

Florano, Ebinezer R.

**Working Paper**

## Community Governance for Disaster Recovery and Resilience: Four Case Studies in the Philippines

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**Philippine Institute for Development Studies**  
*Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas*

## Community Governance for Disaster Recovery and Resilience: Four Case Studies in the Philippines

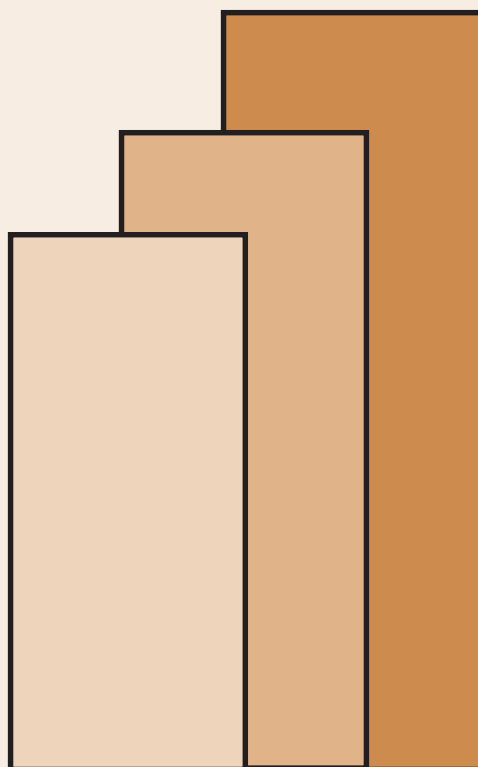
*Ebinezzer R. Florano*

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**COMMUNITY GOVERNANCE FOR DISASTER RECOVERY AND RESILIENCE:  
FOUR CASE STUDIES IN THE PHILIPPINES**

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EBINEZER R. FLORANO, Ph.D.  
Philippines  
August 2014

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Ebinezer R. Florano

## ABBREVIATIONS, ACRONYMS AND TRANSLATIONS

*Amihan* – Northeast Monsoon

amsl – above mean sea level

*bayanihan* – spirit of good neighbourliness by helping one another in times of need

Brgy. – barangay (village)

BDRRMC – Barangay Disaster Risk Reduction and Management Committee

BDC – Barangay Development Council

CALABARZON – Cavite-Laguna-Batangas-Rizal-Quezon

CAO – City Agriculture Office

CArO – City Architect's Office

CCA – climate change adaptation

CCC – Climate Change Commission

CENRO – City Environment and Natural Resources Office

CEMO – City Environment Management Office

CEO – City Engineer's Office

CLUP – Comprehensive Land Use Plan

CDP – Comprehensive Development Plan

CDRRMO – City Disaster Risk Reduction and Management Office

CHO – City Health Office

CPDO – City Planning and Development Office

CSWD – City Social Welfare and Development

CSO – civil society organization

CTO – City Tourism Office

DILG – Department of the Interior and Local Government

DND – Department of National Defense

DOH – Department of Health

DOST – Department of Science and Technology

DPWH – Department of Public Works and Highways

DPR – disaster preparedness and response

DRCI – Disaster-Resilient Community Index

DRR – disaster risk reduction

DRRM – disaster risk reduction and management

DSWD – Department of Social Work and Development

EADN – East Asia Development Network

EWS – early warning system

FGD – focus group discussion

GAA – General Appropriations Act

GDN – Global Development Network

GOV – governance

*Habagat* – Southwest Monsoon

IDP/F – internally displaced person/family

INGO – international non-governmental organization

IRA – Internal Revenue Allotment

JICA – Japan International Cooperation Agency

KAE – knowledge and education

KII – key informant interview

km<sup>2</sup> – square kilometre  
 kph – kilometer per hour  
 LCCAP – Local Climate Change Action Plan  
 LCE – local chief executive  
 LDRRMP – Local Disaster Risk Reduction and Management Plan  
 LGU – local government unit  
 MIMAROPA – Mindoro-Marinduque-Romblon-Palawan  
 MMDA – Metropolitan Manila Development Authority  
 MOOE – maintenance and other operating expenses  
 n.d. – no date or no data  
 NDCC – National Disaster Coordinating Council  
 NDRRM – National Disaster Risk Reduction and Management  
 NEDA – National Economic and Development Authority  
 NGA – national government agency  
 NGO – non-governmental organization  
 NSCB – National Statistics Coordination Board  
 OCD – Office of Civil Defense  
 OPARR – Office of the Presidential Assistant on Recovery and Rehabilitation  
 P – Philippine Peso  
 PAGASA – Philippine Atmospheric, Geophysical, Astronomical Services Administration  
 PAR – Philippine Area of Responsibility  
 PDNA – Post-Disaster Needs Assessment  
 PHIVOLCS – Philippine Institute of Volcanology and Seismology  
 RA – Republic Act  
 RAS – risk assessment  
 RAY – Reconstruction Assistance on Yolanda  
 RMVR – risk management and vulnerability reduction  
 TS – tropical storm  
*sitio/purok* – sub-village  
 sq mi – square miles  
 SAP – strategic action plan  
 ST – super typhoon  
 TRRP – Tacloban Recovery and Rehabilitation Program  
 UNDP – United Nations Development Programme  
 UN-OCHA – United Nations Office for the Coordination of Humanitarian Affairs  
 ZO – zoning ordinance

## ABSTRACT

This research aims to investigate the role of communities in disaster recovery and in building resilience to answer the questions: “What is the role of community in the disaster recovery process? What roles do various stakeholders play in community-led disaster recovery? Is community-based disaster recovery affected by exposure to hazards and disasters, or by the community’s level of socio-economic development?” To answer these questions, five hypotheses were tested in the 12 barangays from Tacloban, Iligan, Dagupan, and Marikina Cities. The cases were investigated by reviewing their documents, interviewing city government officials, and conducting focus group discussions involving barangay officials and residents. These were all conducted with the use of unstructured questionnaires and checklists for the Disaster-Resilient Community Index (DRCI), which was used to compute the level of resilience of the barangays. The study found that community governance for disaster recovery seems to be stuck in the pre-NDRRMC (National Disaster Risk Reduction and Management) years because recovery planning is still passive and reactive. There is no early recovery planning, and for the past years, the government has been relying on post-disaster needs assessment after every disaster. Thus, among the four pillars of disaster risk reduction and management (DRRM), disaster recovery seems to be the weakest link. Disaster recovery in the barangays seems to be a function of the level of socio-economic development rather than the knowledge of the exposure to hazards and disasters by barangays officials and residents. The role of various stakeholders in disaster recovery is very important but without meaningful participation from barangays, recovery moves at a snail’s pace. Lastly, the study found that resilience is built through time, but it may be delayed if important recovery sectors (e.g., housing and livelihood) are neglected; this makes people (especially the poor who are always the hardest hit in dangerous areas) feel exposed and vulnerable to hazards and disasters. The study recommends the enactment of laws on pre-disaster recovery planning, public service continuity plans, and relocating people from disaster-prone communities to safer areas as cost-efficient recovery policy, plans, and project. Among others, further testing of the DRCI and widening of the coverage of the study are suggested for further research.

Key words: community governance, disaster recovery, resilience, communities, barangays

# COMMUNITY GOVERNANCE FOR DISASTER RECOVERY AND RESILIENCE: FOUR CASE STUDIES FROM THE PHILIPPINES

## CHAPTER I

### INTRODUCTION

#### A. Rationale

In the aftermath of natural disasters, government agencies usually lead in disaster recovery efforts. Communities, more often than not, are reduced to passive recipients of relief goods. Yet, their roles in post-disaster recovery programs have already been recognized by international disaster organizations like the International Red Cross which, in its Code of Conduct for Disaster Relief, acknowledges the need to “strive to achieve full community participation in relief and rehabilitation programs” (IFRC, 1994).

It is argued in available literature that community-based disaster recovery programs show high levels of success based on the assumption that the more the community owns the plans and the resources involved, the easier it is to implement them (IFRC, 1994). On the other hand, it has also been found that externally-planned and funded plans usually prolong recovery efforts due to the absence or inadequate participation of intended beneficiaries (UNISDR, 2010).

Community participation in disaster recovery has numerous advantages. First, it allows the focus of actions to be on the beneficiaries rather than the outputs. Second, it gives community members the power to control decisions on disaster recovery planning and implementation. Third, plans are aligned to the needs of the beneficiaries (see Barakat, 2003; Barenstein, 2005; Thwala, 2005; and Fallahi, 2007).

However, there are also acknowledged disadvantages in community involvement in post-disaster recovery efforts. Some of these are: (a) difficulties in involving the community in the design and management of the recovery project, (b) difficulties in building mutual trust between agencies and communities, (c) reluctance on the part of governments to give power to low-income groups in the community, and (d) the reduction of community involvement to sweat equity instead of active involvement in decision making (Davidson et al., 2007).

