



Mainstreaming Disaster Risk Reduction in Megacities:
A Pilot Application in Metro Manila and Kathmandu

Executive Summaries

February 28, 2010



Risk-Sensitive Land Use Plan: Kathmandu Metropolitan City, Nepal

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Preface

The project Mainstreaming Disaster Risk Reduction in Megacities: A Pilot Application in Metro Manila and Kathmandu (Phase 2) was undertaken by the Earthquakes and Megacities Initiative from June 2008-January 2010. Funded largely by the German Federal Foreign Office through the German Committee for Disaster Reduction (Deutsches Komitee Katasrophenvorsorge e.v.-DKKV), the project aimed to support the disaster reduction efforts of both megacities, strengthen their disaster management capabilities, and facilitate the mainstreaming of sound risk reduction practices into their basic local governance functions.

This document contains the executive summaries of the various final reports prepared and was compiled to provide a bird's-eye-view of the accomplishments of the project. The executive summaries of the following reports are included:

1. Sectoral Profile of Kathmandu Metropolitan City, Nepal;
2. Risk-sensitive Land Use Plan of Kathmandu Metropolitan City, Nepal;
3. Structuring and Implementing a Competent Disaster Risk Management Function at KMC, Nepal;
4. Risk-sensitive Urban Redevelopment Plan of Barangay Rizal, Makati City, Philippines; and
5. Professional Training in Risk-sensitive Land Use Planning and Local Level Emergency Management, Metro Manila, Philippines and Kathmandu Metropolitan City, Nepal.

The executive summaries provide relevant details on the accomplishments, constraints, results and

recommendation of the following Project Work Outputs:

1. Disaster risk reduction
 - 1.1. Development of a risk-sensitive physical land use plan for Kathmandu Metropolitan City (KMC);
 - 1.2. Structuring and Implementing a competent disaster risk management function at KMC;
 - 1.3. Development of a schematic study for an urban redevelopment plan of one of the most disaster-prone neighborhoods of Makati City; and
 - 1.4. Training of disaster management professionals in Metro Manila on competent local-level emergency management practices.
2. Content customization of two training courses and training of professionals for KMC and Metro Manila
 - 2.2. Pilot testing of a Risk-sensitive Land Use Planning Course in Metro Manila; and
 - 2.3. Pilot testing in Metro Manila and KMC of a Course on City-Level Organizational and Operational Arrangements for Emergency Management.

Sectoral Profile

Kathmandu Metropolitan City, Nepal

Executive Summary

This report is prepared by Earthquakes and Megacities Initiative (EMI) as part of its contractual obligations to the German Federal Foreign Office (FFO) thru the German Committee on Disaster Reduction (DKKV) to develop a risk-sensitive land use plan for Kathmandu Metropolitan City (KMC). The KMC Risk-Sensitive Land Use Plan is prepared under the project titled, “Mainstreaming Disaster Risk Reduction in Megacities: A Pilot Application in Metro Manila and Kathmandu.” The FFO/DKKV-EMI contract covers the Second Phase of the project undertaken from 1 March 2009 to 31 December 2009.

The Risk Sensitive Land Use Plan (RSLUP) for Kathmandu City and accompanying Sectoral Profile and Preliminary Zone Plan are the major outputs of Activity 1.1 of this project. The RSLUP was prepared as a collaborative undertaking between Kathmandu Metropolitan City (KMC), the Earthquakes and Megacities Initiative (EMI) and the National Society for Earthquake Technology - Nepal (NSET-Nepal). The overall goal of the project is to develop a rational land use plan of KMC that fully integrates disaster risk reduction within its spatial and physical development strategies, its regulatory and non-regulatory tools, and its related bylaws and procedures. The project demonstrates that land use planning is an effective tool to lessen the physical, social and economic vulnerabilities of a city. The Sectoral Profile compiles all the data and parameters necessary to develop the RSLUP. In addition, it provides relevant projections and trends of future growth. The outcome of this effort are summarize in this report, which serves as an annex to the main report of Activity 1.1 under the heading of Risk Sensitive Land Use Plan of

Kathmandu Municipal City.

This report includes the following components:

- Executive summary;
- About the project;
- General information on Kathmandu;
- Profiles of the following sectors: Physical Environment, Population, Social, Economic, Land Use, Infrastructure and Utilities, Environment, and Development Administration; and
- List of references.

The Sectoral Profile is an official city document that presents a whole range of information about KMC. It provides a compendium of data and information on the physical, social, economic, cultural, infrastructure, environmental, and institutional characteristics of the city, including its disaster risk landscape, which can serve as a chief source of information for planning, research, investments, decision-making, and other purposes.

Part 1 provides a brief introduction about the document and a short narrative of Kathmandu City, its geography and history. Chapter 2 presents information on the natural physical environment of the city. Chapter 3 discusses the people of Kathmandu and the key features and trends of the city’s growing population. Chapter 4 tackles the general condition of Kathmandu’s social sector including the city’s education, health and protective services. Chapter 5 presents an overview of the city’s economy. Chapter 6 talks about the city’s built environment. Chapter 7 focuses on the land use pattern in the city. Chapter 8 describes the infrastructure and utilities sector in Kathmandu.

data gaps, generating and validating data, and performing data projections for future urban population and future demands for services and facilities in KMC. Majority of the information contained in the profile were collected from secondary sources and official documents such as the Nepal Census Bureau of Statistics (CBS), World Bank City Development Strategy (CDS), Kathmandu Valley Mapping Program (KVMP), JICA Study on Earthquake Disaster Mitigation in the Kathmandu Valley, and other relevant materials. Primary information was also collected by the KMC Project Working Committee (PWC) through field investigations, windshield surveys and direct observations in key areas of the city. Key informant interviews were conducted to collect information from representatives of various national and local agencies including KMC, Kathmandu Valley Town Development Committee (KVTDC), Ministry of Home Affairs (MOHA), Ministry of Local Development (MOLD), Ministry of Physical Planning and Works (MPPW), Department of Roads, Department of Transport and Traffic Management, and National Society of Earthquake Technology-Nepal (NSET), as well as international organizations such as the Japan International Cooperation Agency (JICA), German Technical Cooperation (GTZ), Urban Development through Local Efforts (UDLE), Cities Development in Asia (CDIA), among others.

The Sectoral Profile provides the necessary base information to support the intra- and inter-sectoral analyses for the development of KMC's risk-sensitive land use plan. Most of the decisions and situations made in the project were based on the facts and information contained in the KMC Sectoral Profile.

The KMC Sectoral Profile is not for the exclusive use of the project only. Other potential users of the profile include the KMC departments, offices and wards, the central government of Nepal and its ministries, local government units, the academe, international developmental institutions, international and regional financial institutions, and other institutions and organizations involved in development work

in Nepal. Even the private sector, business investors and citizens of Kathmandu may find the information presented in the Sectoral Profile useful for various purposes.

One major limitation of the document is the lack of timely and updated information about the city. This is partly due to the lack of regular data collection and data management system at the city-level in Kathmandu. The preparation of the KMC Sectoral Profile aims to initiate an effective, continuous and up-to-date data collection system in the city level. Hence, it should be seen as a living document that needs to be constantly revised and updated. As it is owned by the city and its people, anybody can add, update, revise, challenge or correct the information contained in the document in order to improve its accuracy, validity and reliability.

This report is a collective output of the PWC composed of technical specialists from KMC, NSET and EMI.

KMC entered into a formal partnership with EMI in January 2005 with the signing of a Memorandum of Cooperation (MOC), which endorsed the participation of the city in EMI's Cross-Cutting Capacity Development (3cd)

Risk-Sensitive Land Use Plan

Kathmandu Metropolitan City, Nepal

Executive Summary

This preliminary Risk-sensitive Land Use Plan (RSLUP) for KMC is a product of a two-year cooperative undertaking by a multi-disciplinary team of specialists and practitioners from KMC, NSET, and EMI. It is one of the four components of a larger project aimed at mainstreaming DRR in Kathmandu and Metro Manila. The development of the RSLUP received the backing and support of public officials from within KMC, as well as from other ministries and agencies of the Government of Nepal (GoN). The outcome benefitted from inputs and comments of external peer reviewers, KMC local officials, and representatives of relevant ministries, in particular the Ministry of Local Development (MOLD), Ministry of Home Affairs (MOHA), and the Ministry of Planning and Public Works (MoPPW) through its concerned agencies, namely, the Department of Urban Development and Public Construction (DUDBC) and the Kathmandu Valley Town Development Committee (KVTDC).

The project also received inputs from various development partners in Nepal through a series of consultations and workshops that took place during the course of the project. These include the United Nations Development Programme (UNDP), United Nations-Office for the Coordination of Humanitarian Affairs (UN-OCHA), Asian Development Bank (ADB), German Technical Cooperation (GTZ), Japan International Cooperation Agency (JICA), and City Development Initiative of Asia (CDIA).

The deliverables for this particular project component (i.e. PWO 1.1) are as follows:

1. KMC Sectoral Profile;
2. Risk-Sensitive Land Use Plan 2020 (10 years); and
3. Draft Zoning Ordinance Framework (10 years).

The Sectoral Profile provides a compendium of data and information on the physical, social, economic, cultural, infrastructure, environmental, and institutional characteristics of the city, including its disaster risk landscape, which can serve as a chief source of information for planning, research, investments, decision-making, and other uses. It is available as a separate report.

This RSLUP is a ten-year guide (2010-2020) for realizing KMC's desired spatial pattern of development, with due consideration to the city's seismic risks, emergency response and disaster management capabilities, through different land use policies and urban renewal schemes.

The RSLUP builds on previous and existing land use plans, land use maps and land use-related programs of the government, as well as policies, initiatives and studies in disaster risk management (DRM) that affect Kathmandu, such as the Earthquake Disaster Mitigation in the Kathmandu Valley undertaken by JICA in 2002. The RSLUP explicitly incorporates assessments and projections for transportation and traffic management in the future. It also includes strategies and actions that prescribe reasonable limits and restraints on the use of property through proposed zoning regulations and other local ordinances and control mechanisms for development within the city.

It is intended to serve as a guide for engaging in historical preservation, infrastructure development (e.g. transport, utilities, facilities, etc.), regulating housing settlements and open space, reclassifying agricultural lands into non-agricultural uses, and improving emergency management. It covers the entire territorial jurisdiction of KMC.

The Draft Zoning Ordinance is meant to serve as the principal instrument for enforcing the locational policies and performance standards of the RSLUP. Once the zoning ordinance is enacted, further land development must be aligned with what is stipulated in the RSLUP.

While this preliminary RSLUP provides a clear framework to guide the city's future development, it is constrained by the following limitations: (a) some of the data used has not been fully qualified and may need further verification; (b) the financial implications of proposed programs, projects, and activities (PPAs) have not been evaluated; (c) the process of adoption, implementation and enforcement of the RSLUP has not been engaged; (d) the understanding of the RSLUP by the national and international agencies (beyond KMC and NSET) has been limited; and (e) the awareness campaigns, advocacy, and capacity building efforts have been minimal. These limitations are due to the lack of financial resources and the limited timeframe allocated to the project. The land use plan relied largely on secondary information derived from previous studies by KMC, KVTDC and government ministries. One major difficulty encountered was the necessity of relying on risk assessment results prepared in 2002, which focused on earthquake hazards only. Data on other hazards (e.g., flood, landslides, fire, and others) were sketchy. These shortcomings are proposed to be addressed in a future phase of the project. In addition, the implications of existing or planned projects (e.g. ongoing riverside development, proposed parking, and new roads) by development agencies were less studied and not fully incorporated in this RSLUP.

While the RSLUP includes an initial list of proposed PPAs (Programs, Projects and Activities) in the different development sectors, the information on the financial performance of KMC, as well as the potential sources of funding for various projects, were not fully addressed due to constraints in budget and time. At the end of this document, a set of future activities is outlined to complete and improve this RSLUP. This version of the RSLUP should be considered as a working document and not a comprehensive land use plan.

The structure and summary of this report is provided below. The document covers eight chapters with annexes on document reviews and proceedings of meetings conducted as part of the planning exercise.

Chapter 1, Planning Mandates and Approach, provides the rationale for risk-sensitive land use planning and gives an introduction of the planning mandates and key policies and plans that are relevant to land use planning in Nepal. It presents a summary of the mandates of national, regional and municipal planning authorities and directives from the various ministries. The chapter also discusses planning and mainstreaming frameworks and the overall mechanism of integrating elements of DRR in KMC's planning process. It provides contents and limitation of the RSLUP. The chapter ends with the summary of KMC's Sectoral Profile.

