Japan International Cooperation Agency (JICA)
Metropolitan Manila Development Authority (MMDA)
Philippine Institute of Volcanology and Seismology (PHIVOLCS)

Earthquake Impact Reduction Study for Metropolitan Manila, Republic of the Philippines

Final Report
Volume 3
Main Report 2

March 2004

Pacific Consultants International
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PASCO Corporation

Formation of the Final Report

The Final Report is comprised of the following volumes:

Volume 1: Executive Summary
Volume 2: Main Report 1
Volume 3: Main Report 2
Volume 4: Main Report 3
Volume 5: Supporting Report
Volume 6: Data Book

Volume 1, Executive Summary, contains the background information of this MMEIRS study, brief information of earthquake damage scenario for Metropolitan Manila, and summary of the master plan for a safer Metropolitan Manila for earthquake impact.

Volume 2, Main Report 1, contains the information of overall study and its results; that is the background information of this study, earthquake damage scenario, and master plan and action plans for safer Metropolitan Manila.

Volume 3, Main Report 2, defines problem of the present condition of Metropolitan Manila, and represents damage estimation results together with its assumptions and methodologies.

Volume 4, Main Report 3, contains supportive components related to master plan to help understanding the development of master plan.

Volume 5, Supporting Report, contains information on GIS Development and Topographic Map Compilation. It also includes other important out puts of the study, such as city ordinance of earthquake disaster management, earthquake disaster mitigation handbook, and earthquake mitigation and response checklists. Those outputs will be utilized when implementing the master plan.

Volume 6, Data Book, contains various data used for analysis in this Study. In addition, data related to earthquake hazard analysis and damage analysis are stored in CD-ROM.

The following foreign exchange rate is applied on this study report;

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Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Official
ABC	Associate of Barangay Captains
ACP	Advance Command Post
ADB	Asian Development Bank
ADOC	Advance Disaster Operations Center
AMMS	Administrative & Manpower Management Service
AMP	Advanced Medical Post
ASEP	Association of Structural Engineers of the Philippines
ATC	Applied Technical Council
ATI	Asia Terminal Incorporated
BAC	Bids and Awards Committee
BDCC	Barangay Disaster Coordination Council
BFP	Bureau of Fire Protection
BOC	Bureau of Construction
BOD	Bureau of Design
BOE	Bureau of Equipment
BOM	Bureau of maintenance
BRS	Bureau of Research and Standards
C/GP	Clean/Green Personnel
CAR	Cordillera Administrative Region
CBD	Central Business District
CBDM	Community-Based Disaster Management
CBO	Community Based Organization
CDCC	City Disaster Coordination Council
CDMC	Core Disaster Medical Center
CDPP	Calamities & Disaster Preparedness Plan
CFMS	Comptrollership & Financial Management Service
CFS	City Fire Station
CH	City Hall
CHB	Concrete Hollow Brick
CHED	Commission on Higher Education
CHO	City Health Officers
CLUP	Comprehensive Land Use Plan
CMP	Community Mortgage Plan
COA	Commission on Audit
CSSR	Collapsed Structure Search and Rescue
DAO	Disaster Action Officer
DBM	Department of Budget & Management
DCC	Disaster Coordination Council
DECS	Department of Education, Culture & Sports
DENR	Department of Environment and Natural Resources
DEO	District Engineering Office
DIG	Disaster Imagination Game
DILG	Department of Interior and Local Government
DMCC	Disaster Management Coordinating Council
DMH	Disaster Medical Hospitals
DND	Department of National Defense
DOC	Disaster Operations Center
DOCCP	Disaster Center Command Post
DOH	Department of Health
DOTC	Department of Transportation and Communications
DPD	Division of Preventable Disease
DPOS	Department of Public Order and Safety
DPWH	Department of Public Works and Highways

DSO	Directorate for Special Operation
DSWD	Department of Social Welfare and Development
DepEd	Department of Education
ED	Engineering Department
EDM	Earthquake Disaster Management
EMB	Environmental Management Bureau
EMI	Earthquake and Megacities Initiative
EMIP	Emergency Management Institute of the Philippines
EMS	Emergency Medical Service (or System)
EMSA	Emergency Medical Services Authority
EMT	Emergency Medical Treatment
ESC	Environmental Sanitation Center
EVF	East Valley Fault
FD	Fire Department
FEMA	Federal Emergency Management Agency; The United States of America
FS	Fire station
FT	Fire Truck
GDP	Gross Domestic Product
GESI	Global Earthquake Safety Initiative
GIS	Geographic Information System
GMR	Greater Manila Region
GOJ	Government of Japan
GOP	Government of Republic of the Philippines
GPS	Global Positioning System
HEMS	Health Emergency Management Staff
HLURB	Housing and Land use Regulatory Board
HUDCC	Housing and Urban Development Coordination Council
ICS	Incident Command System
ICTSI	International Container Terminal Services, Inc
ICU	Intensive Care Unit
IEC	Information and Education Campaign
IRA	Internal Revenue Allotment
JICA	Japan International Cooperation Agency
JMAI	Japan Methodological Agency Intensity
KI	Key Informants
LCE	Local Chief Executives
LDCC	Local Disaster Coordinating Committee
LGC	Local Government Code
LGU	Local Government Unit
LHP	Local Health Personnel
LLO	Legislative Liaison Office
LPG	Liquefied Petroleum Gas
LRT	Light Rail Transit
LWUA	Local Water Utilities Administration
MAYERT	Makati Youth Emergency Rescue Unit
MCDCC	Makati City Disaster Coordinating Council
MDCC	Municipal Disaster Coordination Council
MEC	Ministry of Education and Culture
MERALCO	Manila Electric Company
MERG	Manila Emergency Response Group
MFS	Municipality Fire Station
MICT	Manila International Container Terminal
MIS	Monitoring and Information
MMA	Metro Manila Authority
MMDA	Metropolitan Manila Development Authority
MMDCC	Metropolitan Manila Disaster Coordinating Council
MMDOC	Metro Manila Disaster Operations Center
MMEIRS	Metropolitan Manila Earthquake Impact Reduction Study

MMI	Modified Mercalli Intensity
MMUTIS	Metropolitan Manila Urban Transportation Integration Study (JICA)
MOA	Memorandum of Agreement
MRT	Metro Rail Transit
MRTC	Metropolitan Manila Transit Corporation
MSSD	Ministry of Social Services and Development
MSW	Marine Slipway
MWSS	Manila Waterworks and Sewerage System
NAIA	Ninoy Aquino International Airport
NAMRIA	National Mapping and Resource Information NAMRIA
NAPOCOR	National Power Corporation
NBCP	National Building Code of the Philippines
NCDA	National Civil Defense Administration
NCR	National Capital Region
NCRPO	National Capital Regional Police Office
NDCC	National Disaster Coordinating Council
NDMC	National Disaster Management Center
NEMA	National Emergency Management Association
NGO	Non-Governmental Organization
NHA	National Housing Authority
NHMFC	National Home Mortgage Finance Corporation
NPC	National Power Corporation
NS	Nurse Supervisor
NSCB	National Structure Code for Buildings
NSCP	National Structural Code of Philippines
NSO	National Statistics Office
NTC	National Telecommunications Commission
OCD	Office of Civil Defense
OPCEN	Operation center
PAGASA	Philippine Atmospheric Geophysical and Astronomical Services Administration
PAHO	Pan American Health Organization
PD	Presidential Decree
PEAC	Pre-Qualification, Evaluation and Awards Committee for Consultancy
PEIS	PHIVOLCS Earthquake Intensity Scale
PERR	Philippine Earthquake Reconnaissance Report
PFZ	Philippine Fault Zone
PGA	Peak Ground Acceleration
PGV	Peak Ground Velocity
PHA	Philippine Hospital Association
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PICE	Philippine Institute of Civil Engineering
PIO	Public Information Officer
PLDT	Philippine Long Distance Telephone Company
PNCC	Philippine National Construction Corporation
PNP	Philippine National Police
PNRC	Philippine National Red Cross
PPA	Philippine Ports Authority
PTSD	Post-traumatic Stress Disorder
RA	Republic Act
RB	Road Board
RC	Reinforced Concrete
RCDG	Reinforced Concrete Deck Girder
RES	Regional Equipment Services
ROD	Regional Operations Division
RQD	Rock Quality Designation
RROZ	Rescue & Relief Operation Zones
RS	Resident Survey
RVS	Rapid Visual Screening

S.W.M.O	Solid Waste Management Office
SARS	Severe Acute Respiratory Syndrome
SEAOC	Structural Engineers Association of California
SFS	Sub Fire Stations
SO	Surveillance Officer and RSI
SOP	Standard Operating Procedure
SPT	Standard Penetration Tests
SS	Strike Slip
SUMA	Supply Management Methodology
SWD	Solid Waste Department
TOT	Training of Trainers
UBC	Uniform Building Code
UHLP	Unified Home Lending Pregram
UNHCR	United Nations High Commissioner for Refugees
UN-OCHA	United Nations Office for the Coordination of Humanitarian Affairs
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator Projection
VCA	Vulnerability and Capacity Assessment
VFS	Valley Fault System
WB	World Bank
WHO	World Health Organization
WVF	West Valley Fault
WVFS	West Valley Fault System

Main Report 2

Part III Understandings for Master Plan

-Conditions, Earthquake Damages and Urban Vulnerabilities-

Part III-1 Background of Metropolitan Manila for Disaster Management Plan

Chapter 7. Past Major Natural Disaster in the Philippines

CHAPTER 7. PAST MAJOR NATURAL DISASTER IN THE PHILIPPINES

7.1 Past Natural Disaster – Damages, Responses and Recovery Processes

7.1.1 Recent Disaster Situation

The Philippines has suffered from various types of natural disaster for a long time. M.L. P. Bautista et al.(2002) summarized the situation as follows:

The Philippines has been battling the onslaught of natural hazards. This is not surprising considering its geographic location. For the last 35 years, the Philippines was affected by 10 earthquakes with magnitude greater than 7.0. Yearly, about 20 tropical cyclones visit the country, about five of them causing significant damages. The Philippines also has 220 volcanoes, 22 of which are considered active having had eruptions for the last 10,000 years. Its most active volcano is Mayon followed by Taal, Bulusan, Kanloan and Hibok-Hibok. Pinatubo Volcano, which was quiet for 600 years, erupted in June 12-15, 1991. It ejected 5 cu. km. of pyroclastic materials and 0.5 cu. km. of ash. Its 1991 eruption is considered as the second biggest in the 20th century with its thick ash circling the globe twice and even causing global temperatures to drop by 2 degrees C years after the event. Other significant natural hazards are droughts and floods, which also caused economic and human losses.

National Disaster Coordinating Council (NDCC)- Office of Civil Defense (OCD) summarized natural and manmade disaster statistics from 1990 to 2001(Table 7.1.1 and Figure 7.1.1). Almost 20 to 80 cases of natural disasters have occurred annually. During this time, 16,632 persons were dead, 18,756 persons were injured and 3,997 persons were missing. Total damaged properties were estimated as 165,200 millions of Pesos. Especially great hazards as follows occurred during last 10 years: 1990: July 16 Earthquake, 1991: Mt Pinatubo Eruption, 1991: Ormoc Flood, 1993: Mt Mayon Eruption, 1994: Mindoro Earthquake, 1999: Dec 12-Earthquake, 2001: Typoon Feria, 2001: Typoon TS Nanang. Total dead persons exceeded 2000 in year 1990 and 1991. Furthermore, a lot of manmade disaster occurred and total occurrence of disaster reached to 1,931 cases and total damaged properties were estimated as 16,808 millions of Pesos.

National Disaster Coordinating Council (NDCC)- Office of Civil Defense (OCD) summarized "Lessons learned from past disasters" in their web site. These are shown in Table 7.1.2 to Table 7.1.6. Some of the recommendations are already applied. Various disaster-counter measures have been actually applied especially after 1990 July 16 Earthquake. Earthquake monitoring system in PHIVOLCS is being strengthened. Earthquake drills are undertaken comprehensively by MMDA and PHIVOLCS. OCD is proposing enactment of laws that will mitigate earthquake impacts. In these considerations, capability built-up of local government disaster coordination councils

(DCC) is often stated. This is because Presidential Decree No. 1566 defines the responsibility of local government in disaster management. However, increasing disasters do not always allow each local DCC to cope with these recommendations sufficiently.

7.1.2 Presidential Decree No. 1566 as basis for Disaster Countermeasure

This Decree was promulgated on June 11, 1978 and it calls for the "Strengthening of the Philippine Disaster Control Capability and Establishing the National Program on Community Disaster Preparedness" (http://www.ndcc.gov.ph/dm_laws.html#Decree). The six main policies of this decree are: [M.L. P. Bautista et al.(2002)]

1) It is the responsibility of all government departments, bureaus, agencies and instrumentalities to prepare plans of their emergency functions and activities;
2) The National Government exists to support the local governments in times of emergencies and according to their levels of assignments. All national government offices in the field shall support the operations of the local government.
3) The primary responsibility during emergencies rests on the government agencies in the affected areas in coordination with the local people.
4) The responsibility of leadership rests on the provincial governor, city and municipal mayors, (and barangay chairman), each according to his area of responsibility.
5) Self-reliance shall be developed by promoting and encouraging the spirit of self-help and mutual assistance among the local officials and their constituents.
6) Each political and administrative subdivision of the country shall utilize all available resources in the area before asking for assistance from neighboring entities or higher authority.

This decree is the basis for any consideration, preparation and implementation for coping with disasters. Details of the decree are explained in chapter 10 in this report.

Table 7.1.1 Summary of Natural and Manmade Disasters from 1990 to 2001

YEAR	Disaster Occurrences	No. of Occur-rence	Casualties			Affected Population		Houses Damaged		Damage to Properties
			Dead	Injured	Missing	Families	Persons	Totally	Partially	in Millions of Pesos
GRAND TOTAL		2607	16632	18756	3997	13312230	65335549	1042476	3054619	165200.50
1990	Natural Disasters	36	723	1506	312	1490036	7561893	223593	637494	16117.36
	Man made Disasters	64								0
	July 16, Earthquake	1	1283	2786	321	227918	1255248	25207	77249	12225.04
	SUB-TOTAL	101	2006	4292	633	1717954	8817141	248800	714743	28342.40
1991	Natural Disasters	18	5271	551	1284	200255	1020515	15517	84062	6255.26
	Man made Disasters	37	54	27	10	1015	4858			0
	Mt Pinatubo Eruption	1	850	184	23	249371	1180132	40867	67862	10624.00
	SUB-TOTAL	56	6175	762	1317	450641	2205505	56384	151924	16879.26
1992	Natural Disasters	16	155	162	56	377566	1891040	3416	8084	9302.11
	Man made Disasters	35	23	133		867	4887	590	1543	13.00
	SUB-TOTAL	51	178	295	56	378433	1895927	4006	9627	9315.11
1993	Natural Disaster	57	878	1746	247	1884428	9337911	164623	445423	21097.75
	Manmade Disasters	115	285	105	6	51696	234893			0
	Mt Mayon Eruption	1				3614	17883			72.72
	SUB-TOTAL	173	1163	1851	253	1939738	9590687	164623	445423	21170.47
1994	Natural Disasters	65	293	255	56	686254	3385193	59051	223911	3570.81
	Manmade Disasters	174	101	29	1	12248	56097	1914	58490	750.52
	Mindoro Earthquake	1	83	420	8	22454	134712	1530	6030	515.00
	SUB-TOTAL	240	477	704	65	720956	3576002	62495	288431	4836.32
1995	Natural Disasters	87	1353	3040	683	1781439	8971363	294517	719779	16658.34
	Manmade Disasters	302	397	582	108	31175	150906	1202	297	2157.33
	SUB-TOTAL	389	1750	3622	791	1812614	9122269	295719	720076	18815.67
1996	Natural Disasters	62	158	175	64	290816	1427405	2995	18918	3113.80
	Manmade Disasters	148	346	407	118	21783	99623	1975	5044	697.84
	SUB-TOTAL	210	504	582	182	312599	1527028	4970	23962	3811.64
1997	Natural Disasters	54	137	46	10	468462	2342095	1283	7614	1704.12
	Manmade Disasters	181	361	662	1	40739	227453	2198	272	11289.60
	SUB-TOTAL	235	498	708	11	509201	2569548	3481	7886	12993.72
1998	Natural Disasters	40	518	896	122	1670237	7450107	137203	406517	25430.96
	Manmade Disasters	228	296	488	89	326	1457	633	36	2.78
	SUB-TOTAL	268	814	1384	211	1670563	7451564	137836	406553	25433.74
1999	Natural Disasters	73	400	150	48	997180	4854841	5797	26713	4034.35
	Manmade Disasters	161	249	329	59	40417	133339	986	104	1092.63
	Dec 12-Earthquake	1	5	40		87	356			3.99
	SUB-TOTAL	235	654	519	107	1037684	4988536	6783	26817	5130.97
2000	Natural Disasters	89	641	538	135	1628881	8093821	25122	198419	9158.18
	Manmade Disasters	240	916	1145	12	165837	865304	11507	2307	0.48
	Mt Mayon Eruption	1				14114	68426			89.86
	SUB-TOTAL	330	1557	1683	147	1808832	9027551	36629	200726	9248.52
2001	Natural Disasters	71	511	1472	160	887884	4212132	16393	58302	8369.71
	(Mt Mayon included)	2				11529	56853			48.82
	Manmade Disasters	246	345	882	64	53602	294806	4357	149	804.13
	SUB-TOTAL	319	856	2354	224	953015	4563791	20750	58451	9222.66

Source: National disaster coordinating council - office of civil defense, http://www.ndcc.gov.ph/home_Disasters1990-2001.html

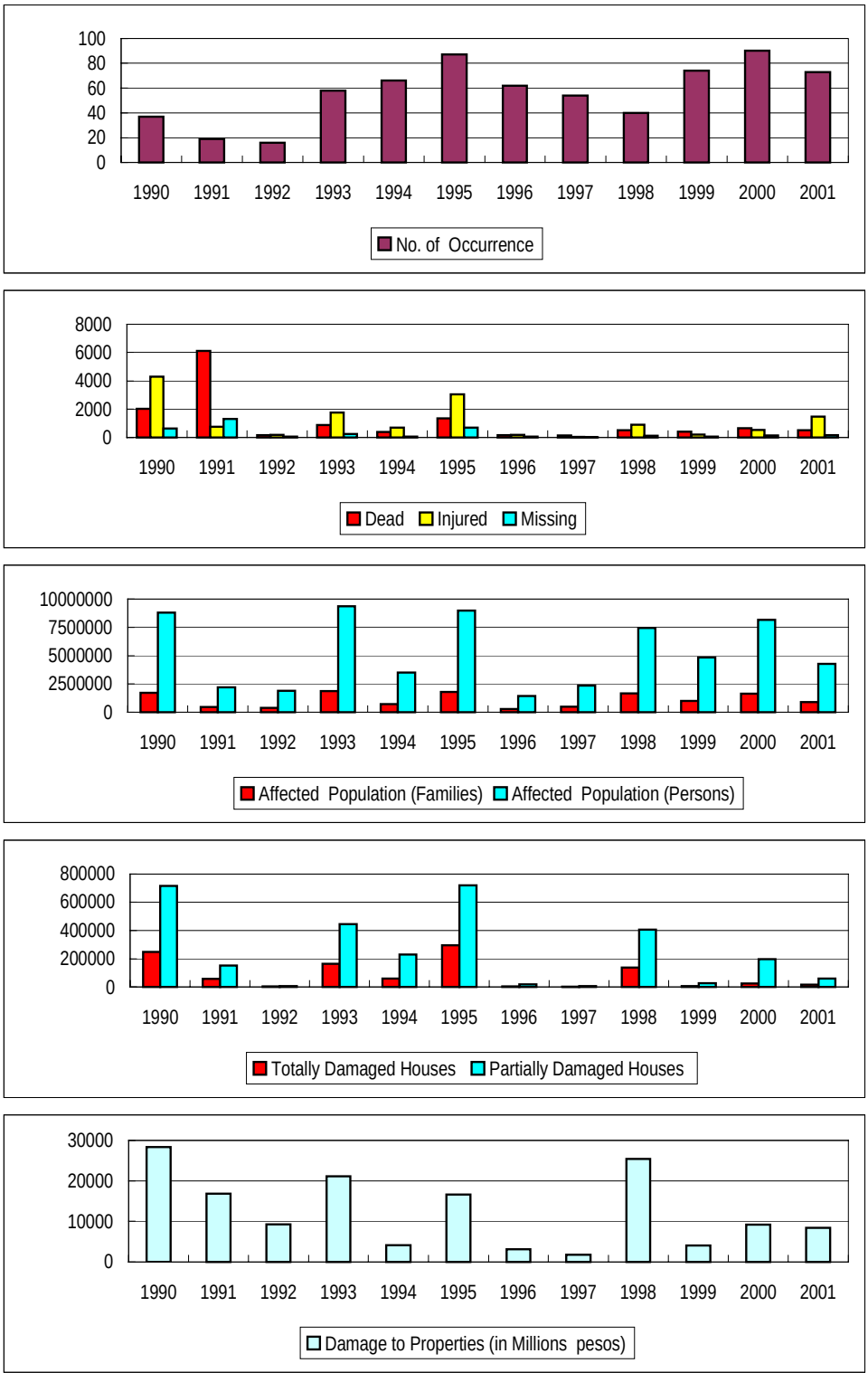

Figure 7.1.1 Damages of Natural Disaster in the Philippines from 1990 to 2001

1990: July 16 Earthquake, 1991: Mt Pinatubo Eruption, 1991: Ormoc Flood, 1993: Mt Mayon Eruption, 1994: Mindoro Earthquake
1999: Dec 12-Earthquake, 2001: Typhoon Feria, 2001: Typhoon TS Nanang
Source: National disaster coordinating council - office of civil defense, http://www.ndcc.gov.ph/home_Disasters1990-2001.html, compiled by JICA Study Team

