

# Flood Hazards in Metro Manila: Recognizing Commonalities, Differences, and Courses of Action

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This paper looks at the vulnerability to flood hazards of different urban groups in Metro Manila, the Philippines. It contextualizes and finds similarities and differences in the physical, social, economic and institutional manifestations of severe flood hazards to three groups of people in the mega-city. They are the street children and residents of wealthy neighborhoods and urban poor settlements. It explicates a set of issues that needs to be confronted and a list of appropriate actions that can be taken to initiate a pro-active stance in dealing with the causes and consequences of flood hazards at the local scale. This is necessary for future development planning and hazard mitigation purposes.

## Flood hazards in Southeast Asia cities

Floods are considered by many to be the hazard that affects more people and causes more damage to property than any other (UNDRO, 1976; Cuny, 1990; Gupta, 1990; Palm, 1990). They are produced by a variety of factors in different parts of the world (White 1945; Ward, 1978; Miller, 1999). Most commonly these include: over bank flow on rivers and lakes due to heavy precipitation exacerbated in denuded watersheds by accelerated runoff; urbanization which complicates flooding events by increasing the area of impermeable surfaces by the encroachment of roads, housing and other land uses onto floodplains; the silting of canals and riverbeds or the obstruction of waterways due to improper construction

activities; and the incidence of storm surges in coastal areas that are already experiencing slow acting land subsidence further magnified by rising sea levels.

The majority of Southeast Asia's urban centers are located in low-lying areas along the banks of major river systems that regularly face the risk of flooding. The cities of Hanoi, Jakarta, Kuala Lumpur, Bangkok and Manila are on the deltas of river systems such as the Red River (Vietnam), Ciliwung River (Indonesia), Gumbak-Klang-Batu Rivers (Malaysia), Chao Praya (Bangkok) and the Pasig-Marikina Rivers (Philippines). The river systems often meander all over the cities. These Southeast Asian rivers have submerged extensive areas for centuries and their expansive flood plains and deltas are widely known for major flood events. For example, more than six flooding events have devastated Hanoi since 1913 and eleven severe floods were recorded in Kuala Lumpur between 1949 and 1988 (UN-ESCAP, 1990). Annually, there are about four to five major flood hazard events in Jakarta. Floods devastate Bangkok whenever heavy rainfall incidences coincide with high tidal movements in the Gulf of Thailand (Opassiriwit & Trachod, 1990).

The hydrology of disastrous inundation events in Asia is also changing rapidly. Floods are increasingly intensified and localized in terms of causes and effects (Sehmi, 1989). Flood events in Southeast Asian cities are compounded by watershed deforestation and land subsidence. Encroachment on flood plains, high population density, inadequate solid waste disposal and inefficient management of the city's infrastructure aggravate most inundation events (Djihad, 1990). Rapid economic development, unprecedented expansion of urban centers and the phenomenal urban population increase, that is about three percent per annum, further worsen the flood problems in Southeast Asian cities (Lindfield, 1990).

Urbanized areas in Southeast Asia also encounter a decrease in the security of flood control infrastructure because most flood protection structures were constructed to protect a floodplain from the runoff of a basin that formerly was not highly urbanized. The increase in surface runoff and improper land uses in the basin caused siltation of riverbeds, reservoirs and irrigation canals and increased incidences of flash floods in the down-lying areas. Similarly, the increased urbanization and construction of reservoirs in the tributaries of the Kelang River in Kuala Lumpur increased

the incidence of flash floods in some portions of the city since the 1960s to the 1990s (TCS, 1987).

Compared to the construction of flood control structures, flood-forecasting -which is the real-time estimation of discharge, stage, duration and time of occurrence of flooding at different points - was not given much importance in many Southeast Asian countries. Flood control works, flood forecasting and other flood prevention and mitigation strategies lagged behind the increasing incidence of inundation events in Southeast Asia.

The annual flood problems in major cities of Southeast Asia affect more and more people but they affect people differently. Specifically, floods tend to compound the everyday problems of impoverished people. For example in Malaysia, thousands of poverty-ridden people who migrated from underdeveloped rural areas squat on low-lying public lands (Chan, 1995). Constrained by landlessness, unemployment, underemployment and poverty, they have to face the problem of yearly inundation on the flood plains where their shanties are illegally built. Flood hazards in these urban poor communities result in thousands of deaths due to drowning. They also suffer from direct injuries, diseases and widespread famine.

Until recently, there has not been much attention given to solve the flood hazards of many disaster-prone cities of Southeast Asia. The lack of attention given to flooding problems may be attributed to the transient nature of the flood events. As the rainy season passes, people do not experience floods throughout the rest of the year. Yearly floods are often localized and are not recognized as a national disaster. Little attention is paid to the problem except by those directly affected (Hissink, 1990). Factors such as lack of baseline information, insufficient funding and lack of coordination among government institutions make flood rehabilitation and mitigation planning more difficult to undertake (Wickramanayake et al., 1995). The concentration of communications, information infrastructure and economic activities in urban centers increases the probability that flood losses in the region will be more costly.

Most programs on flood prevention in Southeast Asia are focused only on infrastructure provision. Often, the engineering measures do not materialize rapidly because flood control programs are not priority projects among the local and national governments. Also, flood control projects receive least attention compared to other less expensive and revenue-

generating urban infrastructure, such as the construction of a light rail system or a water supply distribution system. If a flood infrastructure project gets funding, it is beset with problems of coordination in implementation (Lindfield, 1990). Many countries in Southeast Asia now recognize that floods can hamper economic growth in rapidly expanding cities. Flood protection and drainage improvement programs need to be addressed in the context of sustainable urban development and in recognition of the impending serious risks of increased inundation events that will be caused by global warming. They should be intertwined with the goals of equitable, long-term and efficient economic development.

### Flood hazards in the Philippines

The Philippines is one of the most hazard-prone countries in the world (Cola, 1993; Delica, 1993; Benson, 1997). The country has an average of five noticeable earthquakes per day (Daligdig & Besana, 1993). Landslides and seismic waves often follow major tectonic events. The archipelago has 220 volcanoes, eighty-five of which are active. The volcanic debris that results from periodic eruptions is mobilized by rainfall during the southwest monsoon and the resulting mudflow or *lahar* devastates communities and agricultural lands around the volcanoes, such as in Mt. Pinatubo (Zoleta-Nantes & Bautista, 1993).

The Philippines is a typhoon-prone area. From 1948 to 1991, 869 typhoons have passed the Philippine area of responsibility (Weather Branch-PAGASA, 1992). The country experiences an average of 19.6 typhoons a year in its area of responsibility. These meteorological events may have a lower frequency during the El Nino and Southern Oscillation Periods, as many parts of the country experience severe drought in these intervals (Jose, 1993). The normal high incidence of typhoons brings in heavy rains when it coincides with the southwest monsoon occurrence in the months of June to September. Storm surges accompany tropical depressions and cause extreme flood occurrences. They devastate many low-lying coastal areas. The flood plains of Agno, Agusan, Bicol, Cagayan, Cotabato, Pampanga and Panay river systems are highly susceptible to severe flooding (ADB, 1994). Low-lying agriculturally developed and economically productive lands in Bicol, Central Luzon, Eastern Mindanao, Central Samar and Northern Samar regions are also frequently devastated by extreme flooding events (Benson, 1997).

## Flooding in Metro Manila

Floods are by no means the only natural hazard to affect the island of Luzon or the metropolitan area of Manila but they are surely the most pervasive and chronic. Eighteen to 20 flood events occur in Metro Manila each year (Daligdig & Besana, 1993). In 1985, it was estimated that seven percent or 66, 000 hectares of Metro Manila are prone to flooding. In 1990, 14 percent of Metro Manila (86.7 square kilometers) are inundated with floodwaters (JICA, 1990). If the towns of Cainta and Taytay are included, the total flood prone area in the metropolitan region amounts to 103.6 square kilometers. Floods directly affect 190,000 households in the metropolis and inconvenience almost 70 percent of its total population.

However, there has been little effort on the part of governments to address these problems. Nor has flooding received much attention from Philippine academics. University based studies of flooding in Metro Manila are usually limited to identification of flood prone towns and proposals for installing flood control infrastructure (UNESCO, 1951; UNESCO, 1990; JICA, 1990). Such studies are undertaken in support of public works proposals advanced by the Philippine government to secure loans from foreign financial institutions (JICA, 1990). Given the centrality of Manila in Philippine life, the speed and scale of urbanization and the continuing drag that flood damage imposes on a poor nation's economy, it is imperative that a more effective response to flooding be mounted in the near future.