Chapter 2, The Study Area, provides a summary of the geography, hazards, and socio-economic conditions of the city. It draws information mainly from the Sectoral Profile to provide the initial context of the planning.

Chapter 3, Vision, presents the outputs of the visioning exercise held in July 2009 in Kathmandu City. It includes the description and elaboration of the measures of success for various vision elements, as prepared by local stakeholders. In general, the city's vision emphasizes beauty, safety, tourism, health, green living, robust economy, and resilient local governance.

Chapter 4, Development Issues and Problems, summarizes the challenges and opportunities that could bring KMC closer to the realization of its vision. Among the pressing development concerns identified include congestion in the city core and sprawling development at the periphery, inadequate housing and urban facilities, unregulated industrial and residential expansion, poor income, and high physical vulnerability. Socio-economic concerns include the loss of cultural heritage, ineffective education policy, decreasing performance of industries, and weak institutional capacities. Further the chapter emphasizes earthquake risk and its impacts, represented by a M8.0 Mid-Nepal Earthquake scenario which could potentially produce a level of intensity of IX as measured by the Modified Mercalli Intensity Scale MMI¹. Such scenario is expected to heavily damage 53,000 buildings and result in 18,000 deaths and 53,000 injured persons within Kathmandu Valley. However, these estimates are based on census data from 1991. Since then, the population of the Kathmandu Valley has just about doubled and the density has significantly increased, thus increasing the physical and social vulnerability of the city. The actual losses could be several times greater than these projections.

On physical and environment issues, the following are highlighted: shortage of habitable land against an increasing demand for urban land, continuing loss of public open space, conversion of agricultural lands, fragmentation of land parcels arising from inheritance activities, backlogs in infrastructure development, declining water supply against increasing demands, poor wastewater collection and treatment, deterioration of heritage sites and environmental deterioration, air pollution, electrical power shortages, open dumping of solid wastes, traffic congestion with decreasing capacities, and structural risks to old buildings specially those made of brick and mortar. Lack

¹ Modified Mercalli Intensity (MMI) is a conventional empirical measure of the severity of the earthquake shaking at a site based on observed damage. It should not be confused with the magnitude of an earthquake which is a measure of the energy released by the earthquake at its source.

of facilities maintenance similarly contributes to higher estimates of damage in the core and adjoining wards.

In terms of infrastructure, several bridges are likely to be heavily damaged, closing most of the access points in and out of KMC. The same earthquake study in Kathmandu Valley estimated that more than 10 percent of road length will be damaged and more than 50 percent of bridges will be impassable if an earthquake with intensity IX hit Kathmandu Valley. Almost all bridges connecting to the international airport are at risk. As most of them have neither been replaced nor retrofitted, implications for damage and consequent disruption remain substantial. Note that these estimates are based on data that is at least ten years old. In view of the increase in population in the last decade and further degradation of the physical infrastructure, the losses should be expected to be much higher. However, the project did not have the resources and time to improve on existing data.

The public transportation system of KMC is characterized by the dominance of low-occupancy vehicles namely, three-wheelers, microbuses and taxis. Furthermore, the low quality of the existing public transport system drives the increasing ownership and use of private transport, particularly private cars and motorcycles. This situation has contributed to serious traffic congestion, air pollution and low energy efficiency.

Traffic scenarios developed by reducing trips in the Core Area, that is, by transferring part of its population to the eastern or western areas of the city, revealed that such action only transfers the traffic elsewhere within its boundaries. Hence, it is suggested that decongestion may likely be achieved if future population be directed outside of Kathmandu City and towards the Valley boundaries. An identification of possible sites is suggested in this RSLUP, but requires further studies on their availability and suitability, and the resultant traffic between municipalities and VDCs. A Valley-wide transport study was suggested to reveal the dynamics of this

movement and identify the needed infrastructures and policies, the implications of hazards (e.g. flooding, landslides, ground shaking, and liquefaction) and their related risks on the proposed new development sites, the transport system proposed, and the resulting emergency scenarios that need to be identified and evaluated. The appropriate risk reduction measures should then be integrated into future land use plans or investment projects not just for Kathmandu City but for the entire Valley.

The chapter similarly suggests a list of mutually reinforcing risk reduction and development strategies such as (a) restricting or discouraging new structures in high-risk areas (Core Area); (b) providing economic incentives to discourage development in high-risk areas; (c) use of land pooling experiences by KMC; (d) relocating occupants in high risk-buildings; (e) protection of critical facilities; and (f) encouraging government and private sector to observe building bylaws and zoning regulations. These strategies are further listed in Tables 4.7-4.11.

Chapter 5, Towards a Preferred Urban Form, discusses the preferred urban form as the organizing concept for guiding the physical growth of KMC. It indicates the initial bases and considerations for deciding on an alternative strategy. In the absence of an updated inventory on characteristics of residential buildings (i.e. floor area ratio (FAR), percent area occupation of buildings), assumptions were made to check theoretically if future residential areas in each ward having a FAR of 2 and 50 percent occupancy were sufficient to house its future residential population (based on projections). Based on this, results of the projection are as follows:

- In the East sector, the projected population by 2015 or 2020 cannot be accommodated by its own allotted residential areas. Wards 7, 34 and 35 are likely to remain congested, even if the FAR is doubled. Wards 8, 9 and 10 have enough space to accommodate their own populations, but this is likely to be exceeded in 2020.
- In the Central sector, Wards 5 and 31 can accommodate the population projected in 2015 but it is unlikely that they will be able to do so in 2020. Wards 11 and 32 will remain congested, and raising the FAR may be questionable at this time without further information on ground conditions and allowable height restrictions from microzoning studies. Wards 1 and 33 can accommodate a larger population and may be possible for densification.
- In the North, even if a FAR of 2 is maintained, Ward 16 will still have the heaviest concentration of population to be housed. Ward 3 will increase its capacity; while Wards 2, 4 and 29 can accommodate residential population in 2015 but will exceed this capacity in 2020.
- In the Core, available land area will no longer meet the projected population in either year even if the FAR is raised to 2, revealing a truly congested situation.
- In the West, raising the FAR to 2 increases the residential capacity to meet demand in 2015 but not in 2020.

While these are crude assumptions and estimates, augmenting existing residential areas for future population through infilling and densification may be possible but rather difficult to promote at this time without verifying the actual FAR of buildings on the ground, and resolving the transport congestion problem. Hence, special studies on these are required for ascertaining availability and suitability of sites for residential-mixed used areas.

At the same time, it also points to the fact that in some wards, increases in capacity, through densification of residential areas, may no longer be feasible after the planning period. Hence, looking for possible residential sites outside of KMC and towards Kathmandu Valley remain the most plausible options. These findings and conclusions should be further refined by more detailed studies that also integrates an

comprehensive analysis of the transport system in the Valley.

The redevelopment of the core area needs to be prioritized to include measures for (a) relocating part of the existing residential population outside the Core area; (b) reducing building and traffic congestion and deterioration of heritage sites; (c) directing future non-compatible commercial activities outside the city; (d) pursuing redevelopment or preservation with seismic risks in mind; and (e) providing access to open areas and an emergency plan (e.g. considering the possible blockages created by damaged buildings over narrow streets and roads in an earthquake).

In summary, the strategy proposed at this time focuses on protecting assets (specially the core area) through a combination of seismic retrofitting of buildings and infrastructures and relocating existing structures or locating future structures in safer environments and planned areas. The latter strategy may include future planned expansion in safe, available areas in the Valley. The possibility of forming a new risk-sensitive multi-centered development supported by a properly planned transport system may hold the most promising prospect towards the realization of the KMC vision within the Valley. Within Kathmandu City, different development areas and corridors (see Figure on Kathmandu City Land Use) are described briefly:

The Core

As the traditional city core, it functions as the nerve center of the social, economic and political life of KMC. The heritage site in the core shall be restored close to its original design and form (Integrated Management Framework, Kathmandu Valley World Heritage Site, 2007). With the cultural and heritage value of the monuments in mind, the structural integrity of the monuments and remaining structures shall be reviewed for possible seismic retrofitting against ground shaking and related hazards. The use and function of the public spaces shall be continued, but will be based on the understanding and appreciation of

the heritage values of the site. The RSLUP suggests that the streets and square be restored to allow for their exclusive use by pedestrians. Mercantile operations shall also be regulated; hence, private buildings shall be used only for traditional and compatible activities. Boundaries and buffer zones identified and approved by the World Heritage Committee shall be enforced. Access to emergency vehicles and fire fighting engines should be improved.

Given the varied and special requirements towards the preservation of the heritage site and redevelopment of the Core and its vicinity, this area should be taken as a special zone.

The Central Sector Growth Area

The central area being heavily built up, is congested with mixed uses. The circulation network serving the wards in this area is the “Ring Road”, which shall be improved by widening its connection with the Madan Bhandari Path. A commercial buffer strip along the Madan Bhandari Path shall provide for the new medium to high density commercial uses proposed to concentrate along this road; while dense mixed residential uses shall continue to dominate the rest of the sector. Strong land use policies will have to be instituted to maintain the buffer as well as densify these areas to its carrying capacity under FAR of 2 to 3.

This central sector will maintain its function as the financial and business district of the city, leaving the traditional role for worship, pilgrimage and other related mercantile functions at the core.

Wards outside the CBD (central business district) will be medium density residential areas, where row houses and townhouses will be encouraged.

The East Sector Growth Corridors

Development of the eastern and southeastern sections of the city is influenced by the airport location. Providing the vital link from this airport into inner areas is the same Madan

Bhandari Path. The east sector, in general, will be promoted as a tourism and residential area incorporating into its master plan two major developments: 1) road commercial strips, and 2) apartment housing. These two features will serve as the focal points of this growth corridor. Vegetable markets here will be expanded and modernized in order to cater to the growing population.

In line with the city's aim to further strengthen its role as the premiere center in education and health services, vacant lands still available in the fringes of the East area (near land pooled areas) may be used for setting parks that are conducive to learning and healing.

The North Sector Residential Growth Area
This area shall be maintained as a tourist destination. The highways oriented toward the north can serve as visual corridors leading to the forest areas of the mountains. Therefore, the construction of high rise structures in this area shall be regulated.

The West Sector Growth Corridor
New developments will be identified by urban redevelopment zones (along the Outer Ring Road) within the commercial buffer strips to promote further commerce in the area. The West sector shall remain largely a residential area comprised of "other residential area" categories and land pooled areas. The preferred form will improve the riverside (Bagmati and Bishnumati) in this sector.

Chapter 6, Kathmandu City Risk-Sensitive Land Use Plan, presents the land use plan and the different land use policy frameworks for the regulation of future land use activities, consistent with the chosen spatial strategy. This section presents the four major land use policy areas of settlements, production, protection, and infrastructure. These four policy areas cover all possible areas within KMC's territory.

Chapter 7, The Zoning Ordinance, presents a framework for the zoning plan. Much of the materials are drawn from the KVTDC Building Bylaws of 2007. Other annexes are also included for completeness.

Chapter 8, Conclusions and Future Work, presents a rationale for the extension of the RSLUP to the whole Kathmandu Valley and the completion of the Kathmandu City RSLUP into a Comprehensive RSLUP. It proposes a related work plan for a subsequent three-year phase to undertake the work.

FUTURE WORK

Moving forward with the adoption, implementation and enforcement of the RSLUP will undoubtedly curb the risk to Kathmandu and build the discipline in development decisions and approaches that has been lacking to date. The RSLUP is a benchmark document in filling an important gap for the direction and control of development within Kathmandu that should be endorsed, adopted, implemented and enforced urgently.

Nonetheless, it must be noted that this version of the RSLUP remains a working document. Some of its underlying data needs to be qualified, completed and refined. Its biggest limitation is that it is limited geographically to KMC. Kathmandu City is physically, socially, politically and economically fully enclosed within the Kathmandu Valley. The link between Kathmandu City and Kathmandu Valley is vital in terms of its demographics, economy, living, and livelihood conditions. The RSLUP for KMC leads to the realization that proposed strategies and approaches for future development are dependent on looking beyond the boundaries of the city proper. Key elements such as transport and housing require a Valley-wide analysis in order to be understood, assessed and incorporated adequately. Further, the hazards and their consequences do not stop at the city boundary; thus, approaches for DRR and for effective emergency management must take a Valley-wide perspective. Other hazards such as floods and landslides but also including the long-term effects of climate change also need to be incorporated. Emergency management approaches must be framed in the context of the Valley in order to organize essential emergency management elements such

as fire fighting, search and rescue, evacuation, shelter, water, health, sanitation, etc. Hence, the comprehensiveness and completeness of a risk-sensitive plan is only possible in the context of the full Valley. At the same time, efforts to extend the RSLUP to the whole of Kathmandu Valley will lend themselves to improving and completing the current Kathmandu City RSLUP, which will serve as a model to other cities.

