

Metro Manila Case Study: Development and Realization of the EQTAP Master Plan

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Abstract

To substantiate the EQTAP research framework and the Master Plan, it has been decided that there is a need to get feedback from the real-world scenario, in the form of a Case Study. Metro Manila has been chosen as the Case Study site for its high hazard, high population growth, high vulnerability and availability of suitable counterpart. The most important step of the Case Study was to visualize the process under the Risk Management Framework, and to provide emphasis on the 'Establish the Context', which in turn pointed to the understanding of problems and need at the local level. Several meetings have been arranged in last one year under this Metro Manila Case Study, which provided suitable ground of interaction with different stakeholders. Under an agreed research framework, different teams have been formulated to carry on the Case Study with specific focus areas, like hazard map of Marikina city and study of the construction practices of non-engineered buildings; study of seismic performance of important buildings like schools, and study of the growth pattern and vulnerability of Old Manila. The Case Study is regarded as the first step of field experimentation of Master Plan, and it is hoped that the process will substantiate the realization and development of the Master Plan Framework.

Key-words: *Metro Manila, EQTAP, Master Plan Development, Risk Management Framework, Establish the Context*

Introduction

To enhance the understanding and formulation of the risk management framework, adopted by the EQTAP Project, it has been suggested in the EQTAP Task Force Meeting in New Zealand in October 2000, that the field experimentation is necessary and essential. This idea had been brought forward to make a Case Study in a suitable location in the Asia-Pacific region, which would be able to provide deep insight to the process of the master plan formulation. Metro Manila had been chosen for the Case Study with the following objectives:

- To fill up the gap between the academic research and real-world scenario,
- To promote better communication among the researchers and the local counterparts,
- To substantiate the relationship with diverse stakeholders, and
- To formulate the research policy based on the needs of the local users

It is expected that the Case Study will provide useful feed-back to the framework in the sense of experiences from the field analysis. The different elements of the risk management framework are to be exemplified through several activities in the case study, which will be planned to address a wide range of stakeholders in the metropolitan area. A major emphasis will be given to the key

¹ This Case Study is the joint collaborative work of the Master Plan Task Force, with contribution from the Principal Investigator, the EQTAP Team Leaders, PHIVOLCS, MMDA, and the International Advisory Group.

element of the framework, i.e., “Establish the Context”, which will consists of what has been done so far and what lessons has been learned through those studies. Thus, the case study will enhance the establishment of the Master Plan.

Through the promotion of better communication among the researchers and the local counterparts, and thereby facilitating locally applicable research results, implementation technology will be studied in the field. A wide range of stakeholders will be chosen who will work together in the common understanding of the framework and thereby providing useful experiences and expertise to enhance the quality of the framework.

Metro Manila as the Case Study Site

Metro Manila is considered as a unique example of the mega-city in the Asia-Pacific region, with high hazard, high vulnerability and considerably high earthquake risk (Santiago 2001). The proximity to the active fault region, rapid urbanization and population expansion has posed a great threat to the city (Punongbayan et al. 1993). Increasing vulnerable constructions, increasing informal settlements in the form of slums and squatters, unplanned growth of the city near the high hazardous areas have made the metropolitan area as one of the most risk city in the region.

Figure 1. The location of Philippines and the cities and municipalities in the Metro Manila



Pre-Spanish Manila in the 16th century was a Muslim trading post for conducting trade with China, Vietnam, India and other Asian countries (Oreta, 1996). The Spanish colonizer Legaspi made it a capital city of the Philippines because of its strategic location. The formation of a walled city along the right bank of the Pasig river was the initiation of the growth of the city. The communities grew around the walled city, with accessibility of it as the main, if not the sole factor influencing their

location. This settlement pattern continued till after the Second World War. Consequently, huge settlements concentrated around the coastal margin, and mixed land uses grew even in the unstable areas. Residential areas developed in the flood-prone areas, and high-rise buildings and other high-investment structures were established in critical areas. Beside the seismic hazards, the other factors which made the city increasingly vulnerable are: 1) rapidly increasing population and large number of transient population, 2) concentration of industry and economic activities, 3) increasing number of squatters and slum dwellers, 4) location of central business districts in the hazard prone areas, 5) construction practices and building stocks, 6) environmental degradation, 7) low level of hazard and risk awareness and preparedness, 8) inadequate facilities and planning for emergency responses.

