IDENTIFICATION OF FLOOD RISK MANAGEMENT BARRIERS IN METRO MANILA, PHILIPPINES

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1. INTRODUCTION

Flooding has become a natural event in the Philippines during frequent rain showers, monsoon rains, and, even more so, on typhoon events. Due to the country's location in the Southeast Asia, it frequently experiences typhoons by an average of 20 per year in Philippine area of responsibility and about 9 makes a landfall on the either of its major islands; Luzon, Visayas and Mindanao. Onslaught of flooding brought by typhoons perennially devastates and severs the country environmentally, economically and socially both in the urban areas, such as Metro Manila, and flood prone rural provinces.

In order to alleviate consequent impacts of flooding in the country, a law on typhoon moderation and flood control research and development program has been established since 1970's. In fact, the Pasig river walls were raised and erection of several pumping stations, flood gates and drainage mains resulted soon after (Bankoff, 2003). Then flood mitigation structures such as structural storm drains were initiated again in the early part of the 20th century (Gilbuena et. al, 2013). However, despite efforts given to support the existing law, flooding has sustained to be hazardous which even became a high risk on the contemporary.

Hence, this study aims to identify the risk management constraints and barriers in the national capital region of the Philippines, also known as Metro Manila, through a theoretical diagnostic framework. Barriers and constraints are typologically presented to identify which is the most prevalent and the origin of the barriers were also discerned.

Barriers are defined as obstacles that can be overcome with concerted effort, creative management, change of thinking, prioritization, and related shift of resources, land uses, institutions, etc. (Moser and Ekstrom, 2010). While overcoming barriers does not ultimately lead to success in the implementation and outcomes, understanding the how barriers and constraints on a temporal dimension can be beneficial in planning and management developments in the Philippines.

2. FLOODING IN METRO MANILA

Metro Manila (MM) is located in a semi-alluvial floodplain formed by sediment flow from Meycuayan and Malabon-Tullahan riverbasins in the north and the Marikina river basin in the east. With its vast urbanized drainage basin, this area frequently experiences severe inundation from overflowing rivers and storm surges accompanied by typhoons. The normal high incidence of typhoons brings in heavy rains when it coincides the southwest monsoon occurrence in the months of June to September.

The effect of flooding varies in MM although some cities are acutely susceptible to such occurrences attributed to its location and topography. The extent of flooding in MM may range from a local street flooding to a moderate and regional flooding while incurring damages from low inundations and traffic congestion to considerable property damages and even loss of lives (Liongson, L., 2000). Fig. 1 shows the flood hazard map in Metro Manila for 5-yr, 25-yr and 100-yr return period rains.

3. FLOOD RISK BARRIERS

There are three (3) major type of barriers in flood risk management in MM: political, social, and scientific-related.

3.1 Political

Currently, the Metro Manila Development Authority (MMDA) is the government office in-charge of MM's flood management programs. Originally, this role was under the mandate of the Department of Public Works and Highways (DPWH) until it was transferred to MMDA by the incumbent President in 2002. The issuance of this directive aimed to have a more focused scope in addressing MM's flood problems and to lessen the burden on the DPWH since they handle nationwide projects on flood control and road construction, among others. However, the delineation of work between the two government agencies was not clearly defined and the sole responsibility on the flood management in MM remains uncertain since DPWH continues to conduct several masterplan and feasibility studies for this region. Hence, existence of a government entity that is solely responsible for flood management that supports planning, implementation and maintenance must be established.

These circumstances strongly manifest that there is a lack of direction and leadership within the current organization. There is a need for firm guidance from a leading government organization wherein leaders can motivate, guide and provide vision. The current diverse and separate institutions that manage flood related concerns would require parallel coordination, constant