Table 7.1.2 Lessons Learned from Past Disasters (NDCC and OCD) - Earthquake

DISASTER	LESSONS LEARNED	RECOMMENDATIONS
Earthquake	1. Need to upgrade earthquake monitoring through the provision of advanced seismic equipment and establishment of additional seismic stations in strategic sites of the country	- Upgrade existing monitoring set-up
	2. Need for upgrading awareness and preparedness of Filipinos about geologic phenomena like earthquakes and volcanic activities	- Inclusion of geologic hazards in the elementary school curriculum
	3. Need for effective and fast relief rescue management and implementation during times of natural calamities	- Creation of teams of trained personnel in rescue operations and provide them with the necessary logistics and appropriate equipment
	4. Need for effective and proper land use management and inclusion of preventive measures against adverse effects of geologic hazards in urban development	- Conduct information and education campaign (IEC) regarding geologic hazards in school and communities and include preventive measures in the regional and national urban planning - Strict enforcement of national building code should be done to ensure safety of buildings and structures
	5. Need for coordination and facilitation of entry of foreign assistance	- Institutionalize existing procedures of coordination and facilitation of entry of foreign assistance
	6. Failure of local DCCs to react immediately during emergencies.	- Retrain/revitalize/ reorganize DCCs at all levels - Require LGUs to prepare functional disaster plans - Strict implementation of 2% budgetary reserve for disaster operations under PD #477 and allocation of funds for disaster preparedness under PD #1566.
	7. Need for the establishment of effective management relief centers and staging areas for relief responses in affected areas.	- Determination of relief goods requirements for the duration of relief operations and acquisition of same
	8. Need for an effective quick- response rescue/recovery capability	- Organize/train the rescue/recovery/evacuation team of NDCC and local DCCs with AFP unit as nucleus - Procurement of special equipment for 200-men set-up for rescue/recovery/evacuation purposes
	9. Need for an immediate damage assessment/ feedback information as basis of decision-making by NDCC and tasked agencies.	- Local DCCs to form a survey team for immediate dispatch in affected areas where communication lines are cut-off - Back up communications to be readily available for damage assessment and reporting purposes
	10. Need to decentralize decision-making on rescue, recovery and relief management to tasked agencies	- Spell out an NDCC policy on decentralization of decision- making during emergencies

Source: National disaster coordinating council - office of civil defense, http://www.ndcc.gov.ph/home_lessons%20learned.html#Top

Table 7.1.3 Lessons Learned from Past Disasters (NDCC and OCD) - Fire

DISASTER	LESSONS LEARNED	RECOMMENDATIONS
Manor Hotel	1. Need to review the fire and building code of the Philippines	- Strict implementation of Fire Code and Building Code of the Philippines - Proper inspection of vital facilities by concerned authorities
	2. Need to conduct intensive training of responders for urban search and rescue operations	- Conduct of Intensive training of responders for urban search and rescue operations
	3. Need to conduct regular fire drill in all establishments	- Regular conduct of fire drills in vital facilities
	4. Need to implement the Incident Command System during operations	- Establish an Incident Command System during disasters and clearly define roles of the ICS Structure
	5. Lack of Self-contained breathing apparatus and other rescue equipment	- Allocate additional funds specially for purchase of Self-contained breathing apparatus and other rescue equipment
MV CARMELA SEA TRAGEDY	Responders: 1. Responders were hardly identified due to lack of uniform / identification 2. Improper handling/disposal of casualties 3. Lack of coordination and no established Incident Command System (ICS) 4. No Standard Operating Procedures LGUs 1. Triage for medical was not applied 2. Failures to control the crowd 3. No Media Center was set-up 4. Lack of uniform and identification 5. LDCC is hesitant to augment/release funds for the purpose 6. Networking between the PDCC and CDCC is weak 7. Lack of necessary knowledge on emergency management	- Provision of uniforms to response teams for purposes of identification - Reorientation/networking of local DCCs giving emphasis on SAR, Incident Command System and Emergency Medical Services - To clearly define RA 8185 regarding utilization of 5% Local Calamity Fund - Strict implementation of Maritime Laws Specific training design for Local Chief Executives (LCEs) - Equipage of response teams to deal with maritime disasters - Proper observance in the handling of cargoes/combustible inflammable materials - Augmentation support from the management for such operations

Source: National disaster coordinating council - office of civil defense, http://www.ndcc.gov.ph/home_lessons%20learned.html#Top

Table 7.1.4 Lessons Learned from Past Disasters (NDCC and OCD) - Flood

DISASTER	LESSONS LEARNED	RECOMMENDATIONS
ORMOC TRAGEDY	1. Ineffective watershed management program 2. Need to establish/identify flood hazard zones, warning system and flood mitigating measures 3. Poor drainage system 4. Need to have massive reforestation program nationwide, especially in strategic watersheds and headwaters 5. Assessment and evaluation of flood high risk areas	- There must be an affective watershed management program - Develop efficient drainage system - Massive and aggressive reforestation program nationwide, especially in strategic watersheds and headwaters - Assess other potential disaster areas

Source: National disaster coordinating council - office of civil defense, http://www.ndcc.gov.ph/home_lessons%20learned.html#Top

Table 7.1.5 Lessons Learned from Past Disasters (NDCC and OCD) - Tropical cyclones

DISASTER	LESSONS LEARNED	RECOMMENDATIONS
TYPHOON FERIA (2001)	1. The need to immediately release of NDCC financial assistance to dead and injured victims 2. The need to have direct communication linkage with provincial and municipal DCCs to validate reports received from other sources 3. The need for awareness and education of people living along areas vulnerable to disasters remains a major issue 4. Mitigation and preparedness activities need to be intensified to minimize casualties and damage properties 5. Discrepancy on the figures on disaster impact also remains a major issue 6. The need to upgrade the rescue capability of local responders on SAR	- Immediate restoration of power lines in all affected areas; repair and rehabilitation of damaged roads and bridges by local DPWH and Provincial Engineering Office - DSWD to provide Emergency Shelter Assistance to families with partially damaged houses and Core Shelter Assistance to families whose houses were totally destroyed - DSWD and PSWDO to implement Food-For-Work program to support families while they repair/rebuild their houses - National and provincial offices of the Department of Agriculture to extend technical assistance and other services such as farm inputs, seeds, easy loan terms to the affected farmers for immediate recovery of their losses - Train barangay-based Quick Response Teams and other special operating units - Reorient key implementors of disaster management focusing on lower DCCs to strengthen the system - Augment Provincial Disaster Operations Centers with NDCC Calamity Fund
TS NANANG (2001)	1. Urgent need for effective land use management and institution of precautionary measures against adverse effects of geologic hazards and the like 2. 52nd EBDE, AFP needs available strategic POL reserves to effectively deliver timely emergency response services 3. 52nd EBDE, AFP needs to replace vintage equipment which hampers the rehabilitation effort of the concerned AFP unit	- Implementation of proper land use (Zoning) - Institution of precautionary measures against adverse effects of disasters - Augmentation support or allocation of funds from the higher headquarters for the purpose
2002 destructive cyclones	1. Delayed reporting by some lower DCCs and no existing SOPs at the Disaster Operations Center 2. Need for close coordination with the deputized coordinators even during weekends 3. Lack of manpower and funds for operations purposes.	- Improvement of alert warning/ communications and linkages with NGOs and volunteers - Review the lapses in the system to improve emergency response operations

Source: National disaster coordinating council - office of civil defense, http://www.ndcc.gov.ph/home_lessons%20learned.html#Top

Table 7.1.6 Lessons Learned from Past Disasters (NDCC and OCD) - Volcanic Eruption

DISASTER	LESSONS LEARNED	RECOMMENDATIONS
MT PINATUBO	The local DCCs and LGUs as well as the national implementing agencies have been very responsible and effective in disaster management particularly in terms of monitoring and warning dissemination, rescue, evacuation, relief and rehabilitation operations yet there is still a need for foreign technical assistance. Since we lack experts on lahar, the assistance provided by theUS Government through USGS Team and the Japanese Government through the JICA had complemented the government's present capability.	- It is therefore imperative for the government to equip all RDCCs, particularly those in disaster-prone areas with high technology equipment and devices for monitoring and warning dissemination, helicopters and heavy duty trucks to support immediate SAR operations
	1. Successes: Unrest of long dormant volcano must be treated urgently Willingness to make and to act on uncertain forecasts as needed for successful risk mitrigation Manned lahar watch points are viable valuable parts of the monitoring efforts Video portrayal of volcanic hazards is a lifesaver Satellites or cellular phones are needed for reliable communications during major eruptions because cellular phones worked when all other communications had failed 2. Shortcomings: Planning for worst case scenarios needs to consider combinations of events – for example, an eruption and a typhoon together Manuals instructing local readers how to prepare should be brought to each future crisis Plans for notification must be streamlined and tested Seismic networks need redundant, dual gain or wide dynamic-range instrument, to allow survival of a sufficient number of stations and to keep recording on line and on scale	
MT MAYON	During the duration of the Mayon operations, one single and concerted effort on disaster management program was effectively implemented. DCCs from the provincial down to the barangay level had been very responsive in terms of preparedness, prevention and mitigation with their objective of reducing vulnerability of the people to disaster. There was a pro-active transparent and institution-directed management system wherein quick and immediate reaction to the emergency situation was made possible. All available resources were pre positioned at strategic places for rapid distribution. Relief goods and donations intended for the victims and evacuees were directed to CDCC and MDCC immediately.	

Source: National disaster coordinating council - office of civil defense, http://www.ndcc.gov.ph/home_lessons%20learned.html#Top

References to 7.1.1

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7.2 Past Earthquake Disaster-Damages, Responses and Recovery Processes

7.2.1 Latest Large Earthquake Disaster in Baguio

In the late afternoon of July 16 1990, wide area of northern part of central Luzon island was hit by a very strong earthquake with magnitude of 7.8. The epicenter of this earthquake was located at Cabanatuan City, Nueva Vizcaya Province. According to the PHIVOLCS, this strong earthquake was caused by structural movement of the Philippine Fault Zone, which is a major fault system extending from north to south in Luzon island. Due to the strong shaking of the earth, extensive areas in Benguet ,Tarlac, Pangasinan and Nueva Vizcaya Provinces were heavily damaged. Also, surrounding areas of these provinces were damaged extensively. Metropolitan Manila felt seismic intensity at 7 and buildings along the coastal lowland area of the Manila Bay were slightly damaged.

Based on the report prepared by NDCC in 1990 and DPWH, UNDP/UNCRD et al., in 1992, emergency disaster management and recovery processes will be reviewed to identify existing problems taking into consideration this most recent and largest earthquake disaster in the Philippines.

7.2.2 Outline of the Earthquake Damages

Area affected by this earthquake was the whole Northern and Central Luzon covering regions I, II, III and the Cordillera Administrative Region (CAR) and part of Southern Luzon. In these areas, the provinces of Benguet, Mt.Province, La Union, Pangasinan, Nueva Vizcaya, Nueva Ecijia and Tarlac as well as the cities of Baguio, Dagupan, Cabanatuan and San Josa were seriously damaged.

In upland area such as Baguio city, damages were extensively found not only for buildings but also infrastructures such as road and bridges. Many land slides and land collapses were caused in steep slope area. Debris of these landslides blocked the mountain and caused road traffic in many places for a long time.

Liquefaction took place in coastal lowland area such as Dagupan city. Due to these phenomena, many buildings were tilted or a lower part of buildings subsided into the ground. Many bridges in lowland area also collapsed.

Total casualty was counted at 1,283. Furthermore, 321 persons were missing and 2,786 were injured. A total of 227,918 families and 1,255,248 persons were affected. In Region I, total casualty was 191 and 29 were missing. The provinces of Pangasinan and La Union had 87 and 80 casualties, respectively. In Region II, total casualty was 191 and 94 were missing. Out of that, Nueva Vizcaya had 190 casualties and 94 missing. In Region III, total casualty was 245 and only 2 missing. Nueva Ecija and Cabanatuan City combined have 212 casualties. Almost 50% of total casualties occurred at the Cordillera Administrative Region. Baguio City had 385 casualties and 184 missing whereas Benguet had 243 casualties and 2 missing.

Among affected buildings, about 25,207 were totally damaged and 77,249 were partially damaged.

7.2.3 Emergency Management by the Government of Philippines

The seven immediate concerns aimed primarily to restore the normal living condition of the people in the earthquake stricken area were prepared. These were:

1) Rehabilitation of road networks
2) Provision of temporary housing/shelters
3) Environmental sanitation in evacuation areas
4) Normalization of basic services
5) Relocation, livelihood and water supply in flooded areas
6) Demolition/clearing of disaster debris
7) Restoration of normal flow of commerce and trade.

Most of these activities have been carried out by the Presidential Task Force on Rehabilitation, which assumed the second phase of the government's response to the disaster. The President and government offices responded quickly to take necessary measures for rescue operations and restoration activities such as issuing a series of Presidential Proclamation and budget preparation.

7.2.4 Restoration of Roads and Bridges

DPWH as the responsible agency for road and bridge restoration in the affected area started resurfacing work, prevention of the destruction of the soil and other measures immediately after the quake. The three main roads to Baguio City such as Kennon, Marcos Highway and Naguilian were heavily damaged. These main roads were rendered impassible by landslide debris and Baguio City was isolated for about three days. Heavy machines could not reach these areas promptly and people had to remove rocks and soils by hand for rescue operations.

Naguilian Road was partially opened on the third day after the earthquake event but Kennon road and Marcos Highway have not opened a month after the earthquake. Naguilian road was the only connection route to Baguio City. However, traffic was limited for one-way and was open only during day time. The restoration for the main road networks and roads for village areas needed longer time. These were the restoration condition for main road network and road restoration for village areas need longer time. Bridge restoration also needed a longer time. It took three weeks for one-way traffic to be opened in the case of the heavily damaged Carmen Bridge in Pangasinan. It took a month to build a temporary wooden bridge for pedestrians across the damaged Magsaysay Bridge in Dagupan City.

7.2.5 Rehabilitation/Clearing of Damaged Buildings

In Baguio city, building damage was serious. The Famous buildings such as Hyatt Terrace Hotel and Nevada Hotel totally collapsed. In addition to these collapsed buildings, many another damaged buildings in the city were impossible to restore. Demolition of these buildings and removal of debris required plenty of heavy machineries and long period of time after the event.

In Dagupan city where liquefaction had extensively occurred, many buildings tilted or subsided. Heavily tilted buildings were later demolished. Buildings that subsided were rehabilitated by burying the floor that subsided. A three-story building was converted to a two story one as an example.

Public facilities such as city halls, churches and school buildings were also damaged. Totally collapsed buildings were demolished but slightly damaged city halls were used for daily operation. Damaged school buildings were checked and those confirmed to have no problems were used for re-opening classes. However, many schools were closed for more than a month.

7.2.6 Cost Estimation by Earthquake Damage

Total amount of damages, based on damage investigation by each responsible agency was 12.2 Billion pesos in 1990 cost. For the reconstruction of earthquake damages, following items were programmed;

1) Roads and Bridges by DPWH, Rehabilitation and reconstruction of national highways, bridges, and their access roads. Provincial, barangay, and municipal roads and bridges
2) Housing by NHA. Reconstruction of 7700 houses, repair of 6700 units.
3) Health Facilities by DOH. Reconstruction and repair of 45 hospitals and 350 other health related facilities.
4) Irrigation Facilities by NIA. Reconstruction and repair of irrigation facilities such as dams, dikes, embankments and canals.

5) Flood Control Drainage by DPWH. Reconstruction and repair of Flood control and drainage structures and restoration of dikes, embankments, slope protection and river training works.

6) Water Supply by DPWH and LWUA. Reconstruction and repair of water supply system in rural/barangay areas, mainly the rehabilitation of wells (DPWH). Reconstruction and repair of water supply system in urban areas including elevated concrete reservoirs, deep wells, repair and transmission of distribution pipelines(LWUA).

7) Schools and other governmental buildings by DPWH. Government of the Philippines introduced external funds from the World Bank and ADB as a loan, and bilateral assistance from the U.S.A., Japan, and others to accomplish reconstruction program above mentioned.

Chapter 8. Social Systems and Conditions

CHAPTER 8. SOCIAL SYSTEMS AND CONDITIONS

8.1 Socio-economic Condition of Metropolitan Manila

8.1.1 Economic Condition

Metropolitan Manila is the center of financial, commercial, social, cultural, and educational center and the seat of the national government. Its continuous development through centuries has made the Metropolitan Manila the premier metropolis in the Philippines.

The Gross Domestic Product (GDP) of Metropolitan Manila reached P835.6 billion (US$28.4 billion) in 1997. The share of Metropolitan Manila in the total economy's GDP initially went down from 30.1 percent in 1980 to 28.3 percent in 1985 before recovering to 32.7 percent in 1997 (refer to Table 8.1.1). For 1997, the share of service sector and manufacturing of Metropolitan Manila in the total economy is approximately 40%.

Table 8.1.1 Share of Metropolitan Manila in the Total Economy's GDP

%	1975	1980	1985	1990	1992	1997	Ave 1985-1997
GDP	28.99	30.16	28.35	32.27	32.39	32.74	34.48
GVA in Industry Sector	44.18	40.94	42.97	38.82	38.3	38.41	38.71
GVA in Manufacturing	47.86	48.02	45.8	42.97	42.03	43.26	43.82
GVA in Construction	38.4	32.84	40.97	36.49	34.09	30.08	30.46
GVA in Service Sector	37.84	37.89	35.06	43.29	43.69	44.09	44.81

Source: Philippine Institute for Development Studies

In 1997, per capita GDP in Metropolitan Manila stood at P82,832 (US$2,811). Metropolitan Manila continues to dominate all the other regions with a per capita income that is 2.5 times the national per capita GDP of P33,722 (US$1,144). These are described in Table 8.1.2 below.

Table 8.1.2 Per Capita GDP in Metropolitan Manila and National

Pesos	1975	1980	1985	1990	1992	1995	1997
Metropolitan Manila	6,690.74	13,470.54	25,019.63	43,248.94	51,037.53	65,997.11	82,832.38
National	2,726.30	5,502.34	11,207.01	17,611.42	21,107.53	2,7778.00	33,722.49

Source: Philippine Institute for Development Studies

Poverty line of 1997 for a family of 5 is P71,800 per year. In Metropolitan Manila, 7 percent live below this line out of 2.0 million households, while the national poverty incidence was 32.1%. The poverty incidence is shown in Table 8.1.3.

Table 8.1.3 Poverty Incidence

%	1985	1988	1991	1994	1997	Reduction	
						85-94	85-97
Metropolitan Manila	23	21.6	13.2	8	7.1	15	15.9
National	44.2	40.2	39.9	35.5	32.1	8.7	12.1

Source: Philippine Institute for Development Studies

These variables support the economical concentration in Metropolitan Manila versus the national. Furthermore, these tendencies are becoming stronger in recent years.

8.1.2 Urban Development

1) Historical Development of Metropolitan Manila

Metropolitan Manila has been constantly growing and is expected to expand further. The present Metropolitan Manila has 636 km^2 and 10 million population as of 2000, while the actual metropolitan area has expanded beyond the administrative boundary and houses 14.5 million. According to the Metropolitan Manila Urban Transportation Integration Study (MMUTIS), March 1999, it is predicted that this will further reach 25 million with the expanded urbanized area of 1,500 km^2 (refer to Figure 8.1.1).

Historically, Metropolitan Manila's growth and expansion follows common historical patterns, that is, initial densification of population followed by commercialization and the outward movement of residents to the suburbs. The suburbs subsequently attract commercial developments, and the cycle continues without let up and apparent order. Metropolitan Manila has experienced this phenomenon since the 1970s. This expansion has been continuous, but no longer confined to National Capital Region (NCR), but to the Greater Manila Region (GMR).