Of the 9.5 million population in the metropolis, about 44% are officially listed as living below the poverty line (monthly income less than 225 USD per family of 6 persons). Almost one third of population (31.1%) lives in the squatter areas (Santiago 1996). The squatter households suffer from a high degree of overcrowding and other degrading environmental conditions, social disorganizations, and a perpetual threat to life and safety caused by the criminal elements lurking in the area. Basic utilities like water, electricity, sewages are not provided sufficiently. The Metropolitan Manila remains predominantly a residential community, with about 60% of the land area used for the residential purposes. About 8% is for commercial use, 5% for industrial use, 5% for institutional use, 12% for agriculture; which limits the open area as 10%.

The recent growth pattern in Manila shows that the city has been expanding in the direction of the fault in last 10 years. It will, therefore, be of utmost importance to focus on these vulnerable areas, with increasing growth and concentration of inhabitants in the eastern fringe of the city. Simultaneously, it is also important to note the overall growth pattern and the land use planning. Metro Manila (also known as the National Capital Region, NCR) consists of 13 cities, 4 municipalities, with a total land area of 636 sq km. Besides being the capital of the country, it is also the major economic hub in the Philippines, contributing about 32% of the national GDP (1993 data). The total population is around 9.5 million (1995 census, with a projected figure of 11 million at 2000), with an annual population growth rate of 3%. The average density is 14,870 persons per sq. km.

Historical records show that the Metro Manila has, in the past, experienced numerous earthquakes (Bautista, 2000), 28 of which were major. Statistically, the metropolis is likely to be hit, on an average by a strong (Intensity VII) earthquake every 17 years; moderately strong (intensity VIII) earthquake every 79 years; and extremely strong earthquake (intensity IX) in 112 years. There are five seismic source zones, which can potentially affect the metro area. These are the Valley (Marikina) Fault System, Philippine Fault Zone, Lubang Fault, Casiguran Fault and Manila Trench. Among these five source zones, the Valley Fault System and the Philippine Fault Zone are the ones, which can strongly affect the metropolitan area.

First Case Study Meeting and Field Survey of November 2000

Following the decision of the Case Study, the first meeting was held in Manila, immediately after the 3rd EQTAP Workshop. The purpose of the meeting was to provide a forum for information exchange and free discussion on the problems and need of Manila. There were around 30 people, fifteen from Manila, including different stakeholders, and fifteen from EQTAP including the task force members. Five local needs have been revealed in the discussion (EQTAP 2001):

- 1) GIS based integrated risk assessment,
- 2) Safety of public investment (public buildings, infrastructure),
- 3) Proper land use planning,
- 4) Housing problems, and
- 5) Disaster management

It is suggested that the Case Study be formulated to meet these five specified needs, and should address the related issues.

This meeting was followed by the field survey in Marikina City (Figure 2). During the trip, the administrators of the local government introduced the examples of reform: 1) Relocation of informal settlement along the Marikina River, 2) Preparation of resettlement area, 3) Road cleaning with a water cannon truck, 4) To place road signs of evacuation center, 5) To equip public vehicle with emergency care unit. Marikina is regarded as mainly the residential community, which was divided into two sectors earlier: a farmland in the south and a poster land in the north. The growth of the city has



Figure 2. Marikina City Engineering Department chief with the map of Marikina



Figure 3. Disaster education center of Marikina City



Figure 4. Relocation of houses in Marikina City.

been steady and controlled, with a total current population of 400,000, living in 21 sq. km. A continued migration has been observed, however it did not cause any major problem until now, since the city has enough open space for accommodation more people. There has been no restriction of the height of the building in the city, but the average height is observed to be 2-3 stories. The city has specific focus on the disaster education, and center has been set up in the engineering department (Figure 3). Under the very strong and dynamic leadership of the current Mayor the city has taken many initiatives in the field of health, cleanliness, and informal sectors. The relocation program of the city has been very successful to move people from the riverside informal settlements to the social housing in the north. The specific thing about the relocation is that it is in-city relocation, so that it does not affect the livelihood of the people much. Measures have been taken to facilitate the communication route for the relocated people. However the building practices of the relocation site is regarded vulnerable to earthquake, where concrete block are used without proper seismic strengthening (Figure 4). This has been identified as the major problem of the non-engineered construction in Metro Manila.

