

DIFFERENTIAL IMPACTS OF FLOOD HAZARDS AMONG THE STREET CHILDREN, THE URBAN POOR AND RESIDENTS OF WEALTHY NEIGHBORHOODS IN METRO MANILA, PHILIPPINES

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Abstract. This paper presents the differential impacts of flood hazards among street children, the urban poor and residents of wealthy neighborhoods in Metro Manila, Philippines. It argues that being poor is not the only reason why certain sectors are more vulnerable to floods or any environmental hazards – spatial isolation and lack of participation in decision making intensify their present and future vulnerability, as well. Archival research, interviews, focused group discussion, participant observation and surveys of populations at risk are employed to delineate the flood experiences and coping strategies of street children and residents of poor urban settlements and wealthy neighborhoods in Metro Manila at the household and community levels. The concept of entitlement, the Contextual Hazards Model, and the Access Model are used in the data analysis and interpretation. Several policy recommendations on hazard management and disaster mitigation are identified to reduce flood losses in Metro Manila.

Keywords: coping strategies, differential vulnerability, flood hazards, Metro Manila, Philippines, street children, urban poor

1. Introduction and Objectives

This paper presents the changing flood landscape and the differential impacts of flood hazards to three urban groups of interest in Metro Manila, Philippines. The street children, residents of slum and squatter communities, and members of wealthy neighborhoods are not the only groups of Metro Manilans that experience flooding, but they illustrate the range of flood hazard experiences that occur in this megacity as well as in similar cities elsewhere. This paper argues that the degree of difficulty that is faced by the three vulnerable groups due to annual flooding is greatly affected by their economic background and their position in the arena of political representation. For example, the social and economic conditions and the political position of street children in the community's terrain of social relations determine their vulnerability to any kind of hazards (for a related discussion on the topic, see Boyden 1994 and Burman 1994). The street children's vulnerability is increased by the lack of attention that is accorded to their situation by elected government officials who make decisions on resource allocation and disaster mitigation.

Together with a number of researchers, I take the view that decisions about infrequent hazards are not something that can be separated from everyday decisions



about other issues and problems (Hewitt 1983; Wijkman and Timberlake 1985; Mitchell et al. 1989; Blaikie et al. 1994; Hewitt 1997). This paper also aims to offer additional perspectives on debates about the social construction and differentiation of vulnerability to flooding among contrasting population groups and to elaborate general models of human adjustment to hazard.

The first part of the paper illustrates how the changing urban landscape has led to an increased incidence of flooding in Metro Manila. A discussion of the commonalities and variations in the vulnerabilities to flood hazard and coping behaviors of the three urban groups is presented in the succeeding section. The paper concludes with several policy recommendations that aim to reduce flood losses and improve the conditions of the three urban groups of interest in Metro Manila.

2. Contextual Background and Related Literature

Many scholars have explored the apparent relationship between increased urbanization and a growing susceptibility to natural hazards. The relationship is most pronounced in developing countries that are affected by strong rural demographic pressures which drive populations to migrate to already crowded cities (Bulatao-Jayme et al. 1982; Cuny 1983; Havlick 1987; Mitchell 1988, 1999; Smith 1992; Alexander 1993; Bakhit 1994). Existing research has shown that the relationship holds for different types of physical risks (Babiker 1982; Blaikie and Brookfield 1987; Engkagul 1993).

Natural hazards strike different members of communities in various ways; they affect groups and neighborhoods differently. However, there has been a dearth of empirical studies on the hazard susceptibility of different neighborhoods in the affected cities and among different social groups that are spatially and socially segregated. The need for detailed studies on the vulnerable groups such as the street children, the elderly and women is salient (Flynn et al. 1994; Cutter 1995; Greenberg and Schneider 1995; Paul 1997).

It has long been established that the poor are the most vulnerable group when it comes to facing disastrous events due to lack of access to financial resources (Palm 1990; Blaikie et al. 1994). However, being poor is not the only reason why certain groups in society are more vulnerable to hazards. The existing political, economic, physical and technological constraints in a community determine one's vulnerability to hazards and other environmental variations (Blaikie and Brookfield 1987). There is a need for empirical studies that elaborate other factors, aside from financial or resource scarcity, that make the poor, or other groups of people, more vulnerable to hazards.

In the same manner, different classes of society have different capacities to absorb impacts and recover calamitous events (Susman et al. 1983; Benson 1997). The community members' access to information and their knowledge related to the occurrence and recurrence of disastrous events affect the variation in hazard

experience. Vulnerability is not a fixed condition (Anderson 1994). Lack of entitlements to hazard mitigation resources exacerbates the vulnerability of urban groups to flood and other hazards.

Two recent models of natural hazard are particularly useful for analyzing differential vulnerabilities to flood hazards in Metro Manila: (a) the Contextual Model proposed by Mitchell et al. (1989); and the Access Model developed by Blaikie et al. (1994). The Contextual Model proposes one alternative approach to understanding the hazard experiences of different individuals or societies. It relates the community's experience of a hazard event to circumstances that enfold their daily activities. It analyzes relevant organizational, spatial, socio-economic, political and environmental components that contextualize the hazardous event. This model also applies different appropriate analytical methods and concepts in analyzing the interconnections between them.

The Access Model lays out the elemental reasons that define people's vulnerability to hazards and the links between adversarial risks that those different human groups face. It looks at how economic competence (or incapacity) and political actions (or lack of participation) among community members generate varying levels of vulnerability among different groups. The Access Model questions how different household members (as defined by their gender, class and age) manage resources and develop coping strategies before, during and after flooding occurs. It recognizes that the continued recurrence of a hazardous event demolishes the limited household resources and influences the patterns of recovery and the intensification of their vulnerability levels.