The proposed scope of future work is structured into six tasks which will have two key deliverables:

1. A Kathmandu Valley Risk-Sensitive Planning Framework (KV-RSPF)
2. A Comprehensive Risk Sensitive Land Use Plan for Kathmandu City

The six tasks are fully detailed in Section 6 of the report together with a corresponding timeline. The proposed work is expected to take three years. However, the work can be phased with Task 1 being given the priority, followed by an effort to complete the Kathmandu City RSLUP. For reference, the six tasks are indicated below:

- Task 1: Adoption, Implementation and Enforcement of Kathmandu City RSLUP. This task includes reviewing, improving, and testing the legal and institutional arrangements for adoption, implementation and enforcement of the RSLUP. Performance indicators will also be included in the task.
- Task 2: Valley-Wide Data Collection and Completion of the Kathmandu City RSLUP. This task includes the development of a Sectoral Profile and related Resource Maps to the whole Valley. It also includes the incorporation of on-going and planned development projects into the RSLUP, as well as its completeness and refinement into a Comprehensive RSLUP.
- Task 3: Valley Wide Multi-Hazard Analysis and Emergency Management. This task

includes the extension of the RSLUP to multi-hazards as well as the incorporation of emergency management parameters.

- Task 4: Valley-Wide Risk Sensitive Transport Analysis. This task includes the incorporation of Valley-wide risk sensitive transportation study to serve as a backbone to the Valley-wide risk sensitive development framework.
- Task 5: Special Studies. This task includes the undertaking a several special studies needed to refine the RSLUP (e.g., social housing, historical preservation, building code implementation).
- Task 6: Development of the Kathmandu Valley Risk-Sensitive Planning Framework, This is the final task to integrate the above elements into a Kathmandu Valley Risk Sensitive Development Framework with its companion document Kathmandu-City Comprehensive RSLUP. These elements can then serve as guides and model for other cities to develop their own RSLUP.

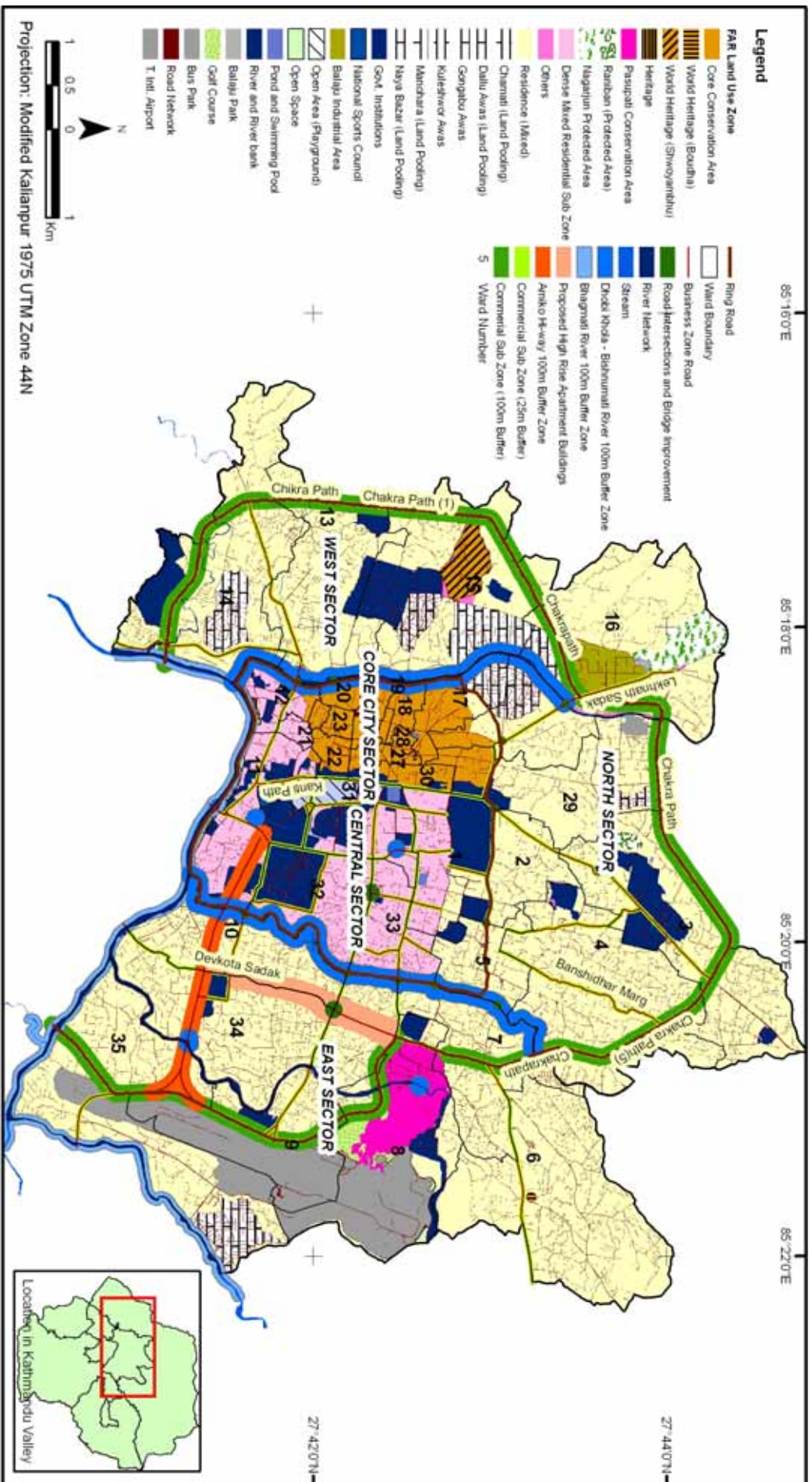
It has to be emphasized that the mainstreaming process should continue towards further refining and updating this land use plan up until the implementation stages. Hence, other stages of planning such as local financial planning, project programming and budgeting, monitoring and evaluation programs need to be included in succeeding planning activities.

CONCLUDING STATEMENTS

The decision to manage the city according to the mandates of the Local Self-Governance Act (LGSA) provides local governments such as KMC and other municipalities the authority to take public control over the direction and pattern of development in their territories. Through a rigorous risk-sensitive planning process, local governments such as KMC can be proactive in prescribing the use of land, with the guidance and support of higher government offices to achieve the following results:

- Hazards such as earthquakes, floods and others are accounted for and their impacts reduced with time;
- Settlement areas are made livable and safe;
- Communities and institutions are prepared, with sufficient understanding of their capabilities, responsibilities and authorities before, during and after a disaster
- Protected areas are respected and preserved for the benefit of all;
- Infrastructure support is adequate and efficient to help a modern city become the model in the management of planned change; and
- Production areas are used sustainably so that the needs of the present and future generations will continue to be adequately met.

Performance indicators of accomplishments in DRM by KMC and other national agencies responsible for land use planning, urban development and DRM should be used to benchmark the current situation and measure future progress. While being a first step, the framework for mainstreaming introduced in this RSLUP could similarly be used to guide development and allocation of land. The replication of the approach towards the Kathmandu Valley can provide lessons in managing risks common to cities and municipalities arising from natural hazards and climate change-related effects in Nepal and beyond.



KMC Land Use Zoning Map

Sources: Kathmandu Metropolitan City Government, JICA

KMC Proposed Land Use Map

Structuring and Implementing a Competent Disaster Risk Management Function

Kathmandu Metropolitan City, Nepal

Project Background and Summary

Most initiatives to mainstream Disaster Risk Reduction (DRR) in local governance do not reach their goals because of lack of sustainability mechanisms. For most local governments, the practice of Disaster Risk Management (DRM) is a new endeavor for which they have little understanding, poor institutional structures, weak competencies and meager resources to support it. The national legal and institutional context inhibits action in many countries. Disaster risk management is often associated with public safety and based on laws and regulations that emphasize response under the jurisdiction of a para-military central agency isolated from developmental and day-to-day community welfare issues. Under such systems, the role of local authorities and their linkages to their constituencies are ignored and sometimes seen as irrelevant. Recent developments show a shift in how local policy makers view disaster management: from being a liability to an opportunity. Nonetheless, engaging in Urban Risk Reduction (URR) is a significant challenge to local authorities, with local actors facing many impediments.

However, experience has shown that local governments which have put in place a competent disaster risk management practice are better equipped to mainstream DRR within their governing structure and core functions. They have also contributed significantly to the risk reduction policies and programs of their countries. It is not by accident that in most developed countries, the DRM practice is decentralized and provides a significant role to local authorities (refer for example to AU/NZS 4360 for Risk Management). This is the challenge in developing countries, where the conditions and resources are much less

favorable.

Thus, building competency for DRM at the local level should be a primary goal for achieving mainstreaming. This should start by considering DRM as another core function of local government; one that emphasizes DRR standards and requirements, including national strategies; is able to implement such strategies locally; and can link to the needs of the community as well as to the national programs. Such a core function will be the natural owner of DRR activities and the coordinator and enabler within the various departments of local governments. This by itself will build local ownership and ensure sustainability. The core DRM function should be linked to social mobilization and citizen's safety to ensure that preparedness and the long-term goal of building a culture of prevention are integrated with its mission. Unfortunately, such structure is missing in most, if not all, cities in developing countries. Putting in place such competencies and practices would more effectively support any national strategy and create the dynamics for local implementation and long-term sustainability.

This is EMI's approach and its contribution to the project. Through a 2-year program of capacity building, the Kathmandu Metropolitan City (KMC) has put in place the initial mechanisms to implement an operational and competent new section in charge for emergency and disaster risk management. A new unit was created, originally called the Disaster Risk Management and Citizen Safety (DRMCS) Unit but now referred to as the Disaster Management Section (DMS), is part of the Urban Development Department (UDD) of

