workshops through the 3cd Program[8] • Complementary to Mega-know and the promotion of DRM-SPs, EMI promotes the use of Map-Viewers (ICT) and models for risk sensitive land use and urban planning[9]
Education and training	**h.** Inclusion of disaster reduction from basic to higher education **i.** Implement local risk assessment and disaster preparedness in schools & Higher Ed. **j.** Teach students how to minimize the effect of hazards **k.** Develop training targeted to development planners, emergency managers, local government officials **l.** Community-based training initiatives **m.** Ensure equal access to training and education for women and vulnerable constituencies	• Models to include DR education in schools and higher education institutions are available in MK • eLearning options for planners are already available through Mega-Plan, available sound practices in this particular field will be used as case studies. • Training for local officials has been considered in Metro Manila and Kathmandu

[5] http://www.emi-megacities.org/megaknow
[6] Learn about the EMI CCP program at www.emi-megacities.org.
[7] http://www.emi-megacities.org/megaknow
[8] Workshops and meetings are organized every four months in those cities actively engaged in the EMI 3cd Program see more at www.emi-megacities.org.

Key Activities	Characteristics	Contribution of 3cd Partnership
Research	**n.** Develop improved methods for predictive multi-risk assessments and socio economic cost benefit analysis of RR actions **o.** Improve technical and scientific capabilities to assess vulnerabilities to the impact of different hazards including monitoring capacities	• Use of Megacity indicators (Mega-Index) for urban seismic risk and disaster risk management is a key element in the research portion of the 3cd Program, reports available in MK-Disaster Risk Management Library[9]
Public awareness	**p.** Media involvement to promote strong community involvement and sustained public education	• Media engagement has been promoted in Kathamandu and Metro Manila through the 3cd Program

Source: UN-ISDR (2005).

[9] The EMI Secretariat in Metro Manila has just launched its eLearning modules on disaster management with the WBI and a Mega-Plan for specific LUP options. See www.emi-megacities.org for more details.

Definition of Sound Practice

A working definition of a sound practice (SP) in disaster risk reduction and management is offered by the 3cd Program as follows: “A sound practice is any proven idea, program, technique, mechanism, method, practice or procedure for assessing, managing, reducing and/or transferring risk in complex urban areas. A practice may be related to legislation, land use, education, preparedness, advocacy, building construction, regulatory enforcement, disaster response, post-event recovery and rehabilitation, risk reduction, hazard assessment, or any combination of these or similar actions.” A sound practice, if adopted or followed in other parts of the same (mega)city or in another (mega)city, would result in an overall reduction of natural hazard vulnerability and/or risk.

These sound practices are intended to address at least one of the four components of the DRMMP model, as adaptable and replicable practices in cities at risk. Cities that look for disaster risk reduction options can benefit from both proven and tested initiatives

2

definition and principles of a sound practice

or projects that in some cases are breaking new grounds for risk reduction in the complex urban context. Some of the most relevant action identified relate to:

- Strengthening the legal framework.
- Increasing institutional and societal capacity.
- Developing community resilience.
- Reducing risk through structural measures.
- Implementing appropriate measures to deal with residual risk.
- Identifying financial mechanisms for risk transfer.

Principles of a Sound Practice

To further clarify what a sound practice in disaster risk reduction and management is, there are certain principles that are taken into account This is necessary in order to ensure transferability from city to city and building confidence that the implementation would have a positive outcome on the reduction of vulnerability in the city. These principles can be elaborated as follows[1]

1. **Universal**. The SP developed in one megacity could be applied in other megacities. Is the SP hampered from becoming a universal tool because it is locality-bound (including area and cultural specificity), or heavily resource-dependent? If the SP is locality-bound, what specific component/s hinders its universal application, and can it/they be substituted? If it is resource-dependent, what are the specific restrictions and how/when might they be overcome?
2. **Applicable**. The appropriate application for the relevant parts of a megacity's multiple-city governance structure is significant. Many megacities comprise contiguous cities with their own governance systems, often overlain by an 'umbrella' coordinating structure. To benefit a megacity as a whole, SPs should have application for as many relevant components as possible in a multi-part governance composition.
3. **Expandable**. The capacity of the small-scale activity/ies that typify SPs to be expanded, or be replicated, throughout the same sectors/ sections of a megacity is a key. Many SPs appear to be conducted on a small scale in a particular sector of a city,

[1] Britton 2004, Developing a Framework for Identifying Disaster Risk Management Sound Practices in Megacities.

and/or with a specific section of a community). There is little current evidence that these small-scale activities are exported elsewhere in a megacity. What is inhibiting this from happening?

4. **Focused**. The SPs should be focused toward reducing the overall level of risk within a megacity. The notion of DRM is to help megacity officials build on their existing, predominantly response-focused activities by broadening the efforts into a more holistic risk reduction program that integrates hazard mitigation practices.
5. **Integrated**. The ability of the SP able to be incorporated or to be assimilated into other risk reduction practices is essential. An effective SP should be instrumental in bringing components together, or in some way amalgamate discrete actions that enable and/or enhance a holistic DRM outcome.
6. **Effective**. Identification of the effect the SP has on actually reducing megacity-level risk should be considered. Unless a practice contributes to risk reduction in a real sense, its utility for the megacity is probably questionable. One way to assess a contribution is to have performance criteria that are measurable.

Objectives of a Sound Practice

In the megacity context, objectives and targets for disaster risk reduction should follow the "SMART" criteria by which the sound practice is:

1. Sustainable over time
2. Measurable, with defined criteria for success and specific benchmarks
3. Achievable within the timeframes that governments set
4. Relevant, to satisfy varied situations related to hazards, vulnerabilities and capacities and set within governmental structures
5. Timely, related to carefully framed tasks, with clear short and long-term goals

This five attributes can be used as quantitative and qualitative yardsticks or criteria in measuring the effectiveness of identified sound practices in a megacity setting.

Typology of Sound Practices

In addition to the main areas of interest and action plans highlighted in the DRMMP model, and in order to respond to key concerns for risk reduction that city administrators have pointed out (refer to Box 3), various types of sound practices

are found in different sectors of the megacity and are done within various focus of intervention. Sound practices are therefore classified in this Manual as follows:

- Community Awareness – includes education, training, awareness raising campaigns, among others.
- Emergency Response – referst to sound emergency management and disaster response practices.
- Instructional - comprises public awareness, education programs and so on.
- Land-Use Management – pertains to sound land use planning practices and environmental management practices for reducing vulnerability and mitigating hazards.
- Legal – refers to sound practices that incorporate laws, enactments, and other legal actions .
- Organization-Managerial – encompasses element such as internal agency procedures and process, inter-agency coordination, etc.
- Planning – considers sound practices in development planning and related functions.
- Political/Governance - includes jurisdictional matters, compliance and enforcement, economic and other incentives and disincentives.
- Regulatory – includes promulgating standards and codes and their proper enforcement.
- Technical – includes structural mitigation measures, information technology, risk management tools, hazard-specific mitigation actions.

Some sound practices constitute comprehensive exercises that touch upon several areas of intervention in the DRM process involving several sectors of society and can be assigned to more than one category of practice. Hence,

Complementing the Sound Practice with the City Profile

Each megacity has different characteristics and the identified sound practice should be understood within the particular megacity context. MEGA-Know compiles the DRM "City Profile" for each one of the cities in the knowledge base. The city profiles incorporate the following elements:

1. Who are the main players for disaster risk management in the city? These may be institutions, organizations and actors, including their roles and responsibilities and motivations.
2. What laws and regulations that govern or related to

DRM are in place? Do they facilitate the process or create bottlenecks? For example, have building codes been developed and enacted, and are there adequate enforcement mechanisms in place?

3. Who is in charge of DRM in the city? What is the relationship between the city organization for DRM and other levels of government, including the national level? What is the local organizational set-up, and what human and economic resources are dedicated to it?
4. Are there issues related to governance, e.g. how many LGUs or districts comprise the city? What is the nature and effectiveness of intercity linkages? How are urban planning, land use and development processes taking place? Is risk reduction an objective used in land use and planning decisions? Do development plans incorporate disaster prevention and mitigation?
5. Is vulnerability reduction explicitly incorporated in poverty reduction programs, education, and gender equality programs?

A city profile template and guide for completing a city profile are provided in the library of MEGA-Know.

Guiding Questions in Identifying Sound Practices

The collection of sound practices follows a standard format in order to achieve consistency, enable comprehension, and facilitate the transportability in implementation. Further, to provide local government officials and other DRM practitioners useful insights that will help them in adapting and implementing sound DRR practices in their respective jurisdictions, information on each sound practice attempts to answer these guiding questions related to a structured set of descriptive topics:

1. Problem Analysis:
   - What hazard/set of hazards is being addressed?
   - What specific problem in disaster risk reduction and management is being treated?
2. Descriptions of Sound Practice:
   - What kind of sound practice is being used to modify the risk and reduce urban vulnerability?
   - Who are the actors involved?
   - How is it being implemented and maintained?
   - Why does this sound practice work?
   - Can the SP be fully adopted or adapted by other communities at risk?
   - What are their social cost-

benefit parameters?
- What are the lessons learned?

3. Human and Economic Resource Requirements
   - What resources are needed to implement the sound practice?
   - What are the ingredients or determinants for success?
   - What does the SP require in terms of monitoring and evaluation?

Available Sound Practices in MEGA-Know

MEGA-Know (www.emi-megacities.org/megaknow) lists 45 sound practices from the network of EMI partner cities showcasing a whole range of types and principles of sound practices for target users to consider (see Table 2). Twelve city profiles from the cities of Istanbul-Turkey, Metro Manila-Philippines, Kathmandu-Nepal, Mumbai-India, Dhaka-Bangladesh, Ciudad de Mexico-Mexico, Quito-Ecuador, Teheran-Iran, Seoul-Korea, Kobe-Japan, Bogota-Colombia, and Amman-Jordan from which these sound practices were culled are also available.

This collection of sound practices offers practitioners the opportunity to understand how the problem was acknowledged and formulated, how the intervention was done, and more importantly, how disaster risk reduction can be approached by a city based on its own needs and context.

This collection of sound practices offers practitioners the opportunity to understand how the problem was acknowledged and formulated, how the intervention was done, and more importantly, how disaster risk reduction can be approached by a city based on its own needs and context.

Table 2. List of Available Sound Practices in MEGA-Know[2]

City	Primary Category	Sound Practice Name
Bogota	Emergency Response	Urban Search and Rescue
Bogota	Organization-Managerial	Integrated System for Disaster Management and Emergency (SIRE)
Bogota	Instructional	Post Earthquake Structural Evaluation
Bogota	Technical	A Disaster Management Indicator System for Bogotá City
Bogota	Instructional	School Curricula
Bogota	Land-Use Management	Resettlement of Families Living in High Risk Areas
Bogota	Community Awareness	Emergency Prevention and Attention Plan for Bogota
Bogota	Organization-Managerial	Response Capacity to a Major Earthquake
Bogota	Instructional	"Constructing Well is a Serious Matter"
Bogota	Instructional	Bogota feet on the land
Dhaka	Instructional	Dhaka Risk Management Postgraduate Course
Dhaka	Technical	Dhaka Earthquake Building Design
Dhaka	Instructional	Dhaka Period Briefings on Earthquake DRM
Greater Mumbai	Technical	Increasing Storm Water Drainage Capacity of the Mithi River
Istanbul	Organization-Managerial	An Earthquake Master Plan for Istanbul
Kathmandu	Community Awareness	The School Earthquake Safety Program (SESP)

[2]Contributions to the collection of sound practices and MEGA-Know are welcome and can be done by contacting EMI or visit: www.emi-megacities.org.

City	Primary Category	Sound Practice Name
Kathmandu	Emergency Response	Program for the Enhancement of Emergency Response (PEER)
Kathmandu	Political	Incorporation of DM policy in Tenth 5-year Development Plan
Kathmandu	Regulatory	Mandatory Implementation of a National Building Code
Kathmandu	Community Awareness	Development of the Disaster Information System In Nepal
Kathmandu	Technical	Creation of the Nepal Forum for Earthquake Safety
Kobe	Planning	Kobe City Restoration Plan
Metropolitan Manila	Emergency Response	Health Networking
Metropolitan Manila	Technical	Marikina City Flood Mitigation Countermeasure Program
Metropolitan Manila	Land-Use Management	Save the Marikina River
Metropolitan Manila	Emergency Response	5-Minute Quick Response Time
Metropolitan Manila	Planning	Sustainable Development in Makati: Environmental Management Plan
Metropolitan Manila	Instructional	Reducing Incidence of Injuries in Construction Industry
Metropolitan Manila	Emergency Response	Makati Emergency Management Services System
Metropolitan Manila	Community Awareness	Creation of Barangay Disaster Brigade
Metropolitan Manila	Community Awareness	Saving the Streams in Quezon City
Metropolitan Manila	Community Awareness	Achieving Fire Safety in the City of Makati
Metropolitan Manila	Land-Use Management	Marikina City Squatter-Free Program
Mexico City	Organization-Managerial	Mexico National Civil Protection System (SINAPROC)
Mexico City	Organization-Managerial	Federal District Permant Plan for Contingencies

City	Primary Category	Sound Practice Name
Mexico City	Instructional	Mexico Security and School Emergency Program
Mexico City	Community Awareness	Program of Corresponsibility for the Construction Sector
Mexico City	Regulatory	Mexico, Federal District Building Regulations
Mexico City	Political	Mexico City Reconstruction Process after the 1985 Earthquake
Quito	Planning	Risk Information System: A Decision Making Tool
Quito	Technical	Flooding and Landslide Risk Reduction
Quito	Organization-Managerial	Rain and Fire Plans
Quito	Community Awareness	Healthy Schools
Quito	Community Awareness	Cotopaxi Plan
Tehran	Land-Use Management	Land Use Planning Based on Seismic Hazard Evaluation

Sound Practices in Disaster Risk Reduction

The aim of this section is to illustrate a cross-section of sound practices which have efficiently reduced risks or mitigated the effects of hazards in various cities. Fifteen (15) Sound Practices are selected out of the 45 cases that are compiled in MEGA-Know (www.emi-megacities.org/megaknow) from the following EMI partner cities: Bogota (Colombia), Dhaka (Bangladesh), Istanbul (Turkey), Kathmandu (Nepal), Kobe (Japan), Marikina City (Philippines), Mexico City (Mexico), Mumbai (India), Quezon City (Philippines), Quito (Ecuador), and Tehran (Iran).

