

The Challenge of Urban Redevelopment in Disaster-affected Communities

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Abstract

The Philippines is one of the most disaster-prone countries in the world due to its hazard-prone location and vulnerable population. If it is to avoid a repeat of the loss of lives and devastation in every disaster, it must plan and manage more effectively, the further growth of its towns and cities as well as the natural environment. This can be achieved through disaster risk reduction-oriented planning and management. This article presents the challenges and issues that need to be addressed in planning for high-risk, low-income areas in the Philippines, and presents as an example, a redevelopment planning project of the community of Barangay Rizal in Makati City. The discussion highlights the hazards, vulnerabilities, socio-economic and other critical considerations in the area, and presents possible actions to reduce the risk and improve the socio-economic condition of the project site. The uniqueness/value of this project is that it addresses the challenges of making an existing low-income built-up community disaster-resilient. The lessons from and the replication of this project are relevant not only to the Philippines towns/cities but also to similar low-income, high-density communities in other developing countries.

Keywords

urban planning, urban redevelopment, risk reduction, disaster risk management, the Philippines

The challenge of urban redevelopment in disaster-affected communities

On 26 September 2009, residents of Metro Manila, the capital region of the Philippines, were caught unawares when Typhoon Ketsana dumped more than 600 mm (NASA Earth Observatory, 2010a) of rain in a day and caused regional floods that submerged large sections of the metropolis. A week later, Typhoon Parma hit northern Luzon, dumping up to 700 mm (NASA Earth Observatory, 2010b) of rain and submerging provinces in northern Philippines. About 800 people died due to these two storms, and damage to infrastructure, agriculture, and private properties reached up to about US\$ 4.38 billion, based on a joint post-disaster needs assessment by the Government of the Philippines and the World Bank (see Figure 1).



Figure 1. Floods due to Typhoon Ketsana in Metro Manila, the Philippines

Source: Erik de Castro, Reuters.

Hazard-prone location

These recent events were another sobering reminder of the Philippines' status as one of the most disaster prone countries in the world. According to the Centre for Research on the Epidemiology of Disasters (CRED), in 2008, the Philippines ranked third in the countries most often hit by natural disasters. Together with India, Indonesia, China, and the US, the Philippines has occupied the top ranking of disaster occurrence in the past three years.

Disasters are now seen as consequences of inappropriately managed risk. Risk comes from a combination of hazards, vulnerability and lack of resilience in all of which the Philippines ranks high. The Philippines' location on the western rim of the Pacific Ocean makes it prone to tropical cyclones (about 19 to 20 a year, with about 8 or 9 making landfall) (Philippine Atmospheric, Geophysical and Astronomical Services Association [PAG-ASA], 2010) (see Figure 2). In 2008, all of the reported natural disasters in the Philippines were typhoon or flood-related. Its topography exacerbates these hazards; being an archipelago (surrounded on the west by the South China Sea, on the east by the Pacific Ocean) its mountainous areas are prone to landslides (often caused by heavy rainfall), while low-lying areas and coastal areas are prone to floods and storm surges. Other major hazards are earthquakes, volcanic eruptions, and tsunamis. Lying on the Pacific Ring of Fire, the Philippines is crisscrossed by a number of faults, and dotted by about 20 active volcanoes. Its coastlines lie open to tsunamis that could be generated by earthquakes within the country and in the Pacific Ocean.