Recent urban developments in Metropolitan Manila can be summarized by the following characteristics:

1) Intensified population density in some inner areas, and population decrease also in inner area, degenerating sprawl phenomena
2) Continuous suburbanization for the residential housings
3) Mixed land use and squatter area are evident
4) Inadequate land use and development control

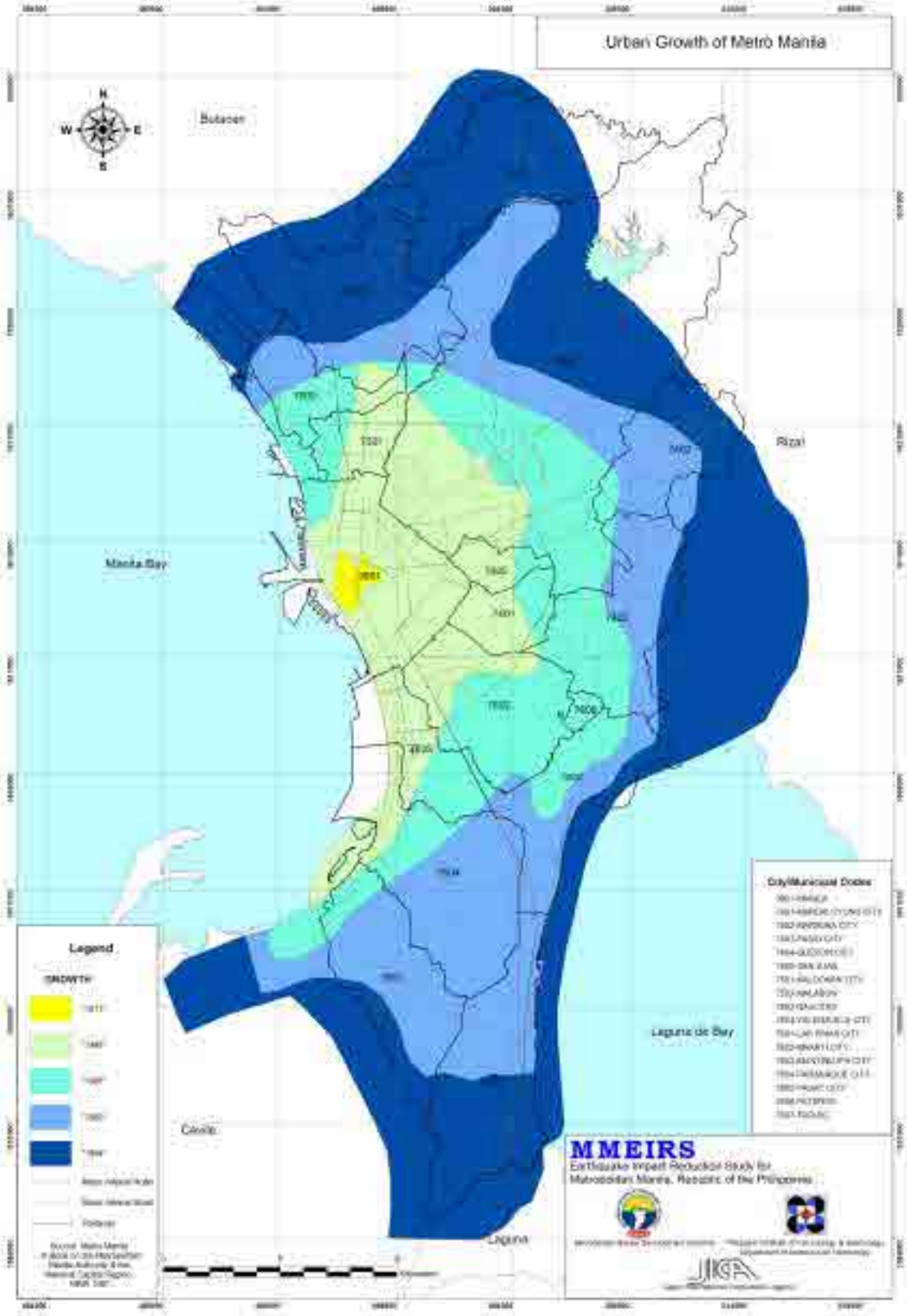


Figure 8.1.1 Expansion of Urban Land

Uncontrolled sprawl is still the norm in Metropolitan Manila. LGUs, cities and municipalities, were transferred with the powers, particularly urban planning and development controls, by the Local Government Code (LGC) enacted in 1991. While many have embraced comprehensive planning and adopted zoning regulations, all are generally ineffective in enforcing land use restrictions and securing future road rights of way. Major reasons for the inadequate use of land, meaning the gap between the land use plan and the actual land use are: 1) decentralization policy without main control, and 2) uncontrollable social factors, such as in-migration and illegal settlement.

2) Land use Classification in Metropolitan Manila

Land use classification in Metropolitan Manila is summarized in Table 8.1.4 and Figure 8.1.2.

Table 8.1.4 Land Use Classification in Metropolitan Manila

Land use	1972		1980		1991	
	Ha	%	Ha	%	Ha	%
Residential	13,570	28.4	18,948	29.4	41,405	65.0
Commercial	530	1.1	2,573	4.0	1,911	3.0
Industrial	1,365	2.8	3,037	4.7	2,548	4.0
Institutional	1,800	3.7	2,892	4.5	3,185	5.0
Utilities			890	1.4	637	1.0
Open Space	30,980	64.0	14,380	22.3	5,096	8.0
Agricultural			7,806	12.1	5,733	9.0
Cemetery/ Memorial Parks					637	1.0
Recreation/ Parks/ Sports			13,012	20.2	637	1.0
Reviers/ Waterways					1,911	3.0
Reclamation			671	1.0		
Agro-Industrial			236	0.4		
Total	48,425	100.0	64,445	100.0	63,700	100

Note: 1972 figures from Manosa (1974) Neda Journal of Development, vol 1/2
1981 figures from Metropolitan Manila Commission (1983)
1991 figures from NCR Regional Development Plan (1993-1998)

Source: Philippine Institute for Development Studies

Metropolitan Manila is predominantly composed of residential area. This tends to continue, because the share of residential area had increased drastically within a decade from the 80s to 90s. On the other hand, open spaces had decreased in great amount, that it now only shares 8% of the total land area in Metropolitan Manila while it was 22% in the 80s. It is evident that this tends to continue as population continues to grow in metropolitan manila.

Since 1986, land use of this area has changed in its urban extent. Thus The Study Team newly compiled an existing land use map. Features of the newly compiled map are as follows:

- Base data: Aerophoto, scale 1:10,000, taken 2003, supplemented with field verification
- Minimum mapping unit: 1ha（10,000m^2）

- Classification types: As shown in Table 8.1.5.

Figure 8.1.3 shows the existing land use of Metropolitan Manila in 2003.

Table 8.1.5 Definition of Classification of Existing Land Use Map

Classification Type		Definition
1	Residential	An area within a city or municipality principally for dwelling/housing purposes
	VL1	1-5 dwelling units per ha. (1-2 storey building)
	VL2	1-5 dwelling units per ha. (3-4 storey building)
	VL3	1-5 dwelling units per ha. (5 or more)
	L1	6-20 dwelling units per ha. (1-2 storey building)
	L2	6-20 dwelling units per ha. (3-4 storey building)
	L3	6-20 dwelling units per ha. (5 or more)
	M1	21-65 dwelling units per ha. (1-2 storey building)
	M2	21-65 dwelling units per ha. (3-4 storey building)
	M3	21-65 dwelling units per ha. (5 or more)
	H1	66-90 dwelling units per ha. (1-2 storey building)
	H2	66-90 dwelling units per ha. (3-4 storey building)
	H3	66-90 dwelling units per ha. (5 or more)
	V1	91+ dwelling units per ha. (1-2 storey building)
	V2	91+ dwelling units per ha. (3-4 storey building)
	V3	91+ dwelling units per ha. (5 or more)
	Informal Settlers	Shanty, temporary housing
2	Commercial and Business	Area supporting or promoting commercial and other business activities: 1. Principally for trade and services and business activities ordinarily referred to as the Central Business District. 2. Quasi-trade business activities and service industries performing complimentary/ supplementary functions to principally commercial zone (CBD). 3. Intended for regional shopping centers such as large malls and other commercial activities
3	Industrial	An area designed for specific types of industry such as manufacturing, refining, fabricating, assembly, storage, parking and other incidental uses
4	Government and Quasi-Public	An area designed for government services and quasi-public services
5	Educational & cultural	An area designed for educational purposes
6	Health & welfare	An area designed for health and welfare purposes
7	Park & recreational	Area reserved exclusively for parks, playgrounds, recreational uses and other similar facilities amenities
8	Religious & cemetery	An area designed for religious activities and burial place/ground.
9	Transport & Service Facilities	An area designed for transport and service facilities.
10	Military	An area for military use
11	Agricultural land	Land devoted or suitable for cultivation of the soil, poultry fish or agriculture production including the harvesting of such farm products, and other farm activities and practices performed in conjunction with such farming operations done by persons whether natural or juridical and not classified by law as mineral land, forest land or national park, residential land or industrial land.
12	Grassland	Area covered with grass, including grazing
13	Forestland	Area which is at least 10 percent stocked with forest trees, wild palm, bamboo or brush.
14	Water Related	An area designed for water related use or facilities (i.e. fish pond, water treatment plants)
15	Open spaces	A tract of unused land
16	Rivers/ Bodies of Water	Rivers/ Bodies of Water

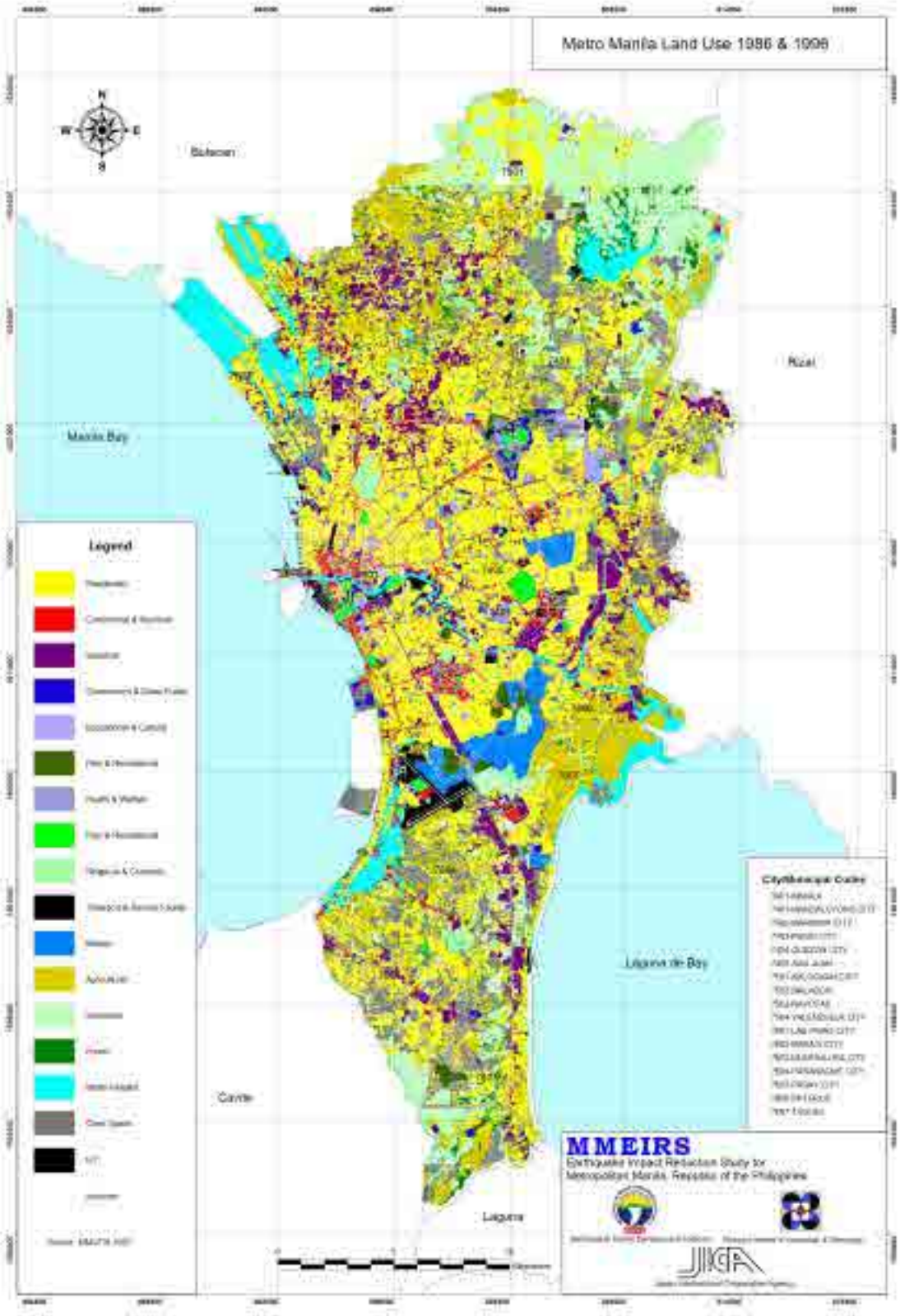


Figure 8.1.2 Metropolitan Manila's Land Use of 1986 (partly updated in 1996)

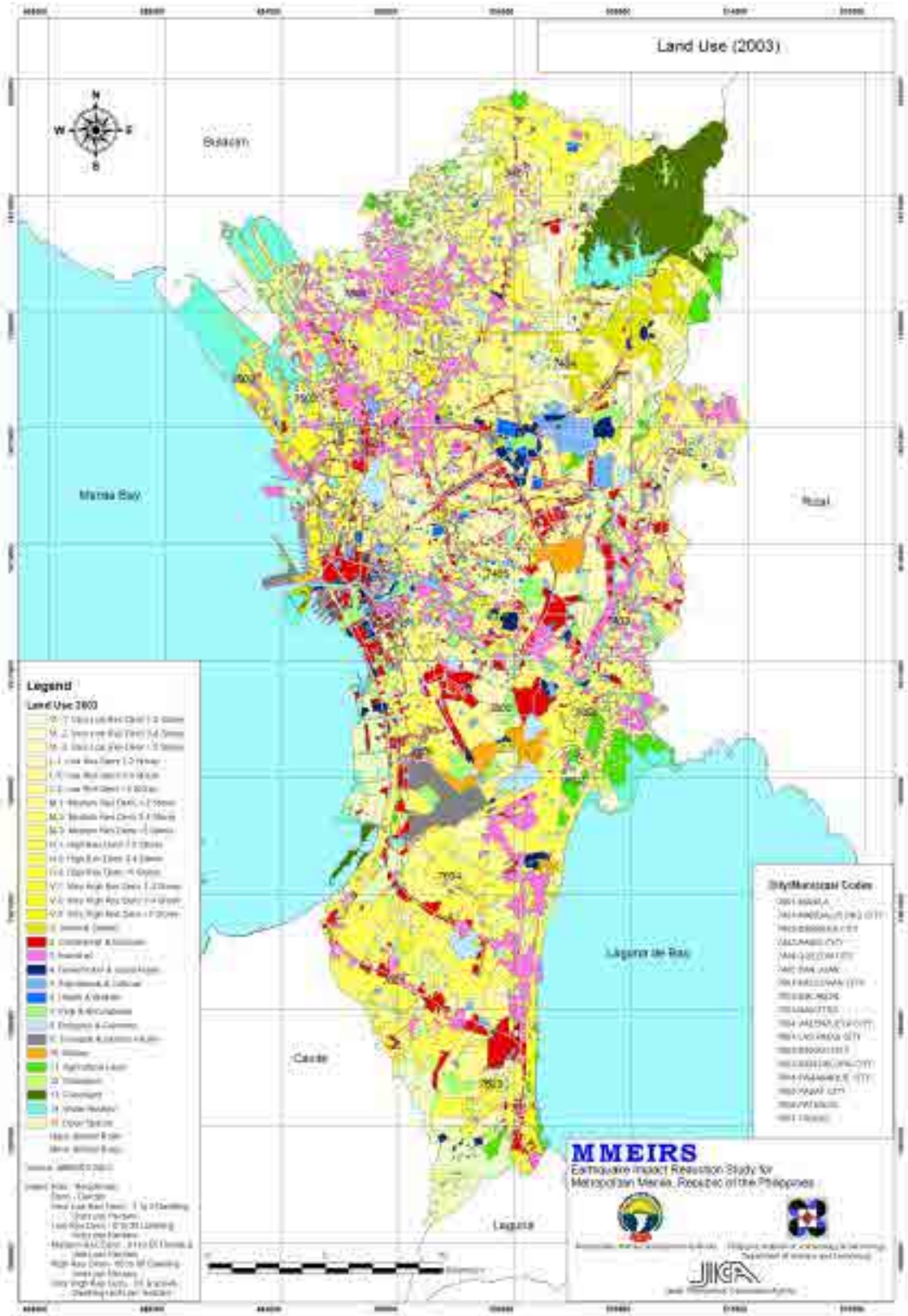


Figure 8.1.3 Existing Land Use Map (Compiled in 2003)

8.1.3 Population

Population distribution is one of the major important sources for seismic damage analysis. Human casualties will be calculated with population data together with building damage result.

1) Current Condition

The National Statistics Office (hereinafter referred to as "NSO") had implemented the population census in 2000. The Study Team will use the data from NSO. Table 8.1.6 shows nighttime population in Metropolitan Manila by each LGUs.

Table 8.1.6 Night-time Population in Metropolitan Manila

LGU	Land Area	Barangay No	Population			Population Growth		Density (pop/ha)		Ave. Pop. Barangay	
	(km^2)		2000	1995	1990	95-00	90-95	2000	1,995	2000	1995
NCR	**636**	**1,694**	**9,906,048**	**9,454,040**	**7,948,402**	**0.94%**	**3.53%**	**156**	**149**	**5,851**	**5584**
City of Manila	38.3	897	1,581,082	1,654,761	1,601,234	-0.91%	0.66%	413	432	1,763	1845
City of Mandaluyong	27	27	278,474	286,870	248,143	-0.59%	2.94%	107	110	10,314	10625
City of Marikina	38.9	14	391,170	357,231	310,227	1.83%	2.86%	101	92	27,941	25517
City of Las Piñas	41.5	20	472,780	413,086	297,102	2.74%	6.81%	114	100	23,639	20654
City of Makati	29.9	33	444,867	484,176	453,170	-1.68%	1.33%	149	162	13,481	14672
City of Muntinlupa	46.7	9	379,310	399,846	278,411	-1.05%	7.51%	81	86	42,146	44427
City of Parañaque	38.3	16	449,811	391,296	308,236	2.83%	4.89%	117	102	28,113	24456
City of Pasig	13	30	505,058	471,075	397,679	1.40%	3.45%	389	362	16,835	15703
City of Valenzuela	47	32	485,433	437,165	340,227	2.12%	5.14%	103	93	15,170	13661
Kalookan City	55.8	188	1,177,604	1,023,159	763,415	2.85%	6.03%	211	183	6,264	5442
Malabon City	23.4	21	338,855	347,484	280,027	-0.50%	4.41%	145	148	16,136	16547
Nabotas	2.6	14	230,403	229,039	187,479	0.12%	4.09%	886	881	16,457	16360
Pasay City	13.9	201	354,908	408,610	368,366	-2.78%	2.10%	255	294	1,766	2033
Pateros	10.4	10	57,407	55,286	51,409	0.76%	1.46%	55	53	5,741	5529
Queson city	166.2	142	2,173,831	1,989,419	1,669,776	1.79%	3.57%	131	120	15,309	14010
San Juan	10.4	21	117,680	124,187	126,864	-1.07%	-0.43%	113	119	5,604	5914
Taguig	33.7	18	467,375	381,350	266,637	4.15%	7.42%	139	113	25,965	21186

Source: * Population:National Statistics Office, 2002, ** Barangay No: National Barangay Operation Office, DILG

From the table, population is increasing remarkably in City of Las Piñas, City of Muntinlupa, Kalookan City and Taguig from 1990 to 1995, which represents more than 6% of population growth. On the contrary, in some LGUs, population migrates outside the city such as City of Manila, City of Muntinlupa, Pasay City and San Juan.

In addition to the population distribution by LGUs, the Study Team received population distribution by Barangay. Figure 8.1.4 shows the population density by Barangay per hectare. However, there are questions on the some of the data. For instance, there are many Barangays with population density of more than 1,200 persons/ha. This is caused by the difference in area between NSO Barangay boundary and MMDA Barangay boundary.