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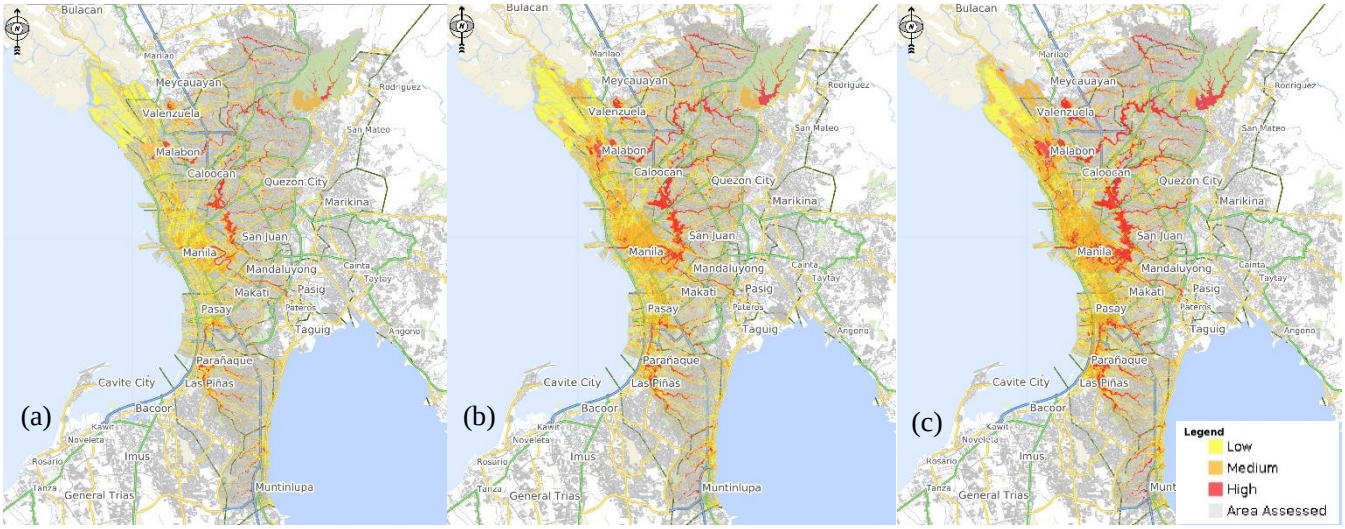

Fig. 1. Flood hazard map in Metro Manila for a) 5- yr, b) 25-yr and c) 100-yr return period rains (Source: DOST-UP Dream and Phil-LIDAR 1 Program)

and information exchange which is tedious and has become lethargic process. Opposition may also arise between the two agencies due to disparity in views on how to effectively manage flood control systems in MM.

In terms of a government budgeting, the government recently sought to increase the budget for flood control measures in MM due to the onslaught of Typhoon Ketsana in 2009. Despite of this increase in budget, flood control projects receive least attention compared to other less expensive and revenue-generating urban infrastructure, such as construction of light rail system or water supply distribution systems (Zoleta-Nantes, 2000).

Flood control infrastructure will take decades to complete. This is due to inefficient management, unwise spending, confusion among inter-agency cooperation on flood mitigation and the lack of political will among government institutions and officials (Zoleta-Nantes, 2000).

3.2 Social

The obsolete urban planning in MM is hampering numerous growing economic opportunities in the region. In fact, the poor urban planning increased the vulnerability of the urban region to flood and earthquake hazards. Rapid urbanization resulted to an overwhelming crowding of poor urban settlements in MM which even led to a massive encroachment of poor informal settlers in drainage ways resulting to inaccessible maintenance and dredging activities at the river waterways and esteros (Zoleta-Nantes, 2000).

Inevitably, the rapid encroachment arises to an endless accumulation of solid wastes in the waterways and esteros as manifested by the lack of discipline and complacenct attitude from the extremely poor and surrounding residential communities. Tons of solid wastes being disposed clogs the drainage ways and increases the likelihood of flooding (Bankoff, 2003). A once natural hazard has become partly human-induced which complicates even more the control and alleviation of flood problems.

Numerous groups are affected by flooding in Metro Manila and exposure varies from the urban poor of the slums to the wealthy families in exclusive residential neighborhood. There is an unequal exposure to disaster risks brought by flood and unequal opportunity deriving from status power relations (Bankoff, 2003; Zoleta-Nantes, 2000). The wealthy can be given priority and immediate response than the urban poor. Nonetheless, risk exposures of the urban poor encroached along the drainage ways and esteros can be lessened if their settlements are demolished. A doable clearing and rehabilitation works in the drainage ways is almost possible if accomplished. However, such ramifications are politically intertwined since incumbent and aspiring politicians deliberately push aside their relocation since the urban poor encroachment constitutes to a large number of possible votes (Bankoff, 2003). Maintenance works are therefore seldom or has never been performed in most areas.