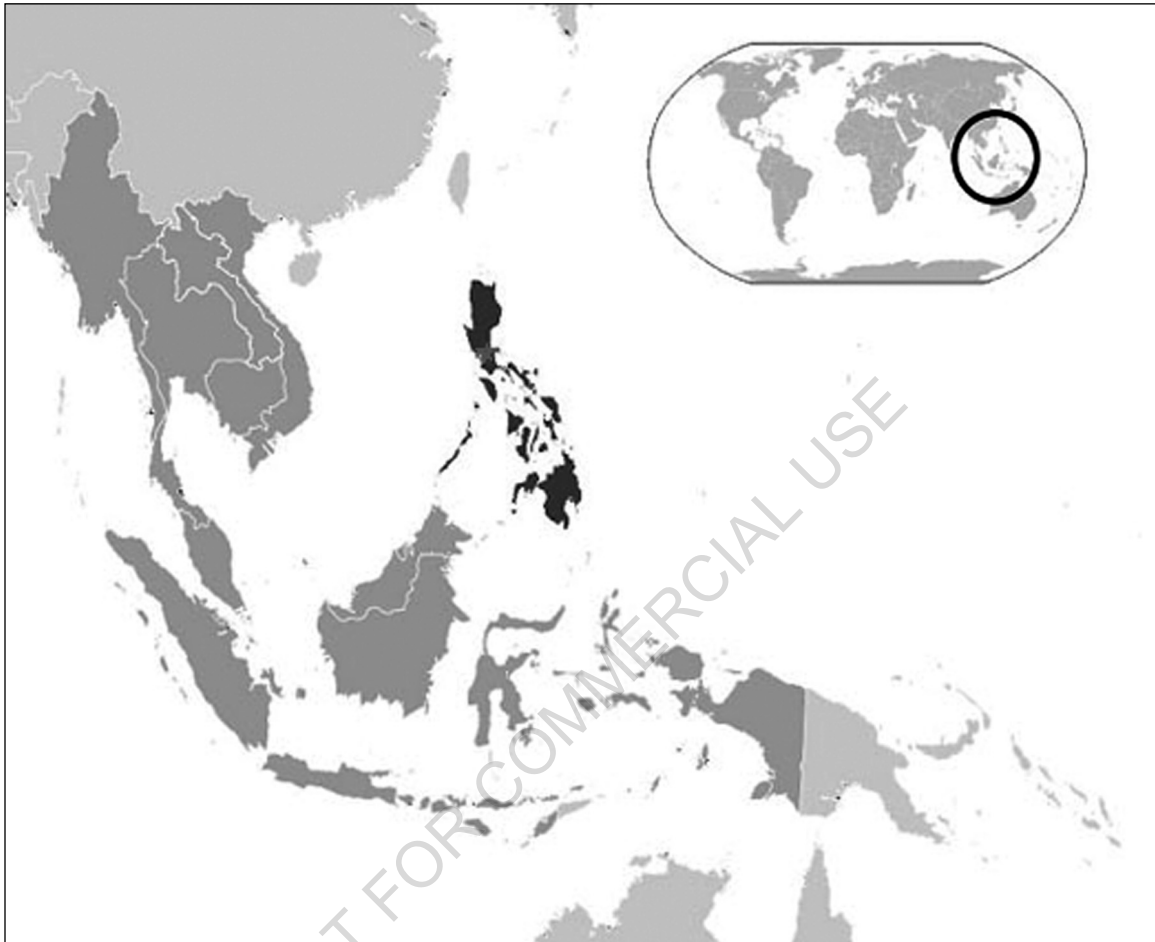


Figure 2. Location of the Philippines

Source: Wikipedia (www.wikipedia.org).

Sometimes these hazards combine, leading to deadly consequences. In 2006, heavy rainfall from Typhoon Durian washed down ashfall and volcanic debris from Mayon Volcano which had a minor eruption some months earlier. Settlements around the volcano were buried in *lahar* (mudflow), killing about 900 and displacing thousands of families.

Vulnerable population

These hazards continually strike increasingly vulnerable settlements. This vulnerability comes primarily from location—most cities in the Philippines grew beside the ports and along rivers, and thus are in low-lying, flood prone areas. Often communities exposed to hazards are those which are located in areas which

should not have been developed in the first place. This can be traced partly to a faulty system of land management, where lands which should have been left as floodplains, fault easements, or forests were classified as alienable and disposable. Another major factor that adds to vulnerability is the low capacity of people to cope. Most of the population of the Philippines is poor, and thus have difficulty coping when these hazards strike. The hardest impact is on informal settlements, which are often in the most hazardous areas.

Typhoon Ketsana and Parma was a wake-up call to the country. If the Philippines is to avoid a repeat of the loss of lives and devastation brought about by these typhoons, it must plan and manage more effectively the further growth of its towns and cities as well as the natural environment. Typhoons and earthquakes are natural events that are predictable and thus their damaging effects can be mitigated or reduced. This can be achieved through disaster risk reduction-oriented planning, education and management.

Challenges in rehabilitation

Rehabilitation in the aftermath of a disaster presents an opportunity to ensure that the process of recovery reduces risk in the long run and does not merely restore the communities back to the state they were in before the disaster. In the Philippines, reducing risk is particularly challenging because the vulnerabilities of its settlements are deep-rooted, and borne out of many causes. For example, the floods that happened due to heavy rainfall from Typhoon Ketsana in Metro Manila, were due to the convergence of uncontrolled urbanization, ineffective environmental management, and lack of public understanding of the impact of their actions on the environment. These kinds of problems need comprehensive, long-term solutions that require the collaboration, cooperation and support from different stakeholders from the community, private and public sectors. However, what usually happens is that response to disasters is focused on humanitarian assistance and emergency response, which does not address underlying causes. Without proper guidance, the process of recovery can become an uncoordinated set of efforts by the public and private sector and the people who are trying to rebuild by themselves. This may eventually lead to the reproduction of the conditions that led to the disaster in the first place.

Thus, it is crucial for government and stakeholders to start putting together a recovery framework as soon as possible to guide the process of rehabilitation. Based upon this framework, a forward-looking action agenda can be prepared with concrete actions to be carried out in the immediate, short- and long-term. In order to identify and facilitate the participation and involvement of key persons and organizations in crafting this agenda, these actions can be clustered under key interrelated themes which include:

- **Land Management:** The classification, management, disposition, titling, and registration of lands, including real estate taxation and policies on various forms of tenure. These policies provide the basis for as well as impact on the use of land.
- **Informal Settlements and the Provision of Adequate Shelter:** Policies, programmes and projects with regards to the treatment of informal settlements in flood-prone areas and other danger zones, and the provision and financing of shelter especially for the urban poor.
- **Environmental Management:** The policies, programmes, management and institutional arrangements relative to forests, floodplains, coastal areas, conservation easements and protected areas.
- **Population Movements and Migration Patterns:** The socio-economic drivers that influence population movements and migration patterns, and how these should be addressed to mitigate the adverse effects of overcrowding and encroachment on danger zones.

- Building Design, Site Planning and Urban Rehabilitation: The policies, regulations, standards and permitting processes relative to disaster-risk reduction-oriented site planning and building design as well as rehabilitation and/or redevelopment of affected areas.
- Institutional Arrangements and Governance: The policies, practices, organizational structures, financing mechanisms, and operating systems and procedures with regard to management of areas comprising of several local government units with common concerns and challenges. These areas include watersheds, urban agglomerations, coastal zones, protected areas, forests, floodplains, etc.

An issue-oriented review of policies, plans, programmes, organizational structures, institutional arrangements, operating systems and procedures which impact on the themes mentioned above can be undertaken to identify shortcomings and/or gaps, and formulate short, medium and long term action plans.

An urgent immediate task is the preparation of area-specific action plans for directly affected communities, for forward-looking, ecologically sensitive and disaster risk-reduction and management-oriented redevelopment and revitalization. The preparation of these area action plans should be participatory and involve all key stakeholders in the community, government, and private sector. These action plans should also be anchored on a multi-hazard assessment which will determine the levels of risk of the affected communities.

Another immediate task which needs to be continued even in the long term is a stronger and more effective public education and information programme on the symbiotic relationship between man and nature. It is critical that people develop a deeper understanding, appreciation and respect for the natural environment and the ecological processes that sustain life.

Risk sensitive redevelopment planning for Barangay Rizal

A more effective time to apply disaster risk reduction-oriented planning and management, however, is before a disaster happens. This article presents an example of such a process currently being done for the community of Barangay Rizal in Makati City, the Philippines.