Similarly, Hewitt (1997) has discussed a vulnerability perspective that is emerging in explaining risks and hazards. He accentuates the importance of looking at how institutional, political, cultural and social phenomena determine human communities' experiences of natural hazards, and the coping behaviors and adaptive mechanisms they employ in the face of such hazards. This perspective focuses attention on factors such as how a society's governance improves or weakens people's capacities to cope with and adapt to danger, and how the general and active capacities of people determine how they avert, endure or recover from trauma.

Amartya Sen's entitlement approach is also used in the analysis, more particularly entitlements by way of government allocation, to explore the level of vulnerability and the efficiency of coping strategies employed by the three urban groups with regard to flooding. Entitlement in this study refers to the rights and access to shelter and building land enjoyed by individuals or groups or the provision of housing units and resources needed for hazard management and recovery activities. Entitlements are legitimized by socially sanctioned and lawful ownership claims such as inheritance, barter, sale transactions, tenure arrangements, and other forms of traditional and common property appropriations, control and sharing arrangements (Sen 1981).

In 1978, a United Nations and Human Settlements publication issued composite maps that showed which parts of Metro Manila are prone to earthquakes, floods and

typhoons. There were a few studies that explored the housing scarcity (Makil 1983 and Ramos-Jimenez et al. 1986), economic vulnerability (Benson 1997; Moser and McIlwaine 1997), and disaster prevention and mitigation activities (Department of Science and Technology-Philippine Institute of Volcanology and Seismology 1993) in Metro Manila. Nevertheless, there is a paucity of recorded information on flood losses at the *barangay* (our country's fundamental political assemblage) and at the municipal or city levels.

Moreover, there is no census information or expert information of any kind on the communities' susceptibility to hazardous events, except for the 1990 Japanese International Cooperation Agency (JICA) publication that presents a compilation of all available Philippine Atmospheric, Geophysical Astronomical Services Administration (PAGASA) climatic data. There is an absence of medical data that is necessary for identifying the needs of the affected population. An assessment of accessible health facilities that are available in times of emergency is conspicuously absent. The richest source of information about past flood losses at the *barangay* and community levels was the newspaper and magazine collection at the National Library of the Philippines.

The need for a post-impact scenario, information on stricken communities' long and short term mitigation requisites, data on accessibility of inundated areas during and after the flood events, and, clues on the possible spread of diseases and contamination from hazardous substances is urgent (Carter 1991). This paper explores the different abilities and failings of the three urban groups of interest to expropriate municipal resources using political representation in the government decision-making machinery during inundation periods.

Street children are characterized in this study as minors who may or may not be members of a household and who live or work on the pavements of Metro Manila. The *children in the street* are those who are living with their relatives but are working in the street. The *children of the street* are those who have no family to support them or nowhere to go home to. Members of both categories are often exposed to a number of physical and social hazards on a daily basis. They get their sustenance primarily from working in the streets.

The urban poor in this study are characterized as members of households who reside in Metro Manila's congested poor settlements. The *congested urban poor settlements* are the squatter and slum areas in the city. *Squatter communities* are impoverished urban poor neighborhoods that are illegally occupying private and public land. Their dwellings usually line the riverbanks, rail tracks and waterways. *Slum dwellers* are legal renters or owners of houses, apartments or rooms in run-down neighborhoods in Metro Manila. Although they differ in status regarding the security of their tenure on their home lots, the conditions of their living environments are similar.

Residents of wealthy residential neighborhoods are characterized in this study as members of households who can afford to rent or own a single housing unit that has a value of at least half a million pesos in any subdivision or housing village

in Metro Manila. They have access to a private motorized vehicle. The combined household income in wealthy subdivisions is much more than the poverty line of Philippine Peso (PhP) 11, 216.70 (US \$ 295.00 as of September 1997) that was set by the Philippine government in 1996 (National Census and Statistics Office 1996).

3. Material and Method

The primary and secondary data used for this paper derive from three data gathering sessions (1995, 1996 and 1997) conducted in the field in Metro Manila. The fact that I had lived half of my life in Metro Manila and had numerous opportunities to experience flood events in the past in this megacity proved to be very useful. A multi-pronged approach to data collection was used, including observation of urban flooding events, inspection of relevant public records, map analysis and surveys of populations at risk (Zoleta-Nantes 2000a).

Eight *barangay* officials, thirty-two government officials at different levels, and five proponents of non-governmental programs were extensively interviewed. Participant observation was employed among the residents of frequently flooded neighborhoods to observe economic and social activities on a daily basis. An interview guide was used to gather the flood experiences of 39 urban poor and 39 residents of wealthy neighborhoods. The interview guide inquired about their socio-economic features, livelihoods and coping strategies, and the local institutions they depend on to deal with flood hazards. The interviews usually lasted for about an hour. Informal but focused group conversations were held with ten street children in the city streets of Manila.

The urban poor neighborhoods chosen for the study include several deteriorating neighborhoods in Quezon City, Manila, Pasay and Marikina, squatter communities on the banks of the *esteros*, private and government lands in Manila, Kalookan, Pasay, Quezon City and Marikina and a relocation area in Marikina. To identify a set of flood-prone wealthy neighborhoods, the leads provided by past flood incidents recorded in major newspapers archived in the National Library were followed. Access to these wealthy households was made possible through my close friends and relatives and their acquaintances who reside in these increasingly flooded areas.