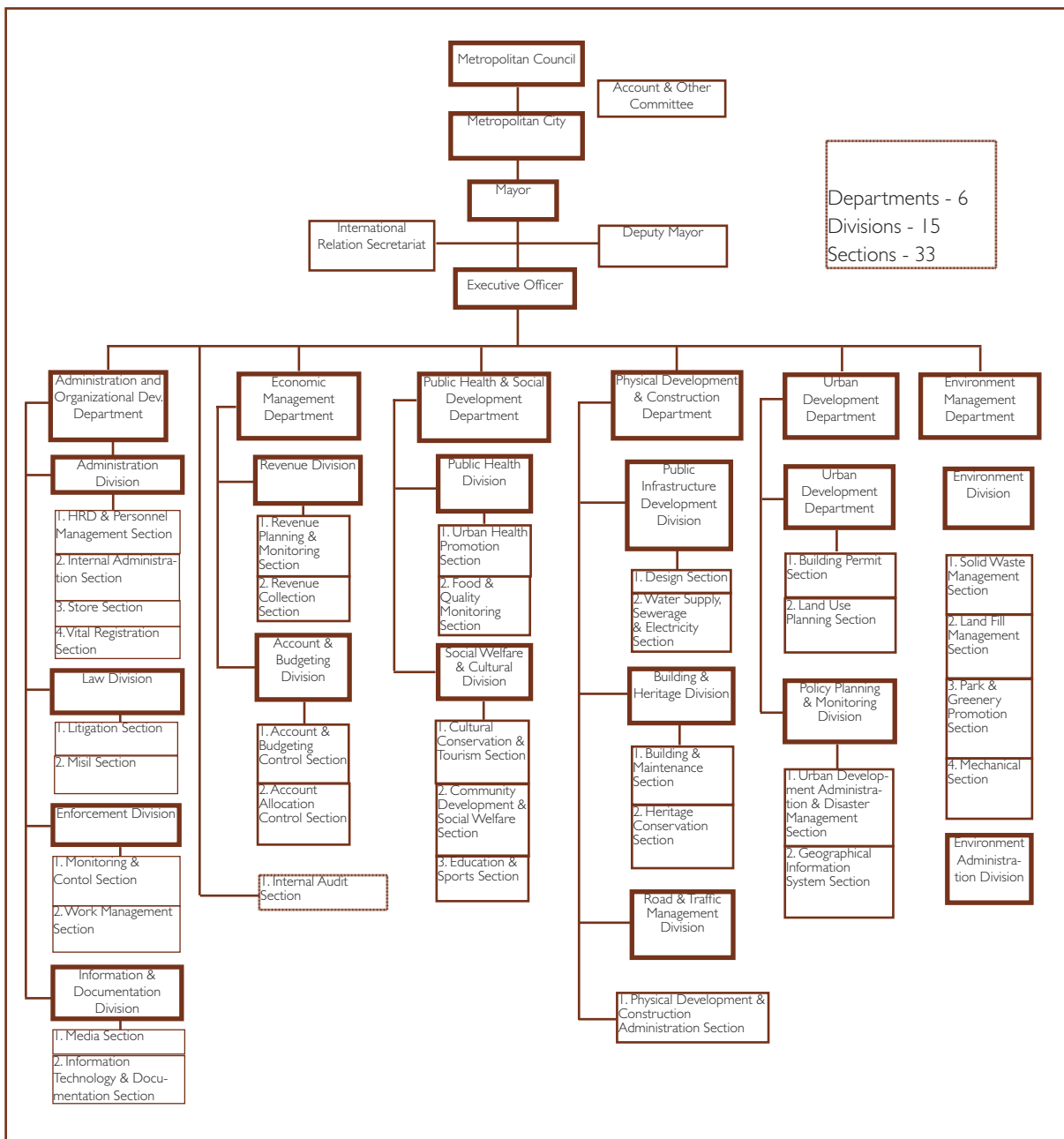


Figure 1. Organizational Structure of Kathmandu Metropolitan City

KMC. This unit has been institutionalized as part of the Urban Development Department through a directive from the former Chief Executive Officer, Mr. Dinesh Kumar Thapaliya, who served as the focal point within KMC for this initiative. Figure 1 below presents the organizational structure of KMC showing the DMS section under the UDD.

The following highlights the accomplishments of the project:

- **Institutional Arrangements**

The Disaster Risk Management and Citizen Safety (DRMCS) Unit (later renamed Disaster Management Section) was created and its administrative structure defined. The DRMCS Unit is structured around its core function of Emergency Management, preparing and responding to all types of emergencies (from major disasters to so-called “every-day” risk). It links vertically and horizontally to institutions

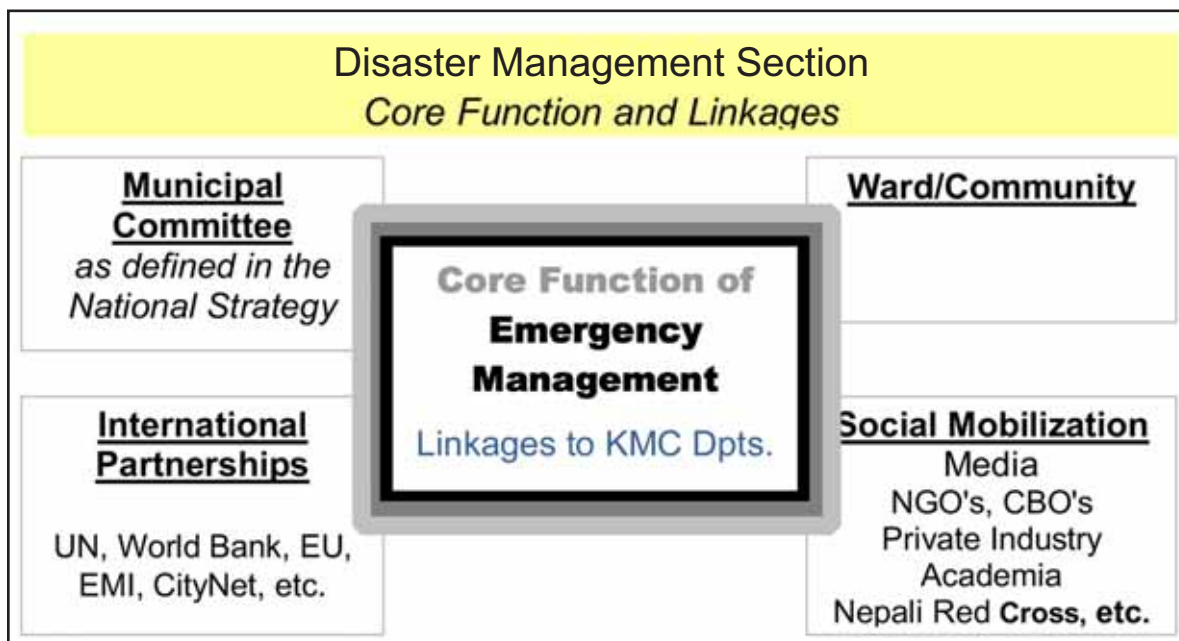


Figure 2. Disaster Management Section

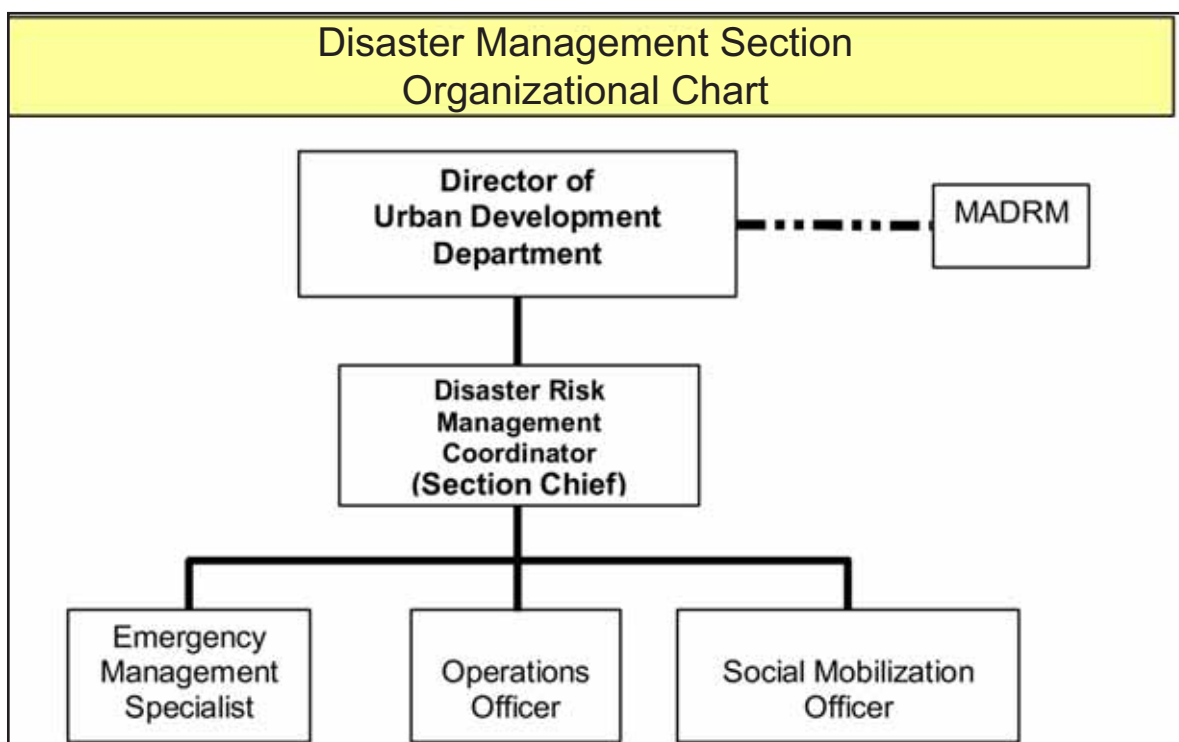


Figure 3. DISASTER MANAGEMENT SECTION

Source: EMI (2008), Phase I Topical Report No. 2, Kathmandu Emergency Management

and communities to advocate and raise awareness as well as to improve preparedness and inter-institutional coordination. It is the focal agency for DRMat the level of Kathmandu City. The proposed functional structure of DRMCS Unit is shown in Figure 2.

- Development of job descriptions for the

staff of the DMS

Job descriptions for key positions in the DMS were formulated in close consultation with KMC. These positions are:

- * Director of the Urban Development Department
- * Disaster Risk Management Coordinator

- * (Section Chief)
- * Emergency Management Specialist (Planner)
- * Operations Officer (Readiness Officer)
- * Social Mobilization Officer (Ward level Trainer)

Figure 2 represents the proposed organizational chart for five positions under the Disaster Management Section.

The Director of the Urban Development Department will be the representative of the Mayor in the Municipal Authority for Disaster Risk Management (MADRM) as defined in the National Strategy. The MADRM acts as the local municipal platform for DRM. The Disaster Management Section will serve as the Secretariat for the MADRM. These upward and lateral linkages will enable the new section to access not only other directors within KMC, but establish linkages with the national institutions in charge of DRM policy and program, thus fully integrating its actions and programs with the national strategy. The complete job descriptions of these five positions are found in Annex A of this report.

- **Drafting of a sample ordinance for the establishment of the DMS functions and administration**

A Draft City Ordinance on Disaster Management was formulated for KMC during this project. The ordinance authorizes a program for pre-disaster mitigation, provides direction and coordination of disaster preparations, response, and recovery and streamlines the administration of disaster relief in KMC. The full text of the sample ordinance is found in Annex B.

- **Drafting of Vision and Mission Statements for DMS**

The Vision of the KMC DMS is to define an Emergency Management Concept of Operations in which all department personnel understand their respective roles and responsibilities for disaster response operations and understand that all departments must participate in the

planning process. The Mission of the DMS is to protect communities by coordinating and integrating all activities necessary to build, sustain, and improve the capability to mitigate against, prepare for, respond to, and recover from threatened or actual natural disasters, acts of terrorism, or other man-made disasters, and vulnerability to hazards.

- **Delivery of Training Course on City-Level Emergency Management Operations and Functions**

Customized training courses were conducted by EMI during the four (4) field investigations on emergency management to enhance the competencies of DMS personnel. Face-to-face trainings were conducted using the Table Top exercise earthquake scenarios. Such methodology helped develop common operating procedures, defined major roles and responsibilities on emergency response, and contributed to a better understanding by KMC of its relationships to other stakeholders. Chapter 2 of this report explains in greater detail the training process and methodology. Annex C contains the Field Investigation Reports and discusses the training activities conducted for each field investigation.

- **Development of the “Basic Emergency Plan”**

The “Basic Emergency Plan” or the KMC Emergency Operations Plan (EOP) was developed for KMC. The EOP provides an Emergency Management System for responding to a major disaster affecting people, property, and infrastructure, such as a major earthquake. It also describes authorities, responsibilities, functions and operations of KMC during emergencies. Chapter 3 of this report summarizes the components of the EOP. The full KMC EOP is found in Annex D.

- **Development of the “Departmental Responsibility Matrix”**

The “Departmental Responsibility Matrix,” otherwise known as Emergency Support

Functions (ESF), is a grouping of government and certain private-sector capabilities into an organizational structure to provide support, resources, program implementation, and emergency services that are most likely to be needed during emergencies. Operating agencies and KMC Department assigned personnel participate in the ESF structure as coordinators, primary response and/or support agencies, or as required to support incident management activities. The objectives of the ESFs are:

- * Development and maintenance of detailed plans and Standard Operating Procedures (SOPs) to support their emergency response functional requirements;
- * Identification of sources of emergency supplies, equipment and transportation;
- * Maintenance of accurate records of disaster-related expenditure and documentation;
- * Protection and preservation of records essential for continuity of government; and

- * Establishment of a line of successions for key emergency personnel.

For this project, fifteen (15) ESFs were developed. A complete discussion on the ESFs is found in Annex D, “KMC EOP.” The ESF Matrix can also be found in Chapter 2.

Awareness Campaign

The technical assistance to awareness-raising provided by EMI to KMC is twofold: the formulation of an advocacy strategy together with the Project Working Committee (PWC), and the development and design of information-education-communication (IEC) materials. Figure 4 provides samples of the IEC materials produced on EM, while Table 1 describes the advocacy strategy for the project. In terms of implementation, the PWC took ownership of the dissemination of IEC materials and in the execution of the activities in the advocacy strategy.