### How is flooding hazard being experienced by different groups in Metro Manila?

There are different vulnerabilities, experiences, coping behavior and responses to flooding among various groups in Metro Manila. The street children, residents of slum and squatter communities, and household members of wealthy residential neighborhoods are not the only groups of Manila residents that experience flooding but they illustrate the range of flood hazard experiences that occur in the city and in similar cities elsewhere. Here the emphasis is on household and community level experience. Most of the analysis focus on the hypothesized correlation of elevated flood losses with certain neighborhoods or groups that are spatially, economically and socially segregated. I expound on the notion that flood losses are best explained by limits on the access of these groups to the formal decision-

making machinery for hazard management, especially during periods of flood events.

Vulnerability is not really a simple function of financial resource scarcity. Financial resources make the poor vulnerable but their lack of entitlements to hazard mitigation resources as compounded by the spatial isolation that reduce their chance to participate in political decision making, cements their vulnerability and exacerbates it in the near future. Political representation is important in breaking the barriers of isolation and in the whole process of hazard planning and mitigation.

The data used for this paper is from a dissertation that I submitted in Rutgers University in January 2000. I did the fieldwork in 1995, 1996, and 1997 in Metro Manila. I did some archival research, observation of urban flooding events, inspection of relevant public records, map analysis and interrogations of populations at risk. I employed participant observation, undertook intensive interviews and assembled case studies among the study groups. The wealthy neighborhoods that were visited are as follows: Dona Juan Subdivision, the New Marikina Village, New Marikina Heights, Evergreen, UE Village, Pleasant Village, Provident Village, St. Gregory Subdivision, San Antonio Village, SSS Village, Teresa Village, Project 4, Project 7, Project 8, and San Jose, Sta. Mesa. One urban poor neighborhood that was studied is the squatter area along *Estero Tripa De Gallina* in Maricaban, Pasay City. The other squatter neighborhoods that were studied are the ones located along the banks of *Estero De Sampaloc* in Concepcion Aguila, San Miguel, Manila and the slum neighborhoods in *Bagong Buhay*, Galas, Quezon City. The Marikina Squatter Relocation Site along the eastern bank of the Marikina River in Malanday, Calumpang, Marikina was also studied. The *Kanlungan sa ER-MA* Ministry referred one homeless minor to the author for an interview. The other nine homeless minors were interviewed in the city lanes of Manila such as the streets of M. H. Del Pilar, Kalaw, Taft, C. M. Recto, Legarda, and Aurora.

## Urbanization and floods

Flash flood occurrence was already evident in Manila during the Spanish colonial period. After heavy downpours, the paved streets of ancient Manila influenced the amount of rainwater that stayed on the road surface. At the beginning of the 20th century, Manila had approximately 2,000

hectares of urbanized area (Cammayo, 1990). Metro Manila's urbanized area in the 1990s expanded into a 30-kilometer radius from the City of Manila (op cit., 4). The rapid expansion of concrete surfaces in Metro Manila has created more impervious areas.

Rapid urbanization has encouraged massive movements of rural dwellers to urban centers and has led to overcrowding of poor urban settlements in the metropolis. This unplanned and uncoordinated urban growth has adversely deteriorated the condition of the city's drainage system (Figures 1 and 2).

The number of reclamation projects that are lined along the coast of Manila Bay reflects the need for additional urban space. The reclaimed areas generally have a higher elevation (2 to 3 meters) than the mainland coastal plains. The difference in elevation has lessened the flow gradient of water in adjoining sewer and drainage systems in mainland coastal plains. The reclamation sites obstruct and retard the natural seaward flow of water from mainland streams and have increased flooding incidences in Baclaran and Maricaban districts in the cities of Paranaque and Pasay.

Land-use changes in hills and mountains surrounding the National Capital Region influence flooding patterns in the metropolis. The Marikina Watershed was classified as 28,000 hectares of forestlands in 1904 (JOFCA, 1993). The forestlands in the watershed area have been transformed into paddies, grasslands, fruit orchards or dry fields, villages, residential subdivisions and extensive pig farms. According to the National Water Resources Council, 25 to 50 percent of the topsoil in the watershed has already been eroded (JOFCA, 1993). The eroded top soil has silted most of the river systems, most particularly the Marikina and Pasig River systems, has decreased the loading capacity and has led to faster over banking during periods of high water level.

Flooded areas spread from the low-lying areas in the coastal parts of Manila, Navotas and Malabon, and along the banks of San Juan and Pasig Rivers in the 1950s to the suburban areas of Manila, Quezon City, Pasay, San Juan and Kalookan in the 1960s and 1970s. The squatter areas that were mushrooming along the banks of *esteros* and rivers and in other marginal locations were regularly inundated not only once but several times each year. Flood incidence expanded in the 1980s in the increasingly urbanized low-lying areas in Pasig and Marikina and along the shores of



**Figure 1.** The scarcity of affordable build-able lands and living spaces has led migrants to build their homes on top of hazardous landfills or dumpsites.



**Figure 2.** As squatter communities encroach on the drainage canals' service roads, the esteros become inaccessible for dredging activities and solid wastes accumulate on the waterways.



Laguna Bay, most particularly in Tagig and Pateros. Well-off residences in subdivisions built on former agricultural lands are also flood-prone. Flooding became prevalent even in relatively high places in Quezon City, Makati, Manila, Paranaque, Muntinlupa, Pasig, and San Juan in the 1990s mainly due to substandard housing infrastructure (Figure 3). The depths of flooding also increased through time.

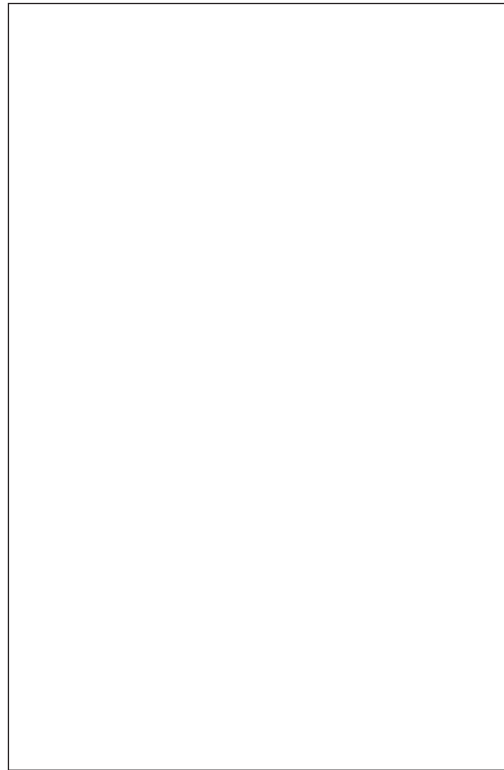
The amount of flood losses escalates through time and health-related risks such as *dengue* fever, *diarrhea* diseases, unsanitary conditions, and water contamination have become prevalent. The lack of priority attention afforded by the elected local government officials and members of the Philippine Congress has been evident in the past fifty years. For example, the plan that was drawn in the early 1950s was implemented partly in the 1960s, continued at a very slow pace in the 1970s and has continued to the present time. Problems of funding sources and efficient handling of whatever little was available were also evident through the years but nothing had really been done to correct the inefficient management and corrupt practices associated with the construction of flood control measures.

### Government actions on Metro Manila's flooding problems

Government responses to flooding in Metro Manila range from relief provision to the construction of flood control structures. Several laws had also been promulgated to address other factors that were contributory to flooding such as improper land use development. The following section lists the range of these responses. There is lack of attention given to other issues such as flood insurance provision and availability and upland watershed protection. There is also neglect in the development and improvement of emergency management and disaster relief programs.

In accordance with Executive Order Number 24 that took effect in January 1987, the Department of Public Works and Highways (DPWH) has lead the construction, operation and maintenance of Metro Manila's flood-control infrastructure. The DPWH has seven engineering districts in the metropolis and 10 mobile flood control crews for flood infrastructure maintenance. The DPWH has disseminated information on proper waste disposal. They have cooperated in squatter clearance and relocation. They have required subdivision developers to install drainage and sewerage systems.

**Figure 3.** Flooded areas in Metro Manila in the 1990s



The National Economic and Development Authority (NEDA) and the Laguna Lake Development Authority (LLDA) have joined the agency in its flood control programs. The Department of Environment and Natural Resources (DENR) helps in rehabilitating Metro Manila's river systems and waterways. The Metropolitan Waterworks and Sewerage Systems (MWSS) has cooperated with the DPWH on water and sewerage infrastructure development in Metro Manila. They have also implemented a program called Program to Reduce and Eliminate Sewage from Streets (PROGRESS).

The local government units and the Metropolitan Manila Commission (now the Metropolitan Manila Development Authority or MMDA) have undertaken urban sanitation and drainage improvement. Local government units (LGUs) have undertaken only minor drainage activities because their engineering departments have few staff and limited capabilities to undertake major engineering and drainage projects.