A meeting was held in Tokyo on March 12, 2001 to share information with the Tokyo Institute of Technology (TIT) Group. TIT was conducting a JSPS project for last five years, titled 'Impact

Analysis of Metropolitan Policies for Development and Environment Conservation in Philippines'. For this project, there are several counterparts in the Philippines: UP Diliman, UP Las Banos College, NCTS (National center for Transportation Studies), PHIVOLCS, DENR (Department of Environment and Natural Resources), BSWM (Bureau of Soil and Water Management). It has been agreed in the meeting to share information and data, produced by the JSPS project.

Second Case Study Meeting and Field Investigation

The purpose of the field trip was to have an idea about the social stocks around the West Valley Fault, starting from north to south of the Metro Manila. The field trip started from the PHIVOLCS, and the first stop was 'Fillinvest Area' (Figure 5, Bautista et al. 2001), which is a high-end development area in the Quezon city. The development started almost 20 years back. The survey of PHIVOLCS has identified the traces of fault along that area, and it has been observed that several houses were found located on the fault line.

The second stop was on the northern part of Metro Manila, in the San Jose plain, known as ERAP City, passing through the Quezon city (Figure 6). The area is a relocation site of the informal settlers from the Pasig river. Around 3000 families are planned to be relocated. The study of PHIVOLCS shows that the fault runs through around 60 houses. These two cases point out lack of proper land use planning and incorporation of hazard information in the development planning of the new areas.

Proceeding toward south, vulnerable non-engineered construction of the Marikina city relocation site have been observed (Figure 7). The Quezon city was found to be a mixture of government centers, residential areas and commercial areas. The senate is located in this city, and the presidential palace is also located here. Many international organizations like Asian Development Bank, World Bank are located in the Quezon city. The city has many high-end residences, like Valley Verde, which is one of the most high-end residential areas in the city.

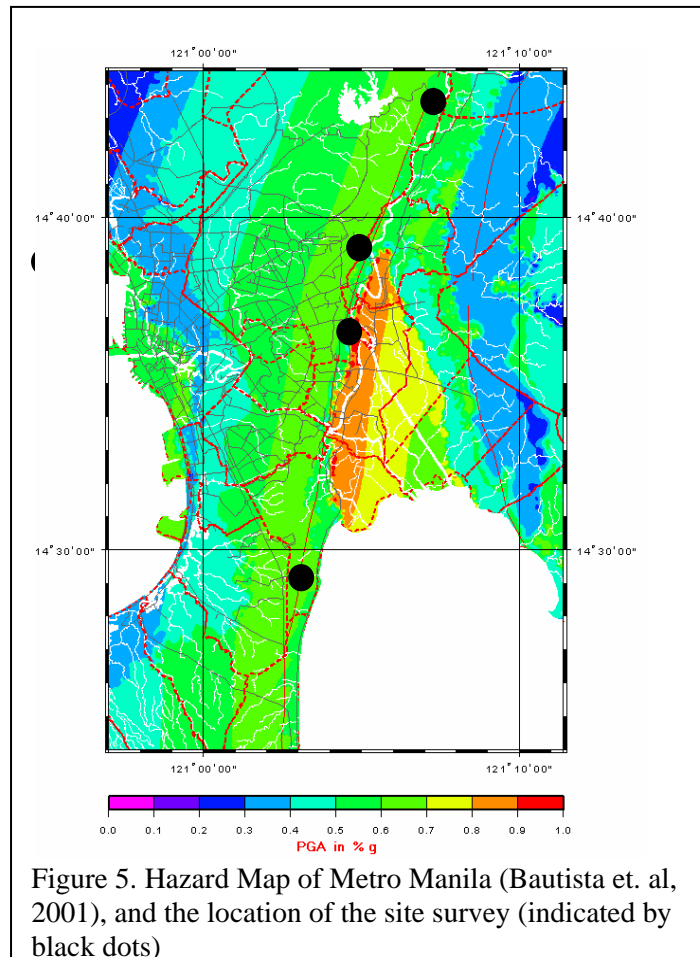




Figure 6. Resettlement area along the fault (marked red) shows poor land use management



Figure 7. Non-engineered vulnerable construction in Marikina city (relocation site)

The City of Makati is the central business district, and is the location of main economic activities. This part of the city is characterized by many high rise buildings (Figure 8). The city of Muntinlupa in the south has many industries in the northern part, along the Leguna Bay Lake.