Nine of the street children that I conversed with were minors that I met on the streets and were approached on a random basis. The *Kanlungan sa ER-MA* Ministry, a non-governmental organization that provides social services to street children, referred one homeless minor. One big disappointment from this study was my inability to make a difference in the lives of the street children that I interviewed.

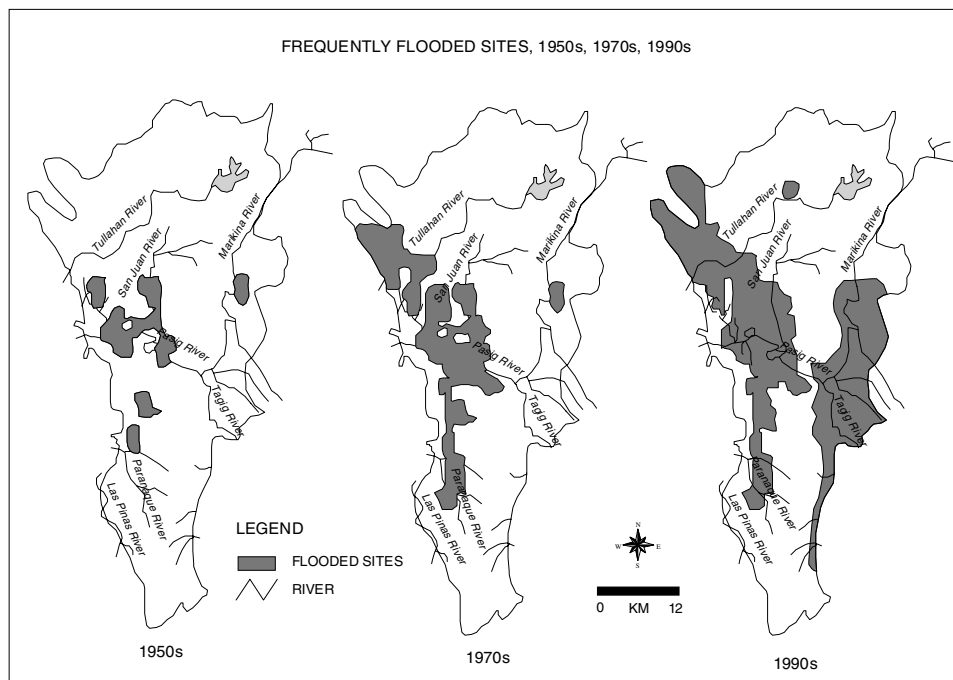


Figure 1. Frequently flooded sites in Metro Manila, Philippines.

4. Results and Discussion

4.1. THE CHANGING FLOOD LANDSCAPE OF METRO MANILA

Metro Manila is the National Capital Region (NCR) of the Philippines. It lies on the semi-alluvial fan that was formed by the deposition of sediments on the Eastern Shore of Manila Bay by the Malabon-Tullahan and Meycauayan river systems in the North and the Marikina-Pasig River system in the East (Tabios et al. 2000; Zoleta-Nantes 2000c) (Figure 1). The Laguna de Bay, a large fresh water lake with an average depth of three meters, backs much of southern Metro Manila. The Napindan-Pasig River issues from the freshwater bay and flows about 24 kilometers across the coastal plain to the sea. Its main northern tributary is the 35 kilometer-long Marikina River.

The main physical components of flooding in Metro Manila are the following: surface runoff, tidal variations, incidence of monsoon rains and changes in groundwater hydrology and periodical tropical storms (i.e., typhoons) (Cruz 1992). For example, annual occurrence of weather disturbances such as typhoons, coupled with monsoon rains, bring in about 3,000 millimeters of rain in the catchment areas of the Marikina-Pasig river system and about 2,000 millimeters of rain in the Manila Bay area (JICA 1990; Fano 2000). The rainwater flows through the major river systems of Metro Manila and contributes to the inundation of Manila Bay's

low, flat shores that are fringed with deep soils with high water tables (Zoleta-Nantes 2000c). These low-lying parts of the coastal margin are subject to frequent floods that are due to the daily tidal movements that can inundate low-lying areas by up to 0.3 meters above mean sea level. The problem of rising water has also been compounded by the subsidence of the whole Eastern shores by up to 0.33 meters (Asian Development Bank 1996).

Adjacent to the coastal margin is the Guadalupe Plateau, an area of resistant volcanic rocks that rise up to 40 meters – and sometimes 70 meters – above sea level. Flood risks are lower, though not insignificant, in this area. This section also has a low probability of experiencing earthquake damage. Further inland, lies the Marikina Valley. It is another flood-prone area. The Marikina Valley alluvial plain has poor soil drainage. It has a shallow water table, low soil stability and is prone to earthquake and flood hazards.

There are also some technical considerations when looking at the problem and the management of the flood hazards of Metro Manila (Tabios et al. 2000). These include poor planning or design of flood control systems and the deterioration and poor maintenance of the existing flood prevention infrastructure. Other major contributing factors are improper estimates of storm and flood magnitudes, system failures of flood control due to garbage and other urban debris, and lack of sufficient funding to improve the design and maintain the flood control system.

The occurrence of flash floods is not new in the metropolis; it was already evident in Manila during the Spanish colonial period (16th to 19th centuries). For instance, after heavy downpours, many paved streets in the Binondo district of the ancient city of Manila would be flooded with then crystal clear floodwaters.