In the case of the Philippines, the involvement of communities or *barangays* in disaster recovery efforts is needed now more than ever. In the *World Risk Report 2013*, the country is ranked third as the most disaster-prone country in the world for having the most number of hazards, damages, and fatalities every year (ADN, 2014, p. 64). This was made more apparent after the devastation caused by Super Typhoon (ST) Yolanda (a.k.a., “Haiyan”) in Region VIII on November 8, 2013. Recovery efforts have been moving at snail pace. Apparently, the government has not yet mastered the techniques of “building up better” from years of dealing with disaster-stricken areas (GDPC, n.d.). Is this true or not? What lessons can be learned from local government units (LGUs) which have been stricken by natural disasters in the past in the area of recovery?

## **B. Research Questions**

From the foregoing, it appears that community involvement has potential in assisting governments “build back better” the lives of disaster victims. However, there are issues and problems that must be investigated in the case of community-based disaster recovery in the Philippines. These are:

- What is the role of community in the disaster recovery process? What roles do various stakeholders (residents, experts, academe, NGOs, local authorities, donor institutions) play in community-led disaster recovery?
- Is community-based disaster recovery affected by exposure to hazards and disasters? Or, does their state of socio-economic development motivate them to prepare to plan for early recovery?
- Given the potential of community involvement in disaster recovery efforts, what policies must be instituted to speed up recovery at the community level and build their resilience?

## **C. Research Objectives**

In general, this research investigates the role of community in the disaster recovery process and in building resilience. Specifically, this research aims to:

1. Find out if a community’s exposure to hazards and disasters has made it better prepared for disaster recovery.
2. Probe if the state of socio-economic development of a community is related to its disaster recovery preparedness.
3. Look into the involvement of community and other stakeholders in disaster recovery.
4. Suggest a policy framework or measures that will recognize communities as partners of the government in disaster recovery and resilience-building efforts.

## **D. Hypotheses**

This research attempts to prove the following hypotheses:

1. The more exposed a community is to hazards and disasters, the greater is its preparedness for disaster recovery.
2. The more socio-economically developed a community is, the more prepared it is for disaster recovery.
3. The more involved a community is in recovery planning and implementation, the faster is its recovery.
4. The more stakeholders involved in disaster recovery, the faster is the recovery of a community.
5. The faster the recovery of a community, the more resilient it becomes.

In all of these five hypotheses, two assumptions are embedded: (1) that these hazards are known to the community officials and residents, and (2) the communities have local disaster recovery plans.

The first hypothesis is tested by relating the number of hazards to the disaster recovery preparations made by the barangays. The indicator for the former is the number of hazards known to the officials and residents, while for the latter it is the local disaster recovery plan.

The second hypothesis is tested by the looking into the state of socio-economic development of the barangays, i.e., economic activities, jobs or livelihood of residents, and their social profile, vis-à-vis their disaster recovery preparations.

The third hypothesis is proven by looking at the participation of the barangays in recovery planning and implementation<sup>1</sup> vis-à-vis their perceived time of recovery as reported by the barangay/city hall officials.

The fourth hypothesis is tested by identifying the other stakeholders and their roles in the disaster recovery process and relating them to the perceived time of recovery of the community as reported by the barangay officials and residents.

The last hypothesis is proven by relating the perceived time of recovery of the community as reported by the barangay/city hall officials to the Disaster-Resilient Community Index (DRCI) of each barangay (see “Chapter II: Methodology” for detailed explanations on the DRCI). For this hypothesis, there is an assumption that communities which have experienced destruction from disasters would prepare local disaster recovery plans so as to prevent similar debilitating effects if and when another hazard strikes in the future. Thus, they will become (more) resilient.

The testing of these hypotheses were done through qualitative analysis even though surveys were conducted. Statistical techniques to establish association or causality cannot be used because the respondents were selected through non-random purposive sampling. Simple averaging and percentage analysis are the only statistical techniques that were utilized.

## **E. Theoretical Framework**

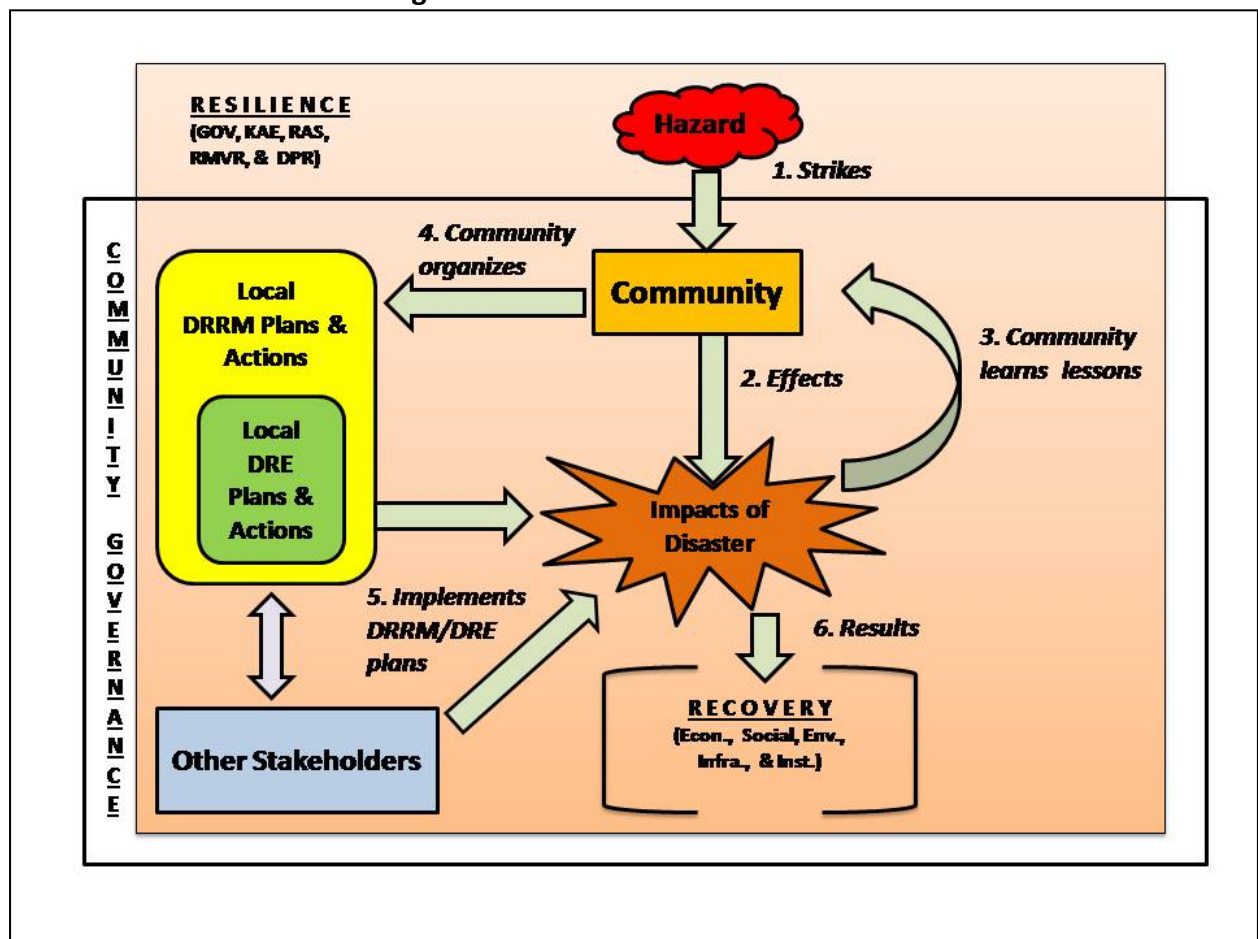
This study revolves on the framework shown in **Figure I.1**. Community governance is the aggregate decision, plans, and actions of the community in response to disasters brought about by a hazard or hazards (IRP, 2010, p. 2). Members or residents of the community get involved in governance by informing co-residents about the dangers of impending hazards, consult with one another and other external stakeholders/actors on how best to deal with the hazards and the disasters that they will bring to the community, make decisions, and implement those decisions through local policies, plans, programs, projects, and activities, which include local disaster recovery plans, strategies, and actions which are normally designed within the framework of the community’s local disaster risk reduction and

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<sup>1</sup> Restore the people’s means of livelihood and continue economic activities and business, restore shelter and other buildings/installations, reconstruct infrastructure and other public utilities, and assist in the physical and psychological rehabilitation of persons who suffered from the effects of disaster (NDRRMC, 2011, p. 56).

management plan (ODPM 2005). More often than not, community members learn their lessons on how to survive future disasters based on experiences from previous ones. These are all incorporated in the local DRRM plans and/or local disaster recovery plans. With the participation of other stakeholders, recovery efforts proceed guided by these plans. These may or may not lead to the recovery of the community, which are usually measured through the restoration of the pre-disaster conditions and building them better in the areas of economic recovery, social recovery, environmental recovery, infrastructural recovery, and institutional recovery (Jordan and Javernick-Will, 2012, p. 2195). With recovery and having learned their lessons, it is assumed that communities will take further recovery measures, along with disaster prevention and mitigation, preparation, and response, to make themselves (more) resilient to future hazards and disasters. The parameters used to measure the resilience of a community are grouped in thematic areas such as governance, knowledge and education, risk assessment, risk management and vulnerability reduction, and disaster response and preparations (Twigg, 2009, p. 1).