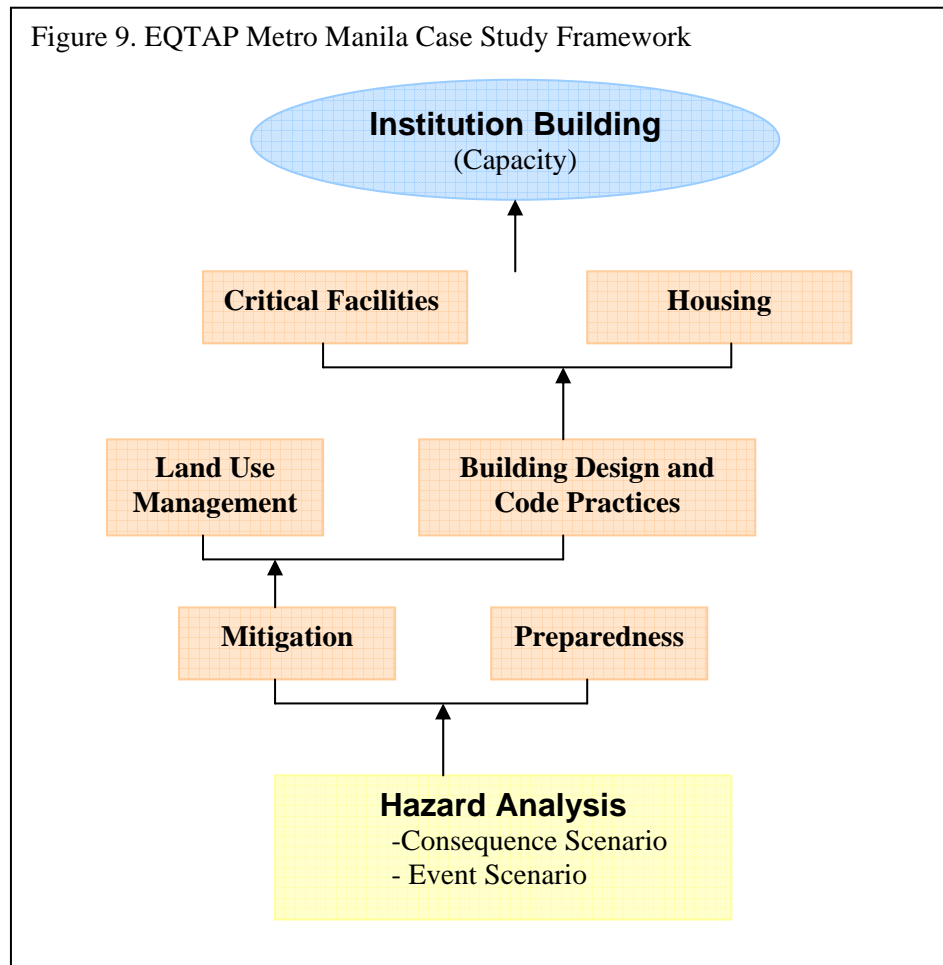
Figure 8. Panorama view of Makati, the Central Business District (Photo: K. Horie, EdM)

These are mainly product-based factories, and low-cost housing inhabited by the factory workers. In the city, the creep phenomenon was noted, which is observed southern stretch of the Valley Fault System. The city has grown from an agricultural city in 1970 to an industrial city in 1980s, and a commercial city in 1990s. Land subsidence has been observed widely in the city, and the city also has other hazards like tropical cyclones, flooding, storm surges, high tides. There might be liquefaction problem during the earthquake, since the soil is made up of sand and sandy clay. The City Disaster Coordination Council is responsible for the implementation, policy making, and operation. It consists of 17 task force members, including the private participation. There has been a migration problem, but since the city has still open spaces, there is no specific problem caused by it. The two important aspects of the city administration were observed: one, the city seemed to be more receptive and flexible, especially on the participation of the common people and the private sector. The other aspect is that the city is focusing on the land-use planning to prohibit the growth in the high-hazard areas.