At the beginning of the 20th century, built-up areas in the greater Manila area covered approximately 2,000 hectares; it has since expanded into a metropolis with a diameter of about 30-kilometers (Cammayo 1990). Many of the developed land parcels on the shores of Manila Bay have been reclaimed from the sea. The increasing number of reclamation projects that are studied along the coast of Manila Bay reflects the need for additional building land in the metropolis.

These reclaimed urban spaces are not the most flood prone areas in the megacity. The elevation of the reclamation sites is generally 2 to 3 meters higher than the mainland coastal plains. Nevertheless, the reclamation sites obstruct and retard the natural seaward flow of water from mainland streams and have increased flooding incidences in the districts of Baclaran and Maricaban in the cities of Paranaque and Pasay (Zoleta-Nantes 2000b). Also, the difference in elevation has lessened the flow gradient of water in adjoining sewer and drainage systems in the mainland coastal plains.

The changes in land cover and land use in the watershed areas of the NCR has also influenced the megacity's flooding patterns (JOFCA 1993). The forest lands in the watershed area have been converted into paddies, grasslands, fruit orchards or dry fields, villages, residential subdivisions and extensive pig farms. According to the National Water Resources Council, these land use changes have contributed to

the loss of 25 to 50% of the topsoil in the watershed. The eroded topsoil has been deposited on the river beds and decreased the loading capacity of most of the river systems of the NCR.

The population of Metro Manila stood at 200,000 at the turn of the 20th century (NCSO 1990). The lack of opportunities in the countryside and the rapid urbanization of Metro Manila have encouraged a massive influx of rural dwellers into the megacity. The NCR has a population of 9.93 million as of May 2000 and an annual growth rate of 2.25% (NCSO 2001) (Table I). This figure may be an underestimation of the actual number of city residents if one considers the difficulties that are associated with counting the homeless minors and residents of congested squatter settlements.

At current projected rates of growth Metro Manila will have a population of 19 million in the year 2016. The megacity has an average population density of 15,610 per sq. km. The population density in the NCR varies from 5,520 persons per square kilometer in Pateros to 88,617 persons per square kilometer in Navotas. The congestion is due to the high natural increase of population and the massive rural to urban migration trend (Pernia 1991). This demographic phenomenon has propagated the expansion of poor squatter colonies (Armstrong and McGee 1985; Porio et al. 1994). It has contributed to the deterioration of the infrastructure and the quality of urban services in the metropolis.

On average, a person generates 0.5 to 0.6 kilograms of garbage per day in the megacity (Passe 1993). As of 1999, the nine million residents of Metro Manila generate approximately 6,000 tons of garbage a day. Yet, only 71% of the solid waste that is generated daily is collected by dump trucks (Perez et al. 1995), and disposed of by government and private waste collection agencies. The remaining 29% or 1,800 tons of garbage, is left to rot on street corners and vacant lots, or thrown into storm drains and other waterways (Alibutud 1990; Passe 1993). Along with sewage leaks from septic tanks and other hazardous materials, this type of solid waste seriously clogs the network of drainage canals (Figures 2 and 3).

Only 10 percent (or a total of 50 kilometers) of the drainage facilities is dredged, de-clogged and maintained each year by the Department of Public Works and Highways in Manila (JICA 1990). This figure is equivalent to a total of only 14 meters every day. Most of the drainage facilities are not accessible because many of the drainage canals' service roads have been encroached upon by different types of residential, government and business structures. Meanwhile, indiscriminate dumping of trash seriously clogs the *esteros*, which are modified systems of natural channels and brackish water from coastal lakes that were intended to relieve flooding and improve waterborne transportation. The *estero* system worked well in the 19th and 20th centuries (Kolb 1978). But as the channels were filled in to provide building sites and refuse dumps for a rapidly growing urban population, the *esteros* have gradually become incapable of serving their original purpose (Liongson 2000).

Encroachment by adjacent private property owners on the formerly protected banks of the *esteros* has been reported since the beginning of the 20th century.

TABLE I
Population of Metro Manila, from 1903 to 2000

Name of political division	1903	1939	1960	1980	1995	2000
National Capital Region*	328,939	993,889	2,462,488	5,925,884	9,454,040	9,932,560
Kalookan City	7,847	38,820	145,523	467,816	1,023,159	1,177,604
Las Pinas City	2,767	6,822	16,093	136,514	413,086	472,780
Makati City	2,700	33,530	114,540	372,631	484,176	444,867
Malabon	20,136	33,285	76,438	191,001	347,484	338,855
Mandaluyong City	4,349	18,200	71,619	205,366	286,870	278,474
Manila City	219,928	623,492	1,138,788	1,630,485	1,654,761	1,581,082
Marikina City	8,187	15,166	40,455	211,613	357,231	391,170
Muntinlupa City	3,128	9,288	21,893	136,679	399,846	379,310
Navotas	11,688	20,861	49,262	126,146	229,039	230,403
Paranaque City	6,507	21,125	61,898	208,552	391,296	449,811
Pasay City	8,201	55,161	132,673	287,770	408,610	354,908
Pasig City	11,278	27,541	62,130	268,570	471,075	505,058
Pateros	4,105	7,160	13,173	40,288	55,286	57,407
Quezon City	–	39,013	397,990	1,165,865	1,989,419	2,173,831
San Juan	1,455	18,870	56,861	130,088	124,187	117,680
Tagig	6,829	12,087	21,856	134,137	381,350	467,375
Valenzuela City	8,183	13,468	41,473	212,363	437,165	485,433
Other information						
Population						
Density (per square kilometer)	517.20	1,562.72	3,871.84	9,317.43	14,864	15,610
Growth rate (%)	–	3.72	3.83	3.58	3.3	2.25

* It was created on November 7 1975 under Presidential Decree Number 824. Source: This compilation was based on National Census and Statistics Office 1990, 1996 and 2001 publications.