A summary of the sound practice is provided within the context of the problem it attempted to resolve. Its contribution to risk reduction in the city is indicated as well as the lessons learned from the practice so that it can be applied to another city. A capsulated city profile is likewise provided (refer to Appendix 1 for the detailed City Profiles). To frame the sound practice in the global context of disaster risk reduction, its contribution to the Hyogo Framework for Action (HFA) is appraised.

This section of the Manual hopes to contribute to knowledge sharing and to facilitate the turning of lessons learned into lessons practiced.

3

sound practices in disaster risk reduction

BOGOTA, COLOMBIA Reducing Disaster Risk in Schools

EMI Cluster: Americas
Population: 4,945,448
Land Area: 1,776 sq.km.

Earthquake

Instructional, Community Awareness

Summary

One of the strategies of the General Program to Strengthen Bogota's Response Capacity to a Major Seismic Event is building the capacity of schools in disaster risk reduction by involving school directors, teachers, personnel, and students by being proactive, by practicing self-help initiatives, and by inculcating a culture of disaster resilience and prevention among the new generation. The preparation and implementation of risk management plans for schools are promoted as well as the integration of disaster risk reduction concepts in the school curriculum.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.
HFA 3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels

Description

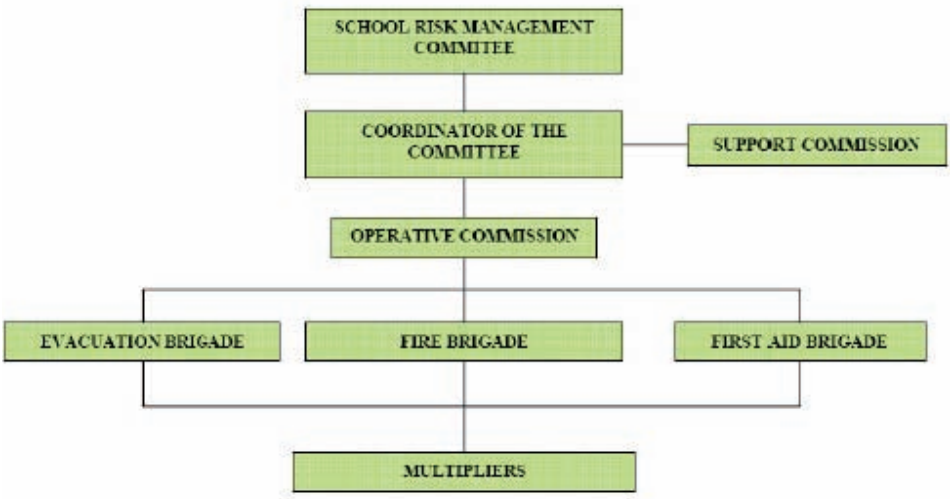
The General Program to Strengthen Bogota's Response Capacity to a Major Seismic Event aims to promote a more effective integration of prevention and self protection practices among the population of the city, following the principle of developing a culture of prevention. The program goal is to develop and strengthen capacities at the community level. One of the key axes of action of the program is to undertake capacity building workshops and undertake disaster preparedness activities in schools. Further, the program aimed at making disaster risk preparedness as an integral part of schools curricula. The premise is that children are more open to change, and thus are more receptive to disaster preparedness messages. Further, children are an instrument of change themselves by carrying their knowledge and spreading the messages within their families and communities.

Thus, the program has two main axes of activities. The first axis pertain to the promotion and extension of the the city's disaster preparedness and management in the schools, by which teachers develop a disaster/ emergency management guide specific to their school. The effort of generating this guide as multiple purposes, including: (1) to achieve a deeper knowledge about risks in

schools; (2) to identify mitigation and preventive actions that can be taken by schools and (3) to focus the attention of students, teachers and the community on emergency preparedness. The guide includes the following information:

The School Risk Management Plan consists of the following parts:

1) Fundamental Concepts: Discusses normative and conceptual elements such as risk factors (e.g. hazards and vulnerabilities) that threaten an education institution. It distinguishes risk from disasters.
2) Risk Scenario: Provides instruction for the construction of a risk scenario in order to diagnose the risk to the school. It distinguishes internal from external risk in order to promote a sound analysis of hazards and vulnerability. Risk assessment are then based on internal (i.e. school's physical conditions) and external (i.e. the school's social, economic and natural context) environments.
3) Instruments for intervention in risk management: Guides in the identification of actions and interventions that may form a disaster risk management and reduction program. It shows how risk may be reduced, mitigated, or eliminated and calls the attention of social actors that contribute to the generation of risk.
4) Risk Management and School Plan: Presents the Risk Management Plan in Schools and enumerates the disaster risk management protocols in the school.
5. Elaboration and implementation of the Risk Management Plan in Schools: The end of the whole strategy is to create awareness and provide tools to act against risk, reduce vulnerability, and be prepared during emergencies.



Capacitating the school stakeholders is crucial. To this end, the manual recommends training students from eighth to tenth grade. Since these students will stay in school for at least two more years, they will have the opportunity and capacity

to promote disaster awareness among their classmates at school as well as engage their family, peers, and friends at home and in their communities in mitigating and preparing for disasters.

To implement the risk management plan, a School Risk Management Committee is formed and composed of the teaching staff, personnel and students. This Committee is tasked to organize brigades whose duties are to detect and mitigate risks. There are brigades for Security and Surveillance, Evacuation, Fire, First Aid, Rescue, Communication, Reservation, Management Network, and Curricular and Extracurricular brigades. The manual recommends involving at least 10 percent of the school community in the brigades.

The second axis is the integration of the theme of risk prevention and disasters in school curricula. The curricula proposal is being designed by the District Education Secretariat according to the methodology inaugurated by the Direction for the Prevention and Attention of Emergencies. The design involves managing of content that gradually ascends in complexity according to the age of students and scope of their concerns. It also widens gradually in terms of their geographical reference: from their personal surroundings, to the district, and to the global context as well as from a self-protection framework towards stimulating the interest in protecting the whole family. The program has a high rate of success as it was adopted by 375 out of 400 schools in Bogota.

Relevance to Practice

This sound practice shows that, in order to instill a culture of disaster resilience among the new generation, disaster education and awareness should begin in schools. Integrating disaster risk reduction themes in the school curriculum is an effective method to influence and educate school children while they are young and start the process of engaging families and communities in risk reduction through the youth. The use of risk management plans in schools mainstreams risk reduction practices and processes in regular school operations and routine functions while making efficient use of existing resources and capacities in educational institutions. The innovation of this sound practice resides in the fact that the risk management plans are developed by the teachers and the students themselves and that the knowledge on hazards and disasters is made an integral part of the general education teachings of the schools.

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BOGOTA, COLOMBIA Resettlement of Communities At-Risk and Environmental Rehabilitation of "Altos de la Estancia" in Bogota

EMI Cluster: Americas
Population: 4, 945, 448
Land Area: 1,776 sq.km.

Earthquake

Land-Use Management, Community Awareness, Planning

Summary

The highly-populated upland areas in the City of Bogota have been identified as high-risk zones where no mitigation work is possible. In order to ensure life safety, vulnerable families living in high-risk areas are relocated and resettled. The resettlement program not only strives to provide permanent shelter for affected families but also improve their quality of life and living conditions in the relocation area. A risk mitigation action plan will then be implemented in the identified high-risk zones to rehabilitate the area, prevent future encroachments, and restore its environmental quality.

Contribution to Hyogo Framework for Action

HFA 4: Reduce the underlying risk factors

Description

The upland areas are highly prone to landslides but are at the same time the most populated areas by marginal communities in the city of Bogota, including *Altos de la Estancia* in the locality of Ciudad Bolivar. Based on zoning and technical studies on landslides conducted by the Fund for Prevention and Attention of Emergencies (FOPAE), Special Treatment Zones for Risk Mitigation were defined. According to the studies, this zone is characterized by the occurrence of landslides that took place between 1999 and 2000 affecting a total area of 70 hectares and 3,000 families, including community facilities such as kindergartens, schools, and parks. It was concluded that this area is a high-risk zone where no mitigation work is possible. Altos de la Estancia is included in this zone. This finding demanded immediate intervention measures, which include resettlement of affected families and rehabilitation of the area.

These zones are incorporated in the Territorial Ordering Plan (POT). The POT defines the Resettlement of Families Living in High Risk Areas Program as "the set of actions and activities necessary to achieve the mobilization of families living in strata 1 and 2 which are settled in

zones declared a high risk area for landslides and flooding where no mitigation work is possible, zones which are object of intervention for public constructions or any area that may be required for intervention according to territorial reordering. The actions and activities include the identification and evaluation of the technical, social, legal and economical conditions of each family, the mobilization to other locations in the city that offers fit and secure shelters and the promotion of social and economical integration which guarantees the welfare of the families and the protection and rehabilitation of the intervened zones".

Resettlement area in Bogota, Colombia

The Resettlement Program for Families living in High risk Areas in Bogota focuses on guaranteeing life protection for vulnerable inhabitants and a legal shelter for everyone. This strategy is oriented to reducing the vulnerability of the families living in high risk zones by relocating them and improving their conditions by including the community in the social services the State while at the same time defining and implementing environmental rehabilitation actions to prevent new occupations in the evacuation areas.

For Altos de la Estancia in Ciudad Bolivar, a total of 3,033 families were identified for the program. About 1,800 families have been resettled and received benefits from various social programs. While resettlement is still ongoing, positive results can already be outlined. The rehabilitation plan of the evacuated area is currently under its design phase following an innovative framework that includes institutional intervention with strong community participation-a strategy promoted by the System for Prevention and Attention of Emergencies (SPAE). In this particular plan, reconstruction and rehabilitation actions are identified and implemented in the short, medium and long term following recommendations of the study by GEORIESGOS "Risk Study

and Mitigation Measures for the Altos de la Estancia Sector in Ciudad Bolivar" (2004).

The FOPAE started relocating approximately 500 families in high-risk areas as part of the project "Risk Reduction in Special Treatment Zones" in Santa Viviana, San Antonio Mirador, La Carbonera and Santa Helena from 1999-2001. The next phase of the project involved a series of agreements between FOPAE, the Caja de Vivienda Popular and the Fund for Local Development in Ciudad Bolivar. The agreements were inter-administrative and co-financial in nature, representing the technical, administrative and financial efforts of the three agencies in resettling these vulnerable communities.

The risk mitigation action plan for the high-risk zones will be implemented once the resettlement program ends. It will involve the cooperation of public institutions and community-based organizations. Planning, environmental, recreational, and utility agencies will be engaged at the local and national levels to integrate efforts and optimize resources toward this end.

Relevance to Practice

This sound practice demonstrates the following pragmatic measures regarding relocation and resettlement of communities at-risk:

1. The integration of financial, human and technical resources is fundamental for the solution of large scale problems. Resettlement must attend to both social and territorial issues.
2. Solutions ought not to be imposed even if they seem faster and more convenient since they may not respond to the necessities, expectations and cultures of the beneficiaries, therefore hasty solution may comprise the success and sustainability of the practice.
3 The respect for the diversity and autonomy of the involved population is crucial in planning and redevelopment of resettlement areas.
4. It is important to promote community organization in order to achieve a participatory process and prepare a comprehensive strategy for resettlement programs.

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DHAKA, BANGLADESH Building and Designing Earthquake Resistant Structures

EMI Cluster: South-Central Asia
Population: 6 million
Land Area: 360 km^2

Earthquake

Technical

Summary

Non-engineered and poorly constructed structures are common in human settelements in many developing countries. Substandard buildings contribute to physical vulnerability to seismic hazards such as ground shaking and liquefaction and exacerbate the possible damage to property and loss of life. Earthquake-resistant building design and construction already exist but need to be widely disseminated to all target users. Information dissemination is done in Dhaka through the publication of separate guidelines for designing and for constructing buildings that take local seismic parameters into consideration.