Initial large-scale projects on flood control in Metro Manila were initiated in February 1974. The river walls of Pasig River were raised to accommodate a water level of 14 meters—a level that corresponds to the expected depth of flood with a 10 year return period (UN-HSC, 1977). As of 1997 there were twelve operating pump stations, each with a capacity to move 167 cubic meters of floodwaters per second. This is sufficient to limit flooding to about 0.2 meter depths in the vicinity of the pumping stations (JICA, 1990). The pump stations are operational in Aviles, Balete, Binondo, Libertad, Makati, Paco, Pandacan, Quiapo, Sta. Clara, *Tripa de Gallina*, and Valencia. There are floodgates in Escolta, Pandacan, and Santo Bañez.

The DPWH has built the Rosario Weir in the Manggahan Flood Way, the Napindan Hydraulic Control Structure, the Pasig River walls, and planned the construction of the Marikina Flood Control Structure, Paranaque Spillway, and the Marikina Dam. The Napindan Hydraulic Control Structure is a large spillway dam that regulates the water level of Laguna Lake and controls the flow of saline and polluted water from Pasig River into the lake. The Manggahan Floodway has diverted excess water flow from the Marikina River into Laguna de Bay (UN-ESCAP, 1990). If the lake's water level is high the Manggahan Floodway structure is closed. If the Marikina River Flood Control Structure (MRCS) is be constructed

and completed, it can accommodate a flood that comes once every one hundred years—a flood with a flow rate of 3,300 cubic meters of water per second.

The DPWH and the LLDA plan to pump water out of Laguna de Bay during the dry season to have more water storage space during the rainy season. They propose to build dikes on the lakeshore to prevent floods within the vicinity. There are proposals to construct silt containment dams on the lake's tributaries to reduce the lake siltation (op cit., 49).

It has been estimated that approximately P 200 million pesos (US \$ 7.6 million) is needed for the construction of additional flood control infrastructure per year. This amount does not yet include operation and maintenance expenses. Taxes from real estate and cinema revenues are proposed sources of funds for building flood control infrastructure. However, these proposals do not have the active support of the Philippine Congress and elected government officials. Altogether, the construction of flood control infrastructure will take decades to complete. This is due to inefficient management, unwise spending of fiscal resources, confusion over inter-agency cooperation on flood mitigation, and lack of political will among government officials. Metro Manila's Flood Control and Drainage Plan covers only 9 percent of Metro Manila (Cammayo, 1990).

There are controversies that have attended structural flood protection policies in the United States and, to a lesser extent, other countries. Associated with the notion that calamity funds are being used as a political leverage, flood structures are generally regarded as insufficient and often counterproductive means for responding to flooding (see Platt, 1999). One will find the same condition in Metro Manila. Calamity funds are often used for political aggrandizement. In Metropolitan Manila's case, however, the proper construction of flood control is not only favored but is a necessity due to lack of flood control measures and improper land uses.

### Flood warning system in the metropolis

Two agencies are responsible for issuing early warning on disastrous events: the Philippine Institute of Volcanology and Seismology (PHIVOLCS) and the Philippine Atmospheric Geophysical and

Astronomical Services Administration (PAGASA). PHIVOLCS issues warnings on volcanic activities and earthquakes while PAGASA disseminates information on weather changes and climate conditions and undertakes typhoon and flood forecasting and monitoring. PAGASA has limited capabilities to issue on-time and accurate early disaster warning. Nevertheless, the PAGASA issues flood warnings in Metro Manila. The meteorologists of PAGASA base their information from rainfall intensity, elevation and past history of flood occurrence in the area. In a typhoon-associated flood, inundation warning is incorporated into a typhoon prediction. The PAGASA Data Center also gathers inputs from the Effective Flood Control Operations System (EFCOS) Project that was completed on October 16, 1993 (DPWH, 1994). The EFCOS Project's main features are a telemetry system that is controlled at the Rosario Master Control Station. The DPWH notes that it operates by gathering "real time rainfall and water level data obtained from two rainfall gauge stations at Boso-Boso and Mt. Oro, and from nine water level gauge stations.... The same real time data is sent and monitored at the Napindan HCS, DPWH Central Office and Data Information Center of PAGASA via Antipolo Relay Station (op cit., 13)." As indicated by the DPWH's 1994 report, it is now possible to determine in advance the magnitude/size of flood emanating from the upper Marikina Watershed.

However, most town and city councils are not equipped with information that facilitates an efficient disaster warning and emergency evacuation. For example, there are no available flood maps that will indicate which areas are at risk, nor what flood depths are to be expected on certain flood magnitudes. There could be an exception and this is Solidum's 1986 flood map that was cited by Punongbayan in 1987. The map was supposedly based on the watermarks of 15-16 August 1986 floods.

### *Barangay* officials and flood hazards management

Town and *barangay* officials in Metropolitan Manila have taken the initiative of issuing flood warnings as in the case of the October 1988 flood in Marikina. *Barangay* officials had transmitted warning to the population at risk in one hour and 20 minutes. A common type of local warning is sounding the town hall's siren, when it is available or functional, while the traditional way is ringing the church bells. However, cities and

towns have expanded in size and church bells are heard only within a short distance. Increasingly, various radio stations have provided disaster warnings and emergency instructions.

Not many cities and municipalities of the National Capital Region possess appropriate technologies or institutions that would make possible immediate reactions designed to lessen the risks and impacts of flooding (Alejandrino, n. d.).

The *barangay* officials are the ones directly confronting the problems that are brought about by the flood hazards of Metro Manila. They are the primary solution finders, not only of the everyday issues and concerns in their neighborhoods, but also during the onset of flooding and post-disaster periods. They are a very rich source of information about relief provision, emergency management and recovery programs in their own neighborhoods and political units. Due to their familiarity with flood experiences of their constituents they can become empiricists and can be consulted on matters that pertain to disaster management. Their first hand experiences and hands-on knowledge in handling emergency activities can be gathered and documented to build a rich pool of information that can serve as basis or guidelines that may improve service delivery and disaster reduction or mitigation programs at the local level.

The *barangay* officials clearly indicate their realization that, regardless of government fund availability, they are the ones primarily responsible for providing assistance to their constituents during emergency periods. However, there are indications that their confidence in the capability of elected city and municipal government officials is eroding. They are also questioning the effective implementation of the laws that will improve the quality of the environments in their constituencies, the seriousness in the elected officials' intent to provide help to the affected communities, and, the elected officials' leadership during emergency periods.

The *barangay* officials often rely on themselves and whatever scant resources they have to provide assistance to devastated constituents. Local officials can learn the values of self-reliance, creative and efficient facilitation and mobilization of scant resources, community spirit, and the true practice and meaning of public service and leadership among these *barangay* officials.

## The commonalities and variations in flood experiences of three different groups in Metro Manila

The data supplied by wealthy respondents provide a number of important findings. First, the wealthy respondents experience significant flood impacts and are active in defense of their own interests. The wealthy are often capable of protecting themselves from flood hazards by using their own reserves of resources, for example, in flood-proofing their houses. They are also more capable of finding solutions on a neighborhood or community level. They do not tend to look to national and regional governments for aid except to protect them against inroads on their neighborhoods by the poor and the homeless. But they often possess effective political connections at the local level that can help them direct much needed resources in flood-proofing their areas such as in elevating street levels and construction of drainage canals. Because of their increased mobility due to availability of private transportation, they work in relatively distant places. They are mostly the ones inconvenienced by increased traffic congestion during flooding periods. They are able to deal with these problems however by measures that their financial capability can support, such as spending the night in a hotel or in a relative's or family friend's house in one part of the metropolis. The findings tend to agree that flooding causes more problems for children than for any other age, gender or employment category in wealthy neighborhoods. Male heads of households and female domestic workers in wealthy neighborhoods are also cited as being significantly affected by flooding, whereas male servants are less often identified as being heavily impacted probably because the field of providing domestic help services is dominated by females.

Finally, as exhibited by the capability of the residents of wealthy subdivisions to mobilize their neighborhood constituents, the rich are a source of potential support for programs that can lead to improved flood protection policies and programs. One example is that they can exert some pressures on public officials to require the production of flood hazard maps and in making them available in the town halls. The wealthy can provide the necessary logistics and cooperate with other urban groups in providing the needed initiatives and leadership in mobilizing community actions. This scenario however is promising only if the wealthy neighborhood associations can be mobilized and encouraged to work on a set of common goals and complementary concerns with the poor and the homeless.