Figure 2. Garbage collection and waste disposal are two of the most pressing environmental problems in Metro Manila.

It would now be difficult to reopen these waterways because of the accumulated changes that have taken place (e.g. land-fills, squatter settlements, emplacement of major roads and prominent buildings, deterioration of water quality, etc.). Thus, rapid urbanization, encroachment of squatters on riverbanks, silting of waterways and lack of sewerage and drainage facilities worsen the flood hazards of Metro Manila.

Since 1953 floods have affected Metro Manila on many occasions including at least a dozen times that drew extensive coverage in the local mass media: August 1953; September 1956; May 1960; July 1961, 1962, 1964; June 1967; August 1970; July 1972; October 1988; August 1997 (Zoleta-Nantes 2000a). Figure 1 shows the most frequently affected areas through the decades, from the 1950s to the 1990s.

Several trends may be observed in the flood events from the 1950s to the 1990s. Flooded areas spread from the low-lying areas in the coastal parts of Manila, Navotas and Malabon, and along the banks of the 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 mushroomed along the banks of the *esteros* and rivers and in other marginal locations were regularly inundated several times each year.



Figure 3. Mounds of trash along the sides of the streets end up clogging the drainage and sewage canals of the metropolis. Squatters' dwelling units encroach upon many access roads thus dredging the canals is not an easy option.

Flood incidence expanded in the 1980s in the increasingly urbanized low-lying areas in Pasig and Marikina and along the shores of Laguna de Bay, most particularly in Tagig and Pateros. Costly subdivisions built on former agricultural lands were not spared from the consequences of flooding. Indeed, flooding had become prevalent even in relatively high places in Quezon City, Makati, Manila, Paranaque, Muntinlupa, Pasig and San Juan in the 1990s mainly due to substandard subdivision drainage infrastructure.

Incomes lost due to floods rise with the frequency of their occurrence and the degree of devastation they cause. Illnesses such as diarrhea, typhoid fever, influenza and malaria have become more prevalent because of insanitary conditions and, likewise, water contamination due to ineffectual control measures (Tables II and III).

4.2. COMMUNALITIES AND VARIATIONS IN FLOOD HAZARD VULNERABILITIES AND COPING BEHAVIORS

A summary of the data collected (Tables IV and V) indicates, first, that wealthy respondents experience significant flood impacts and are active in defense of their own interest (for example, in flood-proofing their houses) (Figure 4). They are also more capable of finding solutions on a neighborhood scale or community



Figure 4. The differences in the economic conditions and political representation among the residents of wealthy neighborhoods, the urban poor and the street children determine their ability to buffer themselves against the damaging impacts of flood hazards.

TABLE II

Ten leading causes of morbidity in the Philippines, number and rate per 100,000 population, 5-year average (1987–1991) & 1992

Causes	5-year average (1987–1991)		1992	
	Number	Rate	Number	Rate
1. Diarrhea diseases	986,474	1634.1	1,037,121	1587.3
2. Bronchitis	833,611	1380.9	770,396	1179.1
3. Influenza	570,610	373.9	510,190	780.8
4. Pneumonia	225,712	945.2	401,025	613.8
5. Tuberculosis, all forms	166,621	276.0	136,981	209.6
6. Accidents	114,449	189.6	135,247	207.0
7. Diseases of the heart	82,293	136.3	71,027	108.7
8. Varicella	21,215	35.1	62,327	95.4
9. Measles	59,861	99.2	54,570	83.5
10. Malaria	95,543	158.3	46,614	71.3

Source: Department of Health 1996

level (Zoleta-Nantes 2000d). They do not tend to look to national and regional governments for aid except to protect themselves and their neighborhoods from the poor and the homeless. They often possess effective political connections at the local level that can help them direct much needed resources towards flood-proofing

TABLE III

Ten leading causes of morbidity in the NCR, number and rate per 100,000 population

Ranked causes of morbidity	Number	Rate
Diarrhea	64,621	758.7
Pneumonia	54,523	640.1
Bronchitis	54,486	639.7
TB all forms	16,064	188.6
Influenza	14,261	167.4
Diseases of the heart	4,608	54.1
Measles	4,349	51.1
Chicken Pox	3,358	39.4
Typhoid and Paratyphoid	2,130	25.0
Malignant Neoplasm	1926	22.6

Source: Department of Health 1996.

TABLE IV
Characteristics of the three urban study groups

	Residents of wealthy subdivisions	Urban poor in slums and squatter areas	Homeless street children
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 away 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

Source: Zoleta-Nantes 2000a.

TABLE V
Coping activities of the three urban groups in times of flood event

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

Source: Zoleta-Nantes 2000a.

their areas (e.g., elevating street levels and constructing drainage canals). However, because of their increased mobility due to availability of private transportation, they work in relatively distant places. They are therefore the ones most inconvenienced by increased traffic congestion during periods of flooding. Nevertheless, given their resources, they are able to deal with these problems by, for example, spending the night in a hotel or at a relative's or family friend's house in another part of the metropolis.