Figure I.1 Theoretical Framework



**Abbreviations:** **GOV** – governance; **KAE** – knowledge & education, **RAS** – risk assessment; **RMVR** – risk management & vulnerability reduction; **DPR** – disaster preparedness & response **DRRM** – disaster reduction and management; **DRE** – disaster recovery; **Econ.** – economic; **Env.** – environmental; **Infra.** – infrastructural; **Inst.** – institutional.

**Source:** Created by the author.

## F. Definitions of Terms

This study adopts the following definitions for terms used:

- **Community Governance:** refers to “community level management and decision-making that is undertaken by, with, or on behalf of a community, by a group of community stakeholders” (Totikidis et al., 2005, p. 12).
- **Disaster:** “a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources” (UNISDR, 2007).
- **Hazard:** “a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage” (UNISDR, 2007).
- **Recovery:** “The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors” (UNISDR, 2007). In the *National Disaster Risk Reduction and Management Plan 2011-2028* of the NDRRMC, “recovery and rehabilitation” is used. For brevity, this paper uses “recovery” to cover both, but may use “rehabilitation” in some places to follow the original sources of data or information.
- **Resilience:** “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions” (UNISDR, 2007).

## G. Scope and Limitations

This study focuses on how the communities in four cities in the Philippines have recovered and how they were able to do it. In the process of rebuilding from the destruction of past disasters, it is assumed that they have learned from them and have prepared specifically for disaster recovery, thus, becoming more resilient.

The limitations of this study are the following:

- This research is limited to “natural” hazards and disasters. The primary hazards and disasters that were considered for this study are limited to typhoons or tropical storms and their secondary hazards, i.e., flooding and storm surge. When there are other hazards that affect the communities, they are only briefly mentioned.
- The focus is on “disaster recovery,” hence, the other pillars of disaster risk reduction and management (DRRM), i.e., prevention and mitigation, preparation, and response, are no longer thoroughly discussed.
- Due to time limitations and financial constraints, the community case studies are limited to three barangays per city. These three barangays were all damaged by the hazards in varying degrees (i.e., severely, moderately, and least); hence, it is assumed that they represent the affected barangays in their cities.

- The respondents from the city halls (city government officials or their representatives) and barangays (barangay officials and residents who were disaster victims) were purposively selected because it is assumed that they have wider knowledge compared to either non-officials or non-victims on matters related to disaster risk management and disaster recovery in their localities. Due to the non-randomness in the selection of respondents, the findings may not be representative of the perceptions of barangay residents. Also, more sophisticated and rigorous statistical analysis cannot be undertaken for inference making, or to establish association or causality.

## H. Organization of the Report

This report is divided into five chapters. This introductory chapter is followed by Chapter 2 on methodology. The third chapter summarizes findings from related literature review. The fourth chapter has five parts – four sub-chapters for the four cities and a sub-chapter that summarizes the findings from all cities. Finally, the fifth chapter answers the research questions and suggests areas for policy action and further research.

## CHAPTER II

### METHODOLOGY

#### A. Research Design

This study is an **ex-post evaluation research** (see Bautista, 1998, p. 29) because it tries to determine whether communities have adequately prepared for disaster recovery after experiencing catastrophic disasters. Furthermore, this study attempts to determine if communities have become (more) resilient and the factors that helped them attain such status.

In conducting the evaluation, the **one-shot pre-experimental research design** (see Bautista, 1998, p. 111) was utilized for all communities. Such a design is the most appropriate because there is no pre-assessment of the situations of the communities before the disaster struck. In this study, communities are represented by the four selected cities. The research design of the study is as follows:

City <sub>1</sub>	X <sub>1</sub>	O <sub>1</sub>
City <sub>2</sub>	X <sub>2</sub>	O <sub>2</sub>
City <sub>3</sub>	X <sub>3</sub>	O <sub>3</sub>
City <sub>4</sub>	X <sub>4</sub>	O <sub>4</sub>

Where: City<sub>n</sub> = a particular city  
 X<sub>n</sub> = the disaster that took place in that city  
 O<sub>n</sub> = observations and assessments on the community's recovery  
 and resilience

In concrete terms, the cities, disasters, and observations/assessments are shown in **Table II.1**):

**Table II.1. The One-Shot Pre-Experimental Research Design**

City	Hazard and Disaster ( X )	Observations and Assessments (O <sub>n</sub> )
Tacloban	Super Typhoon “Yolanda” November 8, 2014	Recovery and resilience of the communities
Iligan	Tropical Storm “Sendong” December 16-17, 2011	Recovery and resilience of the communities
Dagupan	Tropical Storm “Pepeng” Sept. 30-Oct. 12, 2009	Recovery and resilience of the communities
Marikina	Tropical Storm “Ondoy” September 24-28, 2009	Recovery and resilience of the communities

The **qualitative descriptive and historical methods** (see Bautista, 1998, pp. 53 and 91) are employed in this study. The descriptive method is appropriate because it attempts to describe the governance systems and practices of the communities of the four cities and the factors that affect them. The historical method is also appropriate because this study narrates the events that affected the recovery and resilience of the communities from the time they were hit by the disasters. On the determination of the state of resilience of the communities through the use of the Disaster-Resilient Community Index (DRCI), simple **descriptive statistical techniques** are utilized such as mode, mean, and percentage analysis.

The **multi-case study approach** (see McNabb, 2008, p. 290) is utilized to summarize the interactions among various stakeholders in the disaster recovery efforts of the communities, by barangay and by city, and the processes that the communities went through to make them resilient.

## **B. Selection of the Subjects of the Study**

The cities included in this study are: Tacloban, Iligan, Dagupan, and Marikina. They were chosen based on three criteria: (1) they had been hit by strong typhoons or tropical storms within the last five years, (2) they are major cities/urban areas, and (3) for geographical representation, there must be representative cities from Luzon, Visayas and Mindanao (refer to **Table II.2**).

**Table II.2. Locations of the Cities and the Hazard and Disaster that they Experienced**

City	Location of the City	Hazard and Disaster
Tacloban	Leyte Island/Leyte Province Visayas	Super Typhoon “Yolanda” November 8, 2014
Iligan	Northern Mindanao Mindanao	Tropical Storm “Sendong” December 16-17, 2011

Dagupan	Pangasinan Province Luzon	Tropical Storm “Pepeng” Sept. 30-Oct. 12, 2009
Marikina	National Capital Region Luzon	Tropical Storm “Ondoy” September 24-28, 2009

In each city, relevant local government officials were interviewed mostly from the city disaster risk reduction and management office, city administrator’s office, city planning and development office, city environment and natural resources office, city social welfare and development office, city engineering office, city health office, city tourism office, and representatives from the local city council. They were interviewed right after the DRCI Questionnaire B was administered to them (see succeeding part for details of the DRCI). Unfortunately, due to busy schedules or unavailability during the scheduled interview, not all were able to answer the questionnaire and be interviewed. A total of 22 local city hall officials from the four cities answered the questionnaire and were interviewed (see **Table II.3**).

**Table II.3. Respondents from the City Governments**

City	No. of Respondents	Offices Represented
Tacloban	6	CDRRMO, CPDO, CENRO, CHO, , CSWDO, CTO (1 each)
Iligan	6	1 CDRRMO, 1 CPDO, 2 CSWDO, 2 anonymous
Dagupan	6	1 CDRRMO, 2 CDRRMO, 1 CSWDO, 1 CTO, 1 CAO,
Marikina	4	CDRRMO, CPDO, CHO , CSWDO, (1 each)
Total	22	N.A.

*Acronyms:* **CDRRMO** – city disaster risk reduction and management office; **CPDO** – city planning and development office; **CENRO** – city environment and natural resources office; **CHO** – city health office, **CSWDO** - city social work and development office; **CTO** – city tourism office; **CAO** – city agriculture office

Three barangays from each city were chosen for the case studies. They were classified as severely damaged, moderately damaged, and least damaged. “Damage” refers to the extent of inundation of the cities by the typhoon/storm, floods, and storm surge; and the havoc and casualties the hazards brought to them (refer to **Table II.4**).

**Table II.4. The Classifications of the Barangays of the Four Cities**

City	Estimated Damaged Sustained			City Government Office which Recommended the Barangays
	Severe	Moderate	Least	
Tacloban	Sagkahan (Brgy. 62-B)	Marasbaras (Brgy. 81)	Abucay (Brgy. 91)	Barangay Affairs Office
Iligan	Hinaplanon	Sta. Filomena	Tubod	City Planning and Dev’t Office
Dagupan	Pantal	Bonuan Gueset	Uno (I)	City DRRM Office

Marikina	Tumana	Malanday	Nangka	City Planning and Dev't Office
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In each barangay, a maximum of 12 respondents were **purposively** chosen to answer the DRCI Questionnaire C and join the focus group discussion (FGD) sessions. They are composed of seven barangay officials and five residents who were victims of the disasters. The barangay officials were chosen because they are the implementers of local disaster risk reduction and management plans (if any). The residents were selected based on the assumption that they could assess the effectiveness of the disaster recovery efforts in their barangays because they were victims in the past. In all 12 barangays, there were no NGOs and were therefore not invited to answer the questionnaire or participate in the FGDs. A total of 126 respondents from all barangays answered the questionnaire and joined the FGDs (for details, see **Table II.5**).