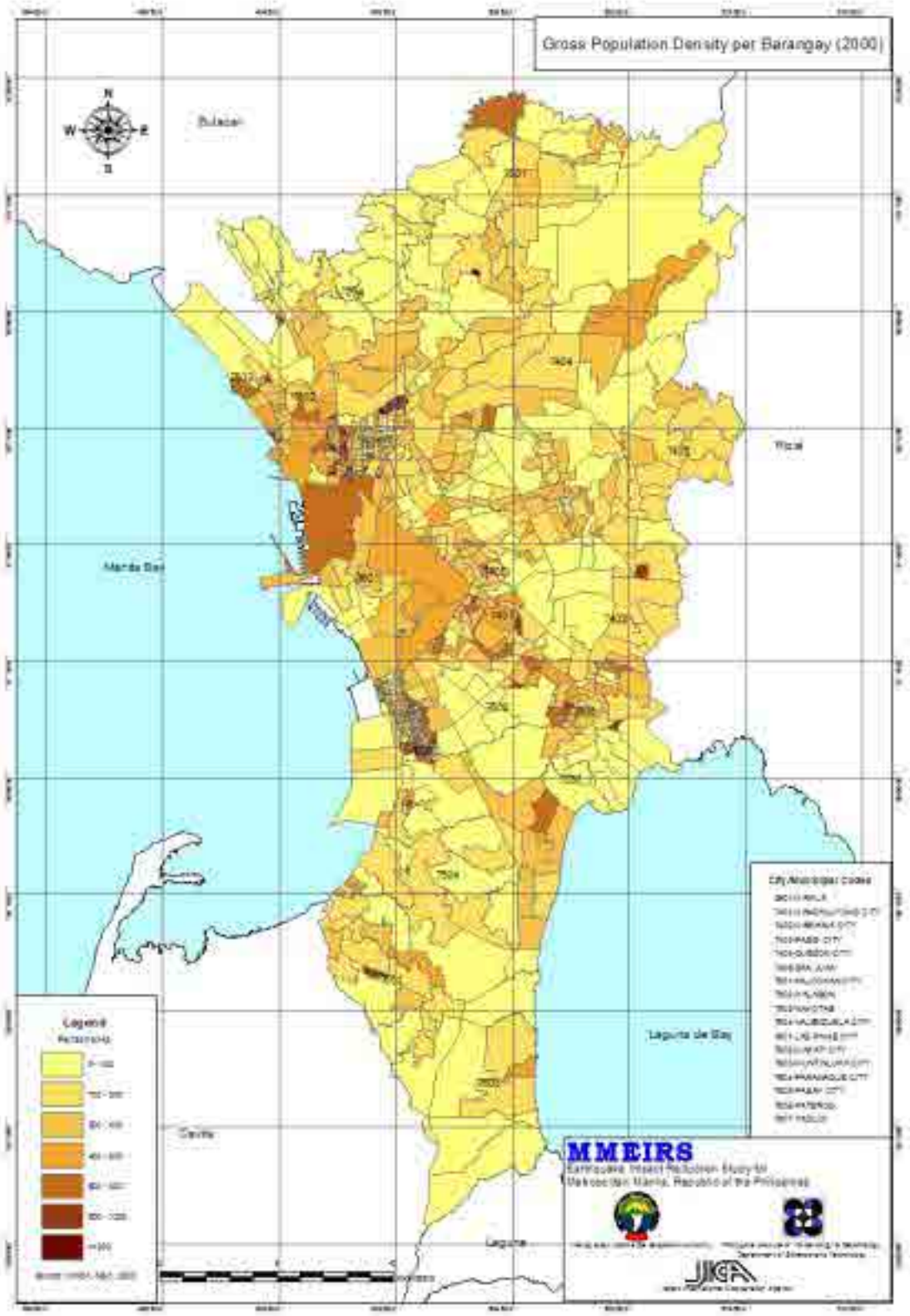


Figure 8.1.4 Population Density Distribution by Barangay (persons/ha)

8.2 Urban Planning Systems in Metropolitan Manila

With regard to urban planning systems in Metropolitan Manila from perspectives of seismic disaster management plans, the following were identified.

8.2.1 Land use Planning Systems

1) Comprehensive Zoning Ordinance for the National Capital Region, March 1981

This ordinance describes the type of zoning and the procedures of implementation. All the local government units, cities and municipalities, are ordered to prepare their own Comprehensive Land Use Plan (CLUP) and submit to the Housing and Land use Regulatory Board (HLURB) by December 31, 2002 for ratification. This ordinance includes articles and sections related to urban disaster prevention. However, only the cities of Makati, Pasig, Marikina, Mandaluyong, Muntinlupa, Parañaque, and Las Piñas have complied so far with this ordinance.

This Ordinance describes the type of zoning and the procedures of implementation. There are zones as follows.

Major zones

- Residence-1 (R-1): low density residential zone
- Residence-2 (R-2): medium density residential zone
- Residence-3 (R-3): high density residential zone
- Commercial-1 (C-1): minor commercial zone
- Commercial-2 (C-2): major commercial zone
- Commercial-3 (C-3): metropolitan commercial zone
- Industry (I-1): light industrial zone
- Industry (I-2): medium industrial zone
- Parks and recreation zones

Special areas

- Institutional zones (INST)
- Agriculture (AGR)
- Agro-Industrial (AI)
- Fishpond area (FP)
- Transport and Utilities area (TRU)
- Cultural area (CUL)
- Cemetery area (CEM)
- Bagon Lipunan site and services (BLISS Site)
- Planned area for necessary development (PLAND)
- Military Zone

"Model Zoning Ordinance" prepared by Housing and Land Use Regulatory Board in 1996 additionally includes some zones as well as restrictions for building shape.

(1) Zones added

"General Residential Zone" and "Socialized Housing Zone" are added to "Residential", and one more zone to "Commercial" and "Industry" respectively. There are some zones newly added such as "Tourist Zone" and "Forest Zone".

(2) Building Shape Regulations for Residential Areas

- R-1: Development density should be 20 units and below per hectare. Only detached house is allowed to develop with the height of 10m and below.
- R-2: Development density should be 21-65 units per hectare. The maximum height of building should be 21m.
- R-3：Development density should be 66 units and over per hectare. The height of building should be determined by the floor area ratio which conforms to the capacity of the area's transportation and other utilities.

2) Articles & Sections relating to Urban Disaster Prevention

The Zoning Ordinance describes the following points relating to the disaster prevention.

(1) Article 2, Section 2

One of the purposes of the zoning ordinance is to secure safety.

- a. To promote and protect public health, safety, peace, morals,
- d. and to insure safety from fire and other dangers;

(2) Article 5, Section 6, Dwelling on Rear Lots

Dwelling on the rear lots should have access to public roads with minimum width of 4m. Two or more buildings may be allowed if a common path to the public roads (right of way) has width of at least 6m.

(3) Article 5, Section-7, Structure to have Access

Every building shall have access to a public street or to a private street open to the public and all structures shall be located on lots so as to provide safe and convenient access for reservicing fire protection units.

(4) Article 5, Section-9-c

At least 5% of total areas of development should be an open space for playground purposes、provided that more than ten families are located. The size of each playground should be 100 ㎡ at least.

(5) Article 6, Supplementary Regulations, Section -2

The section-2 provides a guideline of location for some selected establishments. Among these there is a description about a filling station, which shall be located at least 200m distance from such institutions as schools, hospitals, churches. Also a buffer strip and adequate fire fighting equipments are required.

3) Observations

- As a whole, the existing zoning system will contribute to improving safety of urban areas , provided that the zoning carried into effect in everywhere of Metropolitan Manila.
- Concrete regulations such as maintaining an access road, limiting a location of filling station and securing open spaces along the rivers are appreciated to be effective for disaster mitigations.
- Comparing with the systems in Japan, there are differences as described below.

1) As for residential area, strict or in other words, idealistic regulations are introduced through limitation of building height and setback. On the other hand, regulations for commercial areas seem little, which may deteriorate a safety of space if over-developed.
2) In case of Japan, a zoning of fire proofing district is introduced, especially for promoting fire proofing buildings along the trunk roads in order to formulate a fire break. In the Philippines, there is no such zoning. However, the possibility to achieve similar results still exist since most of lands adjacent to trunk roads are designated to be commercial use which is developed by fire proofing buildings.
   Reference: Presidential Degree 399 aimed to control the areas within 500m from the center of trunk roads. However it was not enforced.

8.2.2 Systems for Urban Developments

1) Development Permission

Due to the continuous increase in population including both natural and social increase, the built-up areas in the Metropolitan Manila has expanded and continues. Most of the urban expansion after 1970's to 1980's has been done by subdivision and condominium developers, especially in areas, which are considered not suitable for living. Informal settles account for about 36% of the population. Development permission for subdivisions is provided by local governments with the guide of HLURB, following the design criterion listed below.

(1) Processing and Approval of Subdivision Plans (BP220)

BP220, amended in 1995, prescribes the design criterion for a subdivision development precisely. Socialized housing also conforms to these plans. The plan cover various aspects of development, including infrastructure such as roads, parks, water supply, sewerage and the design conditions of lots as well as buildings and houses.

Examples

- Roads: The Right of Way for Major Road – 10m and over, for Minor Road – 6m and over
- Parks & Playgrounds: Ratio to the gross area should be 3.5%-9.0% according to the size of development.
- Minimum development size: in case of detached house - lot size 72 ㎡, floor size 22 ㎡
- Setback: Frontage 1.5m, Side & Rear 2.0m
- Regarding the fire protection:
  Provision of fire-hydrants and a cistern by local government
  Fire reserve added to Capacity of Elevated reservoir
  Installation of Fire wall into dwellings
  Installation of Smoke detector

It is supposed that the risk of fire in subdivisions is low, since wooden houses are scarce, and comparatively high level of development quality is required and the development of subdivision usually conforms to the regulations. Thus, it will be sufficiently achieved to secure the spaces for fire fighting, rescue activities and refuge, since the space of parks and roads is properly provided. Following points, however, are matters of arguments.

1) A subdivision is often closed to people except for its residents. It will be difficult to evacuate from a subdivision to outside and to operate rescue activities from outside, since most of them limit the entrance by a fence. Besides, there is a possibility that a subdivision will be an obstacle for evacuation of the surrounding populace or for fire fighting and rescue activities of the neighbor. Systems copping with a subdivision enclosure in case of emergency will be required.
2) The areas with a disaster risk, like flooding and land slides are generally avoided, it is necessary to take various conditions such as the ground conditions and the existence of hazardous factories nearby into account for designing. In this respect, BP220 only describes little. Subdivision developments are sometimes observed in hazardous areas such as for flooding.

(2) Presidential Decree No.957

P.D.957 is mostly about the regulations for the sale of subdivision lots and condominiums, however, following two points are related to urban space structure.

A. Section 29 ：Right of Way to Public Road

The subdivision without an access to any existing public street must secure a right of way to a public street. And it must be developed and maintained according to the request of the government concerned.

B. Section31： Donation of roads and open spaces to local government

According to the amendment by Presidential Degree 1216, 30% of the gross development area should be allocated to open spaces which includes roads, sidewalk, parks, playgrounds and recreational use, provided that the development exceeds 1ha. A developer or the owner develops roads and parks to donate to the local government. The amendment was introduced to reduce a burden of developer if compared with Presidential Degree 953, which necessitated a developer to allocate 30% of land for open spaces including only parks and playgrounds.

2) Housing

Various types of public housing have been provided for the lower income families. Meanwhile, subdivisions had been developed mostly for upper middle classes by the private sector. Some of those housing programs will be possible for restoration of community or reducing disaster risk of built-up areas. The following are related acts and programs.

(1) Republic Act No.7279 - The Urban Development and Housing Act of 1992

The Act intends to provide the national framework of urban development & housing, and to promote the Socialized Housing mainly for the underprivileged and homeless citizens in urbanized areas through rational utilization of idle lands, and provides also guides for equitable land tenure systems, people's participation and to improve the capability of local governments. The Act also is the base of housing programs described in below.

(2) Programs leading to a reduction of disaster risk in built-up areas

A. Relocation and Resettlement Program

Local governments in coordination with NHA (National Housing Authority) implement this program to relocate and to resettle people like squatters from public lands or disaster risk areas outside of Metropolitan Manila, which usually requires a lot of efforts to get an agreement with the residents.

B. Medium Housing Program (NHA)

This program intends to provide in-city relocation for squatter families as well as additional housing stock especially in the areas where the cost of land is too high to secure the affordability of targeted clientele. High rise flats were provided once, but the medium rise building (3-5 storey) is constructed in recent years to sell and to lease in combination due to the difficulties of maintenance and environmental deterioration.

(3) Programs relating to reconstruction of residential areas

A. Emergency Housing Assistance Program (NHA)

For the housing needs of affected people by natural calamities or man-made disasters, the following relief measures are undertaken.

- Provision of temporary shelter
- Development of new settlements
- Provision of home materials for repair & reconstruction
- Construction of evacuation center with communal facilities & utilities

B. Site and services Development Program (NHA)

To meet the need of population increase, this program changes raw lands into serviced home lots mainly for low-income people by land acquisition & development of infrastructure. Loan programs are available for home building also.

Although it is not the program for reconstruction, there is a possibility that this will be adapted for reconstructing highly affected areas or providing a site for relocation.

C. Slum Improvement Program/Zonal Improvement Program

Without relocating the existing occupants, this program improves the infrastructures and the houses through readjustment of various rights and space structures. Therefore its techniques and experience might be useful for the reconstruction of damaged areas. Implementation body of the program is NHA, local governments and land owners.

8.2.3 Urban Infrastructures

Within an urban planning system, there is no planning system regarding infrastructures.

Road Network

A zoning map only shows the existing space of roads, except the roads which are proposed and budgeted already. Regarding the road network planning, there are no official planning, except a major trunk road network planning which is studied rather independently from zoning plans by transportation planning. Therefore no guide lines for road network planning including disaster prevention or communal environments exist.

Park and Green

A zoning plan sometimes includes parks and recreational zones for proposed parks, even though it is not common to all cities and municipalities. The number of parks is rather small. Presidential Degree 957 provides the space ratio of parks and playgrounds, but there are no descriptions about the location of parks.

Just as the case of road planning, there are neither guidelines nor standard for park systems.

8.3 Structure, Condition and its Vulnerability of Metropolitan Manila

8.3.1 General

1) Metropolitan Manila as Capital of the Philippines

Metropolitan Manila, or the National Capital Region (NCR), is the smallest of the 16 regions of the Philippines in terms of land area (636km^2), which compose only 0.21% of the total area. In spite of the small share of the land, Metropolitan Manila has been in the leading position as capital of Philippines since its establishment. It is the prime financial, commercial, political, social, cultural and educational center.

Share on population and economic activities are very high in NCR compared to the national. The population of Metropolitan Manila is 13% of the total population in the Philippines. Gross Domestic Product (GDP) of Metropolitan Manila shared 34.5 percent of the national GDP, and per capita GDP was 2.5 times higher than the national per capita GDP in 1997.

NCR is concentrated with important capital functions and hosts governmental institutions, governmental banks, academic institutions such as universities and research centers.

2) Overall Vulnerabilities in Metropolitan Manila

During the administration of President Aquino, which started in 1986, policy-enacting decentralization was enforced and local government units were given more authorization and powers. Nevertheless, local government's or other local organization's capacity for planning and enforcement of laws and other subjects differs, which leads to ad-hoc development. Measures taken for the development seems quite ineffective. For example, infrastructural measures are usually taken only after knowing that over population exists and there is a need for decongestion.

In the 1990s, urban development was rapid in the central business districts such as Makati and Ortigas. Although there are laws existing for the local government unit to prepare city land use plans, one integrated plan for Metropolitan Manila which the local government units can follow does not exist. Therefore, urban systems like transportation and urban infrastructures are not corresponding enough to the partial development done by the local government. Without integrated urban plans and strategies, equal development in Metropolitan Manila is not yet applied, thus causing recent urban issues, such as traffic congestion and environment deterioration represented by air and water pollution.

Another important vulnerability to mention here is the availability of regions that may substitute for the functions of the capital. Large cities next to NCR are only two; Davao and Cebu in terms of population. However, these cities can not easily substitute the function of the Capital because of their geographical condition. Neighboring satellite cities, such as Olongapo, San Fernando,

and Batangas also can not support the function of the capital. Therefore, if ever a disastrous earthquake hits Metropolitan Manila, its political, economical, and social loss together with secondary disasters will be enormous that it may lead to a chaos and disorder of the nation.

8.3.2 Natural Condition and Urban Development of Metropolitan Manila

1) Topography

Topographically, Metropolitan Manila is divided into three major categories; Central Plateau, Coastal Lowland, and Marikina Valley. Central Plateau is on stiff soils, Coastal Lowland is on soft sand and clay deposits, and Marikina Valley is consists of delta and muddy flood plain deposits. By overlaying the administrative boundaries to the topographic condition map, it is clear that cities and municipalities, such as Quezon, Kalookan, San Juan, Mundaluyong, and Paranaque are located in Central Plateau. City of Manila and cities adjacent to it, such as Novotas, Malabon, Pasay, are located in Coastal Lowland. Finally, cities and municipalities of Marikina, Pasig, Pateros, Taguig, and Muntinlupa are located in Marikina Valley. Cities located in Coastal Lowland and along the coast of Laguna de Bay within Marikina Valley have elevations less than 2 meters. Due to this topographic condition, flooding during the rainy season frequently attacks these areas.

2) Geological Condition

Many faults, such as the Valley Fault System, Philippine Fault, Lubang Fault, Manila Trench, and Casiguran Fault, can generate earthquakes, which might affect Metropolitan Manila. Among these faults, East Valley Fault and West Valley Faults, located in the eastern part of the study area, are considered to cause the largest impact to the Metropolitan Manila area.

Recent studies clarified that the Valley Fault system has caused at least 2 to 4 earthquakes within the last 1400 years, with the approximate return period being less than 500 years. No event along West Valley Fault is known since 16th century, meaning that active phases of the Valley Faults are approaching. Many research studies indicate that the estimated magnitude will be around 7 or more.

3) Urban Development

Historically, urbanization of Manila started in 1571, when Spain established a colony in Manila. The City of Manila had developed as a trading port. The city first developed on the coastal low land, and until the early 1950s, the urbanized area was limited at the central Manila, where city of Manila and Pasay is now located. This area is still the political, economic, commercial, and cultural center of Metropolitan Manila. Over the past 50 years, Metropolitan Manila area was rapidly urbanized, and has been expanding far toward the North and South, and to the East to the coastal line of Laguna de Bay. Since 1950s, the urbanized area expanded more than 8 times of its

area as shown in Figure 8.1.1. This rapid urbanization brought up many urban issues, including unstable socio-economical structure, inefficient transportation system, and unsatisfactory urban infrastructures. Moreover, newly developed central business districts as well as political center, are developed with limited awareness of earthquake disaster. For example, new central business districts of Ortigas and Makati and new political center of Quezon are located close to the Valley faults. In addition, newly reclaimed area along the Manila Bay, regardless of its liquefaction potential, is planned to be utilized as sub-center of Manila.

8.3.3 Vulnerability Components of Metropolitan Manila

1) Socio-economical Structure

(1) Population Concentration

Figure 8.3.1 shows population growth of Metropolitan Manila. Population is nine million and nine hundred thousand in 2000. Comparing the share of the population of Metropolitan Manila to that of the national, it was only 8% of the total population in 1948 but it now shares almost 14% of the total population due to the rapid centralization, which started in the 1980s.

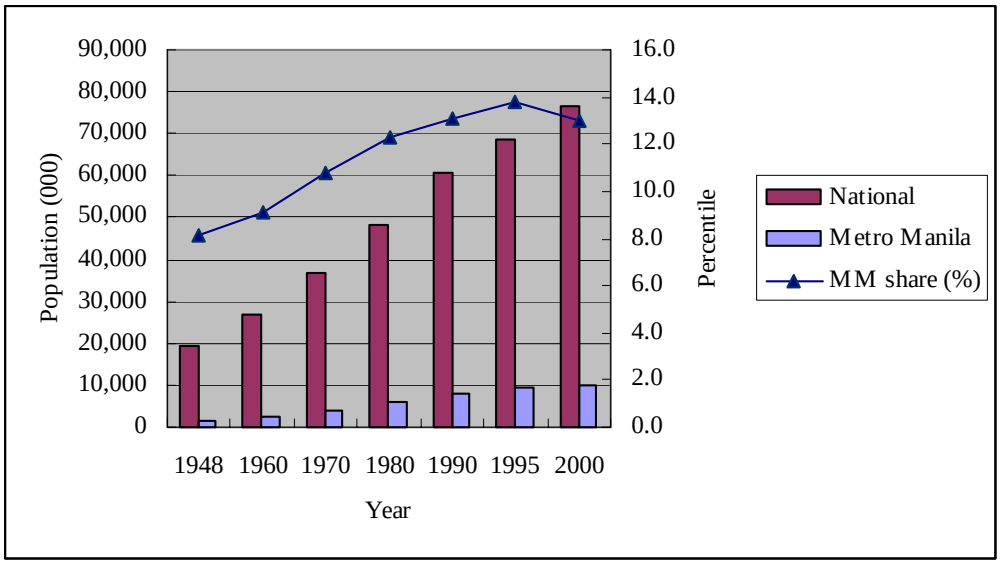


Figure 8.3.1 Population Growth of National and Metropolitan Manila

Source: Philippine Institute for Development Studies

It can be interpreted from Figure 8.3.2 that annual population growth of Metropolitan Manila was always higher by 1 to 2 % than national growth ratio, except for the years of 1995 to 2000. Annual population growth decreased in years 1995 to 2000 to 1% from 3.5% in years 1990 to 1995. According to the MMUTIS report, population is increasing in the Greater Metropolitan Manila region, which includes the surrounding provinces to Metropolitan Manila.