The findings also indicate that flooding causes more problems for children and female domestic helpers in wealthy neighborhoods. For instance, class cancellations due to flooding are often made in the middle of the day. Young students go to school in the morning, thus, they are often stranded in flooded areas in the afternoon. They can drop into open manholes while they are walking, or if they are stranded, on the streets. It is more difficult for them to fight for seats with adult passengers and get a ride home using public transportation. They are easily exposed to diseases and other infections and get sick more often. Yet, although the young household members of wealthy households are definitely at risk during inundation events, the adult family members always prioritize their needs. Often, the female house servants are tasked with fetching children from school and providing for their safety and other pressing needs even to the detriment of the female house helpers.

Female domestic workers experience more problems during flood events. Housekeepers clean the house, cook food and clean the dishes. They wash, dry and iron clothes. As floodwaters rise, housekeepers, who are often the ones left in the house, are required to single-handedly secure household items and carry furniture upstairs. They fetch children from school and bring them home safely. They brave the floods to go to market and procure shopping and supplies that the household needs. Household helpers assume the role expected of the family heads, without authority. Also, they have more cleaning tasks to do after the inundation events.

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 the scarcity of financial resources (Zoleta-Nantes 2000d). Their flood losses are smaller in terms of monetary value if compared to the monetary value of the flood losses of the residents of wealthy neighborhoods. The flood losses incurred by the urban poor have more adverse impacts on their livelihoods, daily survival and their capability to deal with flood hazards in the future. Often, the amount of government assistance they receive is not commensurate to the level of suffering they bear on a yearly basis.

The urban poor have indicated that their networks of neighbors, friends and relatives are the most dependable sources of emergency and financial help during flood hazard events. This networking strategy however is limited only to provision of immediate help during flood events and post-flooding periods. The urban poor can only depend for a short period of time on their network of relatives, immediate

family members, neighbors, friends, employers and friends in their workplace. Often, they are in tight financial situations, too. The urban poor do not have a more securely established community-wide networking support system that can facilitate efficient delivery of daily and emergency needs over a longer period of time. The lack of an entrenched 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 adequate time to organize themselves into action groups to come-up with long-term flood-reduction programs. There is a general feeling of government neglect and apathy among the urban poor.

The data gathered from the street children indicates that the government is not addressing the needs of homeless minors. Although there is a government agency that is assigned to look after their welfare, the street children are not a high priority on their agenda. The institution lacks funding and human resources focused on improving the plight of homeless minors (such as provision of medical and other services). There is no legislation that clearly stipulates activities and programs to 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 aimed at protecting the welfare of child workers, most especially young minors involved in street selling and other informal economic activities, is lacking. The superficiality of programs and activities undertaken by civic groups and local governments on issues concerning street children is disturbing.

Respondents share the experience of having been inundated by floods and also of having little or no flood insurance (Table IV). In all other ways, the groups are differentiated by socio-economic status. Urban poor and street children bear the heaviest absolute losses because they have very few resources in the first place. They are therefore the slowest to recover, especially when they incur debts they are not able to pay immediately. The debts are retained for several years and compete with the limited earnings of the household that provide for their daily subsistence. One can argue that street children suffer the smallest monetary losses. One can also argue that street children are already miserable and their lives cannot be made much more depressing by flooding (Figure 4). However, this study contends that 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. This is clearly illustrated in the narrative of one of the street children that was interviewed in this study:

Junjun: I live under the Sta. Mesa Bridge. I am 11 years old and the third of five siblings. I do not go to school. My mother is not employed but she stays in the house to do all the housework and takes care of all of us. My father collects bottles and newspapers from trash receptacles in nearby places in San Juan and Manila. I help my family earn a living by hanging out under

the Nagtahan Bridge. I ask for some money from strangers on the pavements along the intersection of Legarda and Claro M. Recto Avenue. I go to other places to beg as well. If I am lucky, or if passers-by are generous, I earn more than PhP50.00 a day (US \$ 1.90 as of September 1997). However, my earnings are not mine to keep. At the end of the day, I surrender all of my earnings to an adult overseer of beggars along Legarda. The overseer is part of an organized syndicate that controls street vending and other economic activities, including begging, in the area. The overseer gives me back a portion of my earnings. The overseer becomes mean when I do not earn more than twenty pesos a day. The overseer warns me that he will make me look drearier so that people will pity me more. There are a few times when I earn less than 20 pesos a day. During those times either the overseer tears my shirts or hurts my face so I will look more desolate. I give the remaining portion of my daily earnings that ranges from ten to thirty pesos, to my mother.

We have experienced flooding inside our house under the bridge as far back as I can remember. Our house is made of corrugated iron and plywood scraps. Flood water enters our shack and carries it away together with our few belongings. When the floods subside we collect materials from the river to build our shanty with the help of our neighbors. I also encounter flood water on the streets. If the flood water is deep enough, my friends and I splash or run around or swim in it. I walk, wade and swim during periods of flooding to get to the street intersections where I beg. I know that it will flood when the typhoons come.

My brothers and sisters usually catch colds and have high fevers during the flood season. We do not go to a clinic or see a doctor. If we have money, we buy medicine from the store. In lean times, we just let the fever or other sicknesses pass away. Floods are bad for our family because my father cannot collect recyclable materials from inundated areas. I cannot beg in flooded streets because there are not many passers-by. My family earns very little or nothing at all during the flooding season. We get hungry and my brothers and sisters get sick.

I think that all of Manila is flooded whenever our house is submerged under water. I think that there is no solution to flooding. My family needs food during the flood season. I do not think that my life will improve if the problem of flooding is solved – I will still beg on the streets.