The Makati Risk-Sensitive Urban Redevelopment Planning Project is being done by the Earthquakes and Megacities Initiative (EMI) in partnership with the Makati City Government and the community representatives of Barangay Rizal. It involves the urban redevelopment planning of selected zones in the Barangay to modify and lessen the physical, social and economic vulnerability of the community to earthquake-related hazards. The authors were involved as site planning consultants for the project. As of this writing, the data analysis and planning phase is still ongoing, so only the initial results of the study will be discussed.

Makati is one of the 17 cities and municipalities that comprise Metro Manila (see Figure 3). It has a land area of 27.36 sq km, which is 4.3 per cent of Metro Manila's total land area. It is considered as the country's financial and business centre, being home to the headquarters of 40 per cent of the top 1,000 multinational and local corporations. It has a total resident population of 510,383 (2007 Census) but this balloons to almost 3.7 million during weekdays because of people who come here to work, do business, or shop. Among local governments in Metro Manila, it is considered to be more, if not the most advanced in terms of institutional competencies and capacities in disaster risk management.

Barangay Rizal is one of the 33 *barangays* (smallest political unit) of Makati City (see Figure 4). Located on the eastern fringe of Makati, it is part of a cluster of several *barangays* which are medium-density residential areas. The *barangay* was chosen as pilot area for the project because of the negative combination of

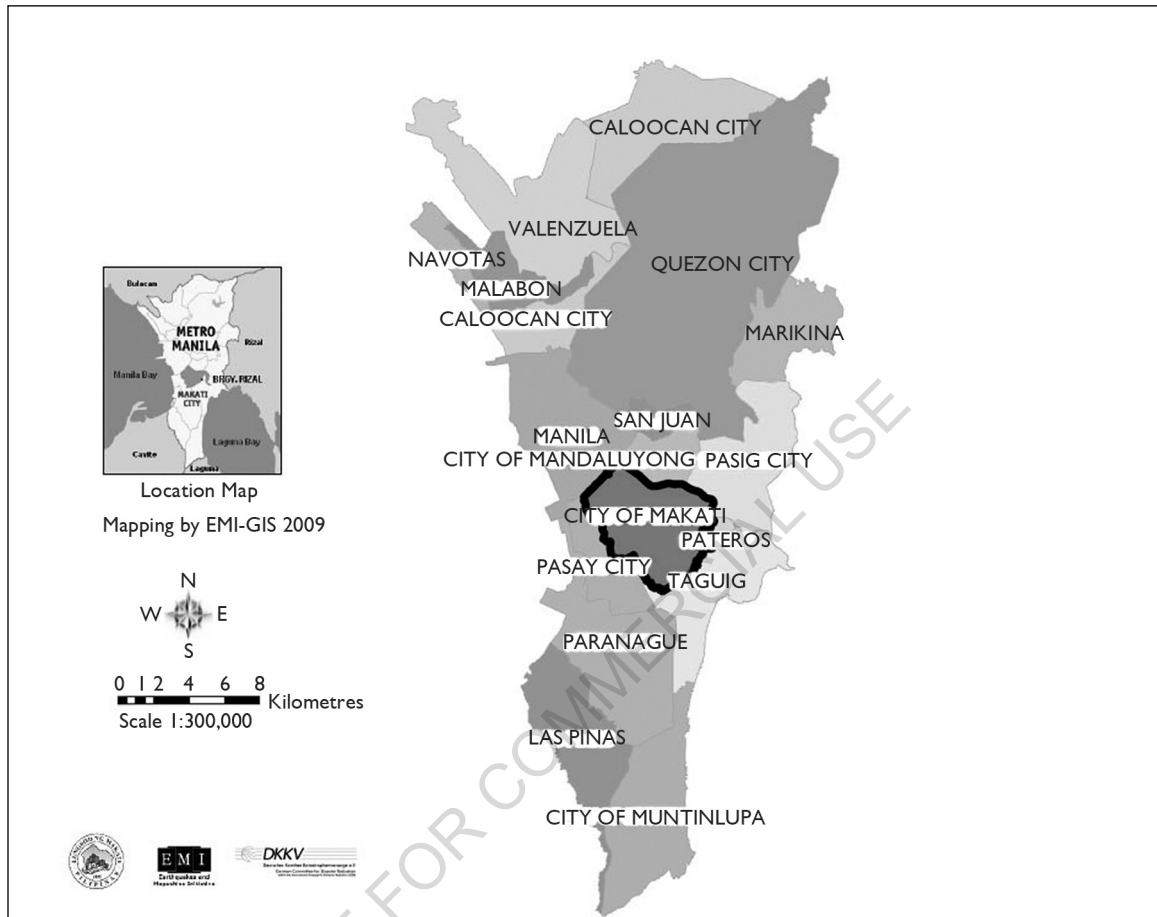


Figure 3. Location of Makati City

Source: Makati Risk Sensitive Urban Redevelopment Planning Project.

its susceptibility to earthquake hazards and its socio-economic conditions. Running along the north-western portion of Barangay Rizal is the Marikina West Valley Fault (see Figure 5), which, according to the Metro Manila Earthquake Impact Reduction Study (MMEIRS), is the fault expected to cause the largest impact in the metropolis. According to MMEIRS, an earthquake with a hypothetical magnitude of 7.5 from the fault may generate a surface rupture of about 70 kilometres, with a maximum right lateral displacement of 2–3 metres.

According to MMEIRS, the area is expected to experience maximum earthquake intensities (on the Modified Mercalli Intensity Scale) of 9–10 (and even over 10 in some portions). Based on a detailed study (Khazai, 2009) done for this project, under Model 8, about 70 per cent of Barangay Rizal has a very high potential for liquefaction, while about 30 per cent has a high potential for liquefaction due to its soil type and shallow water table (see Figure 6).