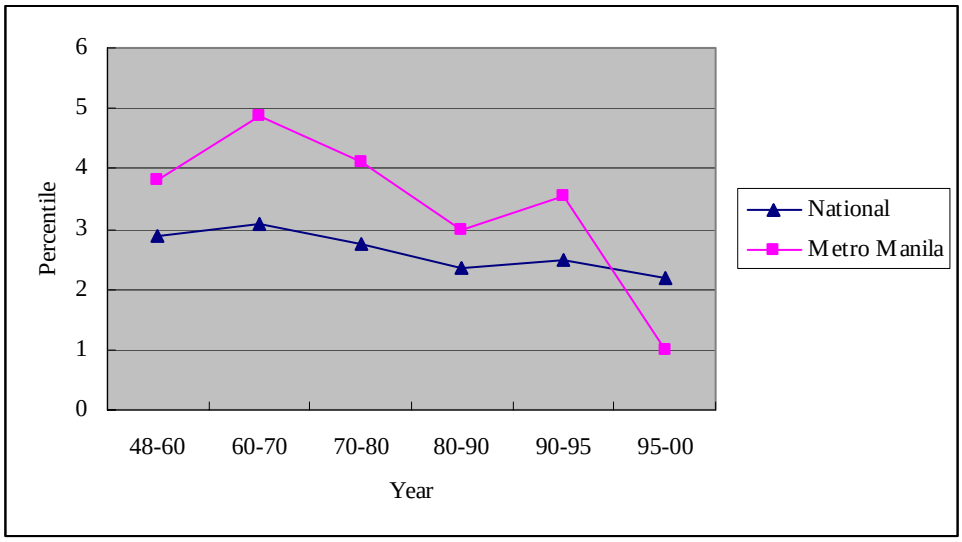


Figure 8.3.2 Population Growth Ratio of National and Metropolitan Manila

Source: Philippine Institute for Development Studies

Metropolitan Manila is one of the typical highly populated large cities in East Asian countries. In 2000, population density of Metropolitan Manila was estimated at 15,576 persons per km^2. Congestion is more glaring in individual cities and municipalities. Figure 8.3.3 shows population density of cities and municipalities of Metropolitan Manila in year 2000. Congestion, as measured by population density, is more evident in Navotas, Manila, Pasig, and Pasay.

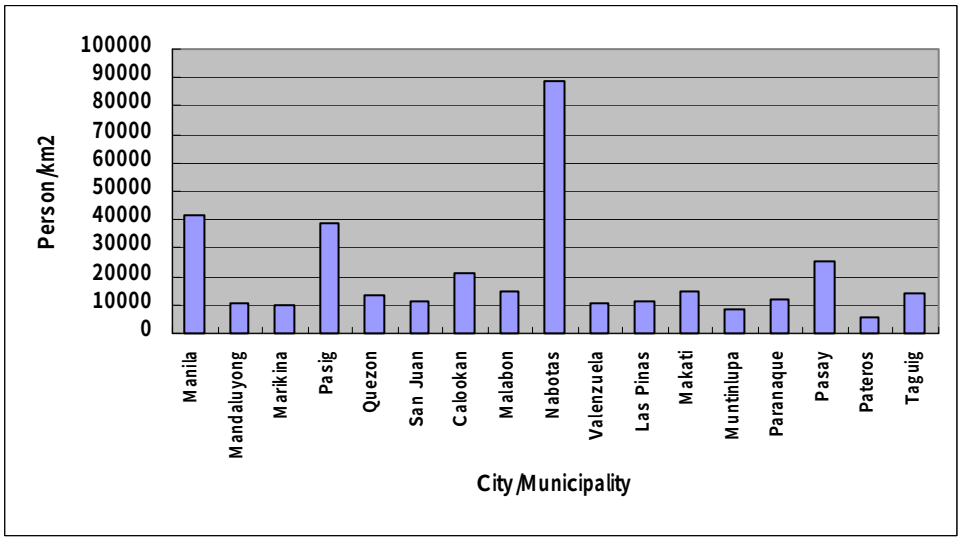


Figure 8.3.3 Population Density of Cities and Municipalities in Metropolitan Manila

(2) Social Migration

According to the study on "Migration and Environmental Issues in Economic Development"1, large portion of migration to Metropolitan Manila is mainly from the regions of Bicol, Eastern Visayas, Western Visayas, and Ilocos, which are considered as economically depressed areas among the Philippines. The study concluded that there was a correlation between migration and poverty in Metropolitan Manila, that those migrants from depressed areas tend to migrate into Navotas, Pateros, Kalookan, Valenzuela, and Malabon (Ordered in higher share of migration to the cities and municipalities), where the annual per capita income is lowest (under 37,220 pesos), or second to lowest (37,220 to 41,573 pesos). The study also concluded that the recent concentration of migrants from the economically depressed region to Metropolitan Manila may decrease per capita income and social infrastructure expenditures. This aggravates poverty and environmental problems in Metropolitan Manila.

Table 8.3.1 shows the number of migrants to Metropolitan Manila. This indicates that although the migration rate is declining, migration to Metropolitan Manila still continues. With the two facts concluded in the above study and continuous migration to Metropolitan Manila, the urban poor, which is more prone to disaster, tends to grow continuously.

Table 8.3.1 Migration to Metropolitan Manila

	Gross Migration to MM			Net Migration to MM		
	70-75	75-80	85-90	70-75	75-80	85-90
Total Migrants	310,824	393,723	462,586	155,087	180,318	128,516
(Total positive net volume)				(161,348)	(194,855)	(196,932)
Migration rate (0/00)	8.9	9.9	9.3	4.4	4.6	2.6

Source: Metropolitan Manila: In Search of a Sustainable Future

(3) Urban Informal Settlers

According to the survey data by national housing authority in 1996, the number of informal dwelling area, located in vulnerable areas such as river banks, esteros, railroad tracks, garbage dumps, shorelines, waterways, and other public places such as sidewalks, roads, parks and play ground, is about 276. This is occupied by about 400 thousand families composing 36% of the total population in Metropolitan Manila. The informal settlers occupy hazardous areas. Additionally, squatting is usually accompanied by deteriorated physical condition and does not conform to community regulations. Thus, squatting may result to clogging of water ways and sewerage and river systems, causing flooding. Informal settlers also tend to expand their territories to the

1 Metropolitan Manila: In Search of a Sustainable Future, Research by Prof. Toru Nakanishi, Graduate School of Social and International Studies, University of Tokyo

sidewalks and to roads, which aggravates the traffic condition. Also, sometimes, sub-standard living environment becomes the breeding ground for infectious disease and viruses.

Houses of informal settlers are mainly two-story height wooden non-structural building, with tin roof. Houses are heavily crowded and, very closely built to each other, tending to collapse easily in case of a strong earthquake. Timbers are commonly used as housing materials, and houses are also easily burned.

The reason for the permanent residence of informal settlers in unapproved area is highly related to the system of the government. Usually, prior to election, candidates for mayors and congressmen has budget for the use of constituents. Informal dwellers do not have access to tenured land of their own. However, they are accepted as the city resident of the settlement. Because of this, the candidates promise and use the budget for the environmental improvement of the informal settler's livelihood in exchange for their votes. This investment in the informal settling area also makes the residence more permanent.

LGUs and National Housing Authority (NHA) are the responsible agencies for the provision of relocation or resettlement sites "with basic services and facilities and access to employment and livelihood opportunities sufficient to meet the basic needs of the affected families". This is enforced under Community Mortgage Plan (CMP), though usually, relocated people do not reside in the provided unit, and rather, they sub-lease the places to others. The reason for this phenomenon is that informal settlers are not seeking for better living condition but are seeking for any small piece of land. If informal settlers ever acquire a small piece of land, they will construct buildings with several stories for rent. This will be a great source for their income.

Out of many LGUs in Metropolitan Manila, Marikina City has so far successfully done a model city program for relocation and maintains no informal settlers within their land. There are two reasons for Marikina City to be considered as successful city of no informal settlers. One is their establishment of real estate property tax system. The city is the only one who is introducing the system, and collecting tax from all households, including the originally informal settlers. The other reason is the introduction of 24 hours patrol system by the city.

2) Urban Systems

(1) Road and Railway System

A. Road System

Due to the limited land for eastward expansion, Metropolitan Manila is expanding to North and to South. Many transportation studies have been executed, and road network among Metropolitan Manila and its adjoining area is improving. Though, road coverage ratio in Metropolitan Manila

is approximately 10%, this is still low compared to the 20 to 25% of those in cities like London and Tokyo.

Road linking north to south has been reinforced but the east-west link is still weak. In addition, linkages between Metropolitan Manila and neighboring cities need to be strengthened.

Vulnerability of road system in Metropolitan Manila is its reliance on bridges, flyovers, and elevated road structures. Due to the Pasig River running through the center of Metropolitan Manila from East to West, urbanized area of Metropolitan Manila is divided in to two portions of North and South. There are 18 bridges which cross the river, and its existence is inevitable for the road network. Additionally, many flyovers and elevated roads have been constructed within the central area for traffic congestion.

Other vulnerability in relation to road network is as follows.

1) Constant traffic congestion in the central Manila
2) Easily submerged road in many places after heavy rains especially during the rainy season

B. Railway System

Railway transportation is developed in Metropolitan Manila. The oldest rail transport system in the Philippines is the long-distance railway being operated by the Philippine National Railways. Its Main Line North is no longer operational, while the Main Line South to Bicol province runs only four or five trips daily servicing approximately 30,000 commuters and cargoes from regional factories. There are two light rail systems operating in Metropolitan Manila: the Light Rail Transit (LRT) Line 1 and the Metro Rail Transit (MRT) 3. The Light Rail Transit Line 1 runs from north to south of Metropolitan Manila (Monumento in Caloocan City to Pasay City) and presently continues to serve at least 400,000 passengers daily. The 16.7 kilometer Metro Rail Transit 3, or the Metrostar Express, runs from the North Avenue in Quezon City to Taft in Pasay City.

The Light Rail systems are both elevated. Recent transportation improvement measures in Metropolitan Manila tend to be introduced as elevated facilities.

In case of large earthquake, those elevated structures have the possibility of falling or toppling down. This may totally shut the access to inner side of Metropolitan Manila. Congestion will even make the situation worse. If such case ever occurs, this damage will be a big barrier for rescue and relief activities and for distribution of the commodities. This also has possibility to lead to disorder of national and governmental functions.

(2) Centralized Capital Functions

In case a capital of a nation suffers a large earthquake disaster, damage will influence the whole country in terms of economy, governance, and international relations. As seen in many other

Asian countries, the Philippines also hold the capital function only in Metropolitan Manila area. For example, presidential palace and office is located in the city of Manila along the Pasig river, senate is located in the reclaimed area along the Manila Bay, and, house of representatives and administrations is located in the city of Quezon. Although those institutions are located in remote distance to each other within the NCR, once the transportation and communication network is cut, it will lead to the disorder of the capital functions.

Also, the vulnerability of the following facilities, together with redundant inter-communication system, is necessary to consider.

- Legislative body: Congress (Senate and House of Representatives), related offices
- Administrative body: Presidential palace, official residence, central governments, national government facilities
- Administration of Justice: Supreme court, official residence
- Financial body: Central bank, Private banks
- Economical body: Financial market (Stock), private companies
- Information body: Mass media, internet exchange
- International facilities: International organization, foreign affairs

(3) Land Use Issues

Rapid urbanization over 30 years has altered Metropolitan Manila's landscape. Residential landuse currently predominate land use activity in Metropolitan Manila. As described in detail above, poverty drives people to live in hazardous areas such as river banks, esteros, railroad tracks, garbage dumps, shorelines, and other public places such as sidewalks and roads, which accelerate the vulnerability of the people.

There are two main problems in land use; the mixed land use, and improper enforcement of land use ordinance.

A. Mixed Land Use

Indefinite use of land is correlated to inefficiency of land use and increase of urban risk. For instance, in spite of land use designating an area as residential, mixed land use for residential, commercial, and industrial purposes occur. Also, industrial areas including hazardous facilities are located or adjacent to residential areas. These examples are in Pasig city, and in central part of city of Manila. These residential areas are normally exposed to fire possibility and hazardous materials. Fire and exposure to hazardous materials may cause secondary disaster in case of earthquake.

B. Improper Enforcement of Land Use Ordinance

In Metropolitan Manila, "Comprehensive Zoning Ordinance for the National Capital Region" was enacted in 1981. This regulates the land use type and enforcement procedures. The Model Zoning Ordinance was regulated in 1996 and this further gave details on the guidelines especially on enforcement. However, there are only seven cities and municipalities, which have finalized their land use plan so far. In addition, the zoning ordinance is not empowered for enforcing the ordinance because there are many places with conflicting to the landuse ordinance. It is also necessary to consider the limited consideration of hazards in the area in the development of land.

(4) Park System and Open Spaces

According to the research paper "Governance and urban development: case study of Metropolitan Manila", of the Philippine Institute for Development Studies three decades ago, open space was the predominant land use. Recreation land uses including parks and sports area comprise only one percent of total land area in 1991 compared to 20 percent in 1980. A large percentage of these land intended as open spaces and for other purposes have been used for housing. It is estimated that if the increasing rate of population and the development pattern or system do not change, the green space in Metropolitan Manila is likely to disappear by 2006.

This is not only the environmental concern, but also a problem for disaster management. If large earthquake occur, open spaces including parks will act as inevitable base as evacuation site, commodity distribution site, or for rehabilitation site. The lack of open space is fatal in emergency response and in rehabilitation procedures.

8.4 Communities in Metropolitan Manila

8.4.1 Introduction

Different types of communities were identified in Metropolitan Manila based on the observation and insight acquired through our social survey. This categorization was conducted from the viewpoints of both sociology and earthquake disaster management.

Characteristics of each category are analyzed and key points for disaster management are considered.

8.4.2 Definition of Community

There are many definitions of community, but here we adopt the definition that "The community is a certain unit in which people can share their interests and feel the sense of unity".

From the aspect of disaster management activities by community members, it is understood that various types of communities exist in Metropolitan Manila. Communities differ in their physical sizes and forms, relationship among residents, roles of leaders, people's perception about their common resources, people's consciousness about their communities, and ways of taking collective actions.

We identified eight (8) types of communities in Metropolitan Manila, taking into account sociological and disaster management aspects. In spatial distribution, same types of communities do not always exist side by side, and different types do exist adjacently.

8.4.3 Difference between Barangay and Community

In the Philippines, the smallest administrative unit is "barangay", which is also true of the Metropolitan Area. In the Metropolitan Area, there are 1,694 barangays, of which more than half are located in the old city area. Barangay's have the administrative duties of providing community residents with such services as medical treatment, social welfare, public health, environmental improvement and garbage collection. They are also responsible for maintenance and management of public facilities, such as culture center, parks, play grounds and sports centers. Regardless of the size of barangays, each barangay has officers consisting of one (1) barangay chairman and seven (7) barangay councilmen (Kagawad) who are elected by residents every three years. They are basically responsible for implementing various polices through their judicial, legislative, and administrative functions, for maintenance and improvement of lives and for keeping Peace & Order for the barangay residents.

In addition to the barangay officers, there are other actors who play public roles at the barangay level. These include Tanods, who are responsible for patrolling their barangays for security. Other actors are also active in barangay cleaning, traffic control and medical assistance.

In view of this, “barangays”, which are administrative units and organizations, are different from “communities” in concept and in actuality. Indeed, there is more than one community in a barangay. In the Philippines, “barangays” are often used to signify the term “communities”. However, it is very important to know that the community is different from the barangay.

8.4.4 Characteristics of Communities in Metropolitan Manila

1) 8 Types of Communities in Metropolitan Manila

Metropolitan Manila is briefly categorized to 8 types of communities. Those are;

Old City Type: Communities, which are located in the old city area (Old Manila).

Long-Established Village Type: Old communities which are located in suburban areas of Metropolitan Manila. Such areas have been urbanized, although their original livelihood was based on farming or fisheries.

Subdivision Type: Subdivisions and town house complexes, which were established on commercially developed land. One subdivision or town house complex constitutes one community.

Condominium Type: Communities found in high-rise residential buildings located in areas, such as Makati and Rockwell. One condominium constitutes one community.

Spontaneously Developed Town Type: Communities, which exist in spontaneously developed areas. Originally, settlers resided in the communities for a long time, but houses were constructed without plans, and then squatters began to reside. As a result, such settlement areas have expanded in unordered manners.

Urban Slum Type: Communities, which are located in the central Metropolitan Manila, which are highly crowded. Their physical living conditions are deteriorated. Many residents own the land where they live.

Permanent Informal Settlement Type: Communities in informal settlements with more durable buildings. Although the residents illegally reside on the land, their houses are constructed with concrete blocks, and public infrastructures, such as water and electricity are provided. In addition, alleys and drainages are paved with concrete.

Transitory Informal Settlement Type: Communities, which are found in informal settlements along railways and rivers, and in vacant public land. Houses are constructed with wooden pieces, and tin roofs, and the living environment has not been improved.

2) Detailed Characteristics of Communities

Detailed characteristics of the above-categorized communities are described below:

Old City Type:

- Location: Old city area (Old Manila)
- Size of Community: Houses located along one street
- Land Ownership: Original residents own the land. Transients live in rented houses. .
- People's Relationship within the Community: Original residents have closer relation with each other, but transients do not have such relation.
- Community Leaders: Barangay captains and council men, or persons who have such experience.
- Unification of the Community: Community members are rather unified, especially among the members of original settlers. Unification between the original residents and transients or among transients is rather weak.
- Population Density: High
- Income: Medium, but varies. People with higher income sublease part of their houses for additional income.
- Physical Conditions of Buildings: Proportional balance of the houses can be imaged as 5% of the all houses are wooden, 25% are houses mixed with concrete and wood, and 70% are made of concrete. The density of buildings is rather high, although roads are relatively wide.

Long-Established Village Type:

- Location: Suburban areas of the Metropolitan manila
- Size of Community: Relatively large, approximately 10-15 ha per one community
- Land Ownership: Owned by residents
- People's Relationship within the Community: Very close with each other. People in the community grew up together.
- Community Leaders: Barangay captains and councilmen, or persons who have such experience.
- Unification of the Community: Unified
- Population Density: Relatively high
- Income: Community people who live near the city center have many job opportunities with higher incomes, while community people who live far from the city center have less chances.
- Physical Conditions of Buildings: 20% of the houses are wooden, 30% are mixed buildings with concrete and wood, and 50% are of concrete. The building density is relatively high, and roads are relatively narrow.

Subdivision Type:

- Location: Suburban, newly developed areas.

- Size of Community: Usually, subdivisions are larger than town house complexes. These units of houses are usually physically separated by walls from other part of the area. It is considered that one subdivision or one town house complex constitutes one community.
- Land Ownership: Basically, residents own the land
- People's Relationship within the Community: Residents of the community are only formally associated through administrative activities. People in the community are in-migrants, from inner city, or suburban. Length of residence in the community is not always long, thus community is under liquid condition.
- Formal residential organization within the organization: Home Owner's Associations exists in Subdivision and Town House Complex
- Community Leaders: Home Owner's Association exists in Subdivision and Town house complex
- Unification of the Community: Relatively weak
- Population Density: Low
- Income: High
- Physical Conditions of Buildings: Basically, houses inside Subdivision are one to two story heights, with front and back yard. However, condition differs on physical conditions, such as the size of houses and infrastructures, from Subdivision to Subdivision, based on the income level of the community.

Condominium Type:

- Location: Close to the Central Business District, such as Fort Bonifacio, and Rockwell in Makati, or Cubao, in Quezon.
- Size of Community: A community is developed in one building
- Land Ownership: A lot for building is owned by all the residents in the building
- People's Relationship within the Community: Residents are independent from door to door, and do not have close relation to each household.
- Formal residential organization within the organization: Building Administration
- Community Leaders: Building administrators of condominiums could play roles similar to leaders.
- Unification of the Community: Weak
- Population Density: Low
- Income: High
- Physical Conditions of Buildings: High-rise buildings are constructed based on the building code

Spontaneously Developed Town Type:

- Location: Suburban

- Size of Community: Varies. It is sometimes the group of houses, which are developed along the alley, or road.
- Land Ownership:
- Community Leaders: Barangay captain and councilmen, or person who have such experience.
- Unification of the Community: Weak
- Population Density: Relatively high

Urban Slum Type:

- Location: Central Metropolitan Manila
- Size of Community: Houses expanded along the alleys of one to three
- Land Ownership: Residents who owns the house own the land legally
- People's Relationship within the Community: A community is usually blood related, and the relationship within the community is very dense. However, relation between the communities is relatively weak.
- Unification of the Community: United
- Population Density: Very high
- Income: Medium. Residents usually sublease their bedrooms for additional income or convert their first floor building into sari-sari (convenience) store.
- Physical Conditions of Buildings: Buildings are made of concrete. When the house is newly constructed, it is usually two-story height building. However, to increase their living area, buildings are usually extended to three to four story height. Building density is very high.