The data provided by the urban poor indicate that their flood problems are intimately linked to survival problems such as decent housing availability, infrastructure maintenance (such as energy, sewer system, and water) and financial resource scarcity. Their flood losses are relatively smaller in terms of monetary value if compared to the monetary value of the flood losses of the residents of wealthy neighborhoods. However, the flood losses incurred by the urban poor have more adverse impacts on their livelihoods, daily survival and their future capability to deal with flood hazards. Their responses also pointed out that they need considerable government support and interventions during hazardous conditions. However, the amount of government assistance that they receive is not commensurate to the level of suffering that they bear on a yearly basis. They have indicated that the network of neighbors, friends and relatives are the most dependable sources of help during flood hazard events. Their networking strategy however is limited only to provision of immediate help during flood events and post-flooding periods. They do not have a community wide networking support that can facilitate efficient delivery of their daily and emergency needs. The lack of a community-wide hazard network is a reason for their failure to embark on activities and programs that will address flood vulnerability reduction in the long run. The primacy of earning a livelihood to support their daily subsistence prevents the urban poor from finding ample time to organize them to come up with long-term flood-reduction programs. Finally, there is a general feeling of government neglect and apathy among the urban poor. They indicate that they are increasingly becoming aware of the implications of flood hazards in their daily survival and future encounters with floods and other devastating events. The urban poor respondents have realized the necessity of finding solutions to flood problems. This makes them potentially rich sources of leadership initiatives and support for community-wide mobilization and other collective efforts.

The government is not really paying attention to the needs of the homeless minors. Although there is a government agency that is assigned to look after their welfare, the street children are not on their priority agenda. The institution lacks funding and human resources that will focus on improving the plight of the homeless minors. The lack of government funding on the provision of medical and other services is prevalent in all government levels such as local, regional or national. There are no laws or legislation that clearly stipulates activities and programs that will address the needs of the street children, such as child-care provision, permanent or short-term housing availability or availability of health services and medical



facilities. Also, the strict implementation and monitoring of laws that are aimed at protecting the welfare of child workers, most especially on young minors that are involved in street selling and other informal economic activities, are lacking. The superficiality of programs and activities that are undertaken by civic groups and local governments on issues concerning street children is very salient.

Economic power is a decisive factor in the level of vulnerability that impinges on any group or household. Household resources and financial support enable access to less flood-prone areas. In times of emergency and recovery periods however, access to and influence over government authorities enable the provision of emergency facilities and hazard reduction system. The following two tables summarize some important indicators that can be used to describe the nature of the losses that are experienced by each group. The tables analyze the dynamics of vulnerabilities of the three urban groups.

Drawing on the two tables and from earlier discussions, the only thing that all respondents share is the experience of having been inundated by floods. The absence of flood insurance among the households interviewed is evident, too. Otherwise they are stratified and differentiated by income, savings level, house size, loss totals etc.

Based on the amount of peso losses, one can argue that the wealthy neighborhoods are more vulnerable to flood hazards in terms of total amount of losses. Wealthy residents bear a lot of losses but based on their possessions they can easily recover from the losses. They are able to recover quickly from the impacts of flood hazards and the burden of past flood events is not transferred to the immediate future. The value of a peso means less to a resident of a wealthy neighborhood than it is to a street child or urban poor.

Urban poor and the street children bear the heaviest absolute losses because they have very few resources in the first place. They recover the slowest. The urban poor suffer flood losses and incur debts that they are not able to pay immediately. The debts are retained for several years and compete with limited earnings of the household that provide for their daily subsistence. One can argue that the street children suffer the smallest losses in terms of monetary amount. One can also argue that the street children are already miserable and their lives cannot be made much more

**Table 1. A brief summary of some important findings about the three urban groups**

	<b>Residents of wealthy subdivisions</b>	<b>Urban poor in slums and squatter areas</b>	<b>Homeless street children</b>
Size of dwelling unit: living area per household	Concrete houses' floor area: from 150 square meters to 400 square meters; lot area ranges from 220 square meters to 800 square meters	Rented rooms have floor areas of 10 - 30 square meters. Shanties, apartment units or houses have floor areas of 20 to 75 square meters	Sleeping quarters on street pavement such as street vendor tables or wooden boxes; Shanties with 10 to 30 square meters living space
Household income per month	P 7,500.00 pesos - P 68,000.00 pesos (US\$ 285.82 - 2,591.46 as of July 1996)	Less than P 1,200.00 to P 12,000.00 pesos (US\$ 45.73 - 457.30)	Less than P 50 pesos a day. (US\$ 1.90/day or approximately US\$ 58.90/mo)
Savings per month	Expenditures range from two percent to 74% of monthly income. Monthly savings range from 98% to 26% of income.	Spend about 37% up to over 583% of income. Savings range from a deficit of -483% to 62.78% of income.	They spend all their earnings. No savings.
Physical inundation in flood waters	97% were immersed in flood waters; 39% of respondents' houses were inundated but were not structurally damaged.	95% have experienced inundation. 85% of respondents' houses were carried or destroyed by floodwaters.	100% have been immersed in floodwaters; shanties were carried away by floodwaters
Wage losses due to floods per day	Zero to P 6,000.00 pesos (US\$ 228.63)	Range from P 40.00 (US\$ 1.52) to P 1,000.00 (US\$ 38.10) or an average of P 340.00 (US\$ 12.95)	P 20.00 to P 50.00 pesos (US\$ 0.76 to 1.90 )
Damage to household resources per flooding event	From P 2,000.00 to P 50,000.00 pesos (US\$ 76.21 to 1,905.48) Average loss is P 17,000.00 (US\$ 647.86)	P 1,000.00 to P 50,000.00 (US\$ 87.10 to 1,905.48. The average loss is P 12,690.00 (US\$ 483.61).	Zero to P 10,000.00 (US\$ 381.09)
Length of time for repair work to get completed	Few days to few weeks	Few days to few weeks	Few days
Length of time needed to repay loans	Several months	Several years	No data
Number of insurance policy holders	One respondent has a FIP for appliances. No homeowner has flood insurance for other property. Only 18% are buying FIP in the future	No one has flood insurance of any kind. No one has any intention of buying flood insurance in the future.	No insurance coverage.
Number of interviews	N = 39	N = 39	N = 10

**Table 2. Coping activities of the three groups in times of flood event**

Residents of wealthy villages N = 39	<ul style="list-style-type: none"> <li>- pray, clean up, self-medicate, stay inside their homes</li> <li>- stock up food, prepare flash lights and other emergency tools</li> <li>- bring extra sets of clothes, shoes to offices or schools</li> <li>- move furniture and appliances upstairs before the rainy season</li> <li>- keep their refrigerators and furniture on wooden stilts</li> <li>- move their treasured items to relatives' homes in elevated places</li> <li>- park their cars on higher areas</li> <li>- buy boats as emergency transportation vehicles</li> <li>- dispose of garbage properly and clean their drainage canals</li> <li>- troop to nearby hotels to have uninterrupted power and water supply</li> <li>- work long hours after the flooding events</li> <li>- get loans from office, bank, friends and relatives</li> <li>- use their savings to cover flood losses</li> <li>- build second stories and added another floor or level to their dwelling structures</li> <li>- elevate the level of the first floor of their houses</li> <li>- spend P 40, 000.00 to P 75, 000.00 pesos for filling materials to elevate their lots</li> <li>- sell their homes or buy a new house in a flood-free place</li> <li>- the homeowners' associations raised money to build flood walls around the villages</li> <li>- purchased boats steered by persons walking on floodwaters</li> <li>- planted trees and installed efficient garbage collection and disposal system</li> <li>- maintained pumps to draw out flood waters from their subdivision to adjoining places</li> <li>- collect an additional monthly contribution for pump maintenance and operator's salary</li> </ul>
Urban poor in slums and squatter areas N = 39	<ul style="list-style-type: none"> <li>- strengthen the house posts</li> <li>- stock up canned goods and candles</li> <li>- pack things ahead of time</li> <li>- stay calm, pray and exercise perseverance</li> <li>- use plastic water basins as buoys</li> <li>- use wide planks of wood as rafts to transport themselves and their few possessions</li> <li>- go to evacuation centers, if there are open ones</li> <li>- observe precautions on flooded streets to avoid open manholes</li> <li>- be extra careful so as not to be wounded by concealed sharp objects</li> <li>- avoid being electrocuted by exposed live wires</li> <li>- cut down food consumption and expenses on clothing, shelter and recreation</li> <li>- self-medicate and buy over-the-counter medication</li> <li>- work extra hours, if employment is available</li> <li>- cut their expenses</li> <li>- children stop going to school</li> <li>- all household members engage in any form of employment</li> </ul>
Street Children N = 10	<ul style="list-style-type: none"> <li>- do not go to a clinic or see a doctor - they buy cold, diarrhea and fever medications from convenient stores</li> <li>- simply let their fever or other sicknesses pass away</li> <li>- continue working, e.g., dust off the <i>jeepney</i> passengers' shoes even if one has fever</li> <li>- ride a <i>jeepney</i> and get off in a flood-free area to find temporary sleeping quarters</li> <li>- scavenge wood planks, big stones or hollow blocks</li> <li>- build makeshift bridges between pavements of flooded alleys</li> <li>- collect coins from anyone who crosses the makeshift bridges</li> <li>- push flooded cars</li> <li>- wash one's body and clothes in flooded streets</li> <li>- dry soaked clothes by facing air conditioning units in the back of most buildings</li> <li>- hop on top of air conditioning units to keep warm and sleep there</li> <li>- stay for a night or two in the backyard of a flood-free apartment</li> </ul>

depressing by flooding. However, this study contends that the street children bear the heaviest losses relative to their means and to what measly belongings they may have. Also, they never reach a point where the term recovery becomes meaningful in the way that wealthy and poor residents understand it.