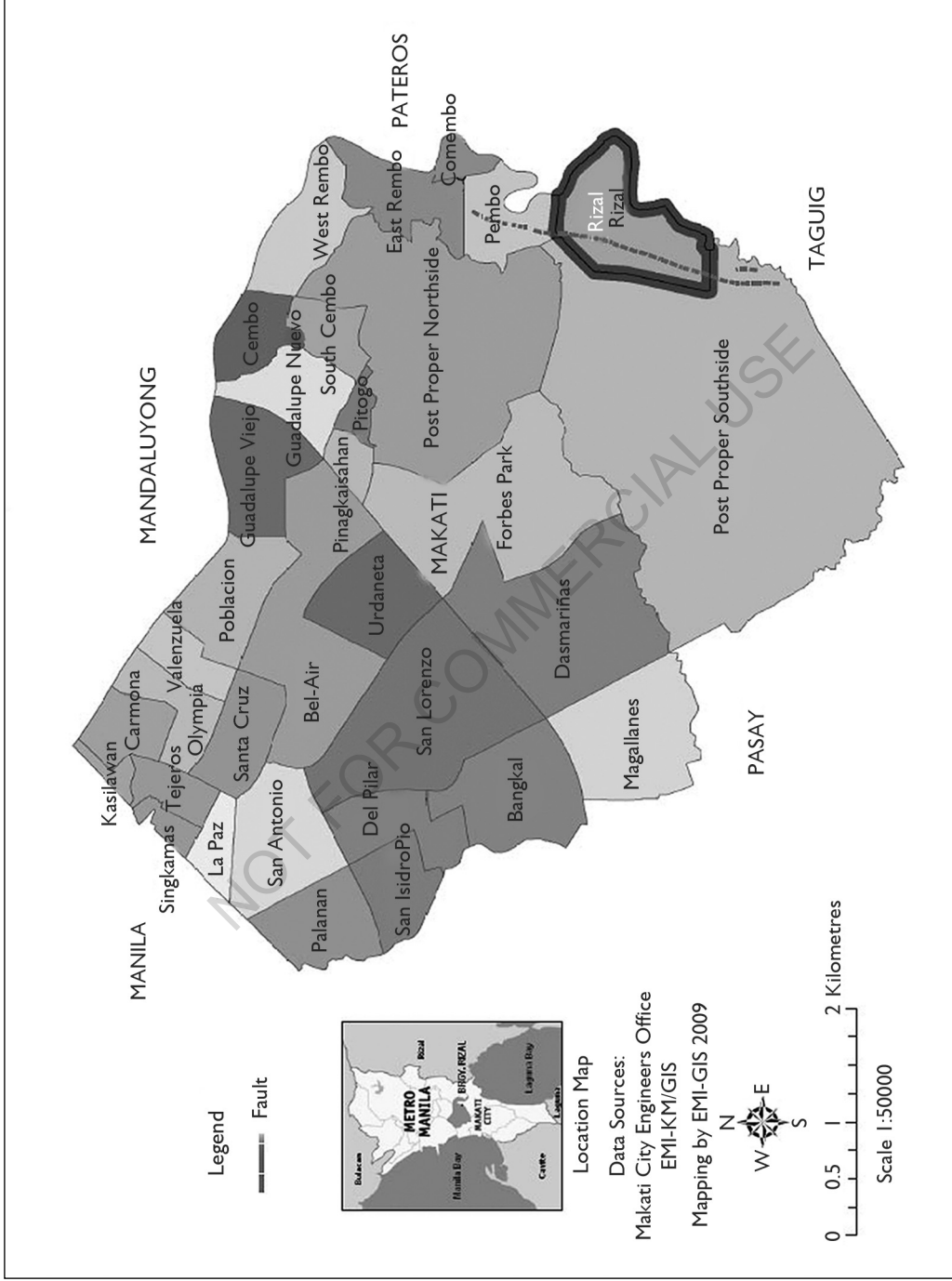


Figure 4. Barangay Rizal Location Map
Source: Makati Risk Sensitive Urban Redevelopment Planning Project.