Permanent Informal Settlement Type:

- Location: Basically suburban
- Size of Community: Unit, which substitute as a boundary named "sitio". Note that Sitio is not always informal settlement area.
- Land Ownership: Not owned
- People's Relationship within the Community: Community develops based on the blood relation. In case of conflict in the community it tends to split easily.
- Leader of the community: Sitio President
- Unification of the Community: United
- Population Density: High
- Income: Very low
- Physical Conditions of Buildings: Most of the buildings are made of concrete bricks. Bricks are only piled up, and thus, is not resistant to the earthquake.

Transitory Informal Settlement Type:

- Location: Suburban, newly developed area

- Size of Community: Mostly settled along the railways, rivers, and vacant land of government or public land.
- Land Ownership: Not owned
- Population Density: Very high
- Income: Very low
- Physical Conditions Buildings: Houses are constructed with wooden pieces, and tin roofs.

As described, different types of communities have different characteristics. It is then proposed, that community unit shall be selected, for the disaster management plan in the community.

8.4.5 Relation between Community and Barangay

In this section, the relation between communities and barangays are discussed.

In some barangays, the boundaries of communities are widely or officially recognized. In such barangays, there are community units, so-called sitios, puroks, or subdivision. Examples of these community units are shown in Figure 8.4.1.

In such barangays where community units or boundaries are explicitly recognized, there are some kinds of leaders in each community. There is a president for the home owner's association in the subdivision, and there are also presidents for puroks and sitios.

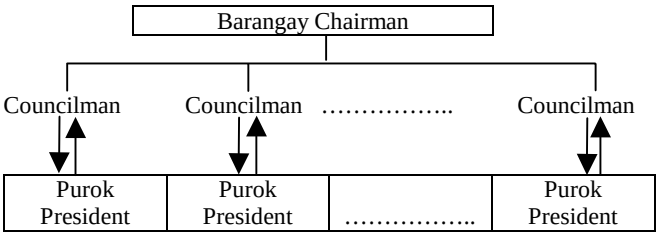
In these barangays, there are some ways of communications between the community and barangay leaders. Figure 8.4.2 shows the channel of information and method of information distribution between barangay leaders and community leaders.

On the contrary, there are many barangays where community units or the boundaries are not explicitly recognized. For example, Barangay Sta. Ellena in Marikina City has several different types of communities in its territory; however, the barangay administration does not have clear understanding of the community units or the boundaries.

In the case of the City of Manila, where the size of barangays is small compared to other municipalities, there are a few communities identified within one barangay. However, the community is not used by the barangay administration. In the barangays of the City of Manila, they use broadcasting systems, or posters as the devices for communication between the barangay administration and community people. Since there are no formally recognized community leaders, the barangay administration has one-way method of communication from the barangay level to the community level.

Name of Barangay, City/Municipality	Description
Hagonoy, Taguig Barangay Purok | Purok | Purok (Sub-division) Purok | Purok | Purok (Sub-division)	- 6 puroks in the barangay - Subdivision is counted as one purok
Quezon, Fairview Barangay → Sub-Division, Sub-Division, Sitio, Sitio, Sitio, Sitio, Sub-Division 10 subdivisions 24 sitios	- 10 subdivisions and 24 sitios in the barangay - Sitios in this area are legal and registered organizations, although the residents of those sitios are informal settlers.
Ugong, Pasig Barangay Ugong Proper(Old Area): Purok | Purok; Purok | Purok; Purok | Purok Sub-Division, Sub-Division, Sub-Division, Sub-Division, Sub-Division, Sub-Division	- 6 puroks in the old neighborhood and 6 subdivisions in the newly developed area

Figure 8.4.1 Example of Community Boundary in a Barangay

<table>
<tr><th>Channel of Information</th><th>Method of Information Distribution</th></tr>
<tr><td colspan="2">Hagonoy, Taguig
 

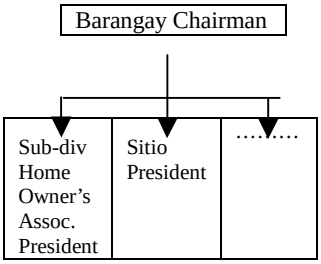
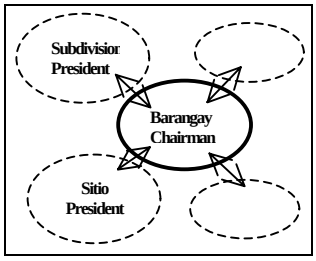
- Verbal communication by the barangay councilmen to purok presidents or vice versa
- Posters posted within the barangay</td></tr>
<tr><td>Fairview, Quezon
Step 1) Call for meeting
 
</td><td>Step 2) Meeting
 
</td><td>Two steps:
1) Prepare official documents to subdivisions and sitios for call on meeting
2) Meeting held with leaders with open discussion style</td></tr>
</table>

Figure 8.4.2 Information Channels and Methods between Barangay and Community Leaders

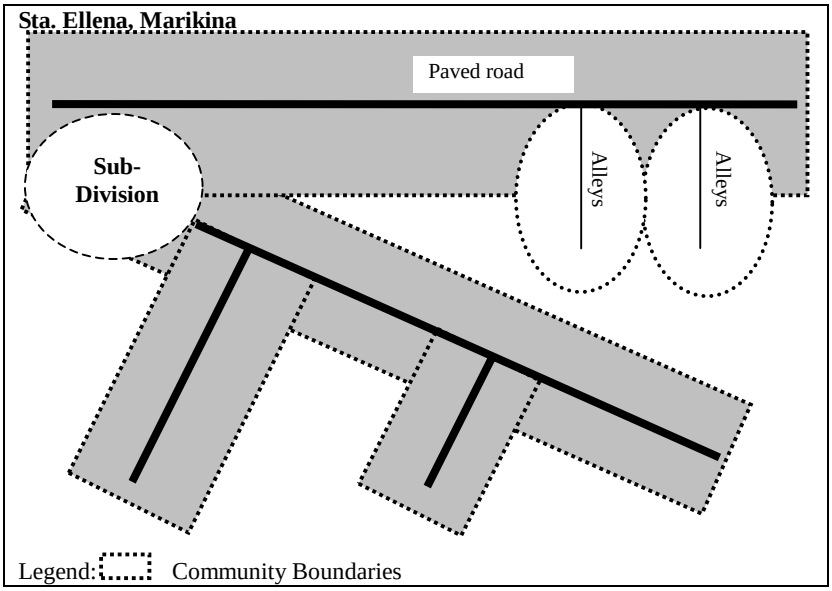


Figure 8.4.3 An Example of Barangay where Community Boundaries are not Aware

In sum of the above discussion, the following characteristics of communities are observed: In the case of barangays where community units or boundaries are explicitly recognized:

- There are two or three types of communities found in one barangay
- There are some kinds of leaders in each community.
- The community level and the barangay administrative level have some methods of communications between the two levels.

In the case of barangays where community units or boundaries are not explicitly recognized:

- There are many different types of communities in one barangay
- Information distribution is frequently unilateral, from barangay leaders to community members.

8.4.6 Key Implication to Disaster Management Activities at the Community Level

As discussed above, a barangay contains different types of communities in its boundary. Therefore, the following points are considered important in planning disaster management activities at the community level.

- It is important to identify appropriate community units through which the disaster management activities are to be promoted for the community
- It is important to identify key actors both at the barangay level and at the community level.
- It is important for the barangay level to intensify the relation with identified community levels through various actors of both barangay and community levels.
- It is important to clarify the roles of both barangay and community levels in disaster management activities.
- It is important to disseminate information on disaster management toward the community level.

8.5 Common Resources in the Community

Common resources are found in communities through our social survey in selected barangays. Some of these resources can be utilized not only during the emergency, but also during the preparedness stage in disaster management at the community level. Some examples are given below:

1) Human Resources

(1) Leaders and agents

Community leaders and their capacity are important resources in disaster management. In some barangays, the capacity of these community leaders have been activated and enhanced by various community development activities.

(2) Women's Group

There is a very strong coordination between women's groups who are active in barangay environmental improvement in Ugong, Pasig City. In case of flood disaster in the area, woman members of the groups also act as leaders of the communities. This is a good example of common resources, which have potential in community disaster management.

(3) Unemployed

Many unemployed people are found in Palasan, Valenzuela City. Those unemployed men are volunteering as barangay tanods. According to the conversation with barangay councilmen, 80% of the households in the community have at least one man volunteering for that position.

2) Financial Resources

A community sometimes collects money for community activities. In some cases, collected money is used during calamities, mainly for flooding.

- In communities of subdivision and town house complex in Sta. Ellena in Marikina City and Fairview, Quezon City, fund collected monthly is utilized for maintenance of security, and rehabilitation of building.
- In sitio community of permanent informal settlement in Fairview, Quezon City, community leaders are collecting voluntary contribution of 20 pesos monthly from the residents. Collected funds are used for maintenance and improvement of livelihood within the community.

Sometimes, barangays collect fund for their capitals. In Hagonoy, Taguig, or in Sta. Ellena, Marikina City, barangay administration holds activities such as popularity contest, bingo, or raffle for raising fund. Collected funds are used together with the allocated fund by the city government, for barangay operation, repairs on infrastructures, and for calamities.

3) Water Resources

Wells are found in many communities all over the Metropolitan. The well water is not potable. But local people use the well water for bathing, cleaning and laundry. On the other hand, in some areas, such as Tunasan, Muntinlupa City, people are no longer able to depend on well water due to water quality deterioration. This is caused by rapid construction of industrial facilities in the areas.

In areas with no public systems of piped water supply, small business owners buy and keep water in water tanks to sell water in their neighbors.

4) Small Open Spaces

In the old Manila area, there are small open spaces which are used for religious purposes. Each of them could accommodate approximately 100 people. Except for the old Manila area, most barangays have basketball courts beside barangay offices. These kinds of open space could be utilized for emergency response to disasters.

8.6 Community Based Disaster Management Activities -Characteristics of Selected Communities-

8.6.1 Objectives

In Metropolitan Manila, an earthquake may hit at anytime. However, not many people have accurate knowledge about a possible earthquake and its damages. In the Philippines, in the current trend of decentralization, local government units and barangays have been institutionally empowered. The barangay especially is a good system of community governance. In urban areas where social cohesion has become weaker, vulnerability to disasters has been increasing and a community based disaster risk management system needs to be developed further.

Under such circumstances, community based disaster management activities were conducted in the three pilot communities during the Study, aiming: 1) to suggest a model for future community based earthquake disaster impact reduction activities in Metropolitan Manila, and 2) to draw lessons learned through sharing community activities with counterpart agencies and local communities.

More specific targets for the selected communities were: 1) to make an earthquake risk reduction conscious community, 2) to enhance risk management capacity through a participatory planning process, 3) to disseminate disaster management knowledge that leads to action, and 4) to encourage mutual help, a self-help attitude, and individual preparation.

For the barangay, the specific targets are: 1) to plan community level disaster preparedness as part of the barangay disaster management plan, 2) to encourage decentralization and participation in turning law and form into practice. The Barangay can be more proactive with strengthened planning and implementing functions, not only problem solving and dispute mediation.

Lastly, for the local government unit, through these activities they have targeted: 1) strengthening of coordination links, and 2) incorporation of disaster risk management concepts and community disaster risk management into master plans and development plans.

8.6.2 Outline of the Community Activities

The pilot communities were aimed to be spearheads to spread similar activities to other communities and barangays in Metropolitan Manila. The community activities started with the social survey, such as key informant survey, and focus group discussions. The community

activities are barangay general assembly, community watching, risk and resource mapping, disaster imagination game, training, and drill. The sequence of the activities is listed in the following chart.

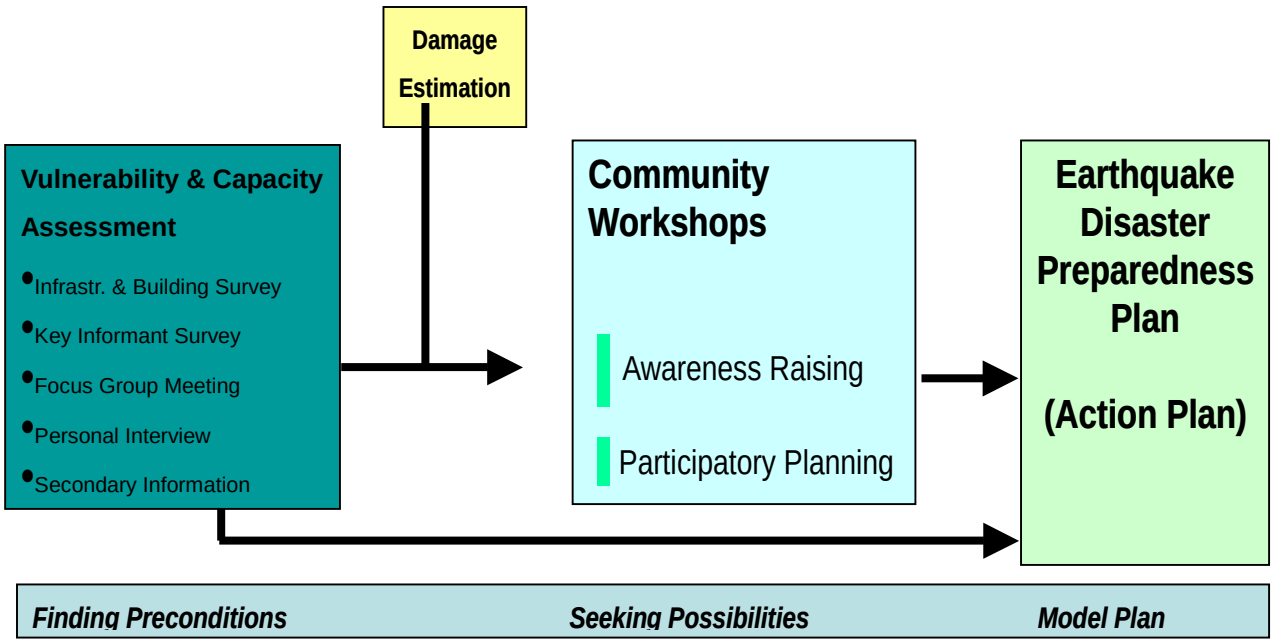


Figure 8.6.1 Sequence of Activities

Table 8.6.1 Community Based Disaster Management Activities

Activity		Agenda
Social Survey	Key informant survey Interview survey	◇ Vulnerability and capacity assessment
	Focus Group Discussion 1 and 2	◇ Sharing the Residential Survey results ◇ Receiving insights and discussion on key results
Community Activities	General Assembly	◇ Explaining damage estimation results ◇ Showing visual image of possible earthquake damages ◇ Sharing damage scenario and developing community response scenario
	Community Watching and Resource Mapping	◇ Identifying resources and risks in the community ◇ Mapping exercise ◇ Building regulations ◇ Introducing building damages and countermeasures ◇ Emergency community response
	Disaster Imagination Game (DIG) 1	◇ Mapping exercise of earthquake hazards ◇ Sharing vulnerabilities and capacities ◇ Earthquake emergency risk management planning ◇ Emergency Medical
	Disaster Imagination Game (DIG) 2	◇ Earthquake emergency risk management planning ◇ Presentation on specific topics
	Training	◇ Training community response in the actual Earthquake situation; testing evacuation routes, information management, learning first aid, fire extinguish, organizing community kitchen etc.
	Drill	◇ Testing the plan ◇ Training community response in the actual earthquake situation; testing evacuation routes, information management, learning first aid, fire extinguish, organizing community kitchen etc.
	Minutes of Agreement	◇ Identifying roles of PHIVOLCS, MMDA and LGU for the continuation of the activities ◇ Discussion and documentation

8.6.3 Selection of the Pilot Communities

The first step in community selection was the selection of cities in Metro Manila. Three cities were chosen based on the following criteria: 1) Hazards: High hazard area, higher Probable Peak Ground Acceleration, referring to the Valley Fault Model 08 and Manila Trench Model 13, 2) Vulnerability of people: High vulnerability, with higher population density, and 3) Vulnerability of buildings and infrastructures: High vulnerability of physical urban structures and building conditions.

The second step of community selection was selection of a barangay within each city. Selection criteria were: 1) Motivation, as evidenced from discussion with city officials, 2) Political Will, as evidenced from the discussion with barangay captains, and officials, and 3) Existence of community organizations in the community.

Based on the above steps and criteria, Barangay 741 of Manila City, Ugong of Pasig City, and Cupang of Muntinlupa City were selected as three target communities.

8.6.4 Basic Characteristics of the Selected Communities

Characteristics of the selected communities are shown in Table 8.1. As shown, Barangay 741 has the highest population density among the three communities. A well-organized community based organization exists in Ugong, having six puroks (small community unit), one senior citizen's association, and one income generating cooperative organization. There is an existing disaster management unit in Barangay Ugong, which automatically becomes activated during a disaster by the request of the city government. The barangay has its own rescue equipment, which is used during different types of disasters in the city. However, earthquake is not currently included in their response capacity. Among the three selected communities, Ugong barangay has the highest possibility to become a model for community activities and influencing the initiatives of other selected communities.

Among nearly 1,600 barangays in Metro Manila, about 900 are in Manila city. Due to this large numbers of barangays in the city, the jurisdiction of each barangay is restricted in area and operation. However, there are many barangay officials in the city, and they can serve as an important human resource during a disaster. In the case of Manila, physical and financial resources of each barangay are limited, however, there is a culture of sharing resources among barangays within the city. Since the probability of damages caused by the possible earthquakes generated by the West Valley Fault is higher in Manila, the communities in the city have higher probability of experiencing damaging effects of the earthquake. Therefore, Manila city needs to incorporate specific measures at the barangay level to reduce the impacts of the earthquake. Compared to the barangays in other cities, Manila barangay officials receive a relatively lower honorarium and have to manage the barangay with a relatively limited budget. Thus, there is significance in choosing one sample case study from Manila City to plan how to motivate barangay officials and mobilize human and physical resources and allocate budget to take different approaches and measures to reduce earthquake impacts.

In contrast, Muntinlupa city has taken different measures related to urban planning, and communities have a relatively higher level of earthquake awareness due to the visible creeping effects of the southern part of the West Valley Fault. However, there are no specific measures taken by the communities to reduce earthquake impacts, which needs attention and focus through the current activities.

Table 8.6.2 Characteristic Features of the Selected Communities

City	Manila	Muntinlupa	Pasig
Barangay name	Bgy 741	Cupang	Ugong
Bgy Budget 2003 (peso)	770,000	20,000,000	34,000,000
Bgy. Employees	30	100	200
Existence of Community	Jolly Clever's club Since 1960's (40 years) exclusive	San Nicolas St. Known as Nofuente Comp. Home Owners' Assc. Since 1970's declining tendency	Purok 1- 5 well-organized Senior Citizen's Assc. KILUS (Cooperative)
Area	1.79ha	1.8ha	11ha (394ha Bgy)
Population	1600	1000	7000 (26,0000Bgy)
Pop. Density	900 p/ha	550 p/ha	630p/ha
House Hold #	317	150	1500
Built-up area (Assumption)	95%	85%	80%
Building type (Dominant)	CB, half Wood	CB, half Wood	CB, half Wood
Disaster Management Plan	none	Organization structure only	Automatic Not in written documents
Hazard	Fire (2003,1985) Flood	Flood (2000) Subsidence (due to water extraction) Fault (Valley fault system)	Flood (2000)
Damage Estimation (Model 08) MMI / PEIS Bldg. Damage Death Ratio Fire spread Liquefaction	 X / lX 30-50% 0.3-0.4% Possible Low	 X / lX 30-50% 0.5-0.7% Possible Low	 X / lX 20-30% 0.5-0.7% — Relatively high

8.6.5 Social Characteristics of the Selected Communities

1) Survey objective

The social survey aims to assess the vulnerabilities of communities in Metro Manila to earthquake disasters, and their preparedness to respond to any eventuality. These findings shall be the basic information to be used in deciding an approach for the community based activities and barangay level disaster management plan.