Contribution to Hyogo Framework for Action

HFA 3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
HFA 4: Reduce the underlying risk factors

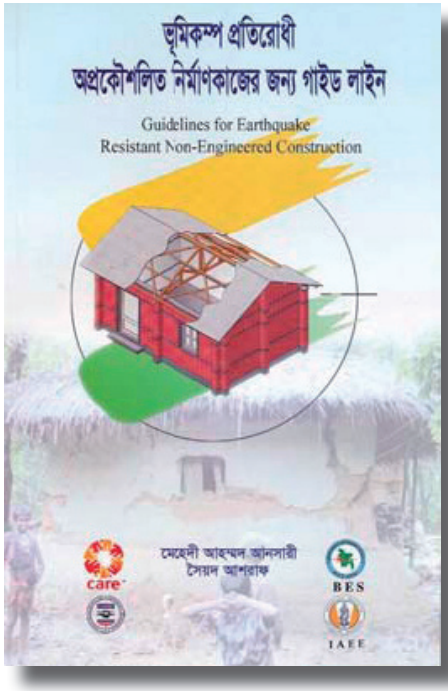
Description

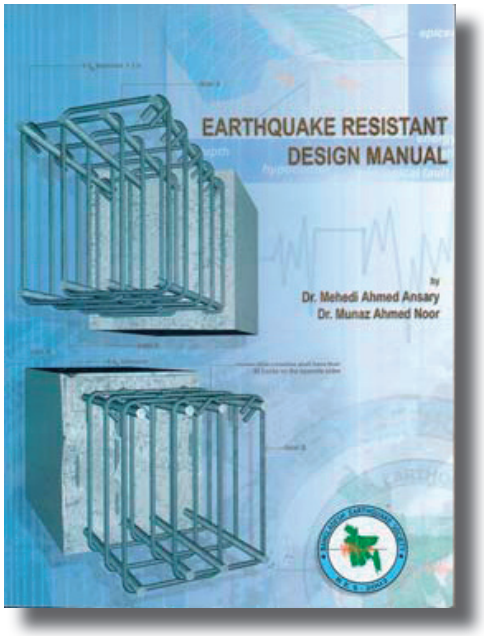
As the country geographically belongs to an active seismic zone, there has been an increasing concern about the seismic vulnerability of the built environment in the urban areas of Bangladesh, especially in Dhaka City. Some incidents of recent building collapse in and around Dhaka raised the issue of escalating physical vulnerability even to low magnitude earthquakes due to very poor quality of building construction and the continual building practice of people without the benefit of engineering and architectural oversight. Another major concern is that there has been little or minimal awareness about reducing earthquake risks. With a built-up area that is highly dense and thickly populated, the potentially tremendous impact of a large magnitude earthquake on Dhaka is unimaginable.

To remedy this situation and mitigate seismic hazards in the capital, Bangladesh Earthquake Society (BES) has come forward to step up the disaster awareness campaign into effective action and improved work ethic among all building professionals and related groups. The BES has been working on raising awareness among all groups of people and professionals involved with such concerns through regular seminars, workshops, and

publications. The "Guidelines for Earthquake Resistant Non-Engineered Construction" and "Earthquake- Resistant Design Manual" are landmarks in the campaign to raise the risk perception of residents as well as improve the standards of practice of relevant professions.

The "Guidelines for Earthquake Resistant Non-engineered Construction" written in the vernacular provides detailed sketches on how small measures can be effective in reducing the earthquake vulnerability of buildings. Techniques on how existing non-engineered structures can be strengthened through repair and restoration are detailed in this guidebook. It also features tips on constructing less vulnerable new buildings.





The second 185-page manual, the "Earthquake Resistant Design Manual," is a comprehensive bilingual (Bengali and English) publication produced to resolve the lack of awareness of seismic risks among engineers, architects, and other professionals involved in building design and construction. The manual provides design and detailing principles on how to make buildings safer against earthquakes. It covers technical aspects necessary for engineering constructions as well as retrofitting of existing week structures, including the behavior of low-rise buildings subjected to lateral loads, seismic design loads, detailing requirements, quality control and quality assurance, and repair, restoration and strengthening of buildings.

Both guidebooks discussed measures considering the generic nature of structure so the practice can be transferable to other megacities. The recommended practices focus on reducing physical vulnerability to seismic hazards. By applying these guidelines, the overall urban disaster risk of a city can be drastically reduced.

Relevance to Practice

Building design and construction practices are important mechanisms in reducing the physical vulnerability of the built environment and the risk to the city. Thus,

1. Addressing the physical vulnerability of structures in a city before a disaster by focusing attention to non-engineered and poorly constructed dwellings may significantly reduce human losses and property damage in an earthquake event and lower the overall risks to seismic vulnerability.
2. Education and knowledge sharing through use of manuals and guidelines are risk reduction measures that all cities can readily implement and sustain.
3. Professional societies and organizations play a key role in risk education and communication.
4. Training and capacity-building programs not only for engineers and architects but also for masons, carpenters and other trades involved in the construction and building industry are important to upgrade the standards of practice and work ethic for a safer built environment.

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ISTANBUL, TURKEY Earthquake Master Planning in Istanbul

Cluster: Euro-Mediterranean
Population: 10 million (approx.)
Land Area: 5,343 sq.km.

Earthquake

Land Use Management, Planning, Political, Regulatory, Technical

Summary

To develop a comprehensive and scientifically-based master plan for earthquake mitiation in Metropolitan Istanbul, the Istanbul Metropolitan Municipality (IMM) engaged the four leading national universities of Bogazici University, Istanbul Technical University, Middle East Technical University and Yildiz University to prepare an Earthquake Master Plan for Istanbul. The master plan is a comprehensive document that incorporates all aspects of disaster management and proposes major project for managing various risks and for reducing future disaster losses in Istanbul. Schemes for financing and for prioritizing are also included. The plan was developed under a cooperative agenda between EMI and IMM, and was reviewed by an independent body of experts.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.

Description

Following the disastrous earthquakes that struck the Marmara region in Turkey in 1999, authorities recognized the high probability of occurrence of a large earthquake that may impact once again in important urban areas of the country, and particularly the megacity of Istanbul. This scenario prompted them to put in place a comprehensive disaster risk management system that incorporates preparedness, mitigation and emergency response procedures, as means to reducing future potential losses and overall risk in the city of Istanbul.

To come up with a strategic document initiating concrete actions to reducing physical, social and institutional vulnerability, the Istanbul Metropolitan Municipality (IMM) tapped four leading technical universities to help them develop an Earthquake Masterplan for Istanbul. These universities are the Bogazici University, Istanbul Technical University, Middle East Technical University and Yildiz Universy The four universities set up several working groups consisting of expert faculty members. In total a multi-disciplinary team of more than 60

experts participated in the study. The Turkish version of the report is more than 1000 pages long. An English version of about 600 pages is also available.

Aftermath of the 1999 Istanbul Earthquake.
(Source: http://www.turkiye.net)

The scope of the Master Plan covers the assessment of seismic vulnerability of the existing building stock in Istanbul, the development of seismic retrofitting methods and rehabilitation of existing buildings, and technical, social, administrative, educational, legal, risk management, and financial measures needed to be able to implement such methods. The master plan includes pioneering examples of Urban Development Projects and Local Transformation Programs, or total "Action Planning" for Turkey.

The master plan aims at planning of the activities in these fields, preparation of implementation programs, and identification of the responsibilities and authorities for earthquake disaster mitigation activities to be carried out in Istanbul.

The Earthquake Master Plan also provides two different yet parallel approaches with corresponding strategies and new organizational structures. The Strategic Plan for Disaster Mitigation in Istanbul (SPDMI) suggests a threefold roadmap which applies different strategies, planning instruments and priorities at the macro, meso and micro level. The SPDMI focuses on:

1. Conceptualization of strategic planning,
2. Problems and potentials of Istanbul Metropolitan Area
3. A road map including strategies
4. Planning instruments, and priorities at various levels

5. Institutional and legal considerations

The other strategic plan, the Earthquake Mitigation Plan for Istanbul (EMPI), is a comprehensive coordination of mitigation measures and risk management methods developed according to the causal structures and spatial distributions of hazards and risks. EMPI stresses that risk management relates mostly to legal, social and political issues requiring the support and commitment of governmental institutions at all levels as well as participation of local society. EMPI aims for:

1. Improvements in infrastructure
2. Eradicating unauthorized constructions
3. Protecting historical and cultural values
4. Facilitating public participation
5. Enhancing total quality of life and urban environment.

Relevance to Practice

Reducing vulnerability to seismic hazards is achievable by being proactive and forward-looking. Land use planning provides tools and techniques that can address structural, social, economic, and legal issues related to disaster risk reduction. The use of a master plan is a planning technique that can help mitigate seismic losses and damage. Risk assessment, hazard evaluation and vulnerability analysis, provides a scientific basis in order for risk-sensitive land use plans to be formulated. The Istanbul Earthquake Master Plan could serve as an example to other megacities on how to set up a comprehensive program that addresses risk in the city holistically, and thus provides for a better understanding of what needs to be done, how it can be done, and who should do it. The city can then understand the priorities and be in better position to justify its policies and programs.

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KATHMANDU VALLEY, NEPAL
Program for the Enhancement of Emergency Response (PEER)

EMI Cluster: South-Central Asia
Population: 1.5 million
Land Area: 550.72 km^2

Earthquake, Typhoon

Emergency Response

Summary

This sound practice highlights the importance of capacity-building and the sharing of knowledge in enhancing emergency response practices of first responders. Existing training resources can be localized and customized to the needs of target users. First responders are very important players in disaster preparedness and response and helps in minimizing loss of life and injuries in a disaster event.

Contribution to Hyogo Framework for Action

HFA: 5 Strengthen disaster preparedness for effective response at all levels.

Description

The Program for Enhancement of Emergency Response (PEER) is a regional training program initiated in 1998 by the U.S. Agency for International Development Office of Foreign Disaster Assistance (USAID/OFDA) to strengthen disaster response capacities in four Asian countries: India, Indonesia, Nepal, and the Philippines. These countries were selected to participate in the program based on their high seismic vulnerability, their need to improve their disaster response capacity, and the interest on the part of their national governments to participate in the program. All of the involved countries have either prepared disaster response policies or have access to institutions to help them develop disaster response policies. However, they do not have adequate emergency/disaster response capacity-building programs, as evidenced by a lack of training curriculum, instructors, and agencies to offer training on a regular basis.

Phase l of PEER established program foundation to test and adapt the courses to the Asian context, and to start developing a pool of instructors. In implementing Phase 2 for the Asian region, the National Society for Earthquake Technology-Nepal manages PEER in collaboration with three U.S. Partners: International Resources Group (IRG), Johns Hopkins University/Center for International Emergencies, Disasters and Refugee Studies (CIEDRS), and Safety Solutions, Inc.

Phase 2 of PEER, NSET-Nepal aims to a) Establish and strengthen the capacity of PEER countries to provide collapsed structure, search and rescue support, as well as basic and advanced life support, beginning with first responder agencies and continuing with personnel in medical facilities; b) Develop a training system that continually provides disaster response with qualified personnel for search and rescue and medical first response and medical facilities prepared to receive victims; and c) Establish a coordinating network of emergency and medical response and training institutions and individuals in PEER countries that ensure the continuation of the PEER process and further promote its evolution. Some of the PEER training courses are Medical First Responder Course, Collapsed Structure Search and Rescue, Hospital Disaster Preparedness, Training for Instructors, Course Design and Development, and Course Adaptation Workshop.

So far, a total of 46 training events have been conducted in five countries, developing 826 personnel from various emergency response agencies in Asia. Among these, 328 are already certified instructors for Medical First Responders, MFR, Collapsed Structure Search and Rescue, CSSR, Hospital Disaster Preparedness, and for HOPE courses.

Relevance to Practice

This training program emphasizes the importance of disaster preparedness and effective emergency response as a means to reduce potential disaster damage and losses. Specifically, it shows that:

1. Search and rescue and hospital disaster preparedness involve different groups of technical personnel that have to be mobilized and capacitated as first responders in a disaster event.
2. Many developing countries need to further capacitate their first responders and emergency managers in order to prevent unnecessary loss of life in a disaster event based on their own context and given their own resources and capacities.

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KATHMANDU VALLEY, NEPAL
Mandatory Implementation of a National Building Code

EMI Cluster: South-Central Asia
Population: 1.5 million
Land Area: 550.72 km^2

Earthquake, Typhoon

Regulatory

Summary

Developing and implementing a national building code involves the national and local governments as well as the cooperation of various professional groups engaged in the construction industry. A building code enhances standards of practice and reduces the physical vulnerability of structures to natural hazards such as earthquakes and typhoons for all types of buildings. Education and training are integral program components for effective code compliance.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.
HFA 4: Reduce the underlying risk factors

Description

The Bureau of Standards and Metrology has initiated a process for defining the draft Building Code as a Nepal Standard. Several of the 22 documents prepared for the National Building Code, which focuses on seismic safety, are accepted as Nepal Standards. In 2003, the Council of Ministers decreed that the stipulations of the National Building Code should be made obligatory for all government-building constructions. It also urged the municipal authorities to strengthen the current building permit process so that code compliance will be mandatory for all new constructions in urban areas. Kathmandu Metropolitan City (KMC) has started implementing building code-2060 from August 21, 2005, for the construction of buildings within the city.

There are three types of codes based on the types and size of buildings. The first one is for state-of-the-art buildings and applies international standards. The second relates to professionally engineered buildings and emphasizes seismic design, fire safety measures, standard quality of concrete, architectural, and electric and sanitary designs. The third category is for short masonry buildings, for which the designer does not need to present detailed designs but should follow mandatory rules of the thumb to assure good performance in case of earthquakes.

The implementation of the building code in KMC looks for engineering design and supervision of the buildings, ending a long term practice of using ordinary elevation drawings and promoting the active participation of professionals. KMC wants to create options to increase code compliance, among them, creation of a monitoring team to supervise the use of the new regulation and to follow up at the construction site. Some other mechanisms to enhance code enforcement include the revocation of professional licenses issued by the municipality.

In October 2005, a National Building Code Implementation (BCI) Committee was set up within KMC. It is comprised by six specialists who act on voluntary basis. This Committee, along with the Building Permit Section, is in charge of building code implementation and enforcement in KMC following the three categories described above.

Based on the Lalitpur Implementation Model (Lalitpur is one of the five municipalities comprising the Kathmandu Valley), a 10-point process has been put in place to educate, motivate and enforce the use of the code. A summary of the implementation process is as follows:

1. **Awareness Raising:** The message is loud and clear: "We live in an earthquake prone area. We have suffered the impact of earthquakes in the past. We can reduce the losses in future disaster events."