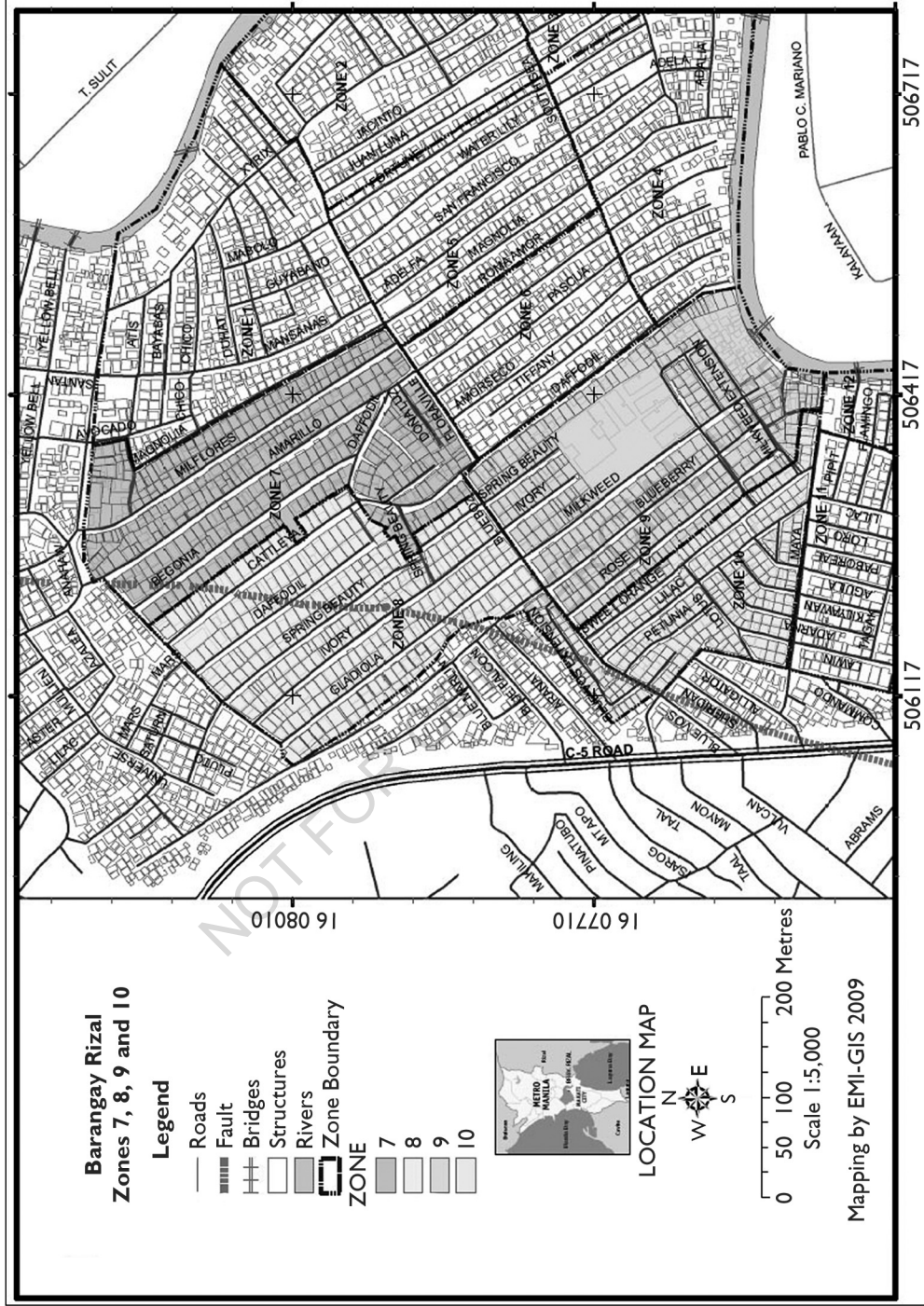


Figure 5. Barangay Rizal Map
Source: Makati Risk Sensitive Urban Redevelopment Planning Project.

Apart from earthquakes, the area is also flood-prone due to its proximity to a creek and its low elevation relative to surrounding areas (see Figure 7). During heavy rains, surface runoff from nearby districts overflow into the area. Portions of the *barangay* were submerged up to waist when Typhoon Ketsana hit the Philippines.

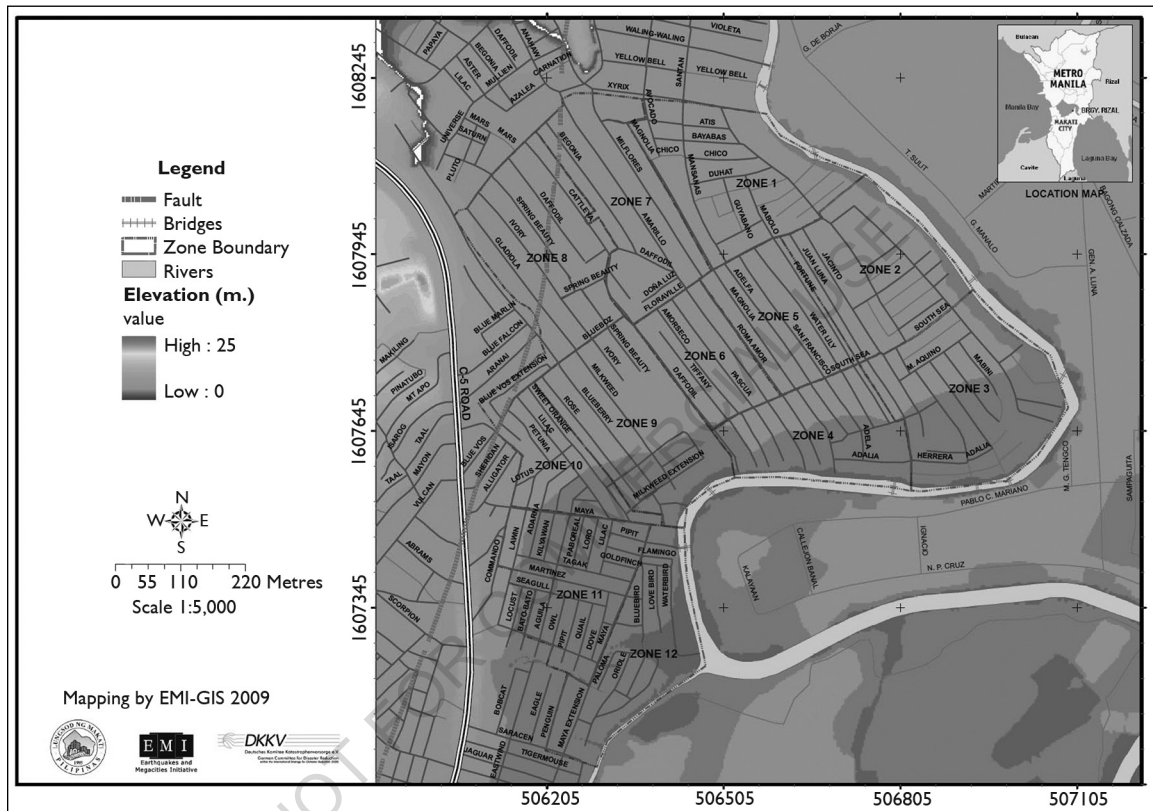


Figure 7. Barangay Rizal Elevation Map

Source: Makati Risk Sensitive Urban Redevelopment Planning Project.

The vulnerability of the area to disasters is heightened by social, economic and physical factors. First is the high population density. According to the 2007 Census, Barangay Rizal has a population of 39,580. It has a land area of 59.4 ha, so its population density is about 666 persons per hectare. This is about 3.6 times higher compared to Makati's overall population density of 187 persons per hectare. Its area is only 2.28 per cent of the area of Makati (2,735 ha), but its population makes up 7.85 per cent of the daytime population of the city. The density in the area is expected to keep increasing, because its proximity to major commercial districts (such as the Bonifacio Global City located right across Circumferential Road 5 or C-5), and the Makati Central Business District farther to the west makes it an ideal residence for those working in these commercial areas. The population is generally low-income with a high level of unemployment.