During the Second Case Study Meeting of March, 2001, a wide range of stakeholders participated to discuss the direction of the Case Study. A framework of the Case Study has been prepared (Figure 9), and has been approved as the official framework of the Metro Manila Case Study (EQTAP 2001). Under this overall framework, specific tasks have been identified for each group, with focus on the needs of the local stakeholders. It has been decided that the group headed by Haruo Hayashi will focus on Marikina city, with emphasis on hazard mapping and construction practices for non-engineered construction. Another group headed by Tetsuo Kubo will focus on the seismic performance of the school buildings in Metro Manila. Subsequent fieldwork and data collection have been made to substantiate the understanding of the current practices with these

specific focus areas. The group headed by Fumio Yamazaki decided to emphasize on the growth pattern and vulnerability in the old Manila through remote sensing and aerial photographs, and subsequent micro risk assessment. It has been agreed unanimously that the Manila Case Study should serve as a model example to integrate the different elements of the risk management framework, and to emphasize the 'Establish the Context' part to understand the need and the problem at the local level.

Figure 9. EQTAP Metro Manila Case Study Framework



Metro Manila Workshop on Earthquake and Tsunami Disaster Mitigation:

The 'Metro Manila Workshop on Earthquake and Tsunami Disaster Mitigation' was held in the PHIVOLCS (Philippine Institute of Volcanology and Seismology) on July 4-5, 2001. The goal of the workshop was to substantiate the interaction of the researchers and practitioners to mitigate the earthquake and tsunami disaster of Metro Manila (EQTAP 2001). The workshop coincided with the National Consciousness Month (July), and thus was intended to raise the awareness of the stakeholders. The objectives of the workshop were as follow:

- 1). To enhance the understanding of the risk of the city, by describing the event scenario for a possible earthquake in Metro Manila, based on the existing work,
- 2). To discuss the current practices of disaster management in Metro Manila, with special focus on the local government,
- 3). To explain the EQTAP project and the framework of the Manila Case Study, and
- 4). To promote the platform for the interaction among different stakeholders

The workshop was a two-day event, where the first day was dedicated to the risk of the city and to understand the vulnerability of the built environment in Metro Manila. The first half of Day 1 focused on the hazard analysis of Metro Manila, followed by the vulnerability of lifelines and infrastructures. The second half focused on disaster management set up in Metro Manila. Thus, on the first day, the main emphasis was given to elucidate the problems and current practices of the city in relation to the earthquake and tsunami disaster.

The second day had two emphasis areas: one to focus on the proposed direction and framework of the EQTAP Metro Manila Case study; and the other to focus on the best practices examples from other parts of the Asian region. The first part was dealt with the summary and presentation from the members of the EQTAP Metro Manila Case Study Group. The second part was facilitated by the presentation from Kathmandu, Nepal and Bandung, Indonesia. Based on the discussion of two days, the main issues and concern of the Metro Manila were pointed out, and the precise direction and activities of the case study was proposed.

On the basis of these sessions, the last part of the Workshop was spent for discussion on integration of different issues under the risk management framework.

The presentations by the EQTAP research team identified six projects might be useful for consideration by the Manila personnel (EQTAP 2001):

1. Undertake a micro risk assessment of the area that Metro Manilas population growth is occurring
2. Produce more local hazard analysis information to assist local understanding of the natural hazard risks
3. Assist in developing appropriate land-use management planning strategies to offset developments such as the San Jose resettlement project that will inadvertently create more vulnerability for an acknowledged at-risk group
4. Improve Building Code application improvements for non-engineered structures
5. Focus on school building assessment and retrofitting strategies
6. Seismic risk assessment case study of Old Manila using GIS and RS data.

Conclusion

The Metro Manila Case Study is regarded as the first step for the development and realization of the Master Plan Framework through input from real world scenario. The most important step in the Case study is the interaction with the local stakeholders in the form of 'Communicate and Consult' in the Risk Management Framework. This exercise helped to understand the need and priorities at the local level, and to formulate the project activities based on the discussion with the local stakeholders. Thus, the activities described above can be regarded as the 'Establish the Context' of the RM Framework.

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