2. **Partnerships:** A BCI Committee was constituted with the broad participation of r representatives coming from the different sectors of the community.

3. **Assistance and supervision:** The Earthquake Safety Section is established within the municipality to provide technical assistance to users and customers and supervise the implementation process in the construction site and in-house assistance through design control and supervision.

4. **Orientation programs:** Conducted by the National Society of Earthquake Technology and addressed to end users such as the association of home owners, these programs emphasize the benefits of using the building code.

5. **Training modules:** Tailor-made for professionals engaged in the construction cycle, especially masons who are the primary source in the actual building construction in medium to high rise buildings that mostly use load bearing wall systems. At present, the municipal roster of trained masons includes 85 certified professionals.

6. Preparing building construction guidelines: Distributed among Lalitpur residents and construction workers. The cost of the publication has been so far covered entirely by the municipality in a effort to reach the biggest number of users.

7. **Public demonstration programs:** To show people the benefits of a sound construction, a shaking table demonstration and scaled models show details of the building foundation, beams and columns for confinement or wall to beam

connections to help people visualize the proper way of construction.
8. **Set up an approval process**: Basic blueprints are revised by the Earthquake Safety Unit. If the design is suitable, then the process of approval will start within the municipality.
9. Differentiate categories of construction: Approval procedures vary depending on the type of construction. For instance, the procedure for reinforced concrete structures is more complex. Assistance in-situ is likewise provided to ensure good quality of concrete mix.
10. **Provision of incentives:** This process has been implemented with "0" costs to the end user to promote the application of the guidelines while making people understand the benefits of life and property protection.

Relevance to Practice

Code compliance as a disaster risk reduction measure is a multi-sectoral issue and requires the cooperation of various stakeholder groups. Further, effectively implementing building codes and other construction regulations for that matter require awareness raising campaigns, trainings, education, and outreach programs that specifically target professional groups, e.g. masons. The use of simple, inexpensive tools such as the shaking table is an innovative method to raise disaster awareness in communities and even among professional groups.

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Kobe, Japan Rebuilding Kobe after the 1995 Great Hanshin-Awaji Earthquake

Cluster: East Asia
Population: 1,506,112
Land Area: 550 sq. km.

Earthquake

Planning
Organization-Managerial, Technical, Land-Use

Summary

The damage from the Great Hanshin-Awaji earthquake in Kobe was extensive, cutting across all sectors of society, halting businesses, and disrupting millions of lives. To reconstruct and rehabilitate the city, the Kobe City Restoration Plan was formulated. This detailed plan elaborated on every aspect of earthquake recovery and reconstruction, from helping the elderly to cope with disaster impacts to properly rebuilding the damaged infrastructures. The overall goal of restoring the city of Kobe was not only to rebuild after the disaster but to build a city that is more socially and economically vibrant as well as safer and sustainable.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.

Description

The Great Hanshin-Awaji Earthquake in January 17, 1995 resulted in a catastrophe which left more than 4,571 deaths, of which 3,891 were in Kobe. The rest were casualties in Awai, Ashiya and Nishinomiya and their surrounding areas. Aside from this, many people were injured, and billions worth of properties and institutional structures collapsed and then destroyed due to fire that followed the earthquake. Notably, this has been the first earthquake in modern history to affect a densely populated urban area in Japan. The total losses as determined by both private sectors and local government amounted to about 10 million yen.

Within a few months after the disaster, the Hyogo Prefectural Government together with the City of Kobe formulated the Priority 3-year Infrastructure Plan to quickly respond to the people's recovery needs. This constitutes the first part of the 10-year "Hyogo Phoenix Plan" or the Great Hanshin-Awaji Earthquake Reconstruction Plan. The plan intends to "get the citizens' daily lives back to normal, to restore the functions of [the] city as quickly as possible," and to have a "place where people can live with a sense

of security." Further, the restoration plan was not only intended to restore Kobe, but to use this as an opportunity to further develop and improve the city as part of a contribution to the "Urban Resort City Development Project."

Highway in National Artery Road No.43 at Iwaya after the 1995 earthquake, 1996, and 2005.

The earthquake revealed to the city leaders the vulnerability of society and they wanted to create a city that guarantees safety as well as convenience of urban life. Thus, the particular restoration process set forth by the City of Kobe had three components. These are: (1) to reduce vulnerability, (2) increase the standard of living, and (3) build a safer city with the residents in mind.

To deal with the catastrophe of this magnitude, the recovery plan followed many steps to reach completion depending on the immediate necessity. The first and most urgent need in this situation was to provide large numbers of housing for the population without homes, restore schools, and rebuild the road system.

Moreover, the restoration plan of Kobe involves a highly detailed multiple goal plan that cut across all issues, all sectors of society, and infrastructure. The plan included many micro-projects for the children, the elderly, counseling, creating citizen based communities among many others. Most importantly, the plan allowed for the citizens of small communities to make decisions and employ efforts, making them a key player.

The general lessons learned from the Great Hanshin-Awaji Earthquake to be applied to future disaster scenarios are:

1. Separate plans for each type of disaster.
2. Revisions of time-priority of response elements.
3. Clearer responsibilities of the state, local public bodies and residents.
4. Clarify the role of the public activities of voluntary disaster risk reduction groups.
5. Changes to accommodate recent changes to the structure of Japan's society and economy.
6. Accident countermeasures are reinforced.

Relevance to Practice

One lesson learned from this case is to pass on the knowledge gained from this tragic event to future generations. The City of Kobe demonstrated that disasters can be "windows of opportunity" to mainstream disaster risk reduction measures in the recovery and reconstruction phases in order to prevent making the same mistakes and mitigate potential impacts in future disaster events. From the case of Kobe, citizens' effort and participation beginning at the lowest level shows that participatory planning is necessary to develop effective disaster recover plans. Communities can be mobilized to be proactive and protect themselves, be prepared, and recreate their own towns and communities that are safer from natural hazards.

More info: Phoenix Hyogo: Ten Years of Creative Reconstruction, http://web.pref.hyogo.jp/hukkou.index.htm.

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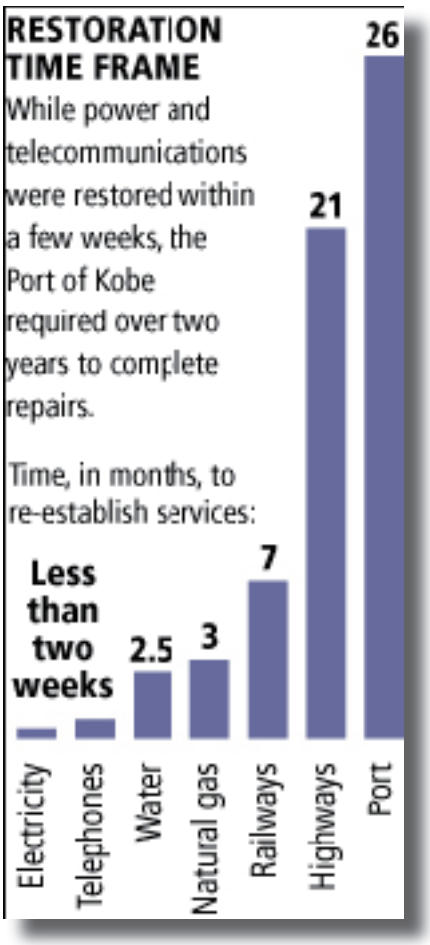

Amount of time, inmonths, taken for Kobe to repair the vital infrastructure and transportation (The Seattle Post, 2002, and the City of Kobe, 2005).

METRO MANILA, PHILIPPINES
Mitigating Urban and River Flooding in Marikina City

EMI Cluster: East Asia
Population 12 million (approx.)
Land Area: 636 km^2

Flood

Technical

Summary

The city government of Marikina engages in proactive flood mitigation program that has finally effectively reduced perennial disaster losses and damage that city residents sustained throughout the years. The city is also reaping the rewards of disaster risk reduction due to increased investor confidence and continuing economic vitality.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.

HFA 4. Reduce the underlying risk factors.

Description

Marikina City is one of the highly urbanized component cities in Metropolitan Manila. Marikina City is comprised of 15 barangays (smallest administrative unit in the Philippines) occupying a land area of 21.50 square kilometers. Its population was estimated at 447,000 in 2004. Marikina City, like the rest of Metro Manila, is characterized by rapid population growth due to high fertility rate and in-migration and a high rate of urbanization.

Marikina is traversed by West Valley Fault of the Valley Fault System (VFS). Movements along the VFS have created a graben valley through which the Marikina-Pasig River now meanders. Cyclone-driven rains can cause overflow of the riverbanks, which poses repeated flooding risk. Floods have proven to be a persistent hazard and occur in high frequency in Marikina City. A comprehensive catalog of historical flood information for Marikina City has not been established but the flood risk is well acknowledged and has been the focus of mitigation efforts over the past 20 years.

To once and for all prevent or minimize damage and losses that occur almost yearly, the city government has engaged itself in flood mitigation activities. These are:

1. Concreting of roads to reduce amount of sand pebbles and mud entering the drainage system.

2. Construction and rehabilitation of major outlfalls allowing flooded areas to recede faster, resulting in reduced flood intensity and duration.
3. Massive dredging operations that contribute to faster discharge of floodwaters in residential subdivisions into creeks and waterways.
4. Demolition of obstruction produced by illegal settlers resulting to the removal of major obstructions along waterways.
5. Continued improvement to existing diversion channels and interceptors.

The number of residences exposed to flooding has been reduced by 54 percent (1,045 residences in 1992 to 479 in 2004), exposed businesses have been reduced by 36 percent, and critical facilities exposed to floods have been reduced by 19 percent.

In terms of land area, Marikina City's flood mitigation program has succeeded in reducing flood-prone areas from 27.52 percent in 1992 (6.4 square kilometers) to 19.04 percent in 2004 (4.40 square kilometers). This means that flooding in Marikina City has been reduced by 31 percent in 12 years.

It is important to emphasize that the city's flood control project has been funded by the city government. The city's Engineering Department was reorganized, initial materials and equipment were provided and competencies were improved. All infrastructure projects were also done by local administration thus saving 30 percent of project cost. Marikina has proven that the local government unit can sustain and protect the city from flooding. Lastly, by solving the perennial flooding problem, investment climate and business confidence in the city are restored and continuing economic development is assured.

Relevance to Practice

Marikina City has demonstrated that being proactive by engaging in disaster mitigation and investing sufficient resources in engineering and public works can pay off in the long term. Non-structural measures such as training and investing in human resources to capacitate the engineering and technical personnel complement structural and engineering interventions and help in sustaining the flood mitigation program of the city. Lastly, Marikina showed that local government units can develop and implement disaster risk reduction initiatives in a self-help and independent manner coupled with a strong leadership.

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METRO MANILA, PHILIPPINES
Saving the Streams in Quezon City

EMI Cluster: East Asia
Population 12 million (approx.)
Land Area: 636 km^2

Flood

Community Awareness, Organization-Managerial, Regulatory, Technical

Summary

Solid and liquid waste pollution of the river systems in Quezon City has become a root cause for a low quality of life for many low-lying communities and has exposed thousands of city dwellers to flashfloods and river flooding. The Project Save the Streams in Quezon City was an environmental management project that sought to revive ailing river systems in the city through the collaboration of the public sector with the stakeholder communities. The project has led to the restoration of the river systems as well as mitigated the flooding hazards in the city and in the metropolis as a whole.

Contribution to Hyogo Framework for Action

HFA1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.

HFA 4: Reduce the underlying risk factors

Description

Indiscriminate dumping of solid and liquid wastes in rivers and creeks by residents and the illegal dumping of effluents and other industrial wastes from factories have clogged the waterways. River easements have also disappeared due to illegal encroachments of the river banks. The result: perennial urban flooding has plagued Quezon City for many decades. Quezon City is the largest component city of Metropolitan Manila in terms population (2,173,831) and land area (160 sq. kms.).

The City is drained by four river systems, namely: the San Juan-San Francisco Del Monte River, Marikina River, Tullahan River and Maycauayan River. Both the San Juan River, which traverses the central and southern sections of the City, and the Marikina River along the eastern boundary, discharge into the Pasig River. Tullahan River, on the other hand, cuts across the Novaliches area and discharges into the Tenejeros River in Malabon City. Creeks in the most northwestern portion of the City drains into Meycauayan, Bulacan Province. Ultimately, the drainage outfall of all these river systems is Manila Bay. With all this interconnected drainage system, the pollution of one river contributes to the overall degradation of water

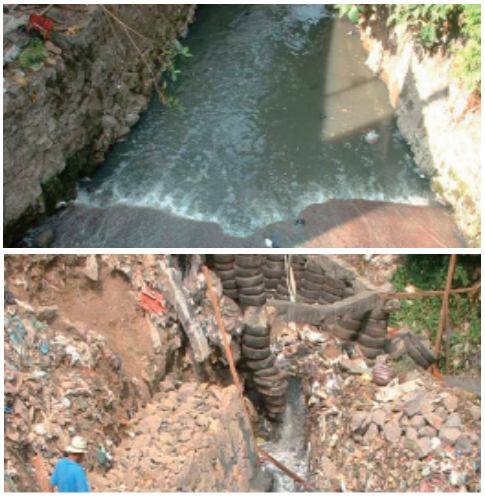
bodies in Metro Manila, including Manila Bay. Ultimately, the pollution of these waterways constitute a factor that increases the flood risk of not only to Quezon City but also to the metropolis.