Results of socio-economic surveys conducted in the area reveal that 16 per cent of households have a combined monthly income that falls below the poverty line. More than half (54 per cent) of the community's productive population are unemployed. About 45 per cent are employed, but only 28 per cent have permanent employment, while the rest either have contractual work or are self-employed (Deocariza et al., 2009).

Government policy was partly responsible for how Barangay Rizal became the congested residential area that it is today. The *barangays* in the eastern section of Makati were originally residential communities for military personnel of the former military camp of Fort Bonifacio. When President Corazon C. Aquino rose to power in 1986, she enunciated as a major policy of her government, the distribution of land to the landless. Fired up by this pronouncement, people from different places in Metro Manila began occupying the land in the guise of people power. Migrants poured into these military residential communities. Consequently, Makati officials subdivided the land in Barangay Pembo (which Rizal was formerly a part of) and awarded the land to landless and homeless constituents (Barangay Rizal Citizen's Charter, 2009). But there was no accompanying plan on how to develop or improve the place.

Today it is a dense settlement of narrow streets lined by small lots with mostly one-two storey houses abutting each other (see Figures 8 and 9). There is no clear hierarchy of roads. Many of the roads in the area are less than 6.5 metres wide, with some falling below 4 metres. Private and public vehicles are usually parked on the road, further decreasing road clearances. Access in and out is very constrained. Aside from narrow roads and constrained access another major concern in the area is the lack of open spaces. No allotment was made for parks or playgrounds, so almost every available space in the area is built up.



Barangay Rizal Zone 7: Aerial Photo



Barangay Rizal Zone 9: Aerial Photo



Barangay Rizal Zone 8: Aerial Photo



Barangay Rizal Zone 10: Aerial Photo

Figure 8. Photos of Structures in Barangay Rizal



Typically streets on the zone, that is Sweet Orange Street (4.25 m), have no sidewalks



Narrow and existing exposed canals along Agila Street (4.00 m)



Encroachment of electrical posts decrease the road width at Milkweed Street extension (4.00 m)

Figure 9. Photos of Roads in Barangay Rizal

A rapid visual screening of buildings for seismic vulnerability revealed that at least one out of every three of the inspected structures may not withstand a seismic event of magnitude 7.2 or higher (Germar et al., 2009). Buildings along the fault trace are particularly vulnerable. Factors that contribute to vulnerability of structures include old age, weak structural systems, irregularities in building form, and poor construction with substandard materials. The proximity of buildings to each other, and the lack of firewalls, also makes them susceptible to fire.

Given these conditions, what are the possible risks for the community if no intervention is done? In the event of a major earthquake, the most highly vulnerable structures in the community could be irreparably damaged or could collapse, and may lead to loss of life (about 20 per cent of structures in the area have more than 10 people living inside). Debris could block the roadways, fire could spread, and there could be thousands of people displaced from their homes for months. The goal of the project is to find ways to reduce these risks by addressing the existing conditions that make the community vulnerable.

The redevelopment plan for the site needs to consider how to reduce risk for these three major aspects: physical vulnerability, social and economic vulnerability; at the same time, it needs to improve the emergency management potential. For physical vulnerability, the main concern is what to do with the structures built on top of the fault zone, and the other highly vulnerable structures scattered throughout the area. Poor construction and non-compliance with building regulations are issues that need to be addressed. For social and economic vulnerability, the high density and increasing population is a concern, as well as vulnerable households who may not have the economic capacity to cope when disaster strikes, and those with vulnerable members, such as those with disabilities, chronic sickness, female heads, and children and the elderly. Related to emergency management is how to improve the mobility in the site, given the narrow and often blocked roads. The need for evacuation areas and temporary shelter is a concern, given that there are almost no major open spaces in the area except the streets.

Given these considerations, a series of planning workshops were undertaken to engage the representatives of the community in the redevelopment process, discuss the risk factors with them and seek their input and guidance in the project. First they were oriented on the hazards and their vulnerabilities. Then they were asked to formulate their vision for the community, given a time frame of 20 years, identify the major problems in the area, and suggest solutions for the three major concerns. The highly participatory planning process facilitated a two-way learning experience between the residents and the planning team, which included a team of experts supported by representatives from Makati City departments. The residents learned about the risks and their implications on their lives, houses, livelihood, etc., while the planning team learned what the residents felt were do-able and/or acceptable risk reduction measures.

The redevelopment plan

The participatory process led to the formulation of a draft redevelopment plan with actions proposed for the short, medium and long term. An identified possible long-term action related to addressing physical vulnerability was to study the possible relocation of families located on top of the fault and within a 5-metre easement on each side as well as those living in very high-risk structures. Technological solutions to these very high-risk structures are not cost-effective. To provide a place for the displaced families, it was proposed that new medium-rise housing be constructed within the *barangay* through land readjustment. This medium-rise housing could be constructed in place of the other very high and high-risk structures. The easement, when cleared up, could then be used as a productive open space such as a park, playgrounds, parking, and a temporary evacuation area as well as serve as a new corridor for utilities and drainage (see Figure 10).