The homeless street children are able to practise only the narrowest range of adjustments (Table V) and most of these are concerned with personal survival during the floods. The need to develop social support networks for the homeless minors is glaringly obvious. On the other hand, residents of wealthy communities are able to make the widest range of adjustments to flooding (Table V). While the wealthy neighborhoods reported greater losses, they are much better able to recover from these losses, given their resources; further, the burden of past flood events is not transferred to the immediate future. Most of their coping strategies 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 at both the neighborhood and community levels.

The residents of poor neighborhoods, due to their scarce resources, are able to practice a significantly narrower range of adjustments (Table V). 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 effort aimed at reducing 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 non-representation of the urban poor in local government decision-making bodies deprive them of their entitlements to some local government funds.

5. Conclusion and Recommendation

Government resources are essential in the daily lives of the three groups of interest; they are 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 and to enjoy a more humane residential environment in the future (Kates and Haarmann 1992). 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 at flood-stricken locations. It also makes salient the need to provide decent housing in safer locations to the urban poor and homeless street children.

The impoverishment processes continue as household resources are reduced by regular inundation events. Increased vulnerability among the impoverished is compounded by many factors. One major factor is the progressive loss of entitlements to resources such as decent dwelling units, suitable building land, a sewage system and drinking water supply, health centers and medical services. These entitlements are needed for relief management, mitigation and recovery. Gaining access to resources that will improve their living environments is becoming more difficult.

As indicated earlier, rapid population growth, poverty, lack of job opportunities and wide 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 longev-

ity and usefulness of the limited infrastructure. Overuse of the infrastructure is compounded by the government's continuous failure to maintain and improve it.

The loss of entitlement to the government's limited resources 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 and property owners and also use their social connections to influence the members of power-holding bodies.

Entitlements to government resources should be based upon the survival needs of people and not on lawfully sanctioned claims to community resources, such as real estate 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 a great deal to flooding will increase over time.

5.1. POLICY RECOMMENDATIONS TO IMPROVE THE CONDITIONS OF THE THREE URBAN GROUPS AND TO REDUCE FLOOD LOSSES IN METRO MANILA

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 among the residents of the megacity, which are directly affected by the inundation events. However, the localized flood problems of Metro Manila need to be regarded as a national disaster because the flooding occurrences in the megacity have major implications in the management of the country's national affairs. The NCR is the site of national government central offices and it is the command center of the country's economic, political, and socio-cultural activities. Every year the flood losses in Metro Manila range from a conservative estimate of PhP 100 million per annum (Gupta 1990) to a more inclusive estimate of PhP 2.78 billion (Lindfield 1990). It will be costlier in the future as the megacity's economy grows. Flood events will rob Metro Manila's residents and the whole nation of economic opportunities.

The disaster management scheme in Metro Manila should continue to seek the help of the elected officials of the national government for rescue, relief and evacuation services during emergencies because the local government units have a limited amount of resources to effectively address these concerns. In the same manner, the local officials must be pressured to spend five percent of the municipal's internal revenues for disaster prevention and mitigation because this is mandated in the Local Government Code of the Philippines. It is important to seek all forms of assistance from private groups or companies and international sources. However, it has to be emphasized that despite the promising contributions that community and private organizations can deliver to devastated communities, the joint efforts of the

national government and the municipal governments are also key factors when it comes to flood prevention and disaster mitigation.

The community residents should form some monitoring and watchdog groups that would be vigilant in pushing for the support of these elected national and municipal officers and urging them 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.

All cities and municipalities of Metro Manila should have coordinated planning and project implementation. There is a need to share technical and technological expertise to deal with flood problems. Mayors of all cities and towns within 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.

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

Another issue that needs close scrutiny is the reliability of information about disaster losses and other socio-economic indicators in Metro Manila. Correct information can aid in planning a set of pragmatic actions to deal with flood problems in Metro Manila. Basic statistics about poverty, the size of the squatter population, the 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 totally different figures from another agency and there is no way to find out which one is really the correct figure. The problem on data reliability is widespread even at an international level. There is no uniform reporting scheme that will indicate a reliable documentation of loss of lives and morbidity associated with flooding events (Legome et al. 1995; Albala-Bertrand 1993). Disaster assessments must be systematically undertaken to avoid distortions that can affect or influence disaster mitigation planning.

Location data regarding flood-prone lands are also lacking. Local and metropolitan government authorities have not clearly pinpointed where the most vulnerable

populations are in the annually flooded sites. Most government agencies lack information on the location of available resources 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 they are forewarned and resources and facilities are available for this – and providing short-term relief aid.

The flood disaster warning system should be improved (see Tayag and Punongbayan 1994). There should be inter-*barangay* and inter-agency cooperation on flood monitoring and disaster warning. Most important of all, the information should be immediately fed to the broadcasting media, such as radio and television news and public service programs. There is also a need to compile a list of *barangays* that are annually 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 language into layperson's terms to ensure clear information dissemination and advance warning. *Barangay* officials of annually flooded-sites must be provided with radio systems during the flooding season connected to PAGASA monitoring stations. *Barangay* officials must also be provided with loudspeakers to use during the flood season so that advance warning about floods can be announced to the public at short notice. 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. This may also encourage a better public response to disaster warnings (Arroyo 1991).

Advance warning is not going to be effective unless the people are informed about what to do during flood episodes. The plan to organize Disaster Coordinating Committees (DCCs) and to hold information campaigns in the communities should be implemented, particularly in the most disaster-prone areas (NDCC 1988). This will tell the constituents what to do, and build on a support network that they can rely on during emergency periods.