**Table II.5. Number of Respondents by Barangay**

City	Estimated Damaged Sustained			Total by Barangay
	Severe	Moderate	Least	
Tacloban	7	12	7	26
Iligan	13	12	10	35
Dagupan	12	9	10	31
Marikina	10	13	11	34
<b>Total by Barangay Classification</b>	42	46	38	126

### C. Data Collection, Interpretation and Analysis

Two sets of research methods were utilized to gather data for the variables disaster recovery, resilience, and community governance. The first set was used to obtain data on the disaster that hit the LGUs and the affected communities, the disaster recovery approach and activities they implemented, and their experiences and the lessons that they learned from the severest disaster that hit them in the past. This involved **documents review** and **KII** (key informant interview) with city government and barangay officials. The records that were requested from the city hall offices were the following:

- Report on the hazard and disasters that hit the city
- Disaster Risk Reduction & Management Plan
- Local Climate Change Adaptation Plan
- Comprehensive Land Use Plan
- Zoning Ordinances
- Comprehensive Development Plan
- Fund allocations for projects on DRRM and CCA
- Training on DRR/CCA
- Monitoring disaster/environmental hazards

The second set was utilized to measure the resilience of the LGU and affected communities, including community governance in general, and disaster recovery and rehabilitation in particular. This was done with the Disaster-Resilient Community Index (DRCI) formulated by the author using the thematic areas and indicators of Twigg (2009). Briefly, the DRCI is an indexing system that can be used to measure the resilience of communities to disasters in five thematic areas, namely: governance (GOV), knowledge and education (KAE), risk assessment (RAS), risk management and vulnerability reduction (RMVR), and disaster preparedness and response (DPR). Under each thematic area are components of community resilience which are listed in **Table II.6**. These thematic areas and their components were identified by disaster resilience experts and compiled by Twigg (2009) in the guidance note entitled, *“Characteristics of a Disaster-Resilient Community.”*

**Table II.6. Thematic Areas of Disaster-resilient Communities and their Components**

Thematic Area	Components
Governance	<ol style="list-style-type: none"> <li>1. DRR/CCA policy, planning, priorities, and political commitment</li> <li>2. Legal and regulatory systems</li> <li>3. Integration with development policies and planning</li> <li>4. Integration with emergency response and recovery</li> <li>5. Institutional mechanisms, capacities and structures; allocation of responsibilities</li> <li>6. Partnerships</li> <li>7. Accountability and community participation</li> </ol>
Risk Assessment	<ol style="list-style-type: none"> <li>1. Hazards/risk data and assessment</li> <li>2. Vulnerability/capacity and impact data and assessment</li> <li>3. Scientific and technical capacities and innovation</li> </ol>
Knowledge and Education	<ol style="list-style-type: none"> <li>1. Public awareness, knowledge and skills</li> <li>2. Information management and sharing</li> <li>3. Education and training</li> <li>4. Cultures, attitudes, motivation</li> <li>5. Learning and research</li> </ol>
Risk Management and Vulnerability Reduction	<ol style="list-style-type: none"> <li>1. Environmental and natural resource management</li> <li>2. Health and well being</li> <li>3. Sustainable livelihoods</li> <li>4. Social protection</li> <li>5. Financial instruments</li> <li>6. Physical protection; structural and technical measures</li> <li>7. Planning régimes</li> </ol>
Disaster Preparedness and Response	<ol style="list-style-type: none"> <li>1. Organizational capacities and coordination</li> <li>2. Early warning systems</li> <li>3. Preparedness and contingency planning</li> <li>4. Emergency resources and infrastructure</li> <li>5. Emergency response and recovery</li> <li>6. Participation, voluntarism, accountability</li> </ol>

Source: Twigg, 2009, pp. 28-44.

Why use an index? An index is a composite measure of variables, or a way of measuring a construct using more than one data item. An index is an accumulation of scores from a variety of individual items. It allows comparisons of subjects of studies using same variables. The index value is a number from 0 to 1. The DRCI is a composite of the five thematic areas mentioned above. An LGU can obtain the highest possible score of 1.0, which means that it has strong resilience. It is computed using the following equation:

$$\text{DRCI} = \Sigma (\text{GOV}w_1 + \text{RAS}w_2 + \text{KAE}w_3 + \text{RMVR}w_4 + \text{DPR}w_5)$$

where:

DRCI	=	disaster-resilient community index
GOV	=	index value in governance
KAE	=	index value in knowledge and education
RAS	=	index value in risk assessment
RMVR	=	index value in risk management and vulnerability reduction
DPR	=	index value in disaster preparedness and response
$W_n$	=	weight assigned based on the number of indicators for each thematic area

The DRCI has three checklists, i.e., Questionnaire A, Questionnaire B, and Questionnaire C. Questionnaires A and B were written in English while Questionnaire C was translated (from English) to Filipino (used in Marikina, Dagupan, and Tacloban) and Visaya (used in Iligan) (see **Annexes II.A to II.C.2** for sample copies). Each has its own non-duplicating unique set of questions.

Questionnaire A is the author's checklist which is meant to rate the DRRM and disaster recovery plans and implementation in the city and barangays based on the documents that were reviewed. Documents were gathered from reliable sources, i.e., NDCC/NDRRMC, LGUs, and most-affected barangays, to get basic data and information on the hazard that hit the LGUs, the disaster that took place, the casualties and damages, the disaster recovery and rehabilitation efforts (i.e., programs, plans, and activities), and the costs and durations of the latter.

Questionnaire B, on the other hand, is the checklist for the city hall officials to answer. It was also used as the basis for the KII. It was meant to get information on how their cities and barangays were able to recover from the devastation caused by the most severe hazard and disaster that occurred in their jurisdictions. They were also asked about the roles of the various sectors in disaster recovery efforts, the extent of involvement of residents on disaster recovery, and the issues, problems, and challenges of disaster recovery that they experienced. This questionnaire was administered to the 22 city government officials.

Questionnaire C is meant to allow the barangay officials and residents rate the resilience of their barangays using the five thematic areas (GOV, KAE, RAS, RMVR, and DPR) and 199 indicators/questions of Twigg (2009, pp. 28-44). A total of 126 respondents from the 12 barangays answered this questionnaire. This questionnaire was used as the basis for the conduct of the FGDs in each barangay. For the steps in administering the three

questionnaires, refer to **Annex II.D**. For the computations of the DRCIs for each barangay, see **Annexes II.E.1 to II.E.4**.

## **CHAPTER III**

### **REVIEW OF RELATED LITERATURE**

#### **A. Introduction**

This review discusses the terrain of existing cumulative knowledge on the following concepts, their indicators, and their interrelationships: disaster recovery, resilience, community, community involvement, and community governance. The first part shows how communities get involved in bringing back normalcy in the aftermath of a disaster. Empirical evidence of community governance for disaster recovery in several countries, including the Philippines, is narrated and lessons are derived. The second part compares and contrasts the various indices on disaster recovery and resilience. The last part points out the gaps in knowledge and practice from the literature reviewed.

#### **B. Community Governance for Disaster Recovery and Resilience**

##### **B.1. Disaster Recovery and Resilience**

Disaster recovery and resilience are two related concepts in disaster risk reduction (DRR). The latter is a broader concept which includes the former. According to the UNISDR (2007), disaster recovery refers to “the restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster and risk factors.” A community is said to be resilient when it has the ability to recover from the disaster that hit it. The tasks of recovery begin soon after the emergency phase has ended. It should be anchored on pre-existing policies and strategies that assign roles and functions to DRRM institutions and allows public participation. Recovery is not just going back to the original pre-disaster state but being able to “build back better” to be resilient in the future.

Resilience means the ability of the community to “spring back” from a shock. According to the UNISDR (2007), it is “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.” A community is said to be resilient from potential hazard events if it has the necessary resources and institutions to respond both prior to and during times of need.

##### **B.2. Community and Community Involvement**

“Communities” are typically defined either geographically or socially. Geographically speaking, a community “is recognized by attributes tied to physical appearance or location, such as natural boundaries, a recognized history, demographic composition, or the presence of certain industries or organizations” (CARE USA, 2005, p. 8) On the other hand, socially

speaking, a community is classified in terms of “people who share common social attributes and interests, such as language, customs, class, or ethnicity, regardless of geographical proximity” (CARE USA, 2005, p. 8). For purposes of this research, geo-administrative-political boundaries define the meaning of “community.” “Geo-administrative political boundaries” refer to the division of political and administrative units of the country from the national level up to the local levels, i.e., regional units, provincial, city/municipality, barangay, and *sitio* taking into consideration their geographical location. Not to be confused, when we speak about “communities” in the study, we are referring to either barangay or sitio.

In current literature (CARE USA, 2005; Clarke and Stewart, 1998; IRP, 2010; McKieran et al., 2000; ODPM, 2005; and Totikidis et al., 2005), “community involvement” is made synonymous with “community participation,” hence, both are used interchangeably. Both are seen as occurring along a continuum, according to the degree of control and decision-making that community members have, i.e., co-option, compliance, consultation, cooperation, co-learning, and collective action. The movement from co-option to collective action is presumed to lead to community ownership of the problem and the corresponding sustainable action. The reverse movement, on the other hand, leads to non-ownership and unsustainable action (CARE USA, 2005, p. 9).