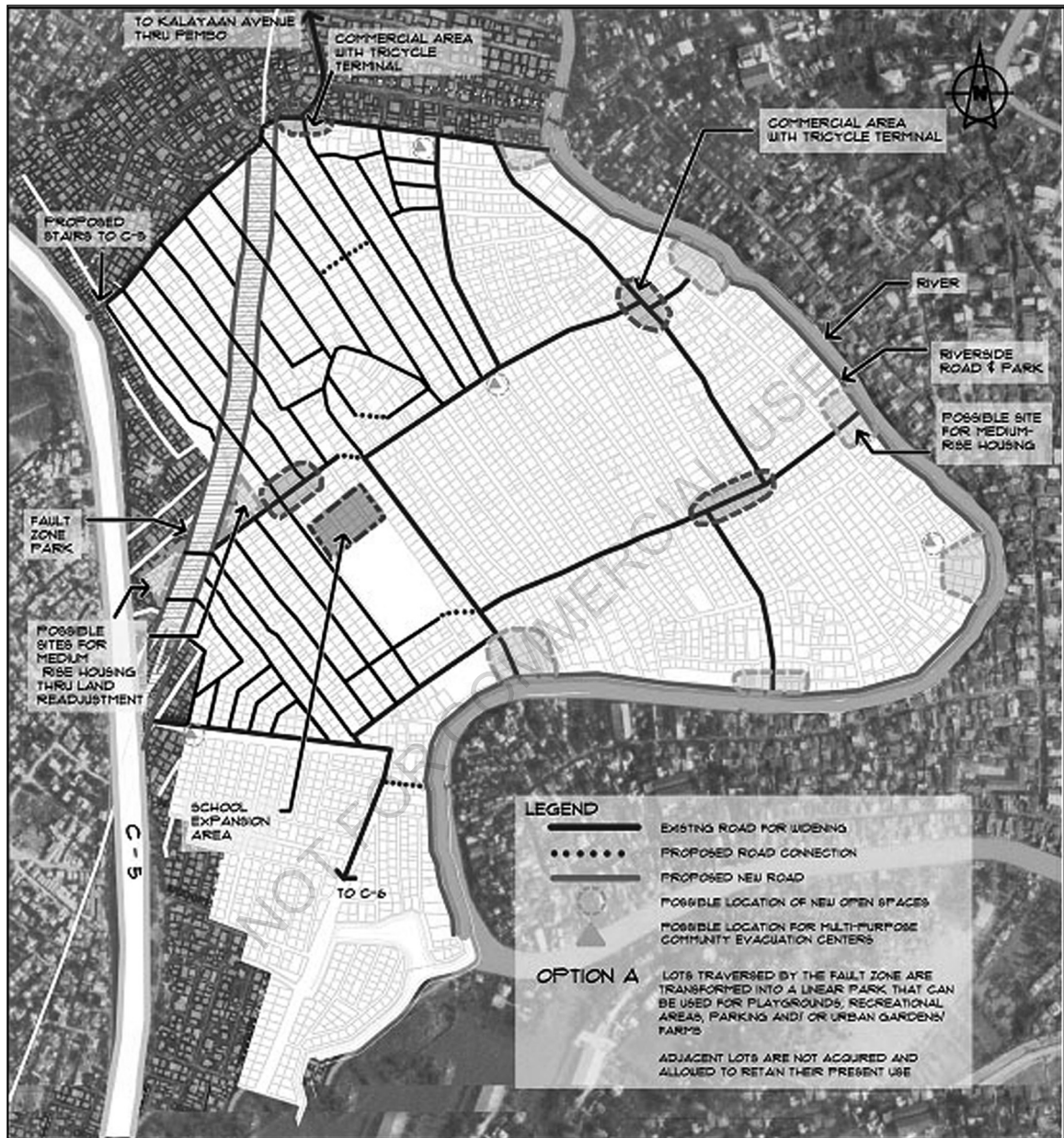


Figure 10. Map of Draft Redevelopment Plan

The construction of a linear park along the nearby creek side was also proposed to add to the open spaces. To create more open space in the long term, a programme for open space acquisition needs to be started in the short term so that the government can acquire land.

To improve mobility, other medium long-term actions included possible widening of major access roads, connecting or opening up dead end streets, and construction of additional alternate entry/exit routes. Short-term actions included setting up regulations for traffic management, land use, and limits on house construction. Designation of emergency routes and evacuation sites were also proposed.

To address social and economic vulnerability, the need for a continuous information and education campaign was emphasized. Training for disaster preparedness and skills training for livelihood improvement were also brought up.

This is the first project of its kind in the Philippines to address the redevelopment of a built-up urban area, keeping in mind the reduction of risk. Thus there are no local precedents which can serve as guide. In addition to the physical risks, the redevelopment plan took into account the following considerations related to implementation:

1. The stakeholders and their interests
2. The nature of property ownership
3. Finance
4. Political commitment

Stakeholders and their interests: For the redevelopment of Barangay Rizal in general and this project in particular, the key stakeholders include the *barangay* residents, the Barangay Council and Zone leaders, the Makati City Government, national government agencies concerned, and the planning team. Through the participative planning process, a consensus was forged among these various stakeholders on the overall vision for the area. But conflicts may still arise when details of the redevelopment plan are fleshed out and people more fully comprehend the trade-offs associated with the plan. While the stakeholders may share the same goals, their interests differ. The residents obviously have a more direct and intense interest in the area, while the other stakeholders may not have the same intensity of interest, but their support and cooperation are essential to achieving success.

Nature of property ownership: An important stakeholder group is the *barangay*'s landowners, regardless of whether or not they are occupying their properties. One of the most challenging tasks in a redevelopment project involving several individually owned lots is consolidating these lands into a few parcels to implement the project redevelopment plan in an integrated manner. These landowners need to be convinced of the benefits of pooling their properties. The fragmented land ownership of Barangay Rizal is most likely one of the main reasons it is bypassed by redevelopment efforts of the private business sector. To achieve the redevelopment objectives, the Makati City Government as well as the Barangay Council will need to forge agreement among the project partners not only on the physical improvement plan but on a package of incentives as well, in order to provide a conducive environment for the proposed redevelopment to materialize.

Finance: In redeveloping Barangay Rizal, none of the stakeholders individually has the capacity to provide the required financing. These will need to be raised from various sources, including the private sector. But the private sector will provide its share of redevelopment resources only when projects are commercially viable, promising attractive returns relative to the risk undertaken. It is necessary for the Makati City Government to create an enabling environment for capital markets to attract private investment that helps the city to promote Barangay Rizal's redevelopment.