The specific objectives of the survey are as follows:

- To clarify and characterize the citizenry's level and quality of awareness and perception of disasters;
- To identify the needs of local citizens, barangay officials and other public officials who are concerned with disaster management;
- To identify household and community vulnerabilities and their root causes among the selected local communities; and
- To assess and evaluate available and unavailable resources and capacities that may be utilized for disaster management in these communities.

2) Survey design and sample size

The social structure survey is comprised of the following four major items and each sample size is in the bracket.

1) Key Informant Survey: (30 samples at each selected community)
2) Participatory Observation: (2 entire days at each selected community)
3) Questionnaire Survey: (50 samples at each selected community)
4) Focus Group Meetings: (2 groups at each selected community)

Prior to the Questionnaire Survey, semi-structured interview survey were conducted for key informants of the four selected areas of Mataas Na Lupa area (Barangay 735, 736, 737, and 741), Manila City, Barangay Cupang, Muntinlupa, and Barangay Ugong, Pssig City. The respondents consisted of elected community leaders (barangay chairpersons and councilors) and representatives of different sectors: women's groups, youth, senior citizens or the elderly in the communities, entrepreneurs, the police, teachers and health workers. Interview guides tailored to different groups were used in the interviews. The 83 key informants were distributed by research site as follows: 28 from Zone 80 Mataas na Lupa [Barangays 735, 736, 737, 741], Manila; 28 from Barangay Ugong, Pasig City; and 27 from Barangay Cupang, Muntinlupa[2]. A focus group discussion among the community-based facilitators generated additional insights, while sharing local vulnerabilities and capacities with the local community members by showing the survey results.

[2] The ages of the key informants ranged widely from 88 years old in Pasig and 18 years old in Manila. Reflecting the overall population, they were predominantly Catholic in terms of religious affiliation, and a significant majority were married. A majority were also born in Metro Manila while the rest were either migrants from nearby provinces or from Visayas and Mindanao. Marriage to a resident in the area or location of their employment pushed the migrants to consider the research community sites their homes. Among the community leaders, the longest serving rendered 22 years while the shortest has served for only 2 months when interviewed.

8.6.6 Major Observations

1) Political will

Disaster risk is mostly generated through unsustainable development and weak governance. Community based disaster management which is integrated with development planning will reduce vulnerability and disaster losses. In the Philippines, the community based approach is commonly recognized and promoted among disaster response agencies. Practically, the institutional arrangement has been set, since the barangay that originates from the community unit coincide with the smallest administrative unit; moreover, barangay based community disaster preparedness is defined to be promoted in the national policy of Presidential Decree 1566. However, in the case of the Philippines, including a wider spectrum of policy makers is essential, and the success of the project depends on political will. Policy makers are national and local government level officials and political will means political commitment and high-level support from national and local government officials and politicians to ensure initiation of the program and linking mitigation measures with other programs. Risk management policies, especially mitigation policies, need to ride on other development policies. In this sense, more advocacies are necessary for policy makers to understand that disaster risk management is the essential component of sustainable development, that it pays off in the long run, and that the community approach is vital.

2) Democratic participatory approach

In the Philippines, more democratic and process-oriented approaches are commonly taken with a relatively high voting rate, in average perceived percentage of voters in the selected communities during elections are 68% in Manila, 80% in Pasig and 50% in Muntinlupa city. This means that more concerned people are expected to be involved from the beginning. Keeping concerned people informed is the essential factors for further cooperation. The Local Government Code clearly defines the roles of the people's and non-governmental organizations and promotes linkages with them. It says that local government unit shall promote the establishment and operation of people's and non-governmental organizations to become active partners in the pursuit of local autonomy. The code further defines that local government units may enter into joint ventures and such other cooperative arrangements with people's and non-governmental organizations to engage in the delivery of certain basic services, capability-building and livelihood projects, and to develop local enterprises designed to institutionalization. Pasig City is encouraging cooperatives to be established among the community for livelihood programs. Effective risk management can best be achieved where the intended beneficiaries are involved in the design, management, and implementation of the assistance program in a participatory way.

Consensus building might be time consuming, but it is worth it to invest in it, keeping in mind the sustainability of the process.

3) Leadership structure / Elections

The leadership structure and elections play important roles in the decision making in the community. This is especially relevant to the diverse and multi ethnic groups where formation of the common voice out of individual needs is the key issue. Barangay captains are the basically the local leaders. The barangay captain is a honorary position. Some of them run their own businesses, others may regard this as a gateway to a political career. After completing the maximum 3 terms as Barangay captain, some will run for city councilors, vice mayor, mayor and so on.

In most parts of Metropolitan Manila, smaller community organizations/associations exist within each barangay, e.g. homeowners' associations, sitio, purok etc.; elections are also held at this level of the organizations and each organization/association selects leaders by elections. This democratic process of selection of leaders is found to play an important role in sustaining community activities and obtaining support from communities in the longer term.

4) Self reliance in the Philippine Context

Self reliance has its connotation within the local socio-economic and cultural context. In the case of the Philippines, self reliance is observed more as a process, where voluntary contributions and donations are obtained or raised from different sources like churches, wealthy businessmen, cooperate donations, etc. by the communities. These funds are usually utilized for community activities, festivals and gathering. This is to be noted that it is not a direct self-contribution within the community, but this process of fund raising helps in achieving self-reliance.

8.6.7 Vulnerability and Capacity Assessment

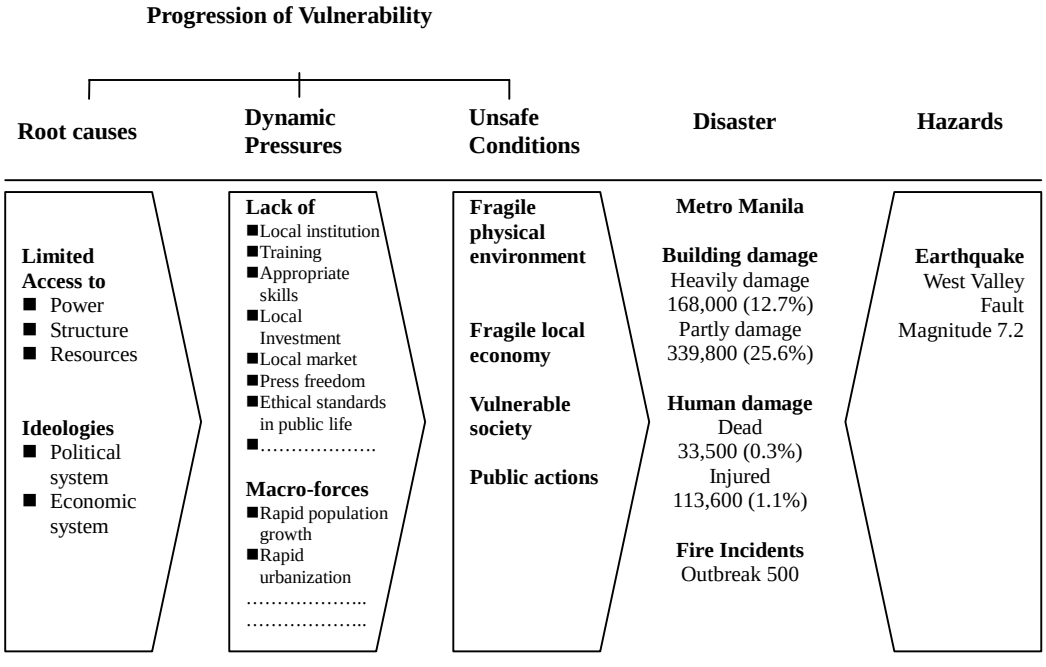
Vulnerability and capacity assessment (VCA) is a good opportunity to develop local skills and capacity. Involving community people in this survey helps them to understand their own situation, especially when you involve community participants in assessing the results. It is important for them to realize their own capacities and vulnerabilities. This self-evaluation process is essential to create motivation to reduce local vulnerability. The viewpoints of VCA are categorized in the following table.

Table 8.6.3 Viewpoint of Vulnerability and Capacity Assessment

Category	Viewpoints
Resource Structure	■ High population density ■ Dependence on lifelines ■ Gap of day time population. night time population ■ People coming from outside ■ Scarce resources (individuals, local organizations, CBOs, Barangay, LGU) ■ Lack of disaster countermeasures (individuals, local organizations, CBOs, Barangay, city gov., local enterprise) ■ Lack of disaster management plan ■ Lack of disaster management facilities ■ Distance to evacuation site, fire hydrant, water supply, access to shops, public facilities, welfare facilities ■ Distance to workplace ■ Economic capacity ■ Employment status (unemployment, part-timer) ■ Family composition ■ Household members, kinship ■ Ratio of elderly, disabled persons ■ Influx of outsiders, boarders ■ Weak neighborhood relationships ■ Weak family relationships ■ Activities based in the community (year of living, commitment) ■ Low skills for living ■ Access to medical services ■ Geological conditions (lowland, swampy land, slope land) ■ Land ownership ■ Building ownership
Execution structure	■ Uncertain responsibilities of the disaster management organizations ■ Skills of disaster respondents ■ Exclusiveness of organizations ■ Coordination between organizations ■ Decline tendency of local organizations ■ Organizing abilities（member、fund raising capacities） ■ Distribution of political power ■ Sense of Volunteerism
Decision making structure	■ Leadership ■ Decision making mechanism (each DM organization, community, Bgy, LGU) ■ Plural will ■ Organizational background of leaders, politicians ■ Tendency of resolving disputes, local problems ■ (Bgy, LGUs churches, politicians, citizens) ■ Community movement, citizens' movement, CBOs ■ Information resources, amount of information, dissemination route
Value and normative structure	■ Resignation to disaster ■ Disaster culture ■ Cultural stability ■ Social psychological stability ■ Standard of social security system ■ Regulations, normative guidelines for behavior ■ Level of disaster knowledge, local countermeasures, theoretical knowledge ■ Lack of disaster consciousness, awareness ■ Lack of disaster knowledge

Vulnerability and Capacity Assessment was done following the above viewpoints; however, the challenge of incorporating these findings directly and systematically into the planning process remains unsolved. The VCA process identifies various descriptive factors, but the correlations of these factors might be different in each local context to integrate them into the development planning.

The following model shows the image that disaster is the intersection of two opposing forces: those pressures generating vulnerability on the one hand and physical exposure to a hazard on the other. The left hand side illustrates the progression of vulnerability. A series of levels of social factors generates vulnerabilities. The root causes of the disaster sometimes lie in the distance, like the economic and political sphere. These are normally a function of the economic structure, political system, legal definitions of rights, gender relations, etc. The check list of the above is listed in parallel, but thinking about the progression level of vulnerability will help us think about how to approach reducing vulnerability.



Source: " At Risk " Piers Blaikie et al.

Figure 8.6.2 Progression of Vulnerability

8.6.8 Enhancing driving forces and minimizing hindrances

A participatory workshop was conducted with the participation of the officials of Manila, Muntinlupa and Pasig cities, barangay officials of the selected communities, and community leaders. During the workshop, three basic topics were discussed: 1) applicability of current community based disaster management (CBDM) activities in their respective communities, 2) driving forces and restraining factors in regard to implementation of CBDM activities, and 3) measures and countermeasures needed for enhancing driving forces and mitigating restraining forces. The results are shown in the following table.

Table 8.6.4 Applicability of Current CBDM Activities

Bgy	Q: In your opinion, can the CBDM activities be applied in your barangay?
Bgy 741 Manila City	It is for common good.
	People will be ready for any disaster to come.
	This is essential for the Brgy.
	This is essential for the people.
	If the chairman will not be influenced by politics, it will work.
	As long as transparency & coordination exist, it will be applicable.
Bgy Cupang Muntinlupa City	There exists a "thing" like that in our Barangay, especially in times of flood. People are always ready to have their motorboat lent to others, but this is not written in black and white.
	It could be done. Especially in places where there are numerous calamities, importantly the earthquake. This is important in preparedness.
	CBDM is important because there is a need for this so that the effects of calamity will be minimized.
	There is a need to organize this in the Barangay because it is a high-risk area.
Bgy Ugong Pasig City	It can be implemented.
	It can be done, in fact, something similar is now being done in the barangay.

Table 8.6.5 Force Field Analysis

Bgy	DRIVING FORCE	*RESTRICTING FORCE*
Bgy 741 Manila City	Strong leadership	Poor leadership
	Disaster experience	Lack of community involvement
	Funds	Lack of funds
	Perception from people	Unawareness
	Existence of Educators & trainers	Lack of interest
	Community cooperation	Dole-out mentality
	IEC	Overpopulation
	Preparedness	Poor access for infrastructures & communication
	Support from Local Gov. Unit	
Bgy Cupang Muntinlupa City	Cooperation from the community	Lack of cooperation as a whole.
	A sense of concern from the people.	Lack of training and knowledge
	Communication equipment	There is no sense of concern on each other.
	Information dissemination	Time and effort given on this endeavor.
	An active Barangay council	Policy implementation
	Coordination with other community.	Dishonesty
	Encouragement	Opposing good plans
	Cooperation between the Barangay and the community	Lack of funds/ not enough plans
	Sufficient funds	Belief differences about the issue
		Lack of political will
		Political differences
		Drug problem among the youth, sense of voluntarism among them curtailed.
Bgy Ugong Pasig City	Cooperation, teamwork spirit	Self centeredness
	Unity, willingness to cooperate	Lack of knowledge on what to do
	Community participation	Talking of someone else's ills
	Agreement to the possibility of doing CBDM	Lack of knowledge on what to do
	Equipment	Lack of communication
	High income of the Brgy	Politics
	Desire to cope and implement CBDM	Lack of community participation
	Initiative, motivation, positiveness	Lack of funding sources
	Adequate training	Lack of training needs
	Good health	Poor leadership organization
	Political support	Poor information dissemination
	Financial support	Negative approach
	Communication	Disorder
	Existence of Fault	Established legal limitation
		Red tape

For Bgy 741 and Cupang, the answers are ranked from the top, according to the number of responses written in the Meta cards.

Table 8.6.6 Countermeasures for Enhancement and Mitigation

Bgy		Issues	Risk Reduction Measures
Bgy 741 Manila City	Driving Force	Strong Leadership	1. Presentation of MMIERS to Community leaders and Barangay Assembly
		Disaster Experience (1985 fire)	1. identify people/residents who experience the disaster 2. let them talk (tell the stories) 3. film showing 4. disaster drills 5. exposure
		Funds	1. Utilize in priority disaster project
	Restraining Force	Poor Leadership	1. Trainings
		Community Participation	1. Disseminate information of MMIERS 2. Conduct community meetings
		Lack of Funds	1. Generate funds thru solicitation fund drive & other means.
Bgy Cupang Muntinlupa City	Driving Force	Community Organization	1. The Barangay Council should initiate a General assembly, so that the organization will be active again. 2. Regular meeting and an election should be conducted
		Attitude of Cooperation	1. Regular meeting, emphasize the importance of regular meetings (that this regular meeting will help their community) 2.Maintain/enhance transparency in terms of funding and policy.
	Restraining Force	Lack of Information, Education and Communication	1. A General meeting should be initiated by the Barangay 2. Give/distribute information materials to the homeowners Assoc. members 3. There is a need to conduct trainings/workshop/seminar
		Non-cooperation of community members and the Barangay	1. Good implementation of policies in the Nofuente Homeowners assoc. 2. Enhance transparency in terms of funding and policy.
		Lack of political will due to political differences	1. Conduct dialogue to ease out conflicts 2. Create a working cooperation
		Lack of fund	1. Come of with series of meetings to brainstorm possible fund raising projects.
Bgy Ugong Pasig City	Driving Force	Community Spirit/Volunteerism	1. Continued participation 2. Organize the community
		Community Awareness	1. Continuing education 2. Information dissemination 3. Holding seminars and trainings 4. Identification of risk areas
		Community Resources	1. maximum utilization of human/ material resources 2. organize volunteers 3. Holding training, seminars 4. Identifying additional resource personalities
	Restraining Force	Politics	1. Apply multi-sectoral approach
		Lack of Community Awareness	1. Education / Formal education 2. Organizing activities 3. Producing fliers, leaflets/reading materials 4. Utilizing multi-media 5. Organizing community assembly/meetings
		Lack of Community Spirit	1. House to house visit 2. Providing value formation programs
		Legalities/Technical Limitations	1. Lobby for amendment of existing laws related to Disaster Management Budget

8.6.9 Building and Infrastructure Survey and Establishment of GIS Database

1) Purpose

Detailed building and infrastructure surveys were conducted on the three communities where disaster management activities will be held. The aims of the detailed surveys are to gather information for:

The establishment of a GIS database so that community maps can be created to be used for community based disaster management activities such as disater imagination games.

Use in basic analysis of the physical regional risk for earthquake

The GIS to be established for the CBDM covers a larger area than that covered by detailed building and infrastructure surveys so that regional data can be integrated in the activities. Regional data would include information on hospitals, school locations, road network and other infrastructure and public facilities which may not exist within the communities selected.

The series of surveys related to preparation of community disaster management activities and GIS database development are shown in Figure 8.6.3.

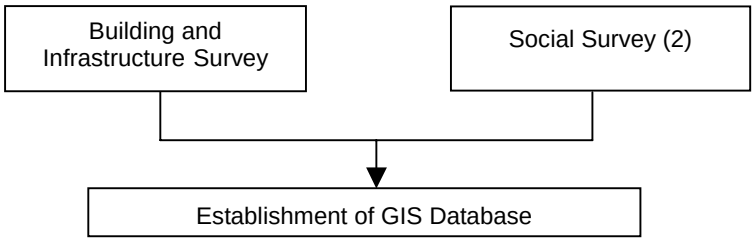


Figure 8.6.3 Flow of the Survey and GIS Database Development

2) Contents of the Work

There are mainly two portions to be covered in this work; survey and the establishment of the GIS database. The survey portion consists of the building survey, and infrastructure survey.

(1) Building Survey

The Building Survey basically collected the following data:

1) Building related information
- Building use
- Building structure

2) Household related information
- Number of residents
- Ownership
- Accessibility to Lifelines/ Infrastructures/ information

For a detailed list of items included in the survey, refer to the survey sheet attached in appendix.

(2) Infrastructure Survey

Infrastructure survey focuses on data collection related to existing infrastructure in the targeted area. The survey collected basic information on the following items.

1) Road, bridge, subdivision walls, residential walls, parks and open spaces
2) Resources related to disaster management
3) Hazards

Detail survey items can be referred from survey sheet attached in appendix.

3) Preliminary Assessment on Building and Infrastructure Data

(1) Mataas na Lupa Area, Manila City

A. Assessment and Findings on Building information

The Mataas na Lupa Community is bounded by two major thoroughfares, President Quirino Avenue to the northwest and President Sergio Osmena Sr Highway to the southwest (see Figure 8.6.4). The area is mostly (94%) for residential purposes. About half (49%) of the structures used concrete for wall material while 40% used a combination of concrete and wood. Only a small ratio (5%) used wood. Half (50%) of the structures used RC frames. Almost all (94%) the houses were in the period from 1985 to 2000. Construction reached its peak in the period from 1985 to 1988. This is due to the fact that a fire razed the area in 1985. About 68% employed conventional carpenters in the construction while about 23% utilized the help of a professional engineer. A small portion (8%) of the residents built their homes themselves. Most of the residents (87%) own their homes while the rest either rents or have their homes belong to other people.

A greater part (94%) of the residents have access to serviced water. Almost all households (97%) use electricity and propane for heating purposes. Almost all households (99%) have access to a sewer system. About 44% either communicate or get their information through cell phones, telephones, radio and television.

B. Assessment and Findings on Infrastructure

Wide roads surround the community but widths of Roads within the community range from 3.5 to 6 meters. Access to the inner portions of the community are limited to narrow alleys with widths typically at 2.5 meters. A total of 3 areas with a total of about 1,300 square meters were identified as open spaces in the vicinity of the target community. Resources for the community include 9 billboards. Four bridges exist in the area. Two bridges cross Estero de Paco, one along President Quirino Avenue and the other along President Sergio Osmena Sr Highway. The other two cross Estero Tripa de Gallina, one along San Andres St and the other along President Sergio Osmena Sr Highway.