For this research, “community involvement” is defined as the “contributions of an individual or individuals to the community in which they reside. This may involve volunteer work, promotion of social causes, or donations to local charities” (CARE USA, 2005, p. 9).

### **B.3. Community Involvement in the Context of Community Governance**

Community involvement is embedded within “community governance” because the latter deals with community management and decision-making (Totikidis et al., 2005) where the former operates. Within the context of disaster recovery, community governance is associated with participation and responsiveness of affected communities in recovery operations (IRP, 2010, p. 2).

The nexus between community involvement and community governance, within the disaster recovery context, can be better understood:

- When community is involved in the development of local policies which signifies that community governance spreads decision-making among local organizations (Jalali, 2002 and Post, 1997);
- When “people are able to articulate strategies for recovery and reconstruction which respond to their real needs through community-based organizations” (Maskrey, 1989, p. 84); and

When looking for funding, community involvement is usually considered as an important component (Davidson et al., 2007).

There are six principles of community governance according to Clarke and Steward (1998) which may prove useful for disaster recovery. These are:

- The concern of the local authority should extend beyond the services provided to the overall welfare of the area;
- The local authority's role in community governance is only justified if it is close to and empowers the communities within and the citizens which constitute them;
- The local authority must recognize the contributions of other organizations – public, private, and voluntary – and see its tasks as enabling (not controlling);
- The local authority should ensure that the whole range of resources in the community is used to the full for the good of its area;
- To make best use of those resources, the local authorities will need to review rigorously how needs are best met and to be prepared to act in many different ways; and
- In showing leadership, the local authority must seek to reconcile, to balance, and to judge the diversity of use and interests.

When community gets involved in decision-making and there is collaboration among various sectors and stakeholders, horizontally and vertically, there is a perceived notion of community governance (McKieran et al., 2000). There is also an implied recognition that complex community problems cannot be solved by any one person or sector alone. Thus, there is a need for collaboration. "Collaboration" happens "when local government or government agency work together with communities or neighbourhoods to improve disaster recovery operations" (IRP, 2010, p. 7).

#### **B.4. Cases of Community Governance for Disaster Recovery**

Empirically speaking, there are already documented cases of community governance for disaster recovery. A UNDP study (2007) drew lessons and principles of functioning community governance from the experiences of communities in India, Indonesia, the Maldives, Thailand, and Sri Lanka which were affected by the 2004 Indian Ocean Tsunami (see UNDP, 2007 for details). In summary, the study found that the conventional approaches in these communities failed due to the following factors:

- Response to disasters are still dominated by humanitarian assistance and emergency management which does not address the underlying causes that resulted in the disaster, nor does it automatically stimulate rapid recovery.
- The long time spans required for the necessary impact studies, the design of programs and projects, the negotiation of multilateral loans for reconstruction and the timeframe for the approval of development funding generates a *gap* between the ending of humanitarian assistance and the initiation of reconstruction programming.
- Similarly, during the *gap*, people begin to recover spontaneously, rebuilding and reproducing conditions even more risk-prone than those that existed before the disaster occurred.
- Reconstruction is frequently conceptualized and designed to return a country to the conditions of the *normal* development it enjoyed before a disaster occurred.
- In some cases, the longer-term reconstruction never gets off the ground, or is considerably delayed because of the lack of execution capacity in the immediate

aftermath of a disaster, political obstacles to loan agreements, a lack of donor interest in funding longer-term recovery and reconstruction, or the outbreak of new crises. This prolongs the *gap* until the next disaster occurs.

- Support to recovery by government organizations, international agencies, NGOs and others is often done through isolated and uncoordinated interventions, leading to a duplication of efforts in some areas, gaps in others, and again a failure to factor in risk reduction considerations.
- Too often, societies affected by a major disaster tend to seek rapid and visible solutions to restore normalcy, frequently at the cost of more sustainable and durable solutions that truly address the root causes of the disaster“ (UNDP, 2007, pp. 2-3).
- These lessons led experts to formulate principles for “sustainable recovery” that shift focus “from saving lives to restoring livelihoods, effectively preventing the recurrence of disasters and harnessing conditions for future development” (UNDP, 2007, p. 3).

A more recent study was conducted by the International Recovery Platform (IRP) (2010) with four case studies: Yogyakarta, Indonesia; Gujarat, India; Sichuan, China; and Kobe, Japan. The four cases reveal disparate recovery phases and community governance models. The Yogyakarta model is anchored on governance by focusing on social bonds (i.e., *gotong royong*), and neighborhood relationships. The Gujarat model, on the other hand, is built on functional *setus*. A *setu* is a facilitation center established to serve as a link between the community, government, administration, and NGOs for a defined geographical cluster of 15-20 villages. The Sichuan model is one which is a government-led cooperative for community recovery and development in the rural areas. And the Kobe model is a citizen-led governance. The study concludes that in community governance for disaster recovery, the following are the imperatives:

- Mechanisms should respond to the community’s needs during a particular recovery phase by changing its missions and revamping its systems;
- Stakeholders with different backgrounds are expected to adhere to consensus building and decision making for resource mobilization and distribution;
- Use local indigenous wisdom and highly specialized knowledge and expertise as well as appropriate human resources so that optimum problem solving could be facilitated; and
- Community governance should be geared towards both self-governance and open model which connects with outside agencies (IRP, 2010, p. 81).

One case study on disaster recovery planning in Guinsaugon, Southern Leyte, Philippines, was published by IRP in 2011. It was pointed out that recovery was a collaborative effort among the communities, NGOs, and the local government. However, it was noted that after the deluge of humanitarian assistance from the international community right after the landslide of February 2006 waned, NGOs were the ones which were left behind to help the community. In the process, these NGOs shifted their focus – from emergency response to disaster recovery.

A recent book on community-based disaster management entitled, *Building Disaster-Resilient Communities* (2010) illustrates the various roles of communities in strengthening their defences against disasters and their efforts to recover and to be resilient. There are nine case studies drawn from different parts of the Philippines – five from provinces in Luzon (Albay, Camarines Sur, Marinduque, Quezon, and Sorsogon), two from the Visayas (Cebu City and Iloilo), and one from Mindanao (Zamboanga-Sibugay). The studies focused separately on issues such as early warning system, flood risk reduction, mainstreaming of disaster risk reduction (DRR) and climate change adaptation (CCA) to local plans and budget, social protection, and alternative sustainable livelihood generation.

For brevity, only the significant and relevant findings are discussed here. One important finding, as pointed out by one of the authors, underscores the need for community development and community organizing because “most, if not all of the barangays or communities are burdened by historical political-economic systems, and structures of poverty and governance that often overwhelm efforts of development and transformation” (Pagaduan, 2010, p. 238 in Polotan-dela Cruz et al., 2010).

The case studies reveal that communities which are usually under-staffed and ill-equipped acquiesce to link up with national government agencies, civil society organizations, and their peers to be able to serve their constituents better. In the case of the Municipalities of Infanta and Nakar, the early warning device installed to measure water levels in flood-prone Agos River were set up with support from national government agencies (Philippine Atmospheric, Geophysical, and Astronomical Services Administration, or PAGASA), and academic institutions (i.e., University of the Philippines, and Ateneo de Manila University). It had both the elements of indigenous system and high-technology communication (see Garcia, 2010, pp. 9-22 in Polotan-dela Cruz et al., 2010). Thus, communities cannot, on their own, do the monitoring of river upswelling because the residents must learn how to interpret the scientific and technical data. Clearly, this example illustrates “co-management” – that communities need government technical/expertise guidance on scientific and technical matters that are beyond their competence. In the other case studies that delve into mainstreaming CCA and DRR, establishing alternative livelihoods, providing social protection, communities were either assisted by civil society organizations, local governments, or national government agencies (see Magalang, 2010; Balang, Jr., 2010; Tanchuling, 2010; Jimenez-Tan, 2010; and Magcuro, 2010, all in Polotan-dela Cruz et al., 2010).

Finally, in the case studies on mainstreaming CCA and DRR, local planning and budgeting, establishing alternative livelihoods, and providing social protection to potential disaster victims, “participatory governance” was identified as an underlying success factor (see Formilleza, 2010; Bawagan, 2010; Tanchuling, 2010; Jimenez-Tan, 2010; and Magcuro, 2010, all in Polotan-dela Cruz et al., 2010). The over-all message of these case studies is: making members of the community acknowledge the problem, identify solutions, and oversee the implementation of projects and activities is an effective way by making them own the problem.

## C. Indicators and Indices for Community Disaster Recovery and Resilience

### C.1. Indicators

In a regime of collaboration in the context of disaster recovery, the “inherent capabilities of local communities to reduce the effects” (Orencio and Fujii, 2013) of catastrophes ought to be enhanced. Consequently, an index for disaster-resilience and recovery must be established so that communities will be able to “recognize their resilience strengths and opportunities for improvement” (Ewing and Synolakis, 2010).