The chance for developing an effective hazard reduction program is great if there is cooperation between different sectors of the community affected by flood hazards (Mitchell 1988, 1999). Exchange of experiences must be facilitated among residents and leaders of subdivisions with similar conditions. There is a 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 they will be morally enlightened and undertake positive action (Ward 1993; Mitchell 1999). As Berke et al. (1993) have pointed out, community participation in planning and institutional development is vital in the realization of equitable distribution of disaster resources and sustained growth.

These programs must also be complemented by other projects such as environmental protection in watershed areas. Also, some preventive flood countermeasures could be adopted, such as reforestation of the Marikina watershed and the building of terraces on the Montalban Hills to prevent soil erosion and reduce siltation of

riverbeds. One can also build secondary embankments (Rasid and Mallik 1993) or adopt multiple embankments. This would prevent bank erosion in the upper part of the Marikina River's floodplains. These programs can be incorporated in the on-going development programs in the countryside. The projects should also be incorporated in urban development programs being undertaken in the adjoining areas of the National Capital Region (Laquian 1995; Ocampo 1995; Kubo 1993).

5.2. SOME IMPLICATIONS ON CONCEPTUALIZATION OF HAZARDS IN DEVELOPING COUNTRIES

The Access and Contextual models of hazards are very useful analytical frameworks for defining differential vulnerabilities among street children, urban poor and wealthy residents of Metro Manila. The two models clearly guide one's explorations of the physical, political and socio-economic contexts and causal factors of flood hazards and disasters. The models' sensitivity to resource access and power distribution illustrates in detail how unequal resource profiles at the household level determine the extent of a flood's adverse impacts among different groups. As the cases of the wealthy and urban poor residents of Metro Manila show, variations in household savings and political connections define the array of potentials for loss and recovery.

A very useful component of the Access and Contextual models is their capability to incorporate time in analyzing long and short-term impacts of inundation events. The time factor offers clues on the households' abilities to recover from a flood's adverse impacts. Using the time component of the two models, one can chart the multiplication of flood losses and the short- and long-term progression of a household's vulnerability to flood hazards – whether they occur as a single event, or in a regular or repetitive basis. However, there are concerns that should be incorporated more explicitly in the two models. Some intervention needs or policy issues in vulnerability reduction can be effectively addressed at different levels of analysis.

The Access and Contextual models are not static models but their degree of dynamism must be intensified to a level that would lead a hazard practitioner (whether with an academic or applied background) to undertake a proactive stand in undertaking hazards research, policy studies and disaster mitigation programs. In real life and real-time emergency situations, opportunities for intervention and dynamic strategies that will immediately address issues raised by the results of causal analysis of hazardous conditions should come in handy. The seeming lack of proactive pragmatism in the two models may be due to the models' externalism, or the outside observers' perspective in looking at causal linkages between unsafe conditions, root causes, and impacts and opportunities, at the societal, community or household levels. One resultant shortcoming of this outsider perspective is the lack of a sense of urgency, commitment, and motivation to address the constraints that are found in the causal linkages between different contextual factors and soci-

etal pressures that shape those conditions. To effectively reduce the adverse impacts of environmental hazards and disaster events, it is not only important to identify the right loci of analysis, it is imperative to identify numerous practicable entries for interventions over both short- and long-term periods, and at different scales of operation.

A hazard model should not stop at the representation and description of processes that shape one's vulnerability to any particular kind of hazard. It should also emphasize practicable approaches on how socio-political connections and relationships between actors and institutions that influence disaster progression and mitigation may be influenced or changed for the better. A model for hazards and disaster research and analysis should be a combination of process description, causal analysis, theory building, and development and identification of workable strategies to effect vulnerability reduction on different scales on a step-by-step basis. The model should enable a dissection of complex problems into workable tasks where possible or prioritized interventions can be made.

Also, disasters impact a community, a household and an individual simultaneously. Thus, a hazard model must be able to catch the dynamics of these simultaneous hazard experiences and the directness of linkages between participants who undertake actions at different spheres of influence. An approach to develop progressive interventions that emphasizes pragmatic strategies in disaster prevention and mitigation must be incorporated in a hazard model for developing countries.

There is also a need to incorporate additional gradation of time features in a hazard model. This is to locate the discussion of evolving phases or changing contexts that should be addressed in developing capabilities to learn from past experiences and shape directions that may be taken in the future. This will connect discourses on hazards and disasters to some planning and development concerns that may lead to more meaningful disaster prevention and vulnerability reduction.

There is also a need for some organizational components in a hazard model to address the need for collective leadership in bringing together the diverse capabilities of affected communities. This will pave the way for community participation in policy formulation and implementation of disaster-related programs, particularly in empowering and enfranchising the most vulnerable groups. This will bring out other perspectives and innovative strategies so that the affected groups and other actors, among themselves and in consultation with others, would be able to deal with hazards and disaster management effectively and with integrity. These issues are important in places where integrity in public administration can be a determinant of success or failure of any program, project or activity.

There is also a need to discuss hazards in the contexts of provision of basic human rights, citizenship and empowerment, equitable resource allocation, and environmental justice. In addition, there is the need to explore the means by which several networks of cooperation and continuing dialogues between and among government officials, community groups, private institutions, academic sectors and non-governmental organizations may be formed and institutionalized. Prioritiz-

ation of an array of concerns and actualization of more feasible plans are then scheduled to follow. One interesting feature of hazards research is that it is free from any notion that there are only a few correct models to be faithfully replicated at all places at all times. Its dynamic nature offers a lot of flexibility to develop and accommodate varied and suitable approaches to address the particularities of varied hazardous locations and conditions.

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