Based on the earlier discussions and on some data presented in Table 2, the residents of wealthy communities have the capability to make the widest range of adjustments to flooding (22). Most of their coping strategies for flood hazards are concerned with (1) protecting their property during floods; (2) getting economic assistance during the recovery period; and (3) seeking ways to mitigate the long-term risks of flooding. They exhibit preventive and impact minimizing strategies in both neighborhood and community levels.

The residents of poor neighborhoods, because of their scarce resources, are able to practice a significantly narrower range of adjustment (16). Most of the coping strategies that are exhibited by the urban poor are concerned with ensuring personal safety during the flood or with securing increased earnings to cover flood losses and related expenses. There is an absence of community or neighborhood-based programs or concerted efforts that aim to reduce future flood losses. There are no impact-minimization or hazard reduction strategies and their efforts are mainly focused on the maintenance or creation of employment opportunities.

The homeless street children are able to practice only the narrowest range of adjustment (11) and most of these are concerned with personal survival during the floods. They do not receive help from any public or private agencies. The need to develop social support networks for the homeless minors is glaring.

The set of findings directs our attention to the needs of specific urban groups in times of calamities. It suggests what interventions are needed in different communities (in terms of institutional, social, medical programs and services). It presents some clues that neighborhood self-based programs should be prioritized and given utmost support in flood-stricken locations. It also makes salient the need to provide decent housing in safer locations for the urban poor and homeless street children. It also highlights the deficiency of infrastructure such as water supply and sewer system.

The data also suggests the paucity of non-governmental organizations in the area of hazard mitigation and emergency management. The support and resources of non-governmental organizations should be solicited. Non-governmental organizations have material and human resources that can be mobilized to address the needs of hazard-stricken communities. They can also provide social support networking among the impoverished groups.

### What actions are appropriate to deal with the flood problems of the urban poor, the street children, and the wealthy residents of Metro Manila?

Flood risk analysis, flood forecasting, and flood vulnerability assessment are needed to be instituted or expanded in many parts of the country (UN-ESCAP, 1990; Punongbayan, 1993). Floods hinder the country's overall development by destroying agricultural, fishery, health and other urban infrastructure. Floods also undermine the kind and level of employment of the affected communities on a long-term basis (JDI/ECFA/DEVMAN, 1993). They contribute to other environmental problems, such as the spread of contaminated materials, silting of waterways and dams, and erosion of already marginal lands.

The impacts of flood hazards on the three urban groups are severe. The aggregate burden of seasonal floods is less among residents of wealthy residential neighborhoods, and recovery from flood disasters is more feasible among them. They have regular sources of income and ample reserves of resources to confront flood disasters. The financial reserves of these wealthy urban residents make them capable of relocating to other flood-free places. They can rebound from a flood disaster in a much shorter period and incur fewer debts.

The urban poor have limited financial capability to offset flood damages. Flood hazards magnify and compound the daily sufferings of these people. The financially strapped households experience an average of three flood events a year. One major flood disaster after another greatly strains the already depleted household coffer. Financial strains commit the members of urban poor households to high-interest loans and credits. Credit obligations tighten the limited daily budget and future household resource allocation of the impoverished. They are put in a condition where

rebounding is exceedingly difficult. The vulnerability levels of members of urban poor settlements rise through time (Anderson, 1994; Blaikie et al., 1994).

The impoverishment processes continue as household resources are reduced by regular inundation events. The increase in vulnerability level among the impoverished is compounded by many factors. One major factor is the progressive loss of entitlements (see Sen, 1981) to resources such as decent dwelling units, livable residential lands, sewage system and drinking water supply, health centers and medical services. These entitlements are needed for relief management, mitigation and recovery. Getting access to resources that will improve their living environments is becoming more difficult.

Rapid population growth, poverty, lack of job opportunities and large scale displacement of farming communities by conversion of agricultural lands into other commercial uses continue to push poor migrants to marginal and flood-prone areas. The overwhelming congestion puts a heavy toll on the longevity and usefulness of the limited infrastructure. More and more people throw garbage in the *esteros* due to lack of trash collection services. The degradation of sewage and drainage canals results in increased vulnerability to floods, pests and communicable diseases. Overuse of the infrastructure is compounded by the government's continuous neglect to maintain and improve them. Often the resources for the maintenance of the infrastructure are diverted to wealthy residential villages. The loss of entitlement to government's limited resource among the urban poor is an offshoot of lack of representation in the decision-making machinery. This is because of their "illegal" status (Davis, 1987). Residents of wealthy residential neighborhoods often beat squatter dwellers in laying claim to government resources. The wealthy residents use their legal claims as taxpayers of real estate property and social connections to the members of power-holding bodies.

The non-representation of the urban poor in local government decision-making bodies deprives them of their entitlements to some local government funds. Government resources are essential in their daily lives and crucial during disaster periods. Their loss of entitlement to resources contributes to the cycle of environmental degradation that floods bring, such as bank erosion and sewage contamination of their neighborhood. The environmental deterioration reduces their capacity to offset their losses.

It also eliminates the chances for improving their lot to enjoy a more humane residential environment in the future (Kates & Haarmann, 1992).

Street children are expected victims of flood occurrences in Metro Manila because not much is being done to rank their needs at par with the needs of other groups to alleviate their conditions. The social and political position of the street children in the community's terrain of social relations determines their vulnerability to any kind of hazard. The street children's vulnerability is increased by the lack of attention accorded to their situations by elected government officials who make decisions on resource allocation and disaster mitigation.

The avoidance to bring their conditions into the open and discuss them may not be a conscious one but it is very potent in denying the street children their membership and affinities with their territory. It is an effective tool to deny them their legitimate access to resources that may answer their needs. This denial to discuss their plight is critical because it may lead to abandonment of their cause. This deprivation of representation banishes the street children as possible recipients of support from government functionaries. The lack of acknowledgment of their legitimacy as city residents denies the street children of their inherent rights to partake of social resources.

Spatial, social, and political isolation confines the street children to a condition wherein nobody has accountability for whatever happens to them. This segregation negates their chances to participate within their own communities to determine their own fate and put some humanity into their existence. The government can do more for children in terms of providing policies that categorize their needs as equally urgent and important as those of other groups of people.

The circumstances that surround the street children are not given consideration and are not afforded adequate representation even by the media who can exert some pressure in influencing political decisions. The sufferings and depravity that are experienced by the street children are portrayed without any regard to improve their predicaments. Feature stories and social comments to pave the way for their participation to ameliorate their conditions should accompany their portrayal as disaster victims. In this respect, the media malign the street children. The inclination to

simply gaze at their sufferings and not do anything to improve their circumstances is a disturbing attitude. The street children's personal, social and community identities and survival needs should be connected with the activities and priorities of different sectors of the Philippine society. As society's legitimate members, their needs may not be ignored and must be at par with the needs of everyone else.

Entitlements to government resources should be based upon the survival needs of people and not much on lawfully sanctioned claims to community resources, such as real estate property ownership. Community members' participation at all levels of resource appropriation is very important. Unless different members of flood-prone communities participate in resource allocation in disaster periods, the vulnerability of those who lose considerably to flooding will multiply through time. There is a need for more research studies that will illustrate the usefulness and humanity of a socially equitable set of guidelines in allocation and prioritization of resources for disaster mitigation and prevention. Firstly, the need to address some of the government's failures in addressing flood hazard mitigation should be a high priority task.

### Flood as a localized problem

The lack of national focus on the yearly flooding in Metro Manila is due to an orientation that it is not a national problem. Thus, it does not need national priority. While it is true that floods cause damage and inconvenience to a number of neighborhoods, they do not constitute a national disaster. The desire to reduce flood occurrence is a major concern only of those *barangays* or households that are affected by floods.