From March to May 2003, the first phase of *Oplan: Sagip Batis sa QC* or Project Save the Streams in Quezon City was launched and executed to clean and clear all waterways in and around the city and improve its aesthetic condition including river banks and easements. Its total operational cost was almost 11.4 million Php. Spearheaded by the City Environmental Protection and Waste Management Department (EPWMD), this project enjoined the active participation of the communities along the 41 riverways and creeks traversing 101 barangays and gathered support from the different Departments of the City Government.

One innovative approach integral to this project was the aim to increase the level of awareness of the community on the proper disposal of solid wastes and promote active participation of the communities in cleaning and maintaining the waterways within their respective barangays (the smallest administrative unit in the country). Mobilizing the communities from project conception to implementation is considered crucial as they are vital players in the success of the project. Using a consensus-based approach where all stakeholders have a role to play the old tradition of "bayanihan"[2] was employed as communities and barangays were encouraged to volunteer. *Bayanihan* (buy-uh-nee-hun) is the Filipino tradition where neighbors would help in relocating a family by gathering under their house, and carrying it to its new place. More generally, the word *bayanihan* has come to mean the communal spirit that makes very difficult tasks possible through unity and cooperation. Almost 1000 Sagip Batis Volunteers (or SB Volunteers) signed up to participate. The amount of six million pesos was allotted for the daily food allowance of the volunteers for the clean-up operations in the first phase.

After the successful implementation of the first phase, the City decided to execute the 2nd phase of the project from February 14 to April 14, 2004 with expanded objectives to include pollution control on illegal discharges of waste water by factories, disposal of human waste by informal settlers, and repair and rehabilitation of river banks.

The Problem



Two weeks later...

Various departments of the City Government including the Local Barangay Councils worked together to attain high efficiency and effectiveness of the project and create greater impact. For instance the Engineering Department provided manpower support while the Parks Development and Administration Department (PDAD) handled all improvement and beautification activities of river banks and easements. Support was also given by the General Services Office, Personnel Department, Accounting Department, Public Affairs and Information Services Office for fast processing of personal data sheets, job contracts, payrolls, purchase documents, press release, and the recruitment of the SB Volunteers, among others. The Metropolitan Manila Development Authority (MMDA) Flood Control Unit provided all the necessary equipment such as the backhoe and crane for easier hauling of garbage and where manual labor was not enough.

The total volume of garbage collected was 2, 059.7 cu.m. or 61,791 sacks. The final outcome is a river system that is alive. Based on water samples from the Tullahan River, San Juan River, and Kalamiong Creek, indicators of water quality showed a definite improvement in terms of dissolved oxygen and the biological oxygen demand.

Relevance to Practice

Project Save the Streams is a modest but high-impact intervention that not only revived the river system but also treated the underlying causes of river and urban flooding in the metropolis. Other important points to ponder in this case are:

1. Sound urban environmental management practices contribute to reducing urban and megacities disaster risk.
2. Stakeholders' participation in project implementation is a success factor that, together with a strong commitment from the local government, will lead ultimately to effective disaster reduction initiatives.

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MEXICO CITY, MEXICO Coordinating Risk Mitigation Efforts: The National Civil Protection System of Mexico City (SINAPROC)

Cluster: Americas
Population: 18.5 million (approx.)
Land Area: 1,479 sq. km.

Earthquake

Organization-Managerial

Summary

The SINAPROC is an organic and articulated group of administrative structures, functional relationships, methods and procedures that determine the dependencies among public, civil, and private sectors in relation to federal, state, and municipal authorities. The SINAPROC is established in order to define and implement disaster mitigation and prevention policies and plans for the population's protection against the dangers and risks from disasters.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.

Description

In 1986, a year after the devastating earthquake in Mexico, the Mexican government established the National Civil Protection System, (SINAPROC) in order to coordinate efforts for disaster recovery. The SINAPROC is responsible for mitigating the negative effects of disasters and reducing the human lives and material losses caused by them. It is basically an organic and articulated group of administrative structures, functional relationships, methods, and procedures that determine the dependencies among the public, social and private sectors with the federal, state and municipal authorities in order to define and implement agreed actions for population protection against the dangers posed by disasters and other emergencies.

SISTEMA NACIONAL DE PROTECCIÓN CIVIL

One of the main challenges of the SINAPROC is to coordinate the large number of organizations and institutions responsible for disaster prevention policy. This is necessary because the process of decision making is highly centralized. Many organizations simply implement the decisions made from above without being consulted in the process. This limits the success of disaster prevention policies because they do not incorporate other

stakeholders' input is hardly taken into consideration.

In 1990, SINAPROC included in its objective the implementation of a policy focused on proactive disaster mitigation and prevention instead of just focusing on response after a disaster. With this, the National Council for Civil Protection was identified to do the planning, coordination and advisory for civil protection. This council is constituted at the national level by the Federal President, 12 federal ministers, and the Chief of Government of the Federal District. In the sub-national level, on the other hand, the state governors and the municipalities' presidents are the ones responsible for implementing disaster prevention and coordinating the local Civil Protection System. Each council in this level has its own technical groups for planning, preventing, and implementing the recovery strategies after a disaster. According to SINAPROC and its Program for Civil Protection, 2001-2006 (a national regulatory instrument), the emergency states in which the disaster prevention policy is implemented are Pre-warning, Warning, Alarm, Emergency, and Disaster.

While the Program for Civil Protection, 2001-2006 considers not just the prevention actions but also their links to rescue and recovery, the SINAPROC determines the state of emergencies and coordinates responses of ministries and other institutions involved. When the emergency phase is over, the reconstruction and development of coping capacities and resilience are the responsibilities of the particular line ministries, e.g., public works, health, education, etc.. The line ministries also participate during the emergency phase to provide their own expertise in coordination with SINPROC. SINAPROC approach does recognize that the success of disaster recovery is based on cooperation of governmental and non-government institutions.

In order for the SINAPROC to be

prepared for preventing disasters and determining the kind of emergencies people will face, this organization has constituted several institutions responsible for monitoring events that can produce a natural disaster like earthquakes, hurricanes, cyclones and volcanic explosions.

Relevance to Practice

Sound institutional and legal bases are necessary in order to carry out effective disaster risk management. Having a single national institution responsible for the emergency and response phase, with clear delineation of responsibilities and a system of coordination eliminates the need for ad-hoc processes, waste of valuable time, confusion and tension between different agencies during a disaster. The Mexico model facilitates the collaboration and cooperation of all agencies involved in disaster risk management in decision making and planning and that a system for inter-institutional coordination and linkages also prevents duplication of actions and utilize existing resources more efficiently.

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MEXICO CITY, MEXICO
Contingency Planning in Mexico City

EMI Cluster: Americas
Population: 18.5 million (approx.)
Land Area: 1,479 sq. km.

Earthquake

Organization-Managerial, Planning, Political

Summary

As a megacity that is located in a highly seismically active region, permanent contingency plans have been drafted and implemented by both government and non-government organizations in Mexico City. The contingency plan involved all phases and sectors in disaster management, from damage estimation, medical response, to early recover and rehabilitation. Institutional and coordinating mechanisms have been put in place in order to execute the contingency plan within an hour after a disaster hits the city.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.

Description

Mexico City is one of the largest megacities in the world with a population of about 18.5 million, which is 19 percent of the national population. Aside from its vulnerability due to population concentration of population and assets in a localized area, the megacity is exposed to different kinds of geologic hazards. Due to its complex tectonic setting that includes North America, Cocos and Caribbean Plates, earthquakes have caused the most severe disaster impacts on the city.

In response, the Federal District government has designed and implemented several policies, plans, and programs for disaster prevention and risk reduction, including the development of a Permanent Plan for Contingencies of Mexico City. The contingency plan describes the procedures and responsibilities of each government agency and non-government organization in order to avoid duplication of activities, promote the efficiency and optimal use of the human, material, technological, and economic resources available, and strengthen the capacities of the government within the jurisidiction of the Federal District government.

The general objective of the project is to prevent and mitigate the effects caused by earthquakes of great magnitude through coordinated actions known as main or core processes. For seismic

emergencies, these main processes are divided into two: operative and supportive.

For the operative process, the actions defined in this plan are:

1. Detection and Damage Evaluation – In this stage, a quick vision of the magnitude of the damage is drawn, damaged areas are identified, and a preliminary report of the damages in buildings, vital public services, strategic facilities, and roads is written.
2. Rescue and Salvage – Coordination of search and rescue of in an earthquake event.
3. Hospital and Health Attention – Provision of medical services to the injured and prevention of contagious illnesses
4. Temporary Refuges – Provision of basic services, food, medical care and security.
5. Rehabilitation and Reestablishment – Restoration of the functionality of vital services, strategic facilities, properties, and transportation systems as soon as possible.
6. Public Security and Feasibility – Provision of security for the disaster attention phase, preservation of goods and strategic facilities, control of damaged areas, and supporting the evacuation actions.

In the support process, the actions defined in this plan are:

1. Supply - This process focused on the coordination, reception and acquisition of provisions for the storage centers, temporary shelters, and rescue brigades.

2. Emergency Acquisitions – Provision of goods and services dedicated to a disaster event.
3. Juridical Support - Offering of legal services through counseling and advice.
4. Social Communication - Informing the population about the emergency situation and making people feel secure as a result of the actions and strategies implemented by the Federal District Government.
5. Computer System - Optimizing

the Federal District Government operative capacity along with civil organizations for emergency attention by using computer technologies and information system, which help in decision making process and in following the instructions and activities established in the Permanent Plan.

This permanent contingency plan is activated within an hour after a large earthquake or emergency has taken place. It operates on the existing infrastructure. Government institutions develop common activities with more focus on disaster preparedness and recovery. All institutions and actions are subordinated under the Coordinating Center of Operations (CCO). The CCO is the maximum authority for disaster management during the phase of recovery of the city.

Relevance to Practice

Contingency planning is necessary for cities to implement disaster preparedness actions and measures. For contingency plans to be properly developed and implemented strong inter-institutional coordination and public and civil society cooperation are required and that contingency plans must be made within the existing infrastructure and resources available.

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MUMBAI, INDIA
Increasing Storm Water Drainage Capacity to Mitigate River Flooding in Mumbai

EMI Cluster: South-Central Asia
Population: 11.9 million
Land Area: 437.71 km^2

Flood

Technical, Planning

Summary

The Mithi River constitutes a natural administrative boundary dividing the city and the suburbs of Mumbai, India. Flooding in the river has direct or indirect impacts on traffic in five transport corridors; Central Railway Main Line, Central Railway Harbor Line, Western Railway Line, Western Express Highway, and Eastern Express Highway. This project includes widening and deepening of the Mithi River and other city drains planned and implemented in a scientific and well-planned manner. This aims to increase their discharge capacity and prevent flooding in low-lying areas adjoining the river by reducing gradients of the Mithi River in its upper reaches.

Contribution to Hyogo Framework for Action

HFA 4: Reduce the underlying risk factors

Description

Mumbai city receives four months of rainfall a year (from June to September) averaging 2500mm. The Storm Water Drainage (SWD) has 29 outfalls that all drain directly to the sea while another 14 drain into Mithi River (joining Mahim creek). The core of the SWD is about 70 years old, capable of handling rain intensity of 25 mm per hour at low tide. If the rain intensity is higher than 25 mm at high tide, water logging in some parts of the city usually occurs. The unprecedented rainfall of 944 mm at Sta. Cruz airport last July 26, 2005 resulted to the submergence of large areas adjoining the Mithi river.

The Mithi River flows through the city of Mumbai, India and forms a principal channel to discharge storm water and sewage. Because of this, flooding in the river has direct or indirect implications for disrupting traffic on five transport corridors in Mumbai: the Central Railway Main Line, Central Railway Harbor Line, Western Railway Line, Western Express Highway, and the Eastern Express Highway. Recently, the storm water drainage for the river's catchments area has been disrupted. This is due to the encroachment of hutments in large numbers. At the same time, the existence of storage facilities, processing industries, workshops and scraps yards situated along the Mithi River make it difficult to delineate its path. The direct discharges of untreated sewage, wastewater

from unauthorized settlements and industrial effluents along the river's course are also great concern.

In 1985, following the damage caused by severe flooding in Mumbai, the BRIMSTOWAD Project was initiated by the Municipal Corporation of Greater Mumbai (MCGM). Through this project, engineers and researchers studied the storm water drainage system of Mumbai in detail and submitted a report in 1993 to MCGM giving suitable recommendations, but largely remained unimplemented.

When Mumbai was again it by a more disastrous flood in 2005, a fresh study on increasing storm water drainage capacity of the Mithi River and other city drains was found necessary. With this, the Central Water and Power Research Station (CWPRS) in Pune – Central Government's Principal Hydrological Research Institute, conducted 1-D Mathematical Model and Desk Studies for mitigating floods of the Mithi River and submitted its report with suitable recommendations in January 2006.

The MCGM and the Mumbai Metropolitan Region Development Authority (MMRDA), which is a government body responsible for development of areas surrounding lower reaches of the Mithi River, have accepted almost all the recommendations and have chalked out a plan to implement them in two phases.

The first phase has been completed in June 2006 involved de-silting and widening of the stretch. The second phase is proposed for the post-monsoon period of October 2006 to June 2007. It involves dredging, widening, construction of retaining wall, beautification and building of service roads.

Relevance to Practice

Engineering studies and researches on storm water drainage capacity such as what the CWPRS and the Indian Institute of Technology have undertaken are necessary to provide a systematic basis for the MMRDA to pursue a solid mitigation program for flooding in the city. This shows that sound engineering practices can be effective to reduce flood losses and also be sustainable when done in a coordinated manner.