Figure 4. IEC materials on EM

Table I. Advocacy Strategy

Key Audience	Communication objective	Message	Channels/medium of communication	Strategy	Focus Person	Expected output
I. Ministries and related agencies i.e., MoLD, MoHA, MoPPW, KVDTC, DUDBC	To secure buy-in of stakeholders	"We would like to partner with you"	Progress report/ update from the PWC; Consultation with the Individual ministries and related agencies, Distribute IEC material, re-visit EM website on DKKV-FFO project to highlight KMC ownership of project	Advocacy through ministry of MoPPW Hold half day workshop for MOPPW personnel Consultation meeting with KVTDC Consultation meeting with ministries and related agencies to get their inputs in RSLUP	Bimal Rijal, KMC	Increased buy-in of stakeholders
CEO, KMC	To get the commitment of the CEO to act as Coordinator and build support to the plan (advocacy champion)	"This is our plan"	Progress report/ update from the PWC; re-visit EMI website on DKKV-FFO project to highlight KMC ownership of project	Request CEO to provide link to EMI website on the KMC website, and in other channels	Bimal Rijal, KMC	Commitment from the CEO to advocate and support the Plan secured.
Metro Council i.e., Ward chairpersons, ward members and nominated members, Metro Board i.e., Ward Chairpersons and nominated members.	To get the social acceptability and communicate KMC Vision with board and Council	"KMC is preparing 10 year RSLUP" Our vision for KMC	Tarpaulin/flex print (KMC), Small pamphlets, Stakeholder consultation meeting/social acceptance of the plan.	Consultation meetings	Rai, Chitkar, Kafle, Rajkarnikar, NSET, Jerome Zayas	Increased social acceptability
City Planning Commission; Department heads i.e., UDD, Legislators (metropolitan council), Ward Chairpersons and two nominated members	To Increase participation in the RSLUP process and Develop ownership of project	"This is our plan"	Presentation and distribution of Pamphlets	Periodic meeting	Kafle, Chitkar	Increased participation and ownership of project
International Donors/Development Partners	To secure future funding for RSLUP implementation	"We would like to partner with you"	Present the RSLUP to get their inputs and see if it match with other ongoing or proposed projects	Consultation meetings and Include them in mailing list of EMI's regular newsletters	CEO's of KMC and EMI with the support of NSET	Get financial support to Implement next phase of the project

Key Audience	Communication objective	Message	Channels/medium of communication	Strategy	Focus Person	Expected output
General Public/ Communities	Awareness campaign regarding KMC RSLUP	"Safe Kathmandu City"	T.V Channel Hamro Kathmandu and Nepal mandal, and Radio Programme Metro FM 96.4 and through the Website	Interview of PCW Team by media personnel	Kafle and Rai	To achieve the objective.

On the whole, the expected deliverables of the project were met. The succeeding chapters of this report explains in greater detail how KMC, particularly, the DMS was supported by EMI to accomplish the deliverables of the project specifically building competency in Emergency Management through structured training sessions, and developing the Emergency Operations Plan (EOP). The report covers four (4) chapters:

Chapter 1: Institution Building, summarizes the process, activities and tasks undertaken to create, structure and build the competency of the DMS, the new administrative organization within KMC for disaster risk management.

Chapter 2, Training Sessions for Capacity Development of KMC, discusses the training activities conducted, including the modules developed for KMC. A total of four (4) Field

Investigations were carried out in support of these training sessions for the duration of the project.

Chapter 3, Development of the KMC Emergency Operations Plan, discusses the salient features of the Emergency Operations Plan (EOP), its objectives, goal, vision, challenges, framework, roles of various stakeholders in city emergency management and the Emergency Support Functions (ESF), plan maintenance promulgation and training schedule, and other supplemental information.

Chapter 4, Accomplishments, Conclusion and Future Work, provides a summary of the accomplishments of the project and discusses the proposed next steps for continuing work to sustain and further build the capacity of KMC on city emergency management.

Risk-Sensitive Urban Redevelopment Plan

Barangay Rizal, Makati City, Philippines

Executive Summary

The Risk Sensitive Urban Redevelopment Planning (RSURP) of Barangay¹ Rizal, Makati City, Philippines is a collaborative project among the Community of Barangay¹ Rizal, the City Government of Makati (CGM), the Earthquakes and Megacities Initiative (EMI) and the Philippine Institute of Volcanology and Seismology (PHIVOLCS). EMI, PHIVOLCS and Makati City entered into a working partnership to engage in a demonstration project to show that land use and redevelopment planning can be powerful tools to modify and lessen the physical, social, and economic vulnerability of highly vulnerable and low-income communities such as Barangay Rizal. The Project involved the preparation of a risk-sensitive urban redevelopment plan for the Barangay with the goal of transforming a high risk community into a safer, disaster-resilient neighborhood while simultaneously enhancing its urban fabric, economic vibrancy, social cohesion, public safety, and environmental quality.

This pioneering project is intended to serve as a pilot application to reduce the disaster risks of highly vulnerable urban neighborhoods with poor and low-income households. The key premises of the Project are: a) none of the residents will be displaced out of the geographical boundaries of the Barangay, and b) the Risk-Sensitive Redevelopment Plan is driven by direct participation of the community. The approaches and methodologies employed and the lessons learned from the Project can serve

¹ Barangay is the smallest geo-political unit in the Philippines. The barangay leadership is elected by its community and the administrative supervision and oversight are provided by the local government unit or municipality that encloses the barangay.

as a template for risk-sensitive redevelopment planning which can be adopted by other high-risk low-income neighborhoods in Metro Manila, as well as other major cities in and outside the Philippines.

The Risk-Sensitive Redevelopment Plan of Barangay Rizal is one of four elements of a larger project entitled, “Mainstreaming Disaster Risk Reduction in Megacities: A Pilot Application in Metro Manila and Kathmandu” funded by the German Federal Foreign Office (FFO) through the German Committee for Disaster Risk Reduction (DKKV).

Barangay Rizal was selected as the pilot site for the Project through a site selection process that involved analysis of potential candidate sites and extensive consultations with city officials and barangay leaders. The methodology for site selection involved the use of “Urban Redevelopment Indicators” (URI) developed by the Project to determine the most suitable site among the 33 barangays of Makati City for urban redevelopment. At the end of the site selection process, Barangay Rizal emerged as the most suitable site for the Project due to its high physical risk, high degree of social vulnerability, and high redevelopment potential. The barangay leaders of Rizal also expressed their commitment and full support to the redevelopment planning project once their Barangay was selected as the pilot site.

Barangay Rizal, which is located on the eastern fringe of Makati City, contains dense residential settlements characterized by narrow streets

and lined by mostly one to two-storey houses abutting each other. Almost every available space is built up, and there is little open space such as parks and playgrounds. Running along the northwestern portion of Barangay Rizal is the West Valley Fault, the movement of which, according to the Metro Manila Earthquake Impact Reduction Study (JICA, 2004), can cause an earthquake as high as magnitude 7.2 which will result in severe ground shaking and potential liquefaction in the area. The risk is further heightened by the area's socio-economic vulnerability. It is a low to middle-income area, with a large population (about 40,000) which is expected to continue increasing because of its proximity to major commercial districts. Further, its physical make-up (congested streets, lack of open spaces) make emergency access and evacuation difficult.

The RSURP process was completed in two years. The Project had three phases. Phase 1 consisted of organization of key actors and stakeholders, community preparation, establishment of a project implementation team, and establishment of coordination mechanisms. Phase 2 consisted of risk analysis and site planning analysis. This included hazard assessment, building-risk analysis, vulnerability and capacity analysis, site analysis, emergency management evaluation, and identification of redevelopment concerns and issues. Phase 3 consisted of master planning and action planning; the setting of redevelopment goals, objectives and targets; the development of a disaster risk reduction logical decision-making framework, the generation of alternative strategies; and selection and detailing of preferred strategy. The planning process was facilitated by a planning team which was composed of specialists in master planning, transport planning, engineering, social development, community organization, and legal and institutional development, and representatives from Makati City departments and Barangay Rizal.

The planning process used a highly participatory approach as a scientific methodology to facilitate a two-way learning experience between the barangay leaders, residents of the project site and the planning team. In the process,

residents of the community learned about the earthquake and other risks that they face in their community and their implications on their lives, settlements, etc., while the planning team learned which types of risk reduction measures the residents felt were feasible and socially acceptable. Stakeholders from the community and the City were involved at the outset in the data collection, validation, problems- and issues-analysis, and the planning and decision-making processes. This ensured that the Plan reflected community needs and aspirations and, hence, will be supported by the community and key stakeholders during its implementation.

Key Issues and Considerations

The results of the different analyses and the outcome of the stakeholder consultation workshops revealed the following issues in Barangay Rizal which became the main considerations in the formulation of the redevelopment plan:

Physical Vulnerability. Unsafe buildings and structures, lack of public open spaces, as well as narrow and obstructed roads are the main contributors to the physical risk of the area. According to the building risk-analysis, buildings with high and very high structural vulnerability (which are likely to suffer extensive damage or collapse during a strong earthquake) constitute about 34 percent and 6 percent of the building stock, respectively. Buildings on top or near the fault are particularly vulnerable.

There are very few open spaces within the Barangay which can serve as space for evacuation, temporary shelter, and storage for debris in case of an earthquake.

According to the transport study, the existing roads are congested especially during peak or rush hours, and may become impassable due to building debris after an earthquake. Many of these roads have a right-of-way below 6.5 meters, and are sometimes obstructed by parked cars and electric posts, among others. A

possible fault rupture can also cut off vehicular access to C-5 Road (the main highway).

Socio-Economic Vulnerability. Inadequate economic capacity, the presence of highly vulnerable households, and rising population density are the main contributors to the socio-economic vulnerability of the area. Results of household census for the socio-economic vulnerability analysis reveal that 16 percent of households have a combined monthly income that fall below the poverty line of 8,568 pesos per month for a family of five. More than half (55 percent) of the community's productive population are unemployed. About 45 percent are employed, but only 49 percent of those employed have permanent status, while the rest either have contractual work or are self-employed. These socio-economic conditions make it difficult for residents to make any improvements on their properties, and reduce their capacity to recover right after a disaster.

The census also revealed that there are households with elderly, young children, persons with disabilities, and female heads, which may have difficulty evacuating from their homes and/or recovering after disasters, and need to be given special consideration.

The growth of surrounding business areas such as the Bonifacio Global City will put more pressure on Barangay Rizal to densify, placing more people at risk. Thus, regulating population density is a major concern for the Redevelopment Plan.

Emergency Preparedness and Management. The main issues here are the evacuation difficulty and inadequate capacity in emergency preparedness and response. Access to the surrounding north and south neighborhoods has to be improved in case the fault ruptures and cuts off access to C-5 Road. There needs to be additional open spaces for evacuation within the area as well. While the institutional structure for emergency response exists, however, the response to Typhoon Ondoy (International Typhoon Ketsana) in September 2009 demonstrated that the Barangay's capacity

for early warning, search and rescue, and temporary shelter still needs to be strengthened. In addition, the low awareness level of households on the hazards that exist in the area and their knowledge of what to do during a hazard event need to be addressed.

Disaster Risk Reduction Strategies

Reduction in disaster risk and improvement of emergency management capabilities are the driving objectives of the redevelopment plan.

These objectives can be achieved to a great extent by the following strategies:

1. There should be no permanent human settlement with a "Very High Vulnerability" (i.e., structures with a very high likelihood of collapse or extreme damage to earthquakes). The premise is that, at the present time, there is no cost-effective technological method for protecting these structures against earthquake hazards. For this purpose, all structures located on or within a close distance from the fault (about 5 meters on each side) are considered to have very high vulnerability.
2. Structures with "High Vulnerability" should be further studied to ascertain their vulnerability level. The rapid visual inspection used in this initial study is based on limited construction and soil data. A more competent analysis will be able to determine with higher certainty the actual level of earthquake vulnerability. After review, all structures reclassify as "Very High Vulnerability" will fall under Criterion 1. Note that because of the limitations of the rapid visual inspection, none of the structures outside of the fault zone were classified as Very High Vulnerability.
3. There should be a voluntary seismic retrofitting program for structures of High Vulnerability, supported by an incentive package and awareness program.
4. For the sake of creating open space or

1. widening emergency access roads, certain structures/lots need to be acquired. The acquisition of structures/lots for open space should be clustered around structures with Very High Vulnerability as to minimize the number of displaced households.
2. Critical facilities such as schools and health facilities as well as structures which can be used for post-emergency centers should be identified and seismically retrofitted
3. Infrastructure and critical lifelines (e.g., water, sanitation, power, communication, etc) should be upgraded for seismic performance as an integral part of the redevelopment plan.
4. No intervention is planned for structures with vulnerability of Moderate to Low. However, households of these structures will be allowed to participate in the voluntary seismic retrofit program.