The search for scholarly literature on “disaster recovery” from online databases and academic libraries yielded a few indicators. Most of the literature on it is about recovering computer databases from disasters. It even has a journal, i.e., *Disaster Recovery Journal*. This observation is supported by the findings on the same topic by authors Jordan and Javernick-Will (2012). In their content study of 202 articles from four leading journals, i.e., *Natural Hazards Review*, *The International Journal of Mass Emergencies and Disasters*, and *Earthquake Spectra*, they found that the majority of these articles did not cite any specific indicators of recovery. For those which did, only about 20% to as high as 30% identified specific indicators (22 total indicators). It was also found that non-citing articles did not discuss the topic of recovery at all, or did not operationalize it (Jordan and Javernick-Will, 2012, p. 2193). For those articles which identified specific disaster recovery indicators from various disciplines (i.e., Art and Science, Social Science, Engineering, Economics, inter-disciplinary, and practitioner), the most common cited are (with 10% and above citations): housing (19%), facilities and lifelines (18%), transportation (12%), and population return (11%). The rest (with less than 10% citations) are in **Table III.1**.

**Table III.1. Identified Indicators of Disaster Recovery from Several Journal Articles**

Dimension	Indicators
Social	Emotional Equity Population return Quality of life Social services
Economic	Employment GNP Government revenue Income Housing Businesses Standard of living
Environment	Air quality Erosion Land degradation Sustainability Water quality
Infrastructure	Debris removal Housing

Dimension	Indicators
	Facilities and lifelines Transportation Risk reduction

Source: Jordan and Javernick-Will, 2012, p. 2195.

For this literature review, only two articles were found that provide indicators for nature-related disasters (Ewing and Synolakis, 2010 and Jordan and Javernick-Will, 2012). Both do not have an indexing system for disaster recovery.

Ewing and Synolakis (2010) briefly mention major community elements that are important both for minimizing vulnerability and hastening recovery for its study of coastal community areas in the USA that were hit by disasters, i.e., Galveston, Texas from Hurricane Ike, American Samoa from the 2009 Samoan tsunami, and Pacifica, California from the 2009/2010 winter storms. Their importance was just mentioned and there was no attempt to measure them quantitatively in the case studies. The community recovery elements they enumerated are:

- Food and agriculture – to feed the victims.
- Water – for survival and hygiene purposes.
- Communications – notify people where to go for food and water, and provide information on missing persons or direct rescue efforts.
- Transportation – food can readily be brought into the affected areas.
- Housing – people generally will not address long-term recovery until they have shelter; and, even though housing is not a community service, it can be a community responsibility through land use planning, building codes and issuance of building permits, and it has been included in the core elements.
- Energy or power – power can run refrigeration units to keep perishable foods safe or pumps to remove water from low-lying areas.
- Emergency services - immediate health care and, if transportation systems are available, can get people to hospitals and medical centers.

In the end, the authors developed a Community Resilience Index (CRI) which used four other sets of factors different from the disaster recovery factors mentioned above. For details, see section B of this part.

Compared with those of “recovery,” the indicators for “resilience” are aplenty and well operationalized. In the same article by Jordan and Javernick-Will (2012), out of the 202 articles reviewed, 73% up to 96% cited at least one factor in resilience. The study recorded 29 resilience indicators. Out of this total, the most commonly cited are: attachment to place (19%), education (18%), gender (12%), and no vehicles (11%). The rest of the indicators (less than 10% citations) are shown in **Table III.2**.

**Table III.2. Identified Indicators of Resilience from Several Journal Articles**

<b>Dimension</b>	<b>Indicators</b>
Economic	Poverty Business diversity Insurance
Infrastructure	Urbanization Protective structures Construction method Construction quality Maintenance Redundancies
Institutional	Access to government resources Agency commitment Building codes Emergency preparedness Environmental degradation Land use Previous experience Recovery planning
Social	Age distribution Attachment to place Education Gender Disabled Health services Minority populations No vehicles Non-English speakers Social networks
Recovery strategy	Access to information Citizen participation NGO presence Recovery funds Recovery goals

*Source:* Jordan and Javernick-Will, 2012, p. 2197.

## **C.2. Indices**

As earlier stated, the indicators for “disaster recovery” are not yet fully developed as compared to “resilience.” Hence, the author was not able to find any indexing system for the former. Therefore, this part reviews those for “resilience.”

A number of studies propose indices of disaster resilience (Joerin et al., 2012; Mayunga, 2007; and Razafindrabe et al., 2009). Most of these researches built their proposals from the communities’ experiences of natural disasters. One of these studies is that of Joerin et al. (2012). Their research attempts to determine the level of resilience, which the authors defines as the “community’s ability to absorb, manage and bounce back after a disaster”

(Joerin et al., 2012, p. 45) in two urban communities in Chennai, India. These communities were selected on the basis of their exposure to cyclones and inundations from river and sea waters. The authors hypothesize that: (1) the households in these communities are less resilient because they are located in the vicinity of rivers and canals, and (2) that these households learn from a climate-related disaster after having been affected, but their resilience is never enhanced. To test these hypotheses, the authors conducted household surveys and interviews.

In determining resilience, the authors use a Climate-related Disaster Community Resilience Framework (CDCRF) consisting of physical, social, and economic indices. The CDCRF aims to understand quantitatively whether or not affected households take action (adaptive capacity) to enhance their resilience as a reaction to experienced disasters. The indicators for the physical index are electricity, water, sanitation, and solid waste. The indicators of the social index, meanwhile, are health, education and awareness, and social capital and preparedness. Finally, the indicators of economic index are income and employment situation, household assets, and finance and savings.

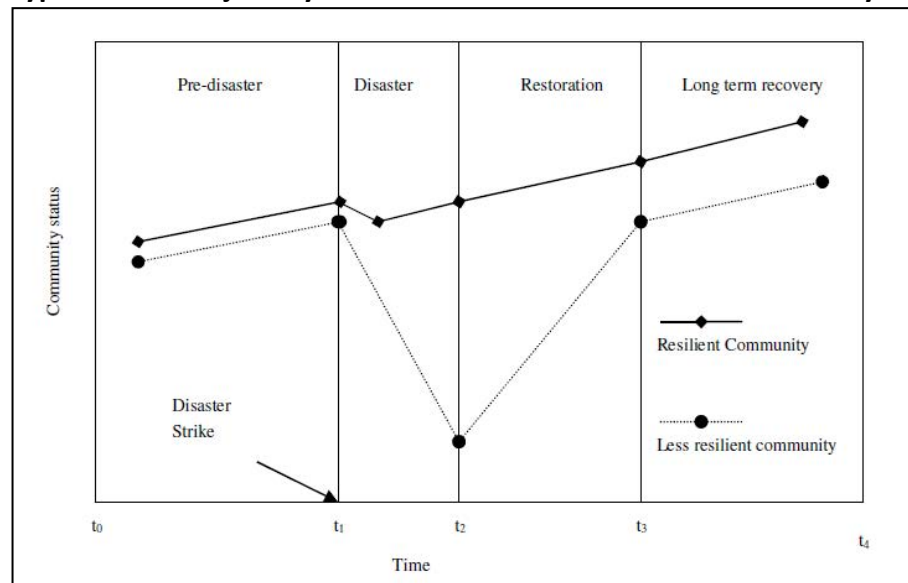
Using Pearson correlation, the study reveals that the experience of a disaster is largely seen by the residents in the form of damaged houses. This means that the resident will say that he experienced a disaster only if his house has been damaged.

The authors proceed by using two-sided t-tests to probe the indices and indicators of resilience. As to the physical index, the authors found that residents who had disaster experiences are not as resilient as those who did not claim damages to their houses arising from natural hazards. In particular, those who had disaster experiences suffer more power cuts, and have lower provision of water storage tanks. The garbage is also collected less frequently. With regard to social resilience, the results show that residents who had experienced disasters have poorer health, are less educated, and less prepared to face natural disasters. As to economic resilience, the research reveals that households who had experienced disasters have an unstable source of income, less access to the internet, and fewer savings than those who did not experience climate-related disasters.

The authors summarize that households with disaster experience, or those with damaged houses, are less resilient in all the indices compared to residents who have not been affected by climate-related disasters. The authors confirm their first hypothesis, and reject the second.

Mayunga (2007), on the other hand, attempts to establish a “conceptual and methodological framework for the analysis, measurement, and mapping of community disaster resilience.” The author defines community disaster resilience as the “capacity or ability of a community to anticipate, prepare for, respond to, and recover quickly from impacts of disaster.” The author, then, depicts this with the use of a hypothetical trajectory of two communities: (1) a more resilient community (solid line), and (2) a less resilient community (dotted line) as shown in **Figure III.1**.

**Figure III.1. A Hypothetical Trajectory of Resilient and Less Resilient Community**



Source: Mayunga, 2007, p. 5.

According to Mayunga, communities go through four sequential phases of change when dealing with disasters, namely: pre-disaster, disaster, restoration, and long-term recovery. According to the author, the more resilient community will often experience less disaster impacts, while the less resilient community will experience significant disaster impacts, and hence greater fluctuation. Moreover, the less resilient community will take longer to recover to normal functioning. Useful as it is in determining the locale of a community in the four phases, unfortunately it does not provide guidelines on how communities should react in all four phases.