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QUITO, ECUADOR Risk Information System: A Decision-Making Tool for Reducing Urban Risk

Cluster: Americas
Population: 1.5 million (approx.)
Land Area: 200 sq. km.

Volcanic Eruption

Planning, Technical, Land-Use Management, Political, Regulatory

Summary

An approach to map and evaluate the essential vulnerable elements in a city based on their relevance to the population. The project is undertaken to provide a city-wide strategy for incorporating vulnerability reduction in urban and land use planning and to supply the elements to improve emergency management.

Contribution to Hyogo Framework for Action

HFA 2: Identify, assess and monitor disaster risks and enhance early warning.
HFA 4: Reduce the underlying risk factors.
HFA 5: Strengthen disaster preparedness for effective response at all levels.

Description

Quito is a part of the Quito Metropolitan District (QMD). It is the capital of Ecuador and is subject to frequent and diverse natural hazards. The risks associated with these events are intensified by the exposure of vulnerable buildings and infrastructure. A significant portion of the population, particularly the poor, lives in informal settlements located on sites already prone to floods and landslides. Adding to these hazards is the environmental degradation that has significantly increased the city's vulnerable condition, not to mention the risk posed by transport and storage of gasoline and other flammable products within the city.

The objective of this project is to establish a risk management policy that addresses the critical elements that are at risk in the city so that limited resources can be spent efficiently. To reach this goal, two subsequent analyses are undertaken:

1) Identification of the elements at risk in the urban fabric of the city based on their exposure to natural hazards (not only volcanic eruptions but also earthquakes, floods, and landslides) (Phase 1);
2) Evaluation of the vulnerability level of the most exposed elements (Phase 2).

In Phase 1, urban elements were considered in relation to the basic services that are provided to the city's population. These elements

include:

a) The population location, distribution, and profile with respect to its needs for basic services such as education, health, cultural and historical links, and religious services.
b.) Urban utilities, including water distribution, sanitary and sewage facilities, telecommunications, power supply, and gas distribution.
c.) Economic, trade and administrative elements including location of factories, tourism, administrative offices, and land values.

All the information gathered during the investigation was validated, geographically and locally, and integrated in the database of the Metropolitan Studies Unit of the Urban Development Department of the Municipality of Quito.

For Phase 2, vulnerability analysis was done. The analysis has four 4 dimensions: 1) Confirmation of essential elements established in Phase 1, 2) Analysis of spatial vulnerability, 3) Analysis of local vulnerability of essential elements, and 4) Options for vulnerability reduction. The different places were classified by the type and degree of vulnerability they create. The subsequent risk classification allows prioritizing and focusing of actions and measures for disaster risk reduction.

Relevance to Practice

There are several innovative elements of this sound practice that other cities can learn from and apply in their own cities:

1) Rather than concentrate on the hazards alone, the study focuses first on the city as a living environment for its population, thus giving more importance to the essential elements that keep the city functional. The hazards are then subsequently incorporated in the functionality analysis of the city.
2) The methodology considers a thematic process so each element is considered independently, in relation to its function, and its spatial dimension in the city.
3) The findings are carefully documented in maps, figures, and incorporated in a database.
4) The database is incorporated in the city's information system that is used across different functions of the city and for a variety of purposes including urban and land use planning and emergency management.
5) The methodology enables easy integration of expertise between urban planners, engineers and social scientists as it does not involve overly complex analytical processes.
6) The methodology can be

intuitively understood by non-experts including policy makers, and thus lends itself to strategic planning and policy setting.

The simplicity and systematic approach of this methodology makes it replicable in other cities. The approach should be led by an experienced urban planner, who then can integrate other expertise in the project as needed.

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QUITO, ECUADOR
Reducing Flooding and Landslide Risk

EMI Cluster: Americas
Population: 1.5 million (approx.)
Land Area: 200 sq. km.

Flooding and Landslide

Technical, Community Awareness, Regulatory, Land-Use Management

Summary

The residents of Quito are not only exposed to the dangers inherent to upland communities but also to seismic risks coupled with torrential rain. Initiatives from the government through projects undertaken by its technical operations have been instrumental in reducing risk and society's vulnerability to floods. Social capacity building also contributed in developing solutions to associated problems.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that DRR is a national and a local priority with a strong institutional basis for implementation
HFA 4: Reduce the underlying risk factors

Description

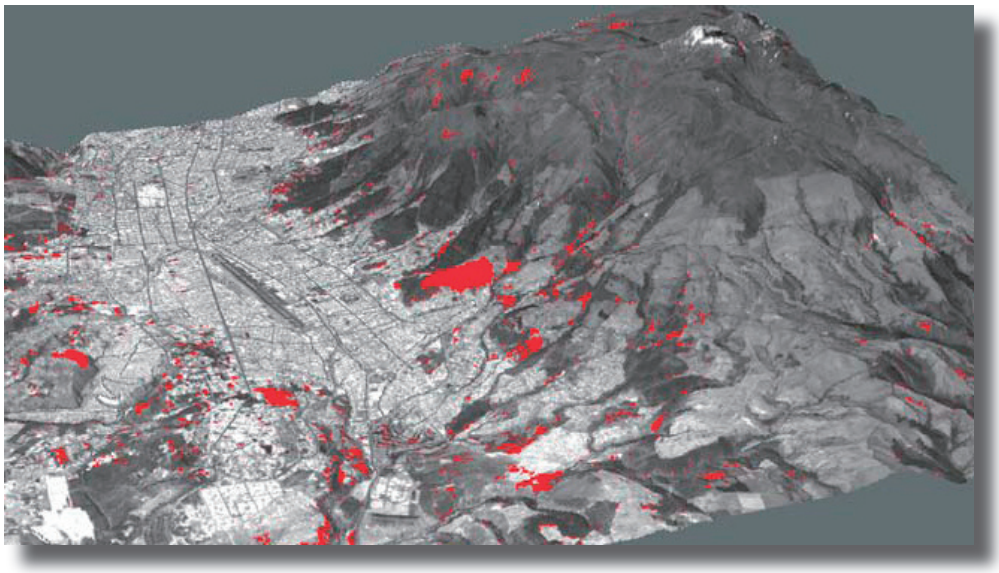
Latin America is considered as one of the most urbanized regions in the world. Like most cities, Quito experiences continuing in-migration, budget shortages, and government decentralization that result in urban growth and urban expansion. Rapid urbanization caused the drastic increase of population, growing at a rate of 1.3 percent to 3.4 percent. From the 1970s to 1980s, populations were forced to settle on peripheral lands around Quito, including the steep slopes of Mt. Pichincha located on the western boundary of the city. In the 1990, the number of informal settlers around the city ballooned to about 18% of the city's total population or 200,000. Many of these communities have been around for 20 to 30 years.

Compounding the threats posed by natural hazards, these informal settlements in high risk zones become more vulnerable to disaster as they are deprived of basic services such as water supply, electricity, and solid waste disposal system. Deforestation of the uplands is another major problem. Solid waste pollution due to domestic garbage dumped in ravines and rivers has decreased the capacity of the natural drainage system. Thus, disasters due to landslides and flooding are therefore magnified by environmental degradation.

In addition, about 55,000 people are documented to be living not

only on dangerous slopes, but also in highly vulnerable non-engineered dwellings. This number may now have risen to 75,0000, distributed in 22 neighborhoods.

Lack of awareness and struggle with basic life necessities among these communities push consideration to reducing risk from natural hazards down among the residents' priorities. A survey carried out by CIUDAD, an NGO dealing with urban problems in Ecuador, concluded that more than 80 percent perceived landslides and flooding are less important compared to everyday problems such as lack of community organization, juvenile delinquency, and domestic violence. This survey confirms that the poor tend to identify everyday problems as more important issues than extreme events with lower frequency. The finding validates conclusions reached by other researchers in developing countries (see Douglass and Zoghlin, 1994; Jacobi, 1994).



The Pichincha slopes in Quito

In order to mitigate the hazards and protect communities at risk, the Municipality of Quito, through the Municipal Enterprise in charge of Water and Sewage, started a project in 1997 whose purpose is to mitigate the disaster risk generated in 33 ravines in the northern slopes of Mt. Pichincha. The project has two components:
1) Structural component to construct the physical infrastructure to control and regulate heavy mudflows, including the retrofitting all collectors, and provide a hydrometeorological monitoring system and control to serve as an alert and warning system.
2. Non-Structural Component to raise awareness and improve preparedness including community-based capacity-building, solid waste management, urban planning and municipal structure strengthening.

The first phase of the project, which ended in 2002, saw the construction of the following infrastructures: 10 earth dams, 2 RC dams, 7 lateral reservoirs, 14 retention ponds used for water storage before the water goes into the collectors and several other mechanisms for energy dissipation. The instrumentation included 25 pluviometer stations, 8 climatological, 6 hydrometric, 10 limnimetric, and 1 base station. A master plan for managing the

environment and protected areas was implemented. Finally, a Comisaria to control further illegal occupation of the high-risk zone was put in place along with community capacity building programs.

Environmental degradation at the Pichincha slopes.

Relevance to Practice

1. Structural intervention is necessary in some cases to accommodate for man-made intervention and create safer living conditions in hazardous zones
2. Addressing the root of the problem or underlying risk factors such as solid waste disposal that aggravates flooding is an integral part of finding a solution to effective way to reduce flood risks.
3. Effective risk communication and information dissemination will help in increasing the capacity of communities in inherently reducing their exposure to risk.
4. Community-based programs such as capacity building complement engineering and structural interventions in mitigating and preventing disasters.

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TEHRAN, IRAN
Using Seismic Risk Assessment as Basis of Land Use Planning

EMI Cluster: Euro-Mediterranean
Population: 14 million (in the metropolitan area)
Land Area: 658 sq. km.

Earthquake

Land-Use Management, Technical, Political

Summary

The Municipality of Tehran is taking an active role in disaster risk reduction in Iran in order to reduce its significant seismic vulnerability. The city utilizes the process of land use planning that is based on seismic risk assessment to formulate guidelines and regulations to control future urban developments in the city.

Contribution to Hyogo Framework for Action

HFA 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.
HFA 2: Identify, assess and monitor disaster risks and enhance early warning
HFA 4: Reduce the underlying risk factors

Description

The seismic risk in Tehran is quite high and seismologists believe that a strong earthquake would shake Tehran in near future. During the previous decades, no important countermeasures have been implemented to decrease the impacts of a potential earthquake in Tehran. Recently, however, some important activities have been carried out by the Government of Iran and the Municipality of Tehran to reduce the vulnerability of the country. One of the main activities is related to land use planning for Greater Tehran for seismic risk mitigation and management.

The Planning Office of Tehran Municipality sponsors this project and the project is carried out by the International Institute of Earthquake Engineering and Seismology (IIEES). It covers different aspects of disaster risk mitigation and management including seismology, geotechnics, vulnerability of structures and lifelines, and emergency response. In order to carry out the project and all elements of disaster risk reduction in the Tehran metropolitan area are considered, many studies and reports on different aspects of earthquake studies (mitigation, preparedness, etc.) are undertaken and compiled to understand the current situation and propose risk reduction measures to deal with the inadequacies.

The Master and Comprehensive Plans of Tehran are now under revision.

In previous plans, no disaster risk mitigation considerations have been taken into account. In this revision, seismic risk management is one of the key elements. The results of the project are used in revising the Tehran master and comprehensive plans as basis for guidelines for on future developments in the city. Project results can also be used as bases for issuing new regulations on urban developments by the city council.

Relevance to Practice

Land use planning offers several effective tools and techniques to mitigate different seismic hazards such as ground shaking and liquefaction. One tool is the use of master and comprehensive plans that lay down regulations and guidelines for future urban developments. Risk assessment that includes the evaluation of seismic hazards and vulnerability analysis of critical facilities and lifelines are a crucial step is risk-based land use planning.

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Appendix

1

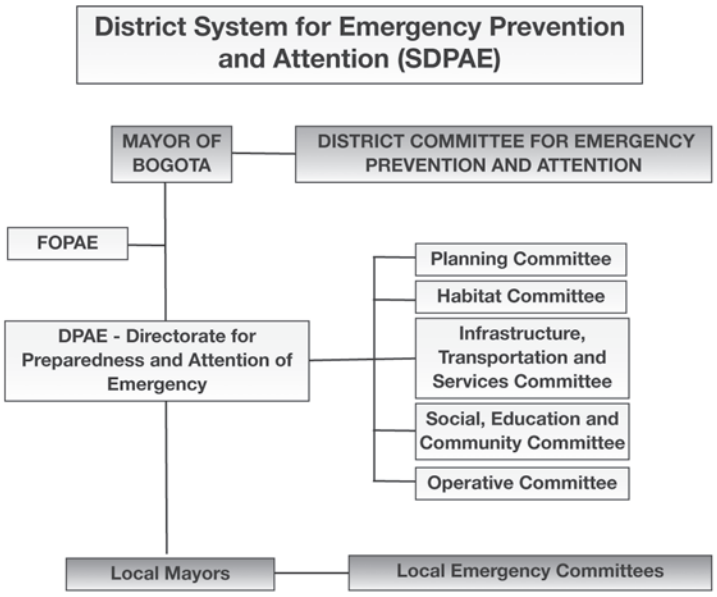
Selected City Profiles

Cross-Cutting Capacity Development (3cd) Program

MEGA-Know >> City Profile

BOGOTA

Colombia



Organizational structure of Bogota's SDPAE

Earthquakes and Megacities Initiative

PARTNERING WITH MEGACITIES TO REDUCE DISASTER RISK

Bogota, Colombia

Cluster: Americas
Population: 6.7 million
Size: 1,776 km^2
Hazards: Earthquakes, floods landslides, wildfires

Relevant Elements for Disaster Risk Management

- Bogota is the capital of Colombia, located in a savannah of the high plateau of the eastern Andean mountain at 2,640 meters above sea level. Disaster risk management is governed by the District System for Emergency Prevention and Attention (SDPAE), which does not depend on regional and national institutions. The SDPAE provides the institutional mechanisms to pursue common strategies among the 20 localities of Bogota.