However, the flood problems of Metro Manila need to be solved because they have been a problem since time immemorial. Floods have caused severe damage to life and property for decades. Every year the flood losses in Metro Manila range from a conservative estimate of P100 million pesos per annum (Gupta, 1990) to P2.78 billion (Lindfield, 1990). Despite the discrepancies in flood loss estimates, solving the yearly inundation of Metro Manila is vehemently needed. Flood disasters are costly to the mega-city and to the nation's economy because inundation events are getting worse, in terms of area coverage and the number of people affected. It will



be costlier in the future as the mega-city's economy grows. Flood events will rob Metro Manila's residents of economic opportunities. Moreover, flood associated problems will bring suffering among the residents especially those with least secure access to land and housing resources, political representation, and economic opportunities.

The present disaster management scheme in Metro Manila shows an over dependence of local government units on national government agencies for rescue, relief and evacuation services during emergencies. Local officials must be pressured to spend five percent of the municipality's gross for disaster prevention and mitigation. The national government must also allocate enough funding to assist the areas that are often inundated. Assistance from private groups or companies and international sources must also be sought. It is important to emphasize that despite the promising contributions that community and private organizations can deliver, the municipal governments are the key factors for flood prevention and disaster mitigation. The community residents should be vigilant to push for the support of these municipal officers and ask for the political will among government officials, especially the members of the Philippine Congress, to undertake their electoral mandate and institutional duties and responsibilities.

There is also a need to create locally based volunteer emergency relief and rescue teams. In this manner the active involvement of the private sector may serve as a check to government apathy and ensure effective disaster management. They can exert pressure on local government officials to undertake their job.

All cities and municipalities of Metro Manila should have coordinated planning and project implementation. There is a need for sharing technical and technological expertise to deal with flood problems. Mayors of all cities and towns comprising the metropolitan area should work hand in hand to arrive at an effective regional approach to flood prevention. Inter-community cooperation must be emphasized because political boundaries do not define floodwater origins and destinations. Adjoining towns and cities should be made to act on this on a regional basis and not with a community turf orientation.

## Resource management and flood prevention

The second set of actions pertain to land-use control, environmental planning and other programs such as population control and solid waste management. The government must require good site development plans among real estate corporations and see to it that the plans are executed. Subdivision owners and residents should plant trees in their vicinities and support reforestation activities in the denuded watershed areas of the metropolis. The proper implementation of land use zoning and land use development guidelines is important. Regular cleaning of drainage canals and reduction of deforestation and mining activities in the Marikina Watershed and Sierra Madre Mountains are urgently needed. The provision of flood control infrastructure and proper implementation of recovery programs without corruption are a must (see also PCIJ, 1998).

The government should undertake projects to regulate congestion in the metropolis and address the population problem by initiating the *Balik-Probinsya* or Back to the Countryside Program among the squatter residents. This must be complimented by wide-scale livelihood improvement projects in the countryside.

Government should eliminate squatter areas along *esteros* and return easement for *esteros* and allot government lands for low-cost public housing for these people. Regular widening and dredging of creeks and de-clogging of drainage canals must be undertaken. The government should fund more flood control projects. It should mobilize more resources and assign more honest and efficient government workers and additional work force during flood days. The technical projects should address programs that will reduce flood flow in the area. They should start from the point of water origins, such as reforestation activities, dam management and operation and dredging all waterways to accommodate more water and avoid over banking in the down-lying areas.

## Reliability and accuracy of disaster information

Another set of actions that needs close scrutiny is the reliability of information about disaster losses and other socioeconomic indicators in Metro Manila. Correct information can aid in planning a set of pragmatic actions to deal with flood problems of Metro Manila. As indicated in the

paper, basic statistics about poverty, number of squatter population, number of street children, flood losses and even statistics on population are often scarce. If they are available they are often inadequate. Often, one agency will have a totally different figure and there is no way to find out which one is really the right figure. The problem on data reliability is widespread even at an international level. There is a lack of uniform reporting schemes that will indicate a reliable documentation of loss of lives and morbidity associated with flooding events (Legome, Robins, & Rund, 1995; Albalá-Bertrand, 1993). Disaster assessments must be systematically undertaken to avoid distortions that can affect or influence disaster mitigation planning. This is crucial considering that financial resources are scarce. Problems on flooding need to be prioritized.

Location data of flood-prone lands are also lacking. Local and metropolitan government authorities have not clearly pinpointed where vulnerable populations are in the annually flooded sites. Most government agencies lack information on available resources and their locations that can be used in future flood occurrences. As a result, government authorities resort to traditional responses during disaster periods such as temporary evacuation—if there are forewarning knowledge and available resources and facilities for this—and short-lived disaster relief giving.

### Traditional mitigation strategies

Relief provision is the most common response to flood disasters among government officials. Traditional responses have merit but they open profiteering opportunities among misguided entrepreneurs and power-wielding groups. Traditional relief giving also exacerbates the shattered frame of mind of flood devastated groups. Relief giving results in people with a helpless and dependent mentality and does not build community resilience.

A group's resilience is associated with the effectiveness of their coping strategies before, during and after disaster events. Creating a dependent mentality among the flood victims is more harmful in the long run. Disaster victims must not be at the mercy of relief giving from political benefactors. Also, traditional response reinforces the *status quo ante* (Morren, 1983). To make a long story short, relief goods provision is palliative. Yet if these sugarcoated acts may relieve several days of hunger or save the lives of

hundreds of persons, they should not be discouraged. However, relief-giving activities should be made more systematic. For example, one organization should be encouraged to provide movable toilets in evacuation shelters. Another civic club should be responsible for dry blankets. One organization should provide drinking water in disposable containers. NGOs can liaison with civic clubs to involve them in more socially progressive activities (Delica, 1993). Vulnerability reduction efforts must be undertaken within the context of social development planning.

Immediate help and continued assistance provision during flood emergencies and recovery periods come from family relatives, friends, neighborhood connections and local *barangay* officials. This supports the findings of another study that help from non-government and government organizations comes a week later than the disaster assistance extended by friends, relatives and *barangay* officials (Cola, 1992). Based on this observance, there may be a need to reorient the way in which disaster assistance resources are channeled from local and international donor organizations to the final recipients. Studies on how this re-channelization of assistance is needed to allow for more time-efficient emergency responses.

### Flood disaster warning system

The flood disaster warning system should be improved (Tayag and Punongbayan, 1994). There should be an inter-*barangay* and inter-agency cooperation on flood monitoring and disaster warning. Most of all the information should be immediately fed to broadcast media, such as in radio and television news and public service programs.

There is also a need to come up with a list of *barangays* that are perennially inundated. The usefulness of *barangay* officials in disseminating warnings is salient. They should be trained to understand the warnings that are issued by PAGASA or the agency should translate their scientific lingo to lay person's terms to initiate clear information dissemination and warning issuance. *Barangay* officials of annually flooded sites must be provided with radio systems during the flooding season that is connected to PAGASA monitoring stations. *Barangay* officials must also be provided with loud speakers that they can use during the flood season so they can announce forthcoming events to their constituents. The roving reporters of radio stations that are equipped with radio transmitters may be asked to

issue flood-warning messages to *barangay* officials during the flood season. However, this may serve to heighten the discouraging lack of public response to inadequate disaster warning (Arroyo, 1991).

Warning issuance is not going to be effective unless the people are informed of what to do during flood episodes. The NDCC's plan to organize Disaster Coordinating Committees (DCCs) in the communities should be implemented specially in most disaster prone areas (NDCC, 1988; Banzon-Bautista, 1993). The DCC workers of MMDA should hold more disaster mitigation and recovery workshops in urban poor neighborhoods. The Barangay Disaster Preparedness training must be implemented and be made mandatory to *barangays* that are annually flooded. This will inform the constituents of what things to do, and build a support network that they can rely on during emergency periods. The MMDA-DCC workers should not focus their training activities on exclusive neighborhoods or middle-class or high-income communities who can sponsor the costs of holding disaster preparedness sessions. These sessions are important because they can lay the groundwork for a neighborhood-based disaster mitigation and recovery that is oriented to community development.

### Community level vulnerability assessment and baseline data management

The local government and the MMDA should be under the direction of the NDCC during disaster periods. The DCCs should be in close coordination with the local government officials even during non-disaster periods. They should initiate vulnerability assessment on the community level. This task will determine the groups that are at risk and identify their local capabilities during emergency periods. The local government, with the help of *barangay* residents, should identify flood shelters, for example, convents, churches, school buildings and other elevated structures. Subsequent assignment of families at risk to the identified flood shelters should be made to facilitate orderly evacuation. The government should initiate the production of evacuation maps that locate government facilities that can aid in disaster operations (Dymon & Winter, 1991; NAMRIA, 1994). The National Mapping and Resource Information Authority (NAMRIA), the local governments and the DLGCD (Department of Local Government and Community Development) should combine their technical resources to facilitate this activity.