Salient Features of the Redevelopment Plan

The redevelopment planning methodology adopted an issue-oriented approach. This involved subjecting the abovementioned physical/socio-economic vulnerability and emergency management to a problem-solving process. Through stakeholder consultation workshops, gaps and needs were determined, trade-offs identified, and solutions to these issues were developed. This led to the formulation of the community vision and redevelopment strategy, and the identification of the programs, projects, and activities which comprise the elements of the Redevelopment Plan. The key features of the Plan are summarized below:

- **Establishment of a fault zone park.** An easement zone along the fault needs to be established. Because of the uncertainty of the location of the fault and to optimize the use of space, the easement will be about 30 meter wide (i.e., 15 meter on each side of the current fault trace). Residents within the fault zone will need to be relocated. This intervention should be accompanied

by a re-housing program for the affected households. Compensation for the displaced households should be determined on the basis of existing legal provisions and in a fair, transparent and socially acceptable manner. Part of the easement will be used for a major access road. The access road will also provide the opportunity to redesign new utility lines and fire protection systems that will be designed for the appropriate earthquake motion. Drainage systems will be incorporated to reduce the risk of flooding. Further, the easement can be used as a park, open market, recreational area, playground, parking space, and a community garden. It will serve as emergency staging area in case of a disaster. This is the major feature of the redevelopment plan

- **Development of a housing program and pocket open space.** New medium density social housing will be created for the following target beneficiaries: (i) households on structures located on top of the fault zone; and others currently living in very high vulnerability structures; (ii) households that will be affected by relocation to create open space for housing; (iii) households that will be affected by the requirement for redevelopment open space; (iv) households that will be affected by road widening; and (v) households that will be affected by other projects such as school expansion and construction of community facilities. The re-housing program should be based on the premise that all relocation will be on-site, i.e., within the Barangay itself. Additional spaces would be created once very high vulnerability structures are demolished and contiguous lots are consolidated. The subsequent construction of new medium-rise housing on the following locations is proposed: along the fault zone park; on proposed nodes along the creek; around the proposed neighborhood commercial centers; and on lots with adjacent high risk structures. A re-housing study needs to be undertaken to establish all the conditions,

process, and financing for the rehousing.

- **Retrofit program for high risk structures.** A voluntary retrofit program is suggested for structures classified as “High Risk.” However, prior to retrofit, more competent structural analysis needs to be undertaken on these structures to ascertain their level of risk considering their construction characteristics and location. One major consideration is that aside from the strong potential ground shaking, the liquefaction ranges from high to very high. Such future study needs to examine whether it is viable to retrofit structures in these conditions, and if so, what specific structural improvements are required and how much it would cost. Mandatory relocation is necessary when the value of retrofitting is no longer cost-effective. Relocation may also be necessary in order to open up space for social housing, a component of the redevelopment plan. No structural measures are specified for medium and low risk structures, unless desired and undertaken voluntarily by their occupants.
- **Development controls.** In order to rationalize future development and prevent additional risks, development controls (in addition to the existing zoning controls) are proposed for existing and new development. These controls include restrictions/regulations on construction, height, easements, compliance with structural design standards, and land use. These new development controls can be incorporated in a City Ordinance or appended to the City Zoning Ordinance.
- **Density controls.** The continuous increase of population in the area can put more people at risk in the future. The following actions will help regulate the area’s density: (i) Require the registration, issuance of a clearance and monitoring of new migrants; (ii) Compel house owners who want to lease/rent their properties to secure appropriate permits; and (iii) Strictly enforce compliance with business licenses/

tax on rental housing and other businesses to prevent overcrowding.

- **Circulation network improvement and emergency access.** The circulation system should be improved to efficiently facilitate movement of people and goods, as well as provide alternate routes in case the roads along the fault are blocked or are ruptured during a disaster. Major connector roads that serve the various zones within the Barangay and link the major entry/exit points should be widened to at least an eight meter right-of-way in order to serve the projected traffic volume and be adequate for emergency vehicles and fire fighting vehicles. In addition, the following measures are recommended: (i) Clearing of illegal encroachments on the road; (ii) Connection of blocked routes and dead end streets; (iii) Provision of through-streets/alleys on very long blocks, and (iv) Construction of a roadway running along the creek.
- **Traffic management.** In order to improve the circulation in the area, the implementation of one-side parking and no-parking schemes were proposed. Roads less than four (4) meters wide, roads with dead ends, and main access roads should be declared as no parking zones. All other roads should have one-side parking only.
- **Open space development.** Open spaces play a crucial role after an earthquake because these can serve as spaces for temporary evacuation and debris storage. To increase the amount of open space in the area, the following measures were proposed: (i) The development of a creek-easement linear park along the creek easement running parallel to the proposed roadway along the creek; and (ii) The provision of open space per neighborhood unit within a theoretical walkable radius of about 250 meters.
- **Disaster preparedness and emergency management.** To enhance the community’s ability to anticipate and cope with disaster events (e.g. floods, fire), the following

- actions were recommended: (i) Installation of an early warning system for different types of hazards; (ii) Formulation of an evacuation plan that considers different scenarios; (iii) Strengthening of emergency response capacity through earthquake drills, household-level orientation, training on emergency response, recruitment of additional responders, acquisition of equipment (radios, generator, etc.), and strengthening of inter-agency coordination; (iv) Placement of pre-disaster emergency caches and (v) Construction of multi-purpose centers for recreation and temporary shelter.
- **Upgrading of critical infrastructure.** The area's planned redevelopment provides an opportunity to upgrade water, drainage, communication and power systems as well as fire fighting and emergency response capability while making them more disaster-resilient. The Fault Zone Park is intended to serve as a major corridor for new utilities as indicated previously. Makati needs to work with service providers such as Manila Water and Meralco in formulating a joint action plan for the design and installation of long-term earthquake-resilient facilities.

To ensure the success of the abovementioned interventions, these should be supported by the following:

- **Development of compensation scheme.** This is for those who will be displaced because their current dwellings are considered to be at very high risk. The compensation scheme should be based on the pertinent legal provisions and regulations. They should consider the socio-economic conditions of the current residents and be developed in a transparent and fair manner. All those displaced will be relocated within Barangay Rizal and, if possible, within their zone.
- **Development of incentive program.** The voluntary seismic retrofit program needs to be supported by an incentive scheme to favor the engagement of private owners to participate. The incentive scheme can be

in various forms such as undertaking all the studies free of charge, providing soft low interest loans, allowing variations in zoning for mixed uses, and others. The incentive program should be carefully crafted to be able to complement the mandatory program and minimize the number of households who will be affected by relocation.

- **Information, Education and Communication (IEC) Campaign for the Redevelopment Plan.** An IEC plan needs to be developed to outline information dissemination, promote awareness-raising and communication strategies that will address information needs of various stakeholders, and improve social acceptability. This needs to start early on and carried out in parallel with the implementation of the elements of the redevelopment plan. The IEC plan will be particularly helpful in undertaking the following project components: (i) emergency management training; (ii) community preparedness campaign; (iii) traffic management; (iv) development controls and (v) projects under the redevelopment plan.

- **Raising Income Level and Improving Economic Conditions.** Aside from the abovementioned interventions which directly address physical risk, the following measures are also proposed to raise income levels and improve the socio-economic condition of the area: (i) Development of neighborhood commercial centers; (ii) Development of educational facilities; (iii) Formulation of strategic livelihoods and skills enhancement program and (iv) Preparation of business and entrepreneurship support program which includes improving people's access to affordable financing and market linkaging. Raising people's income is one of the most immediate means to enhance people's quality of life and at the same time reduce their social and economic vulnerabilities to disasters.

Urban redevelopment is a complex process that requires sustained financial and institutional support over a multi-year period. The implementation strategy for the proposed redevelopment plan includes setting up the appropriate legal and institutional mechanisms that will formalize regulations and incentives, define the roles of the different stakeholders, and ensure the mainstreaming of the redevelopment plan elements into the City and Barangay development plans and budgets. Aside from the legal and institutional mechanisms, social acceptance is also one component that needs to be worked on further to ensure the smooth implementation of the plan. The participatory approach adopted by this project should be continued in order to ensure transparency and social acceptance. Without consensus building and social acceptance, the project will have little chance to get implemented. Finally, several in-depth studies need to be undertaken to support the decision making process, including physical vulnerability, transport, housing and incentive study. Utility and service providers should be closely consulted and engaged in these studies. The private sector should be brought in to look at opportunities for private investment and financing. These studies should be integrated with the Barangay Development Plan and the Makati Development Plan.

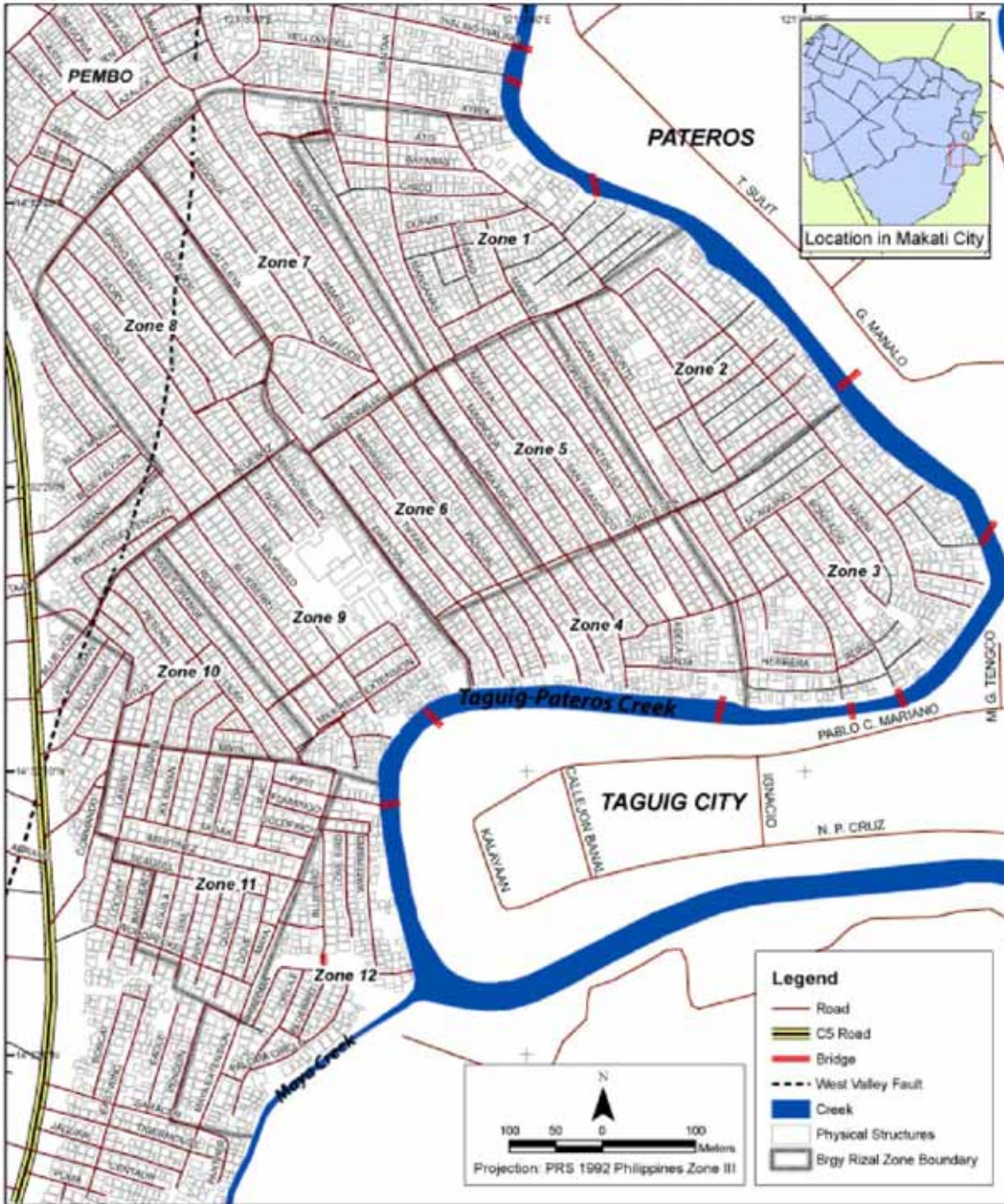
The plan has been broken down into a 10-year timetable with immediate, short, medium, and long term actions. The immediate actions include the formulation of the Plan by the Barangay Council and with City Council, and the preparation of feasibility studies for the components of the plan. The more socially acceptable actions such as road widening can be done within the short to medium term, while interventions which are more difficult to implement such as the Fault Zone Park can be done in the long term. This will enable trust building with the community and provide appropriate time to plan adequately.