The proposed methodological framework for the analysis of community disaster resilience uses a capital-based approach. This approach includes five major capitals: social, economic, physical, human, and natural. Social capital is comprised of trust, norms, and network indicators. Economic capital consists of income, savings, and investment indicators. Human capital, meanwhile, is composed of education, knowledge, and information indicators. Physical capital is indicated by housing, public facilities, and business or industry. Finally, natural capital is consisted of resource locks, land and water, and ecosystem indicators.

The author uses the following mathematical formula for Combining indicators in order to come up with individual indices for each form of capital:

$$Y_1 = \sum (X_1w_1 + X_2w_2 + X_3w_3 + \dots \dots \dots X_nw_n)$$

where:  $Y_1$  = Capital index  
 $X$  = Indicator  
 $w$  = Weight  
 $n$  = Number of indicators or weight considered  
 $i$  = indicator number.

To generate the overall community disaster index (CDR<sub>i</sub>), the author suggests the following formula:

$$CDR_i = \frac{\sum (w_1 SC_i + w_2 EC_i + w_3 HC_i + w_4 PC_i + w_5 NC_i)}{n}$$

where:

- CDR<sub>i</sub> = Overall community resilience disaster resilience index
- SC<sub>i</sub> = Social capital index
- EC<sub>i</sub> = Economic capital index
- HC<sub>i</sub> = Human capital index
- PC<sub>i</sub> = Physical capital index
- NC<sub>i</sub> = Natural capital index
- w = weight
- n = Number of capital domains
- i = Domain number

The author recognizes that “establishing the weights and construction of indices are still methodologically very complex processes. Thus, more research is needed to establish much more sophisticated techniques that can address this challenge.” Further, in this study, the proposed mathematical formulas are yet to be applied in actual cases.

Jordan and Javernick-Will (2012) examine articles from 2000 to 2010 in four disaster-focused journals to find out which indicators these journals frequently use in measuring community resilience and recovery. Parenthetically, these authors define “resilience” as the ability to withstand “disaster impacts as well as to cope with those impacts and recover quickly.” Citing Smith and Wenger (2006), the authors define “recovery” as the “differential process of restoring, rebuilding, and reshaping the physical, social, economic, and natural environment through pre-event planning and post-event actions.”

The recovery and resilience-related journals investigated by the authors cover the categories of arts and sciences, economics, social sciences, engineering, interdisciplinary, and practitioner. In these categories, the authors group the resilience indicators among economic, infrastructure, institutional, social, and recovery strategy. They categorize the recovery indicators among social, economic, environment, and infrastructure.

As to recovery, the authors find that the articles frequently discuss the infrastructure indicators such as restoration of public facilities and lifelines and housing repairs. Based on author and discipline in the examined materials, housing recovery is commonly cited across all categories. Likewise, economic indicators such as employment rates, income levels, government revenue received, and number of businesses, are a point of interest in the examined journals. Finally, the study reveals that practitioners in both governmental and non-governmental agencies use infrastructure repair, sustainability efforts, and economic recovery as indicators.

As to resilience, almost all categories of articles frequently cite emergency preparedness and poverty as indicators. Engineering-related journals, meanwhile, commonly mention construction method, construction quality, building codes, and land use.

The authors suggest that expert opinion is needed “to validate and rank the importance of the indicators from the content analysis to provide the most important indicators for cross-comparative studies of disaster recovery.”

Ewing and Synolakis (2010), meanwhile, define “resilience” as a term which “encompasses both the ability to continue to function during and after some disruptive or disastrous event, and the ability to recover after the event.” They investigate resilience by testing a Community Resilience Index (CRI) on community natural disasters at Galveston, Texas from Hurricane Ike; at American Samoa from the 2009 Samoan tsunami; and at Pacifica, California from the 2009/2010 winter storms. CRI has the following indicators: local susceptibility to hazards, exposure, availability of safe substitute /redundant services, and recovery time.

Local susceptibility to hazards uses the Coastal Vulnerability Index (CVI) which was developed by the US Geological Survey. CVI is used in determining geomorphology, coastal slope, relative sea level change, shoreline erosion/accretion, etc. Exposure, on the other hand, indicates the areas that are prone to inundation, erosion or subsidence. Redundancy provides for alternative community functions, such as inland roads, serving as alternative ways to coastal roads. Recovery time means the period within which community facilities must be redeployed.

In their application of the CRI in three disaster-stricken communities in Texas, American Samoa, and California, the authors find that all of these communities have a high or very high susceptibility to hazards. But these communities differ in the level of resilience because of the disparities in exposure of facilities to hazards.

The authors, however, concede that the CRI does not capture individual community resilience and that it does not provide any “information on the costs, either in terms of time and resources, or benefits from various resilience steps.”

It must be noted, too, that the authors mention transportation, power, water, communications, emergency services, and housing as indicators of resilience. These indicators “form the core of essential community services with which other community needs can be quickly established.” Moreover, it is stated that these indicators are “normally expected to be provided at a community scale.”

As the authors state, food and agriculture “are clearly important at all scales of resilience.” A viable transportation system is important so that food can be easily carried into the affected areas. Power, meanwhile, is important to run refrigeration units and pump flood waters. The significance of a communication system is that it notifies people where to go for food and water and for dissemination of information related to rescue efforts. Emergency services pertain to provision of health care and getting people to hospitals and medical centers. These indicators, however, are not tested as the study focused on the use of the CRI.

Razafindrabe et al. (2009) focus on determining the level of climate disaster resilience of select coastal urban cities in Asia using a “Climate Disaster Resilience Index.” Two of the

Asian cities included in the study are San Fernando City, La Union, and Iloilo City, Iloilo, both located in the Philippines.

In assessing the level of climate disaster resilience of these cities, the research study is guided by its definition of resilience, which is: “(1) the capacity to absorb stress or destructive forces through resistance or adaptation, (2) the capacity to manage or maintain certain basic functions and structures during disastrous events, and (3) the capacity to recover or ‘bounce back’ after an event.” The study is limited to climate-induced disasters such as cyclone, flood, heat wave, drought, and heavy rainfall that causes landslides.

The index used to measure resilience in this study is composed of natural, physical, social, economic, and institutional. The physical index consists of indicators such as electricity, water supply, sanitation, solid waste disposal, internal road network, housing and land use, community assets, warning system, and evacuation. The social index, meanwhile, is indicated by health status, education and awareness, and social capital. The economic index is composed of indicators such as income employment, households’ assets, access to financial services, savings and insurance, and budget and subsidy indicators. The institutional index has internal institutions and development plan, effectiveness of internal institutions, external institutions and networks, institutional collaboration and coordination as its indicators. Lastly, the natural index is indicated by hazard intensity and hazard frequency.

Each of these indicators is subjectively given weight by the concerned city officials on the basis of their perception of the vulnerability of such indicators when compared with each other.

In their findings, the authors reveal that Iloilo City’s physical, economic, and social capital indices are fragile, threatening its community resilience in natural disasters. In particular, the authors took note of the poor water supply, warning and evacuation system, budget and subsidy, and insurance and savings.

The research study also shows that San Fernando City’s community resilience in climate-induced disasters is threatened because of poor rating in several resilience indicators. Specifically, the study reveals that San Fernando City has a poor warning and evacuation system, sanitation and solid waste disposal system, budget and subsidy provisions, and insurance and savings indicators.

Meanwhile, the research recognizes the need to improve the data gathering methodology which is based only on survey questionnaires. Moreover, it is suggested that the study be used in the neighborhood level rather than in the level of the local government of cities to capture the effects of household or individual activities.

Berke and Campanella (2006) focus on planning for resilience after the occurrence of a natural disaster. In their study, the authors argue that: (1) states and federal governments rarely encourage community planning for resilience, (2) the New Urban development codes “involve the lack of attention to conservation and hazardous areas,” (3) there is a lack of

citizen participation and involvement in plans relative to evacuation in some areas in the United States.

Thus, the authors suggest that: (1) federal policy should focus on performance-based environmental risk reduction targets, (2) emphasis must be given to land use planning in hazardous areas; (3) the local governments should pay a bigger share in the infrastructure costs by way of insurance, and (4) citizen participation in disaster planning must be taken into consideration more seriously.

It must be noted that this study does not directly provide a set of indices that can measure community resilience. The research focuses on review of existing literature on planning for community resilience and the authors' reflections on these. Nonetheless, the authors mentioned in the course of their discussion that recovery issues after a natural disaster include transportation, housing, land use, and environment.

Orencio and Fujii (2012) propose an index for determining resilience in disasters at the local level. Resilience in this study is being defined as "the system's ability to adapt, reorganize, undergo change, and still maintain its basic structure, function, identity and feedbacks."

To investigate the level of resilience of a community, the research followed a "Delphi technique, wherein 20 decision makers in Baler, Aurora, the Philippines identified criteria and elements that can be used to reduce the vulnerability of coastal communities using paired comparisons for the Analytic Hierarchy Process (AHP)." The authors further stated that "in this study, the AHP was used to determine the criteria and elements that best described a disaster-resilient community at the local level by subjecting the components of a risk management and vulnerability reduction system in the Philippines in a process of prioritization."