There are some issues that are intertwined with vulnerability to flood hazards among the diverse groups in Metro Manila. They are: gender relations that place a heavy burden on females, patterns of residential segregation that isolate wealthy communities, and temporal and global patterns of flooding that have a disproportionate effect on impoverished groups.

### Gender relations that place a heavy a burden on females

The urban poor women are much more personally threatened by the flood problems of Metro Manila. Due to their de facto assignment as household managers during disaster periods, urban poor women are more familiar with seasonal flood disaster concerns and they are very active in the household sphere and at the local level. The government at several levels must support their primary responsibility of household nurturing and maintenance. For example, the local and national government should facilitate the construction of multi-story community halls. These structures may serve as temporary flood shelters where adult females can bring their young and most important possessions. The structures can house a daycare center, public library, or a social function hall that can be rented to the public during flood-free months. Funding for *barangay* flood shelters will come from local tax collection, appropriation from city or national government, or donations from private sector or international organizations. Tax credits may be offered to private sectors that will support this program.

Each city or municipality should maintain its own bus for the immediate transport of people, particularly women, who are threatened by flood hazards. They may opt to have an amphibian vehicle for the evacuation of households who are threatened by floods and other natural hazards. The national and local government should provide a boat to each flood prone village or its *barangay* officials for use in the evacuation of people. The NDCCs plan of deployment of buses, trucks and hauling vehicles to the flood-prone areas at calamity periods should be systematized and implemented more. The vehicles should be available for evacuation of people, most especially women, the elderly and the young who are in their houses, before the floods inundate the communities, not when they are already several feet under water. To encourage private sector participation in disaster evacuation, for example, company buses of most private corporations should be mobilized during flood hazard events. Assignments

of tax credits that are equal to the amount of help that private corporations render should be facilitated.

Vulnerability also is affected by inequalities in access over political resources. Poverty makes one more vulnerable to flooding. Poverty and isolation from political participation during disaster and pre- and post-disaster periods make urban poor women more vulnerable to flood hazards. Addressing gender inequality will lessen the vulnerability to flood hazards of the urban poor women in the short-term range and may lead to another desirable outcome of poverty alleviation among women in the long-term period.

### Patterns of residential segregation that isolate wealthy communities

Protection from flood hazards is intertwined with people's everyday political representation and control over resource conflicts. Political command over limited resource is an influential factor in creating flood mitigation policy. Lack of capacity to command public resource allocation during disaster periods increases the flood vulnerability of certain groups of people (Hewitt, 1997). As acknowledged by the residents of some urban villages, they receive immediate help during flood disasters because they can command the provision of better public services and infrastructure in their areas. They can influence political decisions to favor their needs. However, the wealthy are also capable of reducing disaster losses because they can initiate self-financed infrastructure improvements in their residential spaces. Residents of well-off residential areas have more chances of recovery as compared to residents of poor urban communities. They are more capable of drawing resources that can improve their conditions before, during and after flooding events.

Metro Manila's residents have indicated that solving flood problems should reduce expenses allotted for repair and replacement of damaged appliances, houses and cars. If flood victims will not have to repair their houses and cars, or buy new furniture or appliances every flood season, the savings of the people will be spent on other things. The money can be used for economic undertakings to help alleviate poverty. Residents of wealthy residential villages have direct social and political connections to local government decision makers who can make political interventions as frequently as needed (Gordon, 1980; Walzer, 1986).

Planning an effective disaster prevention strategy greatly depends on government support. If government officials do experience flood disasters as mere inconveniences, the need for flood shelters, food and other resources will never be prioritized. If government officials look at flood protection as an impediment to social and economic progress, then flood disaster mitigation will go beyond mere relief giving and may be incorporated in the context of urban development (Gonzales, 1993). Flood disasters are initially caused by inundation of floodwaters, but government action or inaction multiplies the victims' misery. Political leaders greatly define the direction and outcome of disaster related activities. Their own economic interests, accountability to constituents, or desire to hold on to office influence their response to disaster mitigation.

One main reason why flood events become disastrous is simply government officials' indifference to flood experiences of the urban poor disaster victims. Government officials, as real estate owners, understand and prioritize the needs of residents of exclusive residential neighborhoods because they can relate with their flood experiences. Final decision on resource allocation is greatly influenced by the decision makers' association with the place. Some power-wielding groups can capitalize on local politics. Politics prevails during the representation and decision making process. Thus, decisions on policy responses to mitigation of disasters must not lie in the hands of a few people. There is a need to widen the base of political representation in disaster planning and involve the impoverished victims in policy formulation and program implementation. This will outline problems that poverty-stricken victims are able to deal with effectively among themselves. This will make the areas needing institutionalized assistance more conspicuous. The question of government accountability and transparency is also very salient.

### Temporal and global patterns of flooding that have a disproportionate effect on impoverished groups

Floods are a daily given during the rainy season. The residents of Metro Manila witness a certain degree of regularity of flood incidences, predictability of the buildup of exacerbating problems, and cyclic apathy of local and national government officials in confronting flood hazard issues. Flood losses are costly for the entire community. However, they are most cumbersome for the urban poor, many of whom have seasonal



unemployment, scant savings and limited household resources. Flood disasters progressively eliminate whatever minute savings or improvements they have accumulated in the past. More importantly, flood disasters diminish their capabilities to provide for the household's daily need and add more financial burdens in subsequent years. As indicated earlier, aside from these concerns the urban poor will have to face the compounding adverse impacts of global warming to seasonal flood patterns (Lewis, 1990).

Global warming will increase the frequency of typhoons in the country that bring heavy rains especially during the Southwest monsoon season by 2010 and 2070 (ADB, 1994). More storm surges will compound the problem of sea level rise that will affect Metro Manila's low-lying coastal places. Possible problems include salt intrusion, saltwater entry into Laguna Lake through the Pasig River and the decrease in animal and livestock production in the lake's coastal *barangays* due to water scarcity because of increased salinity of the lake and contamination of groundwater and other water sources. These developments will cause massive displacement and devastation among the mega-city's population. Complicated by the lack of concern and sense of immediacy among skeptical government officials who do not initiate preventive actions and solutions to flood problems, the urban poor in marginal communities of developing countries are the ones likely to suffer more from these events. Lack of financial resources will prevent them from making the necessary adjustments or from buying insurance policies from insurance companies who are similarly threatened to face bankruptcy due to future global changes in climate (Flavin, 1994). They are more likely to suffer from government's incapacity and lack of resources to come up with several policy options needed for strengthening capacities to identify areas at risk: resource conservation; disaster preparedness; information campaign on floods and climate change and sea-level rise; and, improving government efficiency in providing help in every phase of the problem.

### Finding a common solution to mobilizing communities

People signify their intent to participate actively in flood mitigation and disaster management. For example, in Vietnam, people volunteer to work for ten days to a month annually to repair breached dikes and participate in other disaster mitigation activities (Wickramanayake, 1994). An efficient flood disaster strategy can be effective if the guidelines are not

simply set by the workers of official and legal institutions but by the residents of communities that face the challenges of inundation. It is also important to consider some informal connections that exist among people and capitalize on those relationships.

The other sets of actions are about finding a common solution. The respondents believe that the local governments of adjoining cities must find solutions to solve their problems. The chances for developing an effective hazard reduction program are great if there is cooperation among different sectors of the community that is affected by flood hazards (Mitchell, 1988). The respondents indicate the need for people to do some coordinated actions that will press the need for an institutional approach to flood control and flood disaster mitigation in Metro Manila. They indicate that the residents of Metro Manila should be willing to participate in an inter-neighborhood *pulong-pulong* or regular discussions. Exchange of experiences must be facilitated among residents and leaders of subdivisions with similar conditions. They need to form alliances among other neighborhood associations to pressure officials to act on flooding problems and deal with them as inter-community concerns. They also have to facilitate a networking and advocacy system to pressure government officials so that the officials will be morally enlightened and undertake positive action (Ward, 1993). As Berke, Kartez, and Wenger (1993) had pointed out, community participation in planning and institutional development is vital in the realization of equitable distribution of disaster resources and a sustained growth. There has to be a Metro Manila wide forum that recognizes all voices and where they can try to clarify the issues that pertain to flood hazards.