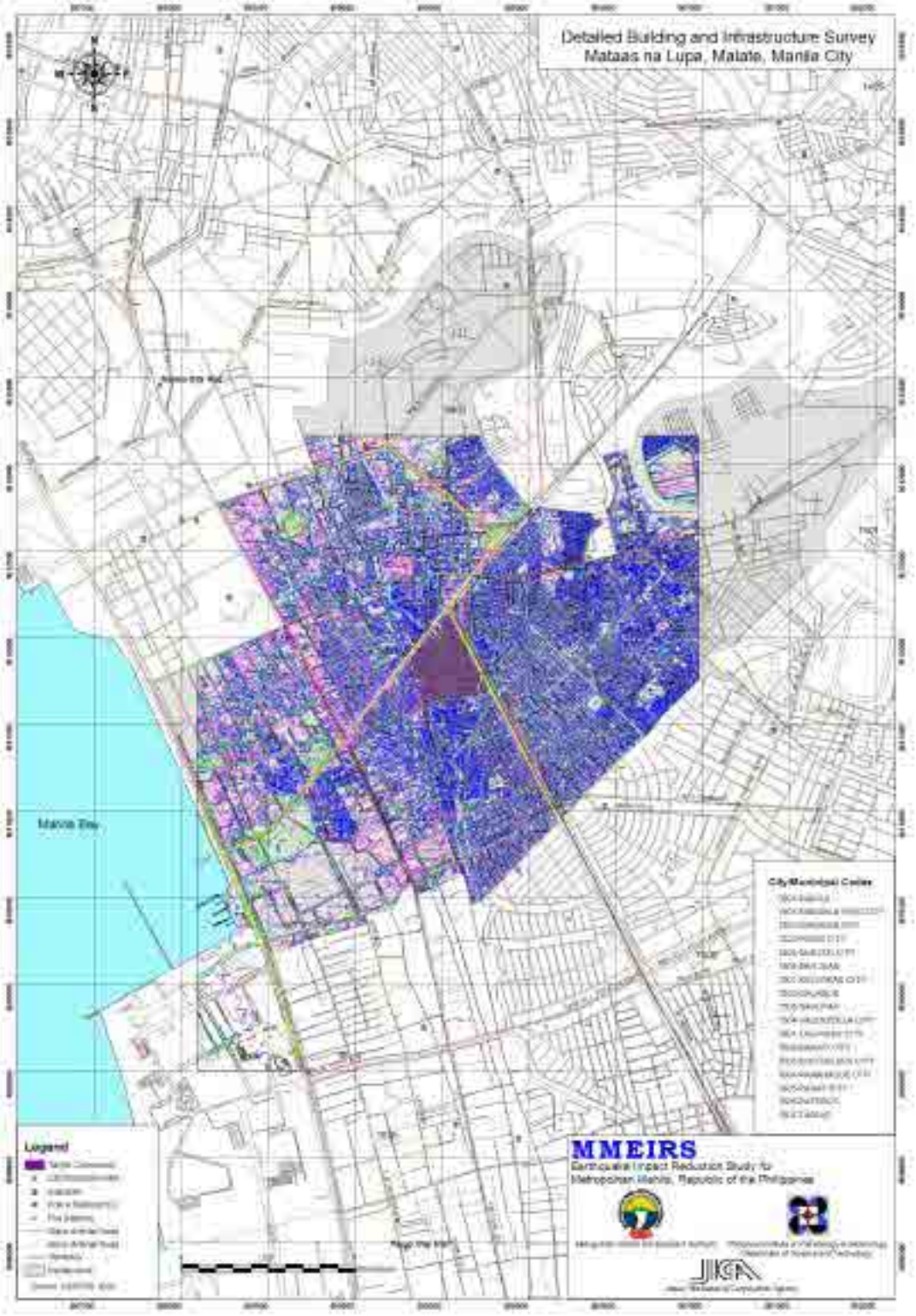


Figure 8.6.4 Detailed Building and Infrastructure Survey Mataas na Lupa, Malate, Manila City

(2) Cupang, Muntinlupa City

A. Assessment and Findings on Building information

The Cupang community is bounded by Laguna Bay to the east and South Luzon Tollway to the west (see Figure 8.6.5). The Cupang, Muntinlupa community mostly consists of residential areas. Of the three communities, Cupang has the smallest average floor space for homes. About a 38% of homes in Cupang are made of Reinforced Concrete, 23% of wooden materials. Of the three communities, Cupang has the highest ratio of homes made of wooden materials. This characteristic indicates vulnerability to fire spreading. This is made worse by the fact that houses are built very close to each other. Most of the homes were built in the period from 1971 to 2000. Construction of homes peak in the period between 1981 to 1990. Forty percent of the existing building structures were built in this period. About 70% of the structures were built by conventional carpenters, 20% were built by the residents themselves, and only a small ratio, 8% were built with the help of a professional engineer. Half of the building structures are owned by the residents themselves with 20% built on government property.

Most of the residents (87%) get their water from deep wells. Majority (85%) of the residents use electricity and propane as source of heat for cooking and other purposes.

B. Assessment and Findings on Infrastructure

All roads within the community are considered narrow, all roads being 6 m or less. Road widths range from 2 to 3 meters in areas like Tuklas, Perez Compound, Arevalo St and San Nicolas St. Almost all residents have access to a sewer system. Some residences dispose wastewater to open canals. Most residents have access to information through radio and television. Access to Cell phones is also high.

Two bridges exist within the community which crosses Pasong Diablo River, the bigger bridge is the Cupang-Ilaya boundary bridge and is located along Pres. Manuel Quezon St. Two water tanks exist in the vicinity of Martinez Compound and Penguin.

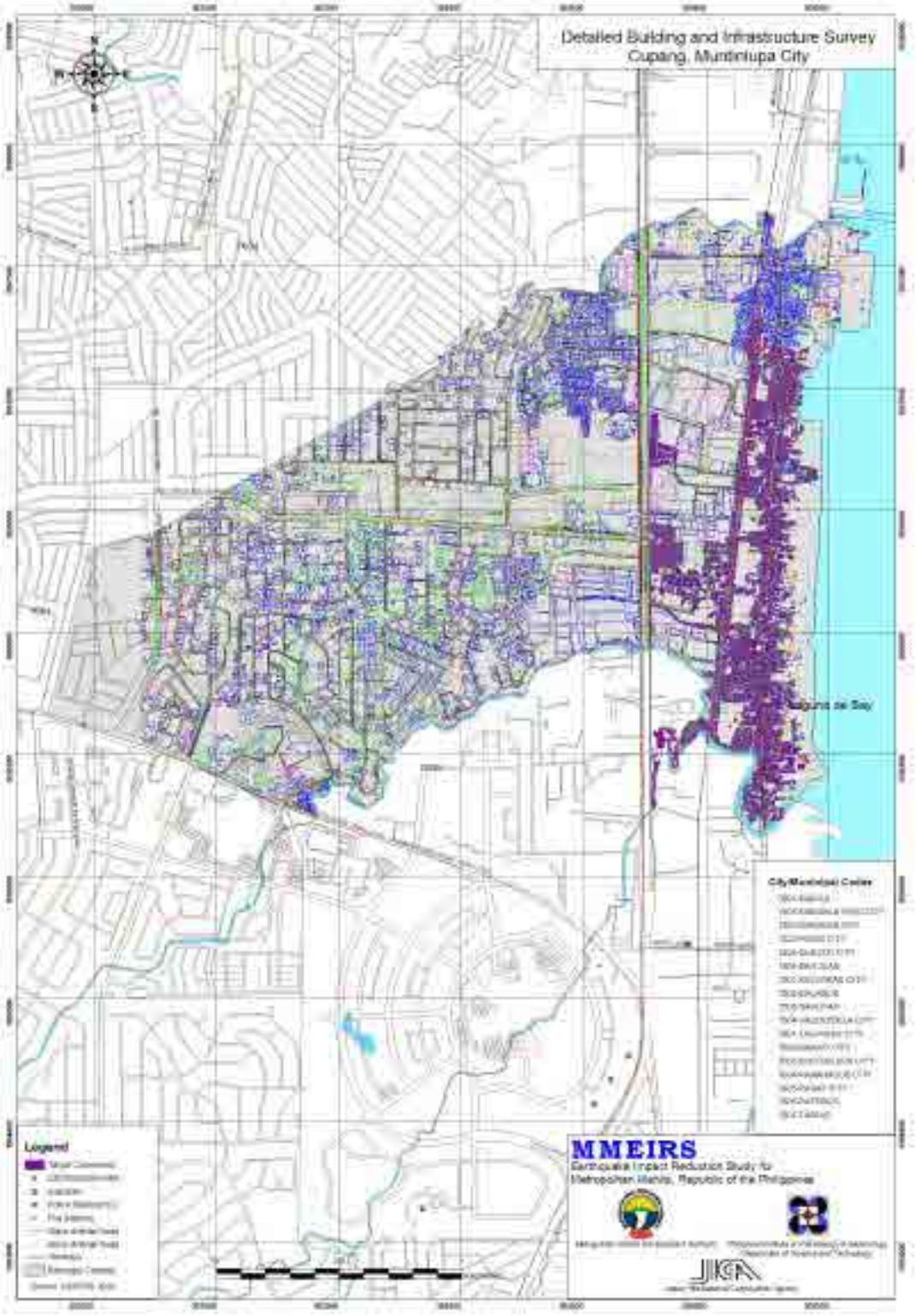


Figure 8.6.5 Detailed Building and Infrastructure Survey, Cupang, Muntinlupa City

(3) Ugong, Pasig City

A. Assessment and Findings on Building information

The target community in Ugong is surrounded by industrial areas and the Marikina River (see Figure 8.6.6). The target community itself is mostly for residential (91%) use. About 40% of the structures are made of RC frame, 19% make use of a combination of RC and wood frame while 10% used wood frame. About half of the wall material used for the houses utilized a mix of concrete and wood while about 40% used only concrete. A little over half of the structures were built in the period between 1911 to 1980. About three fourths (74%) of the structures where built by conventional carpenters, while about 20% were built with the aid of a professional engineer, only a small ratio (5%) were built by the residents themselves. The majority (70%) of building structures are owned by the residents themselves while about 22% rent. Only a small ratio (4%) built on government land.

A bulk (92%) of the residents have access to serviced water. Most of the residents (85%) employ electricity and propane a source for heating. Almost all residents (96%) dispose wastewater to a sewer system. About half (48%) of the residents get their information through telephone, cell phone, radio and television.

B. Assessment and Findings on Infrastructure

The community is situated right next to Marikina River. One major bridge, the Alfonso Sandoval Bridge along Eagle St. exists in the northern portion of the community. To the south, the nearest bridge is Vargas Bridge and is about 1.2 km away.

All roads inside the targeted community are narrow, with road widths ranging from 2.75 meters along M Santiago St. to 4.75 meters along C Santos St. An open space exists in the southern portion of the community with an area of about 4,000 square meters.

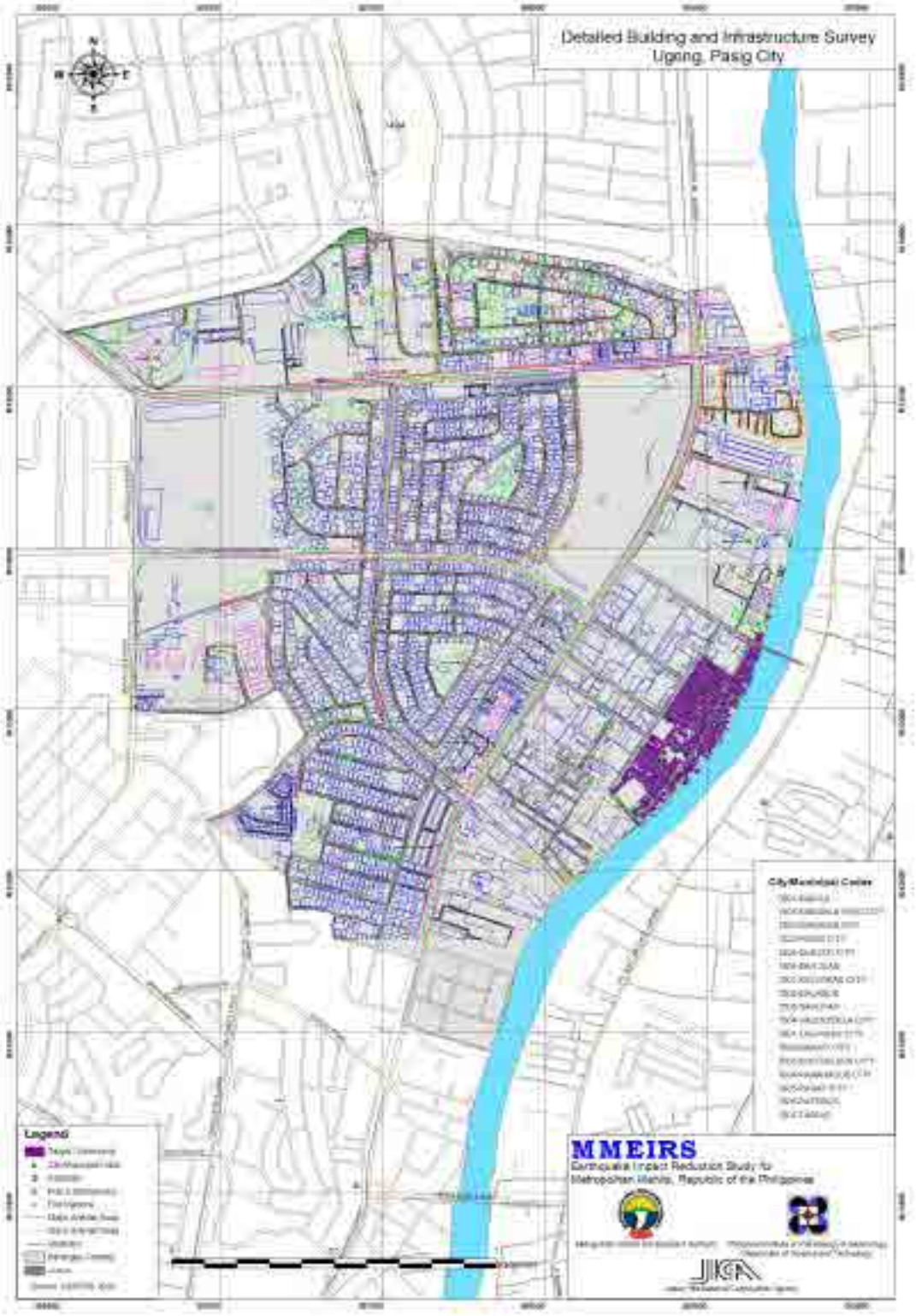


Figure 8.6.6 Detailed Building and Infrastructure Survey, Ugong, Pasig City

Table 8.6.7 Summary Table of Detailed Building and Infrastructure Survey

(1)	*Cupang*		*Malate*		*Ugong*	
Household by Building Use	**Counts**	**Ratio**	**Counts**	**Ratio**	**Counts**	**Ratio**
Commercial/Business	51	1.09%	23	1.52%	15	1.71%
Educational and Cultural	16	0.34%	1	0.07%		0.00%
Government and Quasi-public	5	0.11%	7	0.46%	3	0.34%
Government and Quasi-Public and Health and Welfare		0.00%	1	0.07%		0.00%
Health and Welfare	5	0.11%	1	0.07%		0.00%
Industrial		0.00%		0.00%		0.00%
Mixed	153	3.26%	41	2.71%	30	3.41%
Mixed and Health and Welfare		0.00%		0.00%		0.00%
Park and Recreational	7	0.15%		0.00%	1	0.11%
Religious and Cemetery	7	0.15%	4	0.26%	2	0.23%
Residential	4405	93.74%	1425	94.06%	803	91.35%
Residential and Commercial/Business		0.00%		0.00%		0.00%
Residential and Mixed		0.00%	2	0.13%		0.00%
Transport and Service Facility	2	0.04%		0.00%	1	0.11%
(blank)	48	1.02%	10	0.66%	24	2.73%
Grand Total	4699	100.00%	1515	100.00%	879	100.00%

Household by Builder of Residence Structure	**Counts**	**Ratio**	**Counts**	**Ratio**	**Counts**	**Ratio**
Conventional Carpenter	3,366	71.63%	1,022	67.46%	647	73.61%
Don't know	1	0.02%	1	0.07%		0.00%
Professional Engineer	376	8.00%	354	23.37%	172	19.57%
Professional Engineer and Conventional C		0.00%	3	0.20%		0.00%
Professional Engineer and Residents them	1	0.02%		0.00%		0.00%
Residents themselves	886	18.86%	120	7.92%	47	5.35%
(blank)	69	1.47%	15	0.99%	13	1.48%
Grand Total	4,699	100.00%	1,515	100.00%	879	100.00%

Household by Residence Ownership	**Counts**	**Ratio**	**Counts**	**Ratio**	**Counts**	**Ratio**
Government Owned	1,009	21.47%	11	0.73%	37	4.21%
Government Owned and Othe		0.00%		0.00%		0.00%
Others	1,187	25.26%	83	5.48%	199	22.64%
Owned	2,306	49.07%	1,319	87.06%	614	69.85%
Owned and Others		0.00%		0.00%		0.00%
Rented	82	1.75%	89	5.87%	1	0.11%
(blank)	115	2.45%	13	0.86%	28	3.19%
Grand Total	4,699	100.00%	1,515	100.00%	879	100.00%

Household by Type of Access to Water	**Counts**	**Ratio**	**Counts**	**Ratio**	**Counts**	**Ratio**
Deep Well	4,082	86.87%		0.00%		0.00%
Service Water	369	7.85%	1,435	94.72%	813	92.49%
Service Water and Deep Well	2	0.04%		0.00%		0.00%
(blank)	246	5.24%	80	5.28%	66	7.51%
Grand Total	4,699	100.00%	1,515	100.00%	879	100.00%

(2)	*Cupang*		*Malate*		*Ugong*	
Household by Source of Heat	**Counts**	**Ratio**	**Counts**	**Ratio**	**Counts**	**Ratio**
Charcoal/Wood	5	0.11%		0.00%		0.00%
Charcoal/Wood and Kerosene	1	0.02%		0.00%		0.00%
Electricity	192	4.09%	26	1.72%	44	5.01%
Electricity and Kerosene	129	2.75%	1	0.07%	18	2.05%
Electricity and Propane	3,998	85.08%	1,473	97.23%	746	84.87%
Electricity, Charcoal/Wood and Kerosene	13	0.28%		0.00%		0.00%
Electricity, Propane and Charcoal/Wood	18	0.38%		0.00%	2	0.23%
Electricity, Propane and Kerosene	12	0.26%		0.00%	1	0.11%
Electricity, Propane and Others	1	0.02%		0.00%		0.00%
Electricity, Propane, Charcoal/Wood and Kerosene	2	0.04%		0.00%	1	0.11%
Kerosene	4	0.09%		0.00%		0.00%
Propane	208	4.43%	1	0.07%	45	5.12%
Propane and Charcoal/Wood	6	0.13%		0.00%		0.00%
Propane and Kerosene	3	0.06%		0.00%		0.00%
(blank)	107	2.28%	14	0.92%	22	2.50%
Grand Total	4,699	100.00%	1,515	100.00%	879	100.00%

Household with Access to Sewer System	**Counts**	**Ratio**	**Counts**	**Ratio**	**Counts**	**Ratio**
Sewage System	4,532	96.45%	1,501	99.08%	843	95.90%
(blank)	167	3.55%	14	0.92%	36	4.10%
Grand Total	4,699	100.00%	1,515	100.00%	879	100.00%

Household by Source of Information	**Counts**	**Ratio**	**Counts**	**Ratio**	**Counts**	**Ratio**
Cellphone	13	0.28%	1	0.07%	2	0.23%
Cellphone and Radio	19	0.40%		0.00%		0.00%
Cellphone and Television	76	1.62%	2	0.13%	5	0.57%
Cellphone, Radio and Television	1,427	30.37%	135	8.91%	156	17.75%
Radio	88	1.87%	5	0.33%	10	1.14%
Radio and Television	1,362	28.98%	182	12.01%	67	7.62%
Telephone	16	0.34%	12	0.79%	2	0.23%
Telephone and Cellphone	7	0.15%	6	0.40%	8	0.91%
Telephone and Cellphone and Radio		0.00%		0.00%	1	0.11%
Telephone and Radio		0.00%	1	0.07%		0.00%
Telephone and Television	25	0.53%	65	4.29%	30	3.41%
Telephone, Cellphone and Radio	4	0.09%	1	0.07%	8	0.91%
Telephone, Cellphone and Television	16	0.34%	1	0.07%	19	2.16%
Telephone, Cellphone, Radio and Television	801	17.05%	676	44.62%	420	47.78%
Telephone, Radio and Television	195	4.15%	168	11.09%	30	3.41%
Television	386	8.21%	232	15.31%	52	5.92%
(blank)	264	5.62%	28	1.85%	69	7.85%
Grand Total	4,699	100.00%	1,515	100.00%	879	100.00%

Infrastructure

Total Number of Bridges	1	4	1
Total Number of Open Spaces	0	3	1
Total Area Open Spaces	0	1,290.74	4,000
Average Area of Open Space	0	430.25	4,000

Resources

Broadcasting Pole			
Community Board		9	
Fire Extinguishing Facilities			
Water Distributing Store			
Water Tank	2		

4) Progress of GIS Database Construction and Preliminary Output of GIS Maps

The field work required for the GIS has been finished. Their output consists mainly of field survey maps and tabular data gather from the household survey. The field survey maps have been digitized and incorporated in the GIS. Tabular data have also been encoded, cleaned up and integrated into the GIS database. These information were then processed and summarized into GIS maps and tables.