Political commitment: The performance of an urban redevelopment project cannot be divorced from the attitudes and aspirations of those who direct and work in it, especially of government which often takes the

initiating and leadership role. Political commitment is critical to achieve effective urban redevelopment. For urban redevelopment projects to work, especially those involving partnerships between government, the community, and the private sector, political risks need to be kept at bay and the partnership needs to be carefully designed. A combination of political acceptance, affordability, and financial sustainability must be attained to ensure positive results. For Barangay Rizal, special attention needs to be given to the needs as well as the potential contribution of the urban poor.

Addressing inhering project constraints

The existing built-up and congested conditions in the planning area do not provide much elbow room to pursue measures that are necessary to achieve an optimal level of earthquake resiliency. The range of possible measures is very constrained.

However, this does not mean that nothing can or should be done; it just limits the actions that can realistically be taken. Thus, the redevelopment plan is somewhat less than ideal but has given more importance to the suggestions of 'do-able' actions from the stakeholders, especially the residents and property owners.

The proposed redevelopment plan addresses this constraint by:

1. Adopting a long-term view, with immediate-, short-, medium- and long-term actions, some of which are continuous (such as a public education and information programme), instead of presenting a choice of redevelopment options (do-nothing, extreme makeover, etc.); and
2. Considering the entire *barangay* as well as adjacent areas in order to provide the necessary elbow room to enable necessary actions such as rehousing of affected families.

Overall, the redevelopment plan adopts the view that the disaster risks in the four zones demand the implementation of certain risk reduction measures (and therefore does not support a do-nothing option). But because some of these measures (such as the fault zone easement) will displace a significant number of households who have limited resources for relocation, it will take a significant amount of time and effort to develop the appropriate legal and administrative mechanisms, as well as to convince these households to accept the project. Thus, certain actions need to be initiated early but with a long-term view towards implementation.

Lessons learnt

The study has generated valuable knowledge in terms of both the substantive content and redevelopment planning process for addressing the earthquake risk of an existing community with severely limited resources. The fact that the project site is virtually all built up, with small lots and narrow streets, and occupied by predominantly low-income households, placed severe limitations on the range of redevelopment actions. Coupled with the uncertainty of when the next earthquake will actually happen, and the residents' tendency to accept a high level of risk, these existing conditions posed a daunting challenge in the formulation of the proposed redevelopment plan. Given that it is a pilot project, the proposed plan is site-specific, but the methodology that was utilized has shown to have great potential for replication.

In spite of the various constraints faced by the project, the study shows that formulating an acceptable risk-sensitive redevelopment plan is possible if the planning process is technically sound, systematic, transparent, participatory and consensus-oriented. Engaging the participation and involvement of the *barangay* officials and zone leaders 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. The systematic approach in data gathering, analysis, and open discussions at the stakeholder workshops helped significantly in developing a deeper appreciation of the risks that the community faces and the potential options for risk reduction. And the sensitivity of the city government representatives and the planning team to the particular socio-economic circumstances and constraints on the part of the affected households was especially helpful in maintaining a spirit of collaboration and cooperation throughout the planning process.

Conclusion

The redevelopment of disaster-prone areas in the Philippines is a challenge due to the inherent vulnerabilities produced by a complicated set of factors. Planning for these areas should be holistic, and should address not only the physical redevelopment of the area, but also aim to strengthen the capacity of the community to respond to the hazards. Identifying the means of implementation (the policies, practices, organizational structures, financing mechanisms) is also important. The value of the redevelopment planning of Barangay Rizal is that it addresses the challenges of making an existing built-up community disaster-resilient. The planning process is still ongoing, but this could serve as a model that could be applied not only in cities and municipalities in the Philippines, but also in similar low-income, high-density communities in other.

References

- A brief history of Barangay Rizal, Citizen's Charter: A Guidebook, Barangay Rizal, Makati, Philippines, 2009.
- Deocariza, Marino, Marino Reyes and Nadia Pulmano. 2009. Vulnerability and capacity analysis (VCA): An assessment of the social and economic vulnerabilities in the redevelopment planning site, Working Paper, Makati Risk-Sensitive Redevelopment Planning Project, Earthquakes and Megacities Initiative, Philippines.
- Germa, Fernando, Raza Tabassum and Bendimerad Fouad. 2009. Report on rapid visual screening of buildings for seismic vulnerability, Working Paper, Makati Risk-Sensitive Redevelopment Planning Project, Earthquakes and Megacities Initiative, Philippines, 3 June 2009.
- Khazai, Bijan. 2009. Liquefaction susceptibility of soils in Barangay Rizal, Makati City, Working Paper, Makati Risk-Sensitive Redevelopment Planning Project, Earthquakes and Megacities Initiative, Philippines, 17 August 2009.
- Marino Deocariza, Marqueza Reyes and Nadia Pulmano. 2009. Vulnerability and capacity analysis (vca): An assessment of the social and economic vulnerabilities in the redevelopment planning site, Working Paper, Makati Risk-Sensitive Redevelopment Planning Project, Earthquakes and Megacities Initiative, Philippines.
- NASA Earth Observator. 2010a. Heavy rains in the Philippines, Retrieved 13 January 2010 from <http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=40346>.
- . 2010b. Rainfall from Typhoon Parma, Retrieved 13 January 2010 from <http://earthobservatory.nasa.gov/IOTD/view.php?id=40687>.
- Philippine Atmospheric, Geophysical and Astronomical Services Association (PAG-ASA). 2010. Tropical cyclone statistics, Retrieved 13 January 2010 from <http://kidlat.pagasa.dost.gov.ph/cab/statfram.html>.

Philippine Map with ASEAN Members by Thecurran, Retrieved 13 January 2010 from <http://en.wikipedia.org/wiki/File:ASEAN-PH.PNG>, Working Maps, Makati Risk-Sensitive Urban Redevelopment Planning Project, Earthquakes and Megacities Initiative, Philippines, December 2009.

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