In the process of analysis, the authors use seven indices to determine resilience. These include Environmental and Natural Resource Management, Human Health and Well Being, Sustainable Livelihoods, Social Protection, Financial Instruments, Physical Protection and Structural and Technical Measures, Planning Regimes.

The authors reveal that Environmental and Natural Resource Management is the most important index for determining whether or not the subject community is resilient with regard to disasters. Sustainable Livelihoods and Social Protection Indices follow as the most significant determinant of disaster-resilience. The Planning Regimes comes next after the aforementioned indices.

The study provides that "these criteria and their elements represented the local-level outcome indicators of the composite index for a disaster-resilient community, which was measured using a weighted linear average (WLC) approach to both outcome and process indicators. The index could be used by local governments as a tool to facilitate meaningful disaster-risk reduction management."

## **D. Gaps in Knowledge and Practice**

This part summarizes the gaps in knowledge and practice identified from the literature reviewed. The first part is about community governance for disaster recovery. The second delves into the strengths and weaknesses of indices used to measure disaster recovery and resilience.

### **D.1. On “community governance for disaster recovery and resilience”**

There are still gaps in knowledge about the role of community in disaster recovery and in building resilience. There is no common framework yet on community involvement that would help academics and practitioners situate the niche of communities in the disaster recovery efforts. Each country case study enumerated above has shown varying degrees of community involvement.

There is no definitive agreement yet if community involvement can be viewed in a situational approach or a universal approach. In cases where a community has been wiped out by a hazard or disaster, or pre-existing conditions (e.g., captive area by rebels like in Sri Lanka) to prevent it from being involved, what substitute governance arrangements can be put in place?

### **D.2. On “disaster recovery and resilience indicators and indices”**

It can be seen that the research studies cited above dwell more on providing and testing indices and indicators of resilience than recovery. In these studies, only those of Jordan and Javernick-Will (2012) and Berke and Campanella (2006) discuss recovery indicators which, however, were not tested in actual cases.

Meanwhile, although there are indicators in some studies which may properly be considered as recovery indicators, they are nonetheless presented as resilience indicators. For example, in one study, food and water, communications, and transportations, energy and power, housing, and emergency services are mentioned as indicators of recovery and resilience.

Nonetheless, it can be said that the cited research studies use indices or indicators that are common across most of these papers. In particular, it can be argued that the following items are frequently discussed by these papers: exposure and susceptibility to hazards or natural or environmental indicators, infrastructure or physical indicators, economic indicators, and social indicators. It must be noted, however, that these indicators were operationalized and tested using different qualitative and quantitative methods.

This research will identify the roles of communities in, and the governance systems suitable for pre- and post-disaster recovery periods, and in fostering resilience. Equally important and a pre-requisite for this, this study will aim to determine the recovery and resilience indicators and indexing systems appropriate for the Philippines that would help local leaders measure their ability to rise from the aftermath of disasters, or in the new parlance in DRRM, “build back better.”

## CHAPTER IV

### FINDINGS AND ANALYSES

#### A. Introduction

This chapter consists of five sub-chapters for the studies done on the barangays in Tacloban City, Iligan City, Dagupan City, and Marikina City. They are arranged according to how recently the disaster occurred. The fifth and last sub-chapter is the integration of findings and analyses for all four cases.

Each sub-chapter of the four case studies is divided into three parts. The first part discusses the brief profile of the city, the destruction caused by the disaster, the recovery and rehabilitation efforts in the city, and an overview of the state of recovery in the city. The second part of the case study has four sections: (1) profile of the barangays and the destruction caused by the hazard/disaster, (2) explanation of the vulnerabilities of the barangays, (3) the role of the barangays and other stakeholders in disaster recovery efforts, and (4) assessment of the resilience of the barangays measured by the Disaster-Resilient Community Index. The last part summarizes the findings and analyses for each case.

#### SUB-CHAPTER IV.A

##### CASE STUDY ON TACLOBAN CITY

#### A. Context and the Disaster

##### A.1. Profile of Tacloban City

**Table IV.A.1. Overview of the Profile of Tacloban City**

Item	Description
Geographical Location	Northeastern part of the island of Leyte in the Eastern Visayas Region, 1 <sup>st</sup> district of Leyte
Year of Establishment	Founded in circa 1770; December 18, 2009 (as a highly urbanized city)
Income Classification	1 <sup>st</sup> class highly-urbanized city
Political Subdivision	138 barangays divided into 10 political sub-divisions or areas
Land Area	201.72 km <sup>2</sup> (77.88 sq mi)
Elevation	2 meters (7 feet) – 21 meters (29 feet)
Climate	Types II and IV with its characteristic of having no distinct dry season and no pronounced period for maximum rainfall
Natural Hazards	Earthquakes, liquefaction, coastal and slope erosion, landslides, floods, storm surges and tsunamis
Population (2010)	221,174
Population Density	1,100/km <sup>2</sup> (2,800/sq mi)
Annual Population Growth Rate	2.73%
Society (ethnic group,	Majority are Waray-waray people and Christians

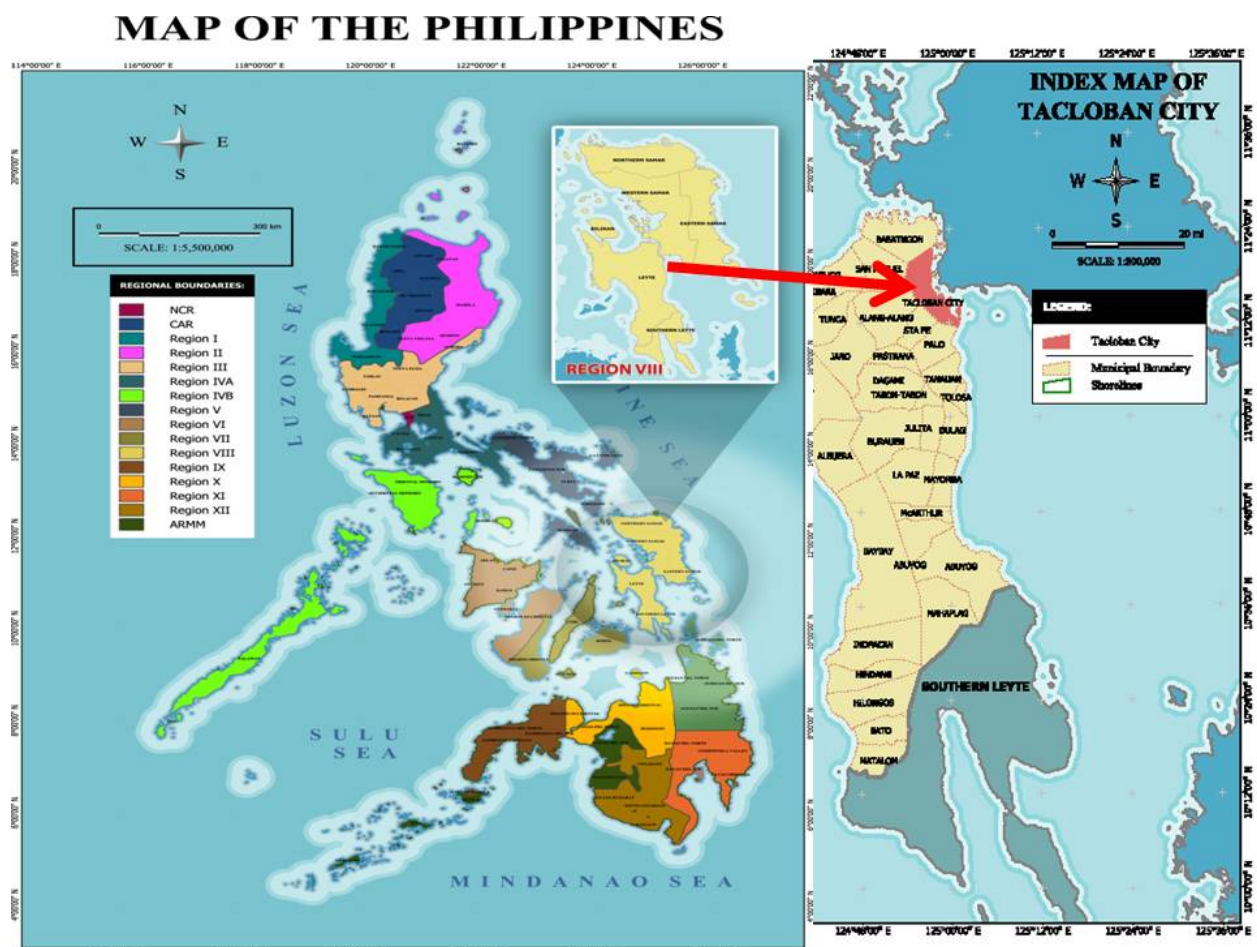
religion)	
Local Economy	Local and international trade and commerce, agriculture, tourism and industry

Sources: Tacloban City, n.d.2 and Tacloban City, n.d.6.

### A.1.1. Geographical Location of the City