People or organizations that would like to initiate efficient garbage disposal and collection system in their own communities should be allotted funds. As deduced earlier, Metro Manila's garbage collection system must be improved. Approximately 1,590 tons per day of solid wastes are not collected in Metro Manila (Passe, 1993). Most uncollected wastes end up in drainage canals. The local government should open concessions for garbage collection to community groups and private sectors that can do a better job than the contractors hired by government officials (Cointreau-Levine, 1994). Money must be channeled to community groups instead of being concentrated in the coffers of government officials. The program *Pera sa Basura* (Money in Garbage) promotes the monetary benefits of

recycling garbage. The program may be extended to buy people's trash at a small price so people will think twice before throwing the garbage in flood waterways or drainage canals. There should be direct coordination between the plans and activities of community organizations and local and national politicians. The participation of non-government organizations is also crucial to this program. They can determine ways to improve the garbage collection system in a community. The expertise of non-government organizations to develop social networking may be used for developing neighborhood-based trash collection and disposal and may be expanded to the development of a flood early warning system (Punongbayan, 1987). The network shall also identify households who are at great risk to flood hazards, and households who can provide immediate help. This will start a neighborhood self-help system.

These programs must also be complemented by other projects such as environmental protection in watershed areas. Also, some preventive flood countermeasures may be adopted such as reforestation of the Marikina watershed and building of terraces in Montalban Hills to prevent soil erosion and reduce siltation of river beds. One can also build secondary embankments (Rasid & Mallik, 1993) or adopt multiple embankments. This can prevent bank erosion in the upper part of Marikina River's floodplains. These programs can be incorporated in the rural development programs in the countryside. The projects should also be incorporated in urban development programs in the adjoining areas of the National Capital Region (Laquian, 1995; Ocampo, 1995; Kubo, 1993).

There are alternative technologies and infrastructure options for flood control that may be applied in Metro Manila. NAST-DOST (2000) identifies the drop-shafts, underground floodways (big subterranean tunnel-reservoirs for storing floodwaters beneath urban centers), super levees or high levees, and house or building rainwater collection and infiltration facilities. They are measures that may be applied to control flooding incidence in the metropolis. However, the cost of installing these technologies and infrastructure is inhibiting.

To fully deal with the flood problems of Metro Manila, the local government and its constituents should incorporate risk assessment as one of its yearly planning activities. Local officials must gather all available information about the flood risks in an area and build a database on flood

susceptibility of the place. This will provide decision-makers, project managers, and constituents with concrete data that show the magnitude of environmental challenges that floods may bring to the area. Flood reduction projects and disaster mitigation must be planned and formulated in the context of urban development. In assessing the potentials of the area for economic development, the magnitude of flood threats in a specific area must be taken into consideration. Special emphasis on issues such as low-cost housing, community health and sanitation and poverty alleviation must also be given (Nicholas, 1997). A risk based development planning should be beneficial to Metro Manila because it will prevent unnecessary losses. It will also encourage a participatory mechanism. It will gather the inputs of various groups in the community to decide over many things, such as allocation of resources, yearlong disaster prevention, program definition and prioritization, implementation and monitoring. In the same manner, risk assessment must be undertaken within the context of urban development (Lindfield, 1990).

A pragmatic disaster policy making necessitates cooperation among different representatives and levels of government bureaucracy. Timely collective actions are crucial for an impartial allocation of disaster assistance. Also, the maximization of whatever opportunities that are available and strengthening the government's organizational capacity will lead to a better redirection of development goals that may address social conflicts such as provision of affordable housing, health services and other public facilities in poor neighborhoods (Berke et al., 1993). The goals of hazard reduction and disaster mitigation must be intertwined with the mandated goals of different in-place government institutions because of their existing organizational infrastructure and resource at their disposition (Oaks & Bender, 1990). This approach however, is a political process. Ideally, policy definition should take into consideration equally the needs of all the constituents. A pro-people's flood-disaster control program should address landlessness, job scarcity and poverty. A flood disaster prevention that will help the majority in need should address the problems of land speculation, suitable land-use planning, and equal access to health and other public services (Gilbert & Gugler, 1992). Government authorities cannot simply plunge into flood disaster mitigation without tackling the discourse on urban poverty and equal political representation. Links between the local decision makers who appropriate resources and the most vulnerable groups who greatly depend on local government entitlements to offset the burden

of flood hazards must be identified, established and strengthened. More balanced flood disaster mitigation would require the redistribution of resources, power and privilege. Risk mitigation and disaster reduction strategies must help and empower the vulnerable groups (Hewitt, 1997).

As people continue to congregate in Metro Manila, the populations of municipalities in the northern, eastern and southern provinces surrounding the mega-city are growing rapidly, too. Ocampo (1995) has reported that these regions are the popular destinations of industries, and manufacturers that are relocating due to congestion in the mega-city. Bulacan towns and municipalities in the CALABARZON (Cavite, Laguna, Batangas, Rizal, and Quezon) areas are becoming the popular destination of immigrants from different parts of the country. There is also a growing trend among workers of Metro Manila to buy residential homes away from Metro Manila. The more popular places are Santa Rosa and Calamba, Laguna or in Baliuag and Plaridel, Bulacan. These out-migrants have lessened congestion problems in some parts of Metro Manila. However, the daily commutes from their homes to their workplace in major highways have contributed to the major traffic congestion in major arteries of Metro Manila. Initial observations also indicate that the kind of urban development that is taking place in the areas surrounding the mega-city is as unplanned and uncoordinated as that of the National Capital Region. Reports of flash flooding events are already surfacing in the rapidly growing cities and municipalities in Bulacan and the CALABARZON region. As urban development spills over into the areas surrounding Metro Manila so are its accompanying congestion, lack of sewage and drainage and flooding problems. A comprehensive flood disaster approach should situate the flood-prone *barangays* of Metro Manila in the context of the rapidly urbanizing CALABARZON and the Central Luzon Regions.

The multiple hazards in Metro Manila's flood-prone neighborhoods are creations of multiple environmental, social, political, economic, financial and bureaucratic interests at the local, regional and national levels. Contributing factors such as deforestation, job availability, urban housing scarcity, lack of public infrastructure, poor urban planning, inefficient government administration and mediocre fiscal resource management must be dealt with at various levels of dominion. The question of scale and corresponding need for network formation between and among groups at each domain and at various levels needs to be addressed.

How will one deal with flood problems that will require inter-neighborhood and inter-community alliance and cooperation? How will one deal with flood-mitigation programs that necessitate cooperation between small neighborhoods, local authorities and national agencies? Governments' bureaucracy has made itself so inefficient that finding a workable solution to a region-wide set of flood hazards is really a gargantuan task. Nevertheless, one has to start from somewhere.

How can we contribute to its solution? The College of Social Sciences and Philosophy can greatly participate in this undertaking by gathering the intellectual strengths and research capacities of our rich pool of anthropologists, demographers, geographers, historians, linguists, philosophers, political scientists, psychologists and sociologists. In partnership with other constituents in the university, the college's social scientists can undertake some studies that will map out areas that are frequently inundated and identify the most vulnerable groups in our flood-prone coastal and low-lying communities. For example, faculty members of the Department of Geography can do some extension activities that will train people, both at the local and national levels, to undertake spatial analyses of their natural resources and other capabilities. We can initiate the development of a nationwide database that can be used for flood prevention and disaster mitigation purposes, using among other things the useful and powerful technology of geographical information systems. However, one needs to recognize that before this can be realized, there is a need to equip ourselves so that we can successfully undertake this task. We need to equip our students and local government with useful tools that will help them deal with and analyze different layers of geographic information in a much shorter period of time. Time is a valued commodity during disaster periods. However, this is a gargantuan commitment and the commitment of the university officials and most especially the government officials is crucial for realizing this task.

Furthermore, we can help in cultivating access to government's policy and decision making authority among different neighborhood groups if we can help spearhead a hazard prevention approach that will enable an effective harvesting of limited resources at the local, regional, and national levels. A network of neighborhood and community organizations that cooperate with local and regional government officials and institutions in supporting and prioritizing the needs of the most vulnerable groups is

essential. Establishing and strengthening the links among groups in this network is salient. This will open more discussions on more equitable resource appropriations. More inter-group discussions may pave the way for laying out a set of more socially equitable guidelines that will address political under-representation in disaster mitigation activities. Creating a network of neighborhood and community-based disaster response and planning groups that assigns importance to the economic, health, political and survival needs of vulnerable groups and the site-specific infrastructure exigencies of flood-prone neighborhoods may form the nucleus of hundreds of small-scale disaster mitigation strategies. They could pressure the decision-makers to straighten up their acts on disaster prevention, mitigation and recovery and give these concerns the resources, leadership and vitality that they need. As always, the leadership, resources, foresight, cooperation, and political support and interventions among local, regional and national government officials are imperative.

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