- Since the creation of Bogota's Fund for the Prevention and Attention of Emergencies (FOPAE) in 1987, the city has taken important steps in risk prevention, mitigation and emergency preparedness. Moreover, a National Plan for the Prevention and Attention of Disasters in Colombia (PNPAD) has been adopted which sets decentralization as a fundamental principle. This has been complemented by the adoption at the local level of territorial and land use management plans (POT) since 1998.

- Since 1995 the city has developed a massive legislation program reducing the number of informal settlements. The city of Bogota's Resettlement Program for families living in high-risk zones incorporates three components: 1) relocation, 2) improving livelihood conditions, and 3) implementing environmental rehabilitation actions to avoid new occupation of the evacuated area.

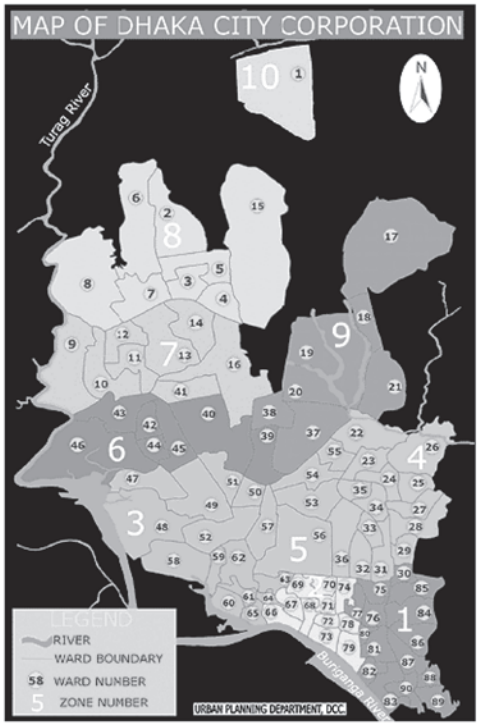
- In the framework of the General Program to Strengthen Bogotá's Response Capacity to a major seismic event, the "Bogota, Feet on Land" campaign is part of the formulation and implementation of a massive and interpersonal communication plan to support educational processes in the field of earthquakes, and to promote strategic alliances among institutions, academia, and private enterprises in order to prevent a major disaster.

For more information, visit http://www.emi-megacities.org/megaknow.

MEGA-Know >> City Profile

DHAKA

Bangladesh



The incorporated area is currently 360 sq km divided into 10 zones and 90 wards.

Earthquakes and Megacities Initiative

PARTNERING WITH MEGACITIES TO REDUCE DISASTER RISK

PACIFIC DISASTER CENTER

KOBE UNIVERSITY

PROVENTION CONSORTIUM

UNDP

Dhaka, Bangladesh

Cluster: South-Central Asia
Population: 6 million
Size: 360 km^2
Hazards: Earthquakes, floods and tornadoes

Relevant Elements for Disaster Risk Management

- The Dhaka City Corporation (DCC) is a self-governing corporation tasked with running the affairs of the city. It is composed of a mayor, 90 ward commissioners, 30 reserved woman commissioners and five "official commissioners" who represent five statutory bodies, namely, RAJUK (for urban development planning), DWASA (for water supply and sewerage), DPHE (for public health engineering), Health Services, and the Power Board.
- The Town Improvement Act of 1953 was promulgated to set the planned urban development of big cities in Bangladesh. In the case of Dhaka, RAJUK was entrusted with preparing the master and structure plans of the city and taking initiatives to develop and implement development projects.
- The land use of metropolitan Dhaka ought to follow the provision of the master plan. Permits are required to locate and construct houses and commercial and industrial buildings.
- The Dhaka Structure Plan (1995-2015), as a part of the Dhaka Metropolitan Development Plan, identifies the magnitude and direction of anticipated urban growth and defines a broad set of policies considered necessary to achieve overall plan objectives. It considers the micro-environmental aspects of Dhaka, both in its existing and future urban form, to reduce the impacts of natural and man-made hazards to the city.

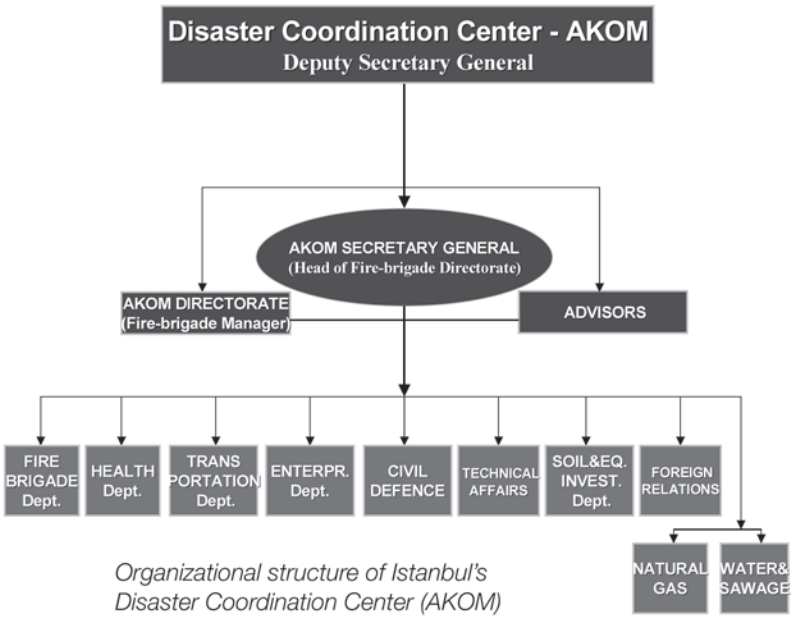
For more information, visit http://www.emi-megacities.org/megaknow.

Cross-Cutting Capacity Development (3cd) Program

MEGA-Know >> City Profile

ISTANBUL

Turkey



Organizational structure of Istanbul's Disaster Coordination Center (AKOM)

Earthquakes and Megacities Initiative

PARTNERING WITH MEGACITIES TO REDUCE DISASTER RISK

Istanbul, Turkey

Cluster: Euro-Mediterranean
Population: 10 million
Size: 5,343 km^2
Hazards: Earthquakes, heavy rains and floods, landslides, heat wave, wind and snowstorms, forest fires

Relevant Elements for Disaster Risk Management

- Istanbul, the capital of Turkey, is composed of 32 districts, each led by a mayor and a council elected for five years. Istanbul is highly vulnerable to earthquakes due to incompatible land use and planning system, informal and poor settlements, and aging infrastructures.
- Following the 1999 Marmara Earthquakes, the Metropolitan Municipality of Istanbul has established AKOM, a 24/7 state-of-the-art disaster coordination center. Also, a systematic capacity building program for emergency personnel, including SAR, fire fighting, and other professionals is continuously taking place to equip the city with effective response capability. The model established by Istanbul is being reproduced in other cities such as the Municipality of Tehran, which also established a similar center named the Tehran Disaster Management Center.
- Since 1999, active engagement in disaster risk reduction by the metropolitan government has resulted in landmark legal reforms in the country that gave cities and particularly metropolitan cities more jurisdictional authority over the land and buildings in the country, including the Building Construction Supervision and the Compulsory Earthquake Insurance laws.
- Main problems encountered in the implementation of disaster-related laws include bureaucratic red tape, weak enforcement of norms and standards to assure minimum seismic provisions, and limited involvement of local governments in disaster risk management.
- The Metropolitan Municipality of Istanbul is considering large scale urban renovation as one of the vulnerability reduction tools for the existing building stock. Different options for urban renovation are being evaluated based on community needs, safety and improved economic activity.

For more information, visit http://www.emi-megacities.org/megaknow.

Cross-Cutting Capacity Development (3cd) Program

MEGA-Know >> City Profile

KATHMANDU VALLEY

Nepal

Earthquakes and Megacities Initiative

PARTNERING WITH MEGACITIES TO REDUCE DISASTER RISK

PACIFIC DISASTER CENTER

KOBE UNIVERSITY

PROVENTION CONSORTIUM

UNDP

Kathmandu Valley, Nepal

Cluster: South-Central Asia
Population: 1.5 million
Size: 550.72 km^2
Hazards: Earthquakes and typhoons

Relevant Elements for Disaster Risk Management

- Kathmandu Valley (KTV), located in the Central Nepali region, consists of three districts, Kathmandu, Lalitpur and Baktapur, which include five municipalities, namely Kathmandu, Lalitpur, Baktapur, Madhyapur-Thimi and Kirtipur.

- KTV and its major municipality, Kathmandu Metropolitan City (KMC), have been the recipients of assistance from several international institutions to promote disaster risk reduction, focusing principally on earthquake hazard. The study on earthquake disaster mitigation in the KTV funded by JICA (2001-2002) is a comprehensive study which analyzes the spatial distribution of the earthquake risks in KTV and suggests a broad list of projects that the national and local government authorities could undertake to reduce these risks.

- The National Society of Earthquake Technology (NSET) has implemented many successful community- and institution-based preparedness and mitigation programs such as ward-level preparedness, school awareness and retrofit programs, mason training programs, and the regional Programme for Enhancement of Emergency Response (PEER), among others.

- Despite these efforts, the risk to the city remains high because both the hazard and vulnerability are high. KTV is one of the fastest growing urban areas in the world but most of its new developments are unplanned and construction standards are not complied with. The old part of the city is congested with old buildings that have little capacity to resist earthquake shaking. Poor access to older neighborhoods makes rescue and relief efforts difficult. The risk to fire following an earthquake is also high in these neighborhoods.

- Local, regional and national authorities are aware of the need to strengthen institutional arrangements, promote risk reduction, institutionalize sound practices for disaster risk management (DRM), and provide sustainability mechanisms for long-term implementation. In this regard, current land use and planning system is being revised to introduce risk reduction criteria, the enforcement of the national building code is being made a high priority nationwide, the implementation of a solid structure for disaster management within KMC is being considered, and capacity building for DRM at the ward level is being promoted.

For more information, visit http://www.emi-megacities.org/megaknow.

Cross-Cutting Capacity Development (3cd) Program

MEGA-Know >> City Profile

KOBE

Kobe City comprises nine (9) wards

Earthquakes and Megacities Initiative

PARTNERING WITH MEGACITIES TO REDUCE DISASTER RISK

Kobe, Japan

Cluster: East Asia
Population: 1.5 million
Size: 550.72 km^2
Hazards: Earthquakes, typhoons and tsunami

Relevant Elements for Disaster Risk Management

- A Designated City since 1956, Kobe is authorized by law to administer governmental jurisdiction with administrative and fiscal authority. It has a Municipal Assembly that determines budgets, enacts local legislation, and makes policy decisions. The Executive Branch, which includes a mayor and the executive committees, then implements these policies. Implementation and supervision of the municipal administration is the mayor's task.
- The Kobe City Planning Committee prepares the general master plan and sends it to the national government. Upon the national government's approval, the city government prepares the detailed plan and publicizes it to residents. If residents object with its contents, modifications may be made, but the local government has the power to change the plan.
- The Hyogo Prefecture City Planning Committee is more of a formality. Once a project is approved at the national level, the prefectural government does not refuse it.
- After the 1995 Great Hanshin-Awaji Earthquake, the Japanese Building Standard was revised and updated in 1998 to improve safety. The main points of this revision are to permit rational building plans based on intensive and effective land use.
- The Kobe City Restoration and Rejuvenation Promotion Council was established in June 1998 to discuss both urgent restoration issues after the Great Hanshin-Awaji earthquake of 1995, and long-term structural issues relating to Kobe's future development. The Council has submitted reports to the mayor containing main policy recommendations to utilize the lessons learned from the earthquake and restoration process for the future development of Kobe.

For more information, visit http://www.emi-megacities.org/megaknow.

Cross-Cutting Capacity Development (3cd) Program

MEGA-Know >> City Profile

METRO MANILA

Philippines

Three cities comprising Metro Manila explore inter-city cooperation for dealing with disaster risk management

EMI

Earthquakes and Megacities Initiative

PARTNERING WITH MEGACITIES TO REDUCE DISASTER RISK

PACIFIC DISASTER CENTER

KOBE UNIVERSITY

PROVENTION CONSORTIUM

UNDP

Metro Manila, Philippines

Cluster: East Asia
Population: 9.9 million
Size: 637 km^2
Hazards: Earthquakes, floods, volcanoes, typhoons and tsunami

Relevant Elements for Disaster Risk Management

- Metro Manila consists of 17 local government units (LGUs) designated as cities and municipalities.
- The governing and policy-making body is the Metro Manila Council (MMC) which is composed of the 17 mayors.
- The apex organization dealing with disaster risk management is the Metro Manila Disaster Coordinating Council (MMDCC). The regional director of the Office of Civil Defense serves as the Executive Officer of the council. Similarly, all LGUs have their own Disaster Coordinating Councils (DCCs).
- Every LGU is required to prepare its own Comprehensive Land Use Plan (CLUP) and submit it to the Housing and Land Use Regulatory Board (HLURB) for ratification. This regulation has been progressively enforced; but it still requires additional work to achieve full compliance.
- Floods and landslides are common in the city. Flooding is aggravated by heavy rainfall in the wet season, poor drainage due to solid waste in the canals and natural streams, and illegal construction along the streams. Earthquakes, typhoons, tsunamis and volcanic eruptions are also likely in the city.
- The disaster risk management (DRM) system in Metro Manila is still focused on the response side; nevertheless, sustained efforts are made to introduce a more comprehensive approach that incorporates prevention, mitigation, and planning for response. Public funds are currently available only when an emergency has been declared, thus making efforts to mainstream risk reduction into the overall development plan a difficult task.