Lessons Learned and Next Steps

The project has generated valuable knowledge

in terms of both the substantive content and redevelopment planning process for addressing the earthquake risk of an existing community. The fact that the project site is virtually all built-up, with small lots and narrow streets, and occupied by predominantly low-income households place extreme limitations on the range of redevelopment actions. The engineering component to resolve the physical vulnerabilities is critical as the risk to every single structure needs to be evaluated. The nature of the structural risk practically dictates the fate of the occupants, and, thus, should be given close attention. Coupled with the inability to predict the probable next earthquake, and the residents' tendency to accept a high level of risk, these existing conditions pose a daunting challenge in the formulation of the proposed redevelopment plan. While the Project is a pilot application in a very limited planning area, the methodology used has a high potential to be adapted or replicated in other contexts/localities. The explicit incorporation of disaster resiliency in redevelopment planning poses great challenge in the legal and institutional aspects. No such local government plan, officially labeled as such, has ever been prepared, and a comprehensive national legislation/regulations and implementing instruments have yet been put in place to guide the process. In this sense, the Risk Sensitive Redevelopment Plan of Barangay Rizal is a precedent-setting effort.

In spite of the various constraints faced by the project, the study shows that formulating an acceptable redevelopment plan is possible if the planning process is systematic, transparent, participatory, and consensus-based. Engaging the participation and involvement of the barangay officials, zone leaders, and community representatives from the outset was critical in forging consensus. The highly participatory process of exchanging information and ideas was particularly effective in developing a common understanding among the stakeholders. It enabled the development of a common vision where the trade-offs are understood by the stakeholders. The systematic approach in data gathering, analysis, and presentation at the

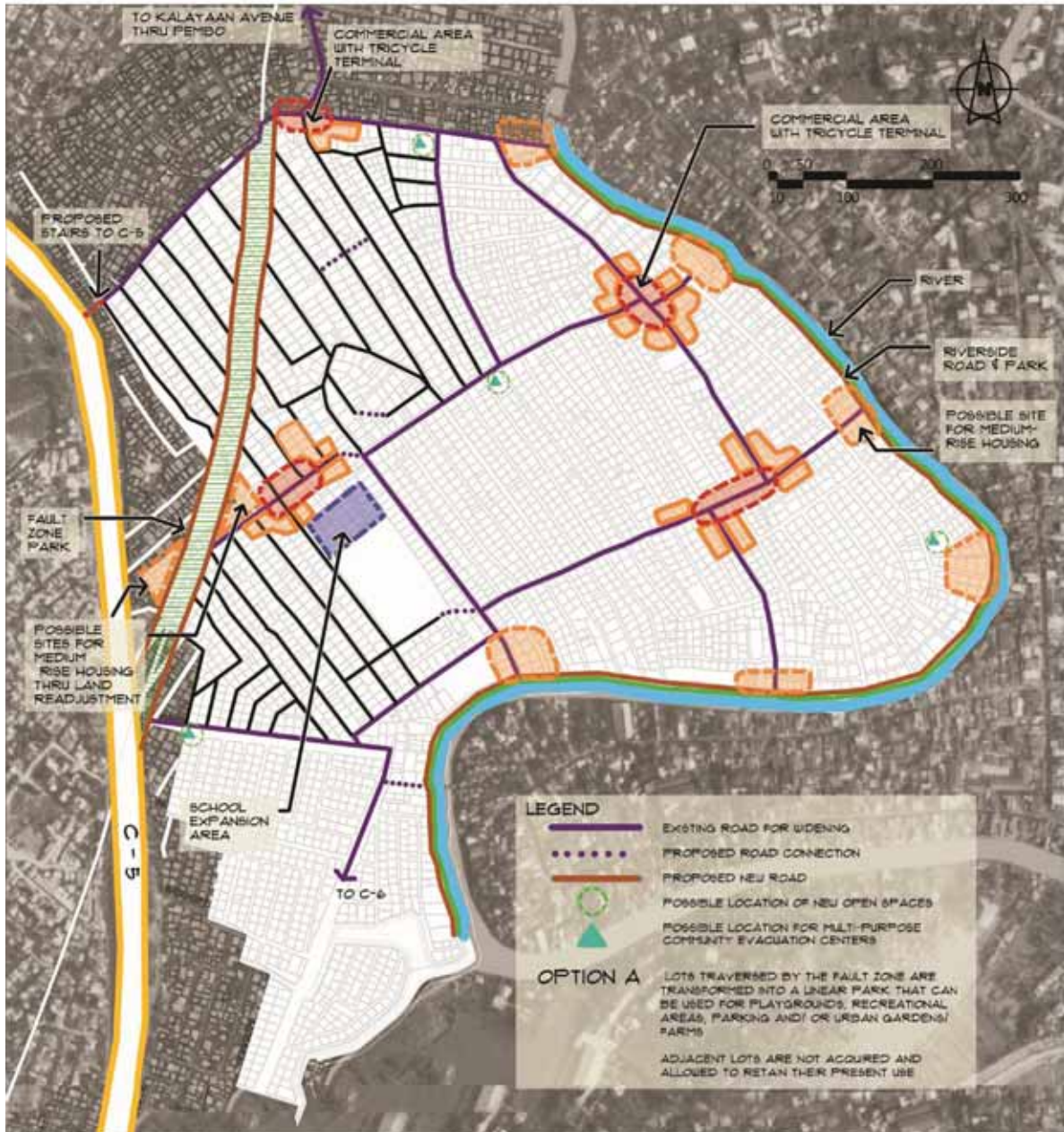


Fault Map of Barangay Rizal, Makati City

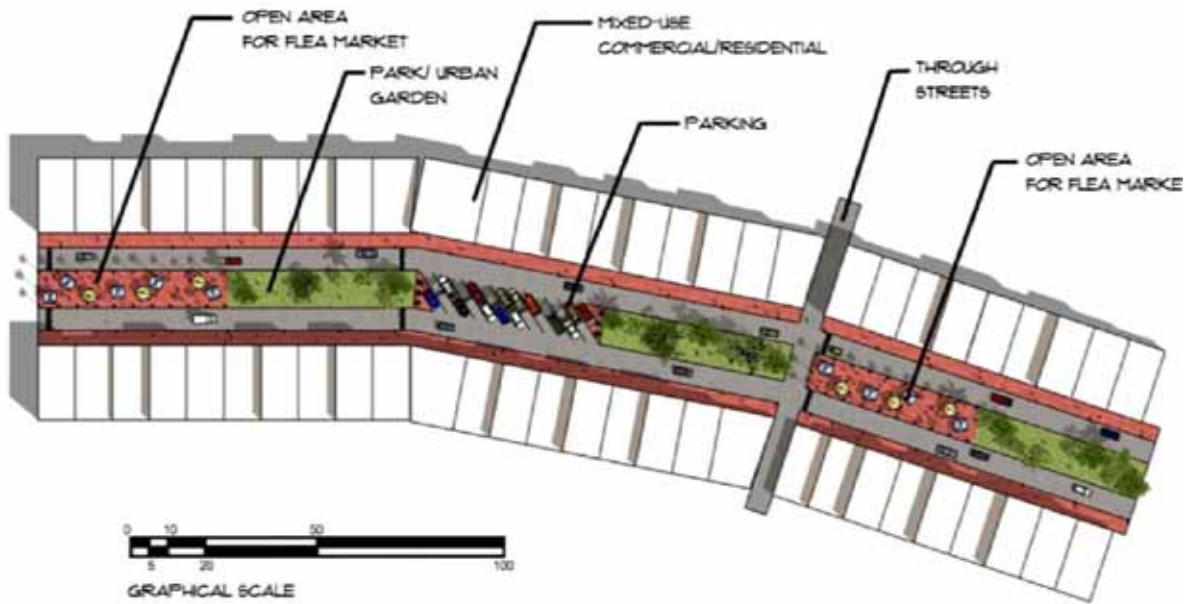
Sources: PHIVOLCS, Makati City GIS Division

EMI 2010

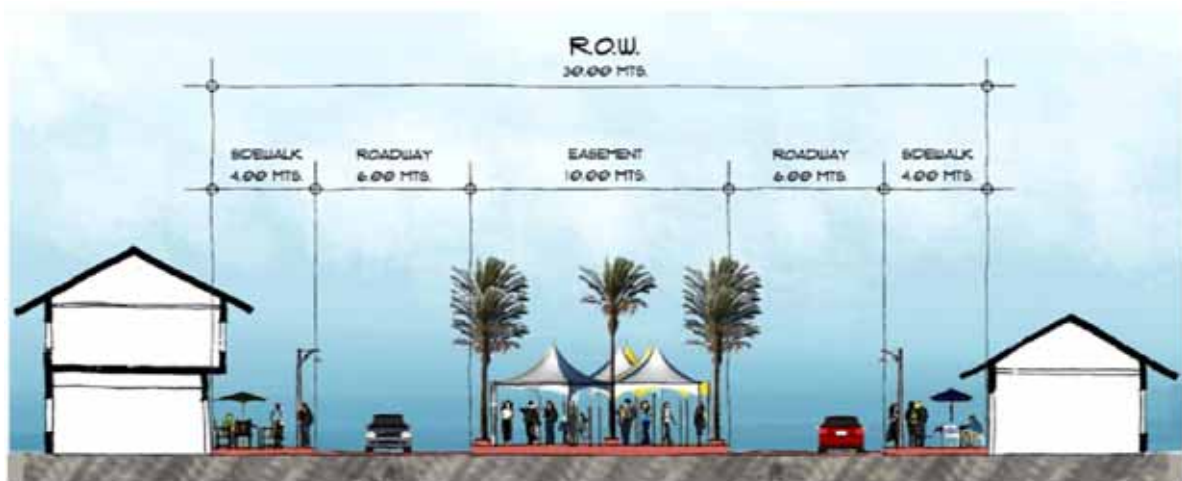
stakeholder workshops helped significantly in developing a deeper appreciation of the risks that the community faces. And the sensitivity of the City Government representatives and technical



Conceptual Site Development Map



Conceptual Plan for Fault Zone Development



Proposed Street Section for Fault Zone Development

PROPOSED INTERVENTION	IMMEDIATE (1 year)	SHORT-TERM (2-3 years)	MEDIUM (4-6 years)	LONG-TERM (7-9 years)
Fault Zone Park Development	Planning/development of re-housing program & compensation for households w/in fault zone	Community preparation Utilities redesign and drainage improvements	Compensation or relocation of households within fault zone to new housing	Road construction, landscaping
Traffic Management	Drafting and implementation of parking regulations Designation of one-way/two-way streets	Continuing implementation of traffic management regulations	Continuing implementation of traffic management regulations	
Circulation Network Improvement	Preparation of detailed circulation network improvement plan	Implementation of Road Improvement Projects Street widening/ connections Clearing of encroachments Provision of through-streets Construction of roadway along creek	Continuing implementation of road improvement projects	Completion of road improvement projects
Open Space Development	Preparation of open space acquisition plan	Development of linear park along creek	Acquisition and Development of Open Space per Neighborhood Unit	Completion of development of neighborhood open spaces
Upgrading of Critical Infrastructure	Drafting of joint action plan with service providers (water, power, communications)	Drainage improvement Retrofitting of water lines crossing fault	Upgrading of Critical Infrastructure	Completion of upgrading