3.3 Scientific-related

Flooding received little attention not only from the Philippine government but also in academics. Primal focus of the government is disbursement allocation for infrastructure, agriculture and peace and order. Hence, the capacity for technological advancements is unavailable while old assets and infrastructure demands for modernization.

Flood damages can be mitigated through reliable estimates of flood risk assessment (Morss et. al, 2005). Unfortunately, there is a lack of sufficient data, high uncertainty and lack of local specificity and local access to it. For example, rainfall data, which is an essential component in rainfall runoff analysis, available on the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) records daily rainfall. Likewise, stream flow data recorded on a daily basis and gauged stations are prioritized to the major river basins only. Access to these data is also restricted if not, it is open for purchase and the cost is per unit parameter. Thus, limited and sparse hydrometeorological information results to high uncertainty estimates on flood estimates and forecasts.

In terms of flood forecasting, PAGASA's capability was only limited to prediction of storm intensity,

prediction of floods using rainfall depth and water levels and real-time updates on the status of major dams for possible spillway water releases (Gilbuena et. al,2013). PAGASA's flood forecasting system does not include floods estimations in Metro Manila and they solely rely on storm intensity as a warning system. Conversely, MMDA's Effective Flood Control Operation and Warning System (EFCOS) is established to reduce the flood in MM but due to lack of funding and data processing systems only water levels and rainfall depths have been monitored.

Moreover, there is also lack of relevant expertise from the agencies in charge of flood control. They mostly rely on technical experts from outside but optimum response from them cannot be expected without actual knowledge and experience on flood hazard.

4. ORIGINS OF THE BARRIERS

The nature of the barrier, its source and location of influence over the barrier may provide a "roadmap" to design strategies to circumvent, remove or at least lower the effects of barriers (Moser and Ekstrom, 2010). The following are the origins of the barrier for each typology:

Political: Flooding has not been recognized as a national problem. The present disaster management scheme in Metro Manila shows an over dependence of LGUs on national government agencies for rescue, relief and evacuation services during emergencies (Zoleta-Nantes, 2000).

Social: Encroachment to drainage ways and esteros ensued from scarcity of livable spaces due to the high cost of lands, housing materials and construction. Records have shown that the value of the land at the cities in MM increased to about 12 to a whopping 400 times over the last century (Bankoff, 2003). Hence, migrants from the rural opt for an interim housing often encroaches to available spaces such as drainage ways alongside esteros. On one hand, lack of available spaces for waste disposal such as sanitary landfills etc. led to an ineffective solid waste management system in MM. This resulted to a societal mindless disposal of wastes on the streets, rivers, and even seas. Correspondingly, clogging coupled with flooding severely hampers the optimal functioning of the pumping stations.

Scientific-related issues: Lack of funding and support from the national government hampers improvement on research and development. Also, there is also a lack of experts and capabilities among the agencies related to flood control management. Philippines has often relied to international experts that does not heuristically possess complexity of flood conditions in the country. In fact, the Philippines only have 189 scientists per million population, far from the ideal number of 380 per million population.

5. OVERCOMING BARRIERS

Ultimately, flood protection and drainage improvement should be addressed in the context of urban sustainable development. Flood damage protection by spatial planning should be achieved through a formulation of a policy that sets out a framework to cover all sources of flooding and contains an integrated portfolio of approaches which reflects both national and local priorities. Urban sustainability and resilient communities can be attained by providing sufficient funding from the national government to local government. Intercommunity cooperation and discipline since flooding is not defined by political boundaries. Micromanagement of solid waste from each household to

6. CONCLUSIONS

Flood management in the Philippines evolved to a complex matter encompassing collectively the political, social and scientific facets while such occurrence has evolved to partly a human-induced hazard as manifested by anthropogenic movement. Appreciation and understanding on barriers and constraints that hampers effective flood control management must be given careful consideration in the planning and implementation process. Altogether, drastic changes in the society in terms of values attitudes, and motivations has to be undertaken to mitigate and completely control flooding the capital region of the Philippines.

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