For more information, visit http://www.emi-megacities.org/megaknow.

Cross-Cutting Capacity Development (3cd) Program

MEGA-Know >> City Profile

MUMBAI

India

Map of Mumbai

Earthquakes and Megacities Initiative

PARTNERING WITH MEGACITIES TO REDUCE DISASTER RISK

PACIFIC DISASTER CENTER

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PROVENTION CONSORTIUM

UNDP

Mumbai, India

Cluster: South-Central Asia
Population: 11.9 million
Size: 437.71 km^2
Hazards: Fire, industrial hazards, floods, chemical and nuclear hazards, and earthquakes

Relevant Elements for Disaster Risk Management

- Occupying an area of 437.71 sq km (14% of the total area of the State of Maharashtra), Mumbai is India's most populous urban conurbation and one of the largest in the world. Official figures indicate that the population of Mumbai has increased from 9.93 million in 1991 to 11.91 million in 2001. However, an additional 2-3 million 'floating population' come and go to Mumbai.
- Mumbai's population density (about 27,209 persons per sq km) is one of the highest in the world. Roughly 60% of the population resides in informal settlements, the number of structures including residential, commercial and industrial comprise 2,768,910 (1991 census).
- The city body in charge of disaster risk management is the Municipal Corporation of Greater Mumbai (MCGM) through its Department of Disaster Management formed in December 2000. It has 12 full time employees and sufficient number of engineers, medical officers, firefighters and other employees.
- The Department of Disaster Management deals with all issues related to disaster management, from mitigation, to preparedness and response, to rehabilitation. It is the command and control agency between administration and field units.
- Disaster management is a component of specific planning and development purposes in the city, namely, priority rail projects, roads, bridges and flyovers, road widening, special corridors, electricity planning, and other major projects in the city.
- Fire and industrial hazards, floods, chemical and nuclear hazards, and earthquakes have high potential of impacting the city. Mumbai is maybe one of the few big urban centers that counts on a nuclear facility within the city limits.

For more information, visit http://www.emi-megacities.org/megaknow.

Cross-Cutting Capacity Development (3cd) Program

MEGA-Know >> City Profile

SEOUL

Republic of Korea

Seoul is bisected by the Hangang River. This divides the city into two parts: the northern part of Gangbuk and southern part known as Gangnam.

EMI

Earthquakes and Megacities Initiative

PARTNERING WITH MEGACITIES TO REDUCE DISASTER RISK

PACIFIC DISASTER CENTER

KOBE UNIVERSITY

PROVENTION CONSORTIUM

UNDP

Seoul, Republic of Korea

Cluster: East Asia
Population: 21 million people in Seoul and its satellite cities of Ilsan, Bundang, Sanbon, Pyeongchon, and Jungdong
Size: 605.52 km^2
Hazards: Typhoons, floods, droughts, landslides, snowstorms, tsunami and earthquakes

Relevant Elements for Disaster Risk Management

- Seoul is divided into 25 self-governing districts called “Gu”, which execute both administrative functions and those delegated by a local administration. Each 'Gu' is composed of bureaus, offices and divisions, and operates a community medical center under one mayor and vice-mayor.
- The administrative organization of Seoul is divided between the Seoul Metropolitan Government, which has a mayor, vice mayors, and four policy advisors, and the Seoul Metropolitan Council, which is composed of the Safety Management Bureau, Facilities Management Bureau, and Cheonggyecheon (Stream) Restoration Engineering Works Bureau.
- Within the Seoul Metropolitan Government, the lead agency for earthquake disaster mitigation is the Disaster Prevention and Planning Division under the Fire and Disaster Management Bureau. Their responsibilities include mobilizing, training, providing available resources, and reserving materials in case of disasters.
- The Seoul Metropolitan Government provided research funds and facilities to the Earthquake and Disaster Prevention Research Institute, established at the City University of Seoul in 2001. This institute conducts research projects on disaster countermeasures and programs, focusing on the local circumstances of Seoul.
- The 2001 Comprehensive Earthquake Prevention Plan requires every existing building to be tested against seismic activity based on earthquake-resistant design standards from 1999 to 2005. The 2001 Seoul Comprehensive Earthquake Response Plan contains an action plan involving the Seoul Red Cross, and incorporates a public-private partnership for the local earthquake management plan.

For more information, visit http://www.emi-megacities.org/megaknow.

Appendix

2

WCDR Declaration

EMI

Disaster Risk Reduction for Megacities in Asia
Planning and Implementation

KOBE UNIVERSITY

under the auspices of International Strategy for Disaster Reduction

Jan 21-22, 2005
Kobe, Japan

a contribution to World Conference on Disaster Reduction 18-22 January 2005, Kobe, Japan

DECLARATION

Whereas; the Earthquakes and Megacities Initiative (EMI) was created in response to the critical need for stimulating earthquake preparedness and mitigation in complex urban areas, and

Whereas; this process of disaster risk management requires partnerships and cooperation between megacities as well as between scientific and professional organizations, governmental, intergovernmental, multilateral and non-governmental organizations, and

Whereas; EMI has become a leading international organization that is called upon to provide technical expertise on the potential threat of earthquakes and other disasters affecting megacities, and

Whereas; the recent natural disasters that impacted hundreds of thousands of individuals around the world raised an unprecedented awareness to the vulnerabilities that face megacities giving EMI the opportunity to further promote partnerships to share knowledge and experiences and to assess, communicate and reduce the risk of disasters, and

Whereas; EMI encourages cities around the world to engage and contribute to vulnerability reduction for their citizens, institutions and physical infrastructure.

Now therefore; the following megacity participants are recognized for achieving progress in disaster risk reduction and committing to achieving the objectives of the Millennium Development Goals (MDG), as well as the goals established by the World Conference on Disaster Reduction (WCDR), 18-22 January 2005, Kobe, Japan.

Further, we attract the attention of the international authorities, United Nations Organizations, other international and regional bodies, and the representatives of the countries present at the WCDR of the need to support megacities in their disaster risk management to reduce the potential losses from earthquakes and other disasters.

CITY/COUNTRY	REPRESENTATIVE	SIGNATURE
Tehran / IRAN	M. HOSSEINI	
Turkey / ISTANBUL	M. BAŞ	
QUITO - ECUADOR	D. CARRIM	

CITY/COUNTRY	REPRESENTATIVE	SIGNATURE
KATHMANDU NEPAL	GOPAL PRASAD PARAJULI	
BOGOTA - COLOMBIA	BERNARDO RAMIREZ	
TASHKENT UZBEKISTAN	ABDURAPYROV SHUKHRAT	
MUMP		
QUEZON CITY, PHL	P.F. MAGHACOT, JR.	
METRO MANILA PHILIPPINES	BAYANI FERNANDO	
MARIKINA CITY	MARIDES FERNANDO	
City of Los Angeles	Ellis M. Stanley, Sr.	

Appendix

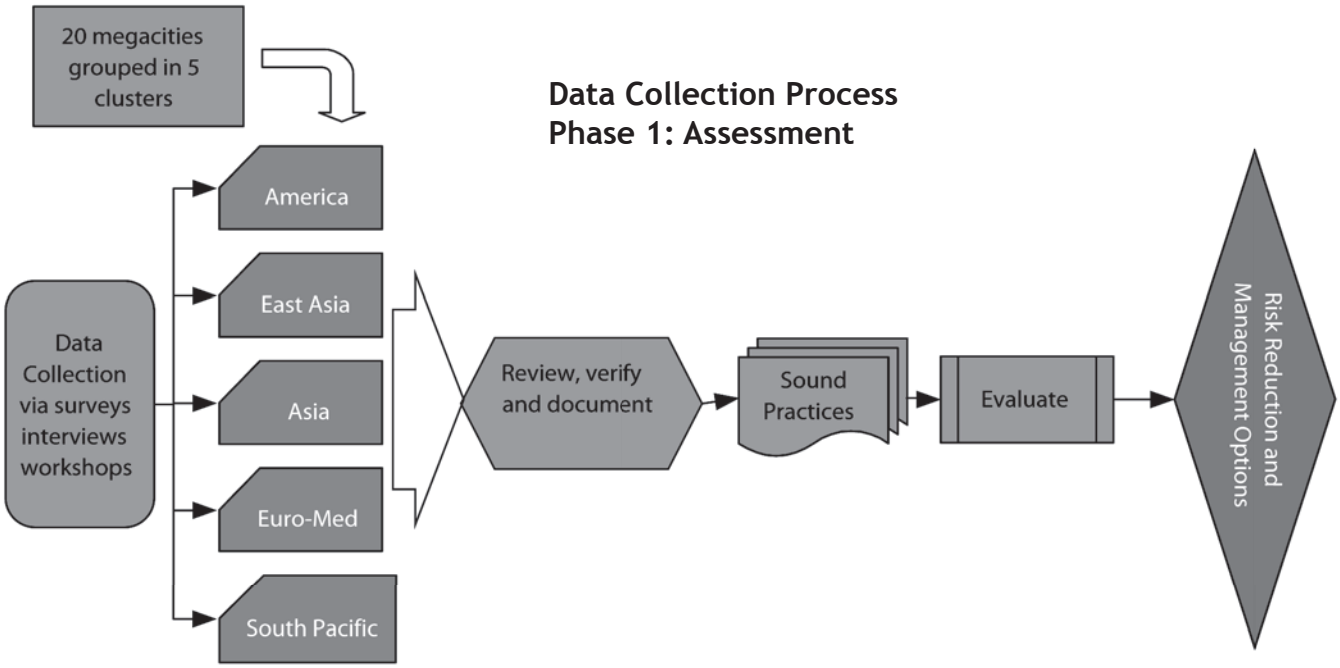
3

Data Collection Process

In 2004, EMI launched its Cross-Cutting Capacity Development 3cd Program[4] as a model for implementation disaster risk reduction at the local level. The 3cd approach for implementing a comprehensive DRMMP in the cities follows four well defined stages, namely:

I. Assess and document
II. Empower local groups to undertake necessary DRR and DRM options
III. Implement agreed upon activities
IV. Sustain the DRMMP process

DRM. The city profiles and sound practices were originally collected in the 3cd Program participating cities as an initial step for the DRMMP implementation process. The effort was later extended to the rest of the 20 megacities in the network based on their interest and willingness to contribute. Additional resources were provided by EMI and its strategic partners such as the Pacific Disaster Center, the ProVention Consortium and the United Nations Development Program to enhance and populate the current knowledge base.



The assessment stage includes a good understanding of existing DRM knowledge in the cities based on previous studies, appreciation of the legal frameworks and institutional arrangements and the determination of gaps and needs for improved

Particularly relevant is the inclusion of a Local Intern Program[5] that allowed hiring well qualified young professionals to work directly with EMI city partners, and under the supervision of a local researcher who assures quality and veracity of the information.

Some tools developed for the data collection process include a two part survey questionnaire focused on DRM organization and delivery, and sound practices; guidelines for standardized data collection, content, and write up templates[6]. In addition literature searches, one-on-one interviews with key actors in the cities and stakeholder workshops where some of the mechanisms implemented to identify sound practices in the cities.

Once the information is gathered within the cities, it is carefully reviewed, verified, and documented through available reports and others similar reference papers. The write up template is then used to produce a sound practice document that captures the information in a standardized manner. This is done in a comprehensive way that includes the local teams in the cities and its counter part at the Pacific Disaster Center.

The next step includes expert evaluation of the sound practices, classification around relevant topics, comparative analysis of similar practices in the cities in order to fully understand and recommend as valid options for risk reduction and management.

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[4]For details in the 3cd Program visit www.earthquakesandmegacities.org or www.pdc.org/emi

[5]Currently EMI and its partners fund local interns in Bogota, Mexico, Quito, Dhaka, Tehran and Mumbai. The cities of Los Angeles and Istanbul have agreed on providing at least one intern to document abundant sound practices available in both cities

[6]Developed in partnership with the Earthquake Disaster Mitigation Center – Team 4, from Kobe Japan on the period March-August 2004.

List of EMI Publications

Proceedings Report
PR-07-01: Stakeholders' Evaluation of the Cross-Cutting Capacity Development Program in Metro Manila, Philippines, Phase 1, 2005-2006
PR-06-01: Mainstreaming Disaster Risk Reduction through Land Use Planning and Enhancing Risk Management Practices
PR-06-02: Enhancing Local Partnership and Stakeholders' Ownership: Implementing the Disaster Risk Management Master Plan in Metro Manila
PR-06-03: Disaster Risk Reduction of Mega-Urban Regions

Topical Report
TR-07-01: Application of Indicators in Urban and Megacities Disaster Risk Management: A Case Study of Metro Manila
TR-07-02: Urban and Megacities Disaster Risk Reduction: Manual of Sound Practices

Brochure
BR-07-01: EMI Brochure, 2nd ed
BR-06-01: EMI Brochure, 1st ed.
BR-06-02: Megacities Disaster Risk Management Sound Practices in East and South-Central Asia

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About the 3cd Program

The Cross-Cutting Capacity Development (3cd) Program is EMI's long-term, inter-disciplinary and multi-partner program aimed at assisting cities to implement sound practices for disaster risk reduction. It is a collaborative effort that involves shifting the current disaster management processes of local governments in developing countries, from being response-oriented to one that is proactive, by influencing government policies to favor disaster risk reduction and by enhancing the capacity of local stakeholders in implementing sustainable disaster risk management policies and actions.

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