PROPOSED INTERVENTION	IMMEDIATE (1 year)	SHORT-TERM (2-3 years)	MEDIUM (4-6 years)	LONG-TERM (7-9 years)
Strengthening of Disaster Preparedness and Emergency Management	<p>Capacity Building</p> <p>Formulation of evacuation and emergency shelter plan</p> <p>Establishment of early warning system</p> <p>Training for emergency response</p> <p>Establishment of pre-disaster neighborhood caches</p>	Acquisition of land for multi-purpose community evacuation centers	Construction of multi-purpose community evacuation centers	
Information, Education and Communication (IEC) Campaign for the Redevelopment Plan	<p>Formulation of IEC Campaign Plan</p> <p>Project acceptance strategy</p> <p>Hazards and earthquake preparedness</p> <p>Traffic management</p> <p>Development and density controls</p> <p>Redevelopment plan projects</p>	Continuing implementation of IEC campaign	Continuing implementation of IEC campaign	Continuing implementation of IEC campaign
Seismic Investigation of High Risk Structures	Seismic investigation of high-risk and critical structures	Formulation of voluntary retrofit program	Structural Retrofitting of High Risk Structures	Continuing retrofitting of high-risk structures

PROPOSED INTERVENTION	IMMEDIATE (1 year)	SHORT-TERM (2-3 years)	MEDIUM (4-6 years)	LONG-TERM (7-9 years)
Establishment of Development & Density Controls	Formulation of Development & Density Controls	Adoption/ institutionalization of development and density controls	Continuing implementation of development and density controls	Continuing implementation of development and density controls
Development of Neighborhood Commercial Center	Planning and setting-up of business controls and incentives	Marketing to potential locators/ local businessmen	Business Development and Construction of Public Facilities Construction or improvement of commercial buildings Construction of tricycle terminals	Continuing business development
Setting Up of Business & Entrepreneurship Support Program	Formulation of Business and Entrepreneurship & Support Plan Organization of affordable financing (micro-credit) program	Implementation of business incubation and entrepreneurship program Lending of support for product design	Continuing program implementation	Continuing program implementation
Creation of Strategic Livelihood & Skills Enhancement Program	Preparation of Strategic Livelihood and Skills Enhancement Plan Market identification Skills upgrading & livelihoods training	Establishment of market linkages with Makati CBD and villages	Continuing program implementation	Continuing program implementation

Professional Training in Risk-Sensitive Land Use Planning and Local-Level Emergency Management

Executive Summary

This Project emerged from EMI's Cross-cutting Capacity Development (3cd) Program in Metro Manila and Kathmandu. EMI's 3cd Program was conducted from 2004 to 2006 as a collaborative project of EMI, Metro Manila Development Authority (MMDA), and the Philippine Institute of Volcanology and Seismology (PHILVOLCS) in Metro Manila, Philippines. Another Project's component was established in Kathmandu, Nepal as collaboration among the Kathmandu Metropolitan City (KMC), the National Society for Earthquake Technology-Nepal (NSET-Nepal), and EMI. The 3cd Program was designed to engage and support megacities in the process of implementing disaster risk reduction (DRR) strategies. The Program also set a framework for developing a localized capacity building agenda which aimed to (1) empower local governments, institutions and communities to plan and deliver DRR program and policies; and (2) mainstream DRR within the day-to-day functions and services of the city, through the development of a sustainable, consensus-based Disaster Risk Management Master Plan (DRMMP).

The outcome from the 2004-2006 effort resulted in EMI proposing a 10-Point DRMMP elements based on the 105 recommendations from the Metro Manila Earthquake Impact Reduction Study (MMEIRS). Through a stakeholders' workshop, the 10 elements were narrowed down into five Implementation Work Outputs (IWOs)¹. Similarly, a five point

1 IWO No. 1 - Develop and institutionalize for risk communication and preparedness, IWO No. 2 - Incorporate risk reduction criteria in land use and urban planning, IWO No. 3 - Conduct training needs assessment and capacity building for DRM, IWO No. 4

IWOs were developed for Kathmandu. This project i.e., Project Work Output (PWO) 2 - Customization of content of two training courses and their pilot application in Metro Manila and Kathmandu-took off from recommended IWOs both for Kathmandu and Metro Manila. This IWO specified the need for specialized training to support institutions and communities in undertaking urban disaster risk reduction at the local level.

The goals of PWO 2 were:

1. Complete and customize a course on Risk Sensitive Land Use Planning, and Local-Level Emergency Management to fit local level practitioners and professionals and to support the objectives of this project;
2. Design the course delivery process; and
3. Pilot tests the courses.

The PWO 2 is one of the four main components of a larger project titled, "Mainstreaming Disaster Risk Reduction in Megacities: A Pilot Application in Metro Manila and Kathmandu." This project was funded by the German Federal Foreign Office (FFO) through the Deutsches Komitee Katastrophenvorsorge (DKKV). The Project involved the customization of two training courses: 1) Risk Sensitive Land Use Planning, and 2) Local-Level Emergency Management. It also included the pilot applications of these courses in Metro Manila and Kathmandu. These courses were selected to support the implementation of other activities of the project (i.e. PWO's 1.1, 1.2 and 1.3).

- Mobilize resources among NGOs, professional organizations, and private sector in DRM agenda, and IWO No. 5 - Improve legal and institutional arrangements for improved DRM delivery.

Note that the content of these two courses was in great part developed with funding from another source[S3]. However, the funding from the German FFO enabled EMI to complete these courses through customization to support this particular project as well as their pilot delivery in both Kathmandu and Manila.

The first training course on risk-sensitive land use planning is referred to as MEGA-Plan. It trained planners and related professionals on how disaster risk assessment tools, techniques, and methods can be integrated into the land use planning process. The second training course on local-level emergency management is referred to as MEGA-Safe. It trained emergency managers and other professionals on city-level emergency management operations, functions, procedures and systems. While not planned originally in the scope of the project, a third training course was added to support PWO 1.3 of the project (Redevelopment Plan for Barangay Rizal) where several engineers were trained on Rapid Visual Screening for Seismic Vulnerability.

The MEGA-Plan and MEGA-Safe training courses made use of blended learning approach, maximizing the potentials of both conventional (face-to-face) mode of training with distance learning and field-based learning modalities. MEGA-Plan was delivered using distance learning modality in Manila while MEGA-Safe was delivered both in an e-learning mode in Metro Manila and in a series of face-to-face training and table top exercises in Kathmandu. MEGA-Safe in Kathmandu supported the development of the Emergency Operations Plan, the main output of Project Work Output 1.2 (see separate report). Material and techniques behind MEGA-Plan were also used for training of Kathmandu planners to develop critical components of the risk-sensitive land use plan for Kathmandu (PWO 1.2). A field-based survey was employed during the training on Rapid Visual Screening of Buildings for Seismic Vulnerability for engineers and other technical staff of Makati City. Several staff of Barangay Rizal and other members of the community were trained on Vulnerability and Capacity Analysis (VCA).

The development of courses, delivery process and pilot testing were completed in two years. The initial plan was to train 40 practitioners on risk-sensitive land use planning in Metro Manila, 40 practitioners on city-level emergency management in Metro Manila, and 20 practitioners on city-level emergency management in KMC. However, it was necessary to re-orient the training in order to accommodate the needs of the project and optimize the outcomes of the training agenda. The final format of the training was as follows:

- a. One day validation training undertaken in the form of a workshop to a selected number of emergency managers from several local government units in Metro Manila on MEGA-Safe. This was necessary to validate the content of MEGA-Safe with highly knowledgeable audience
- b. Deliver MEGA-Plan in Metro Manila on a blended learning approach to a smaller number of land use planners and practitioners. A total of 40 was considered not practical for this first pilot application
- c. Deliver MEGA-Safe in Kathmandu as a series of on-site training classes to planners, emergency managers, public safety officers, and other potential first responders. The training schedule was synchronize with the development of the Emergency Operations Plan for Kathmandu Municipal City undertaken as part of PWO 1.2 of this project
- d. Deliver MEGA-Safe in Metro Manila on a e-learning basis
- e. On-site training of Kathmandu planners on key elements of a risk sensitive land use plan for Kathmandu (PWO 1.1)
- f. Provide in-depth training on rapid visual screening of buildings to assess seismic vulnerability to several Makati City Engineers. This last part of the training was not originally planned but became necessary in order to assess the physical vulnerability of Barangay Rizal. Outputs of this activity were used in developing the Urban Redevelopment Plan (PWO 1.3 of this project)

A total of 105 practitioners were trained as result of this project.

The report on these activities is divided into three parts:

Part I: PWO 2.1-MEGA-Plan with pilot testing in Metro Manila

MEGA-Plan consists of five modules focusing on mainstreaming natural disaster risk parameters into the land use planning and development process. Each learning module has at least two sessions and contains discussions of key lessons, case studies and examples, guide questions, and illustrations. The learning modules were specifically designed for distance learning but can be customized for face-to-face trainings.

In Kathmandu, emphasis was given to enhancing the capacity of KMC Project Working Committee in developing the KMC Sectoral Profile and in identifying the development thrusts and spatial strategies of the KMC risk-sensitive land use plan. EMI also organized a city-to-city sharing between KMC and Makati City. KMC staff and officials visited the emergency management facilities of Makati where they had an appreciation of state-of-the-art emergency management processes and practices.

Further, to support the implementation of PWO 1.4 i.e. Risk-Sensitive Urban Redevelopment Planning for Barangay Rizal, EMI designed an additional training course for city engineers of Makati City on how to assess physical seismic vulnerability of buildings through a rapid visual screening method. The training was conducted using a combination of classroom-typed discussions and field-based exercises to test if the participants understood well the concepts and methods discussed. The results of the training were used in the Redevelopment Project for Barangay Rizal (PWO1.3).

Part II: PWO 2.2 - City -Level Organizational and operational arrangement for emergency

management in Metro Manila and Kathmandu

This training course is referred to as the MEGA-Safe, a specialized web-based course on “City-level Emergency Management Organizations and Operations”. It is designed to train local authorities on how to setup city-level organizational structures and operations for disaster and emergency management. It covers important aspects of emergency management such as setting an incident command system, developing an emergency operations plan, emergency support functions, among others. EMI implemented the MEGA-Safe from 23 June to 17 August 2009 to 22 local emergency managers and planners in Metro Manila.

While MEGA-Safe was conducted for Metro Manila in a distance learning mode, it was delivered to KMC officials and staff in a face-to-face training and workshops. Such training was found useful in equipping the participants the necessary knowledge, attitudes, and skills to develop and strengthen the “KMC Disaster Risk Management and Citizen Safety Unit” and in completing the Kathmandu Emergency Operations Plan. In this manner, the trainees were able to understand the components of the plan well.

Part III: Key Lessons learned and Next Steps

EMI and its partner cities and organizations gained lessons from the capacity building initiatives that they conducted for KMC and Makati City. Some of the problems encountered and key lessons generated from such experiences are as follows:

1. There is a need to constantly encourage participation in distance learning courses. The level and quality of the facilitators need to be adequate to the number of participants. For future runs of MEGA-Safe and MEGA-Plan, it is best to have one facilitator for no more than 12 trainees.
2. The trainees provided input on which topics were most relevant to their work and should be expended. In general, there is always a

1. need for practical examples and hands-on exercises.
2. Trainees acknowledged that in some cases, their limitations of knowledge of disaster risk management hindered their ability to understand the course material. Consequently, it was proposed that the content of the course be aligned more with the reality of the practice of DRM in the field. Another approach is to require that trainees first complete a general course on fundamentals of disaster risk management before taking these specialized courses.
3. Trainers may need to complement textual and oral presentations with visuals and structured learning exercises especially during face-to-face trainings to overcome language barriers such as in Kathmandu where English proficiency is sometimes low among local government staff. Case studies and examples may be effective if translated to native language.
4. All three trainings (i.e., MEGA-Plan, MEGA-Safe and Rapid Visual Screening) were found to have provided valuable knowledge and a stronger analytical foundation for the professionals to enable them to initiate, manage and implement similar tasks in the context of their own work and within their own cities. As a demonstration of that, the Makati engineers who received the Rapid Visual Screening evaluated in excess of 1000 structures in Barangay Rizal. The results of the survey were an essential input to the Risk Sensitive Redevelopment Plan of Barangay Rizal developed in PWO 1.3. Similarly, the emergency managers in Kathmandu were able to understand and contribute to the Kathmandu Emergency Operation Plan and take ownership of it at the end of the project. Planners in Kathmandu were able to complete the sectoral profile and the strategic directions of the risk-sensitive land use plan.

the curriculum of the courses for future delivery. These types of specialized courses that are oriented toward local planners and practitioners are not often available[S4], but they are critical to develop local capacity.

The approach, methodologies and lessons learned from this component will be used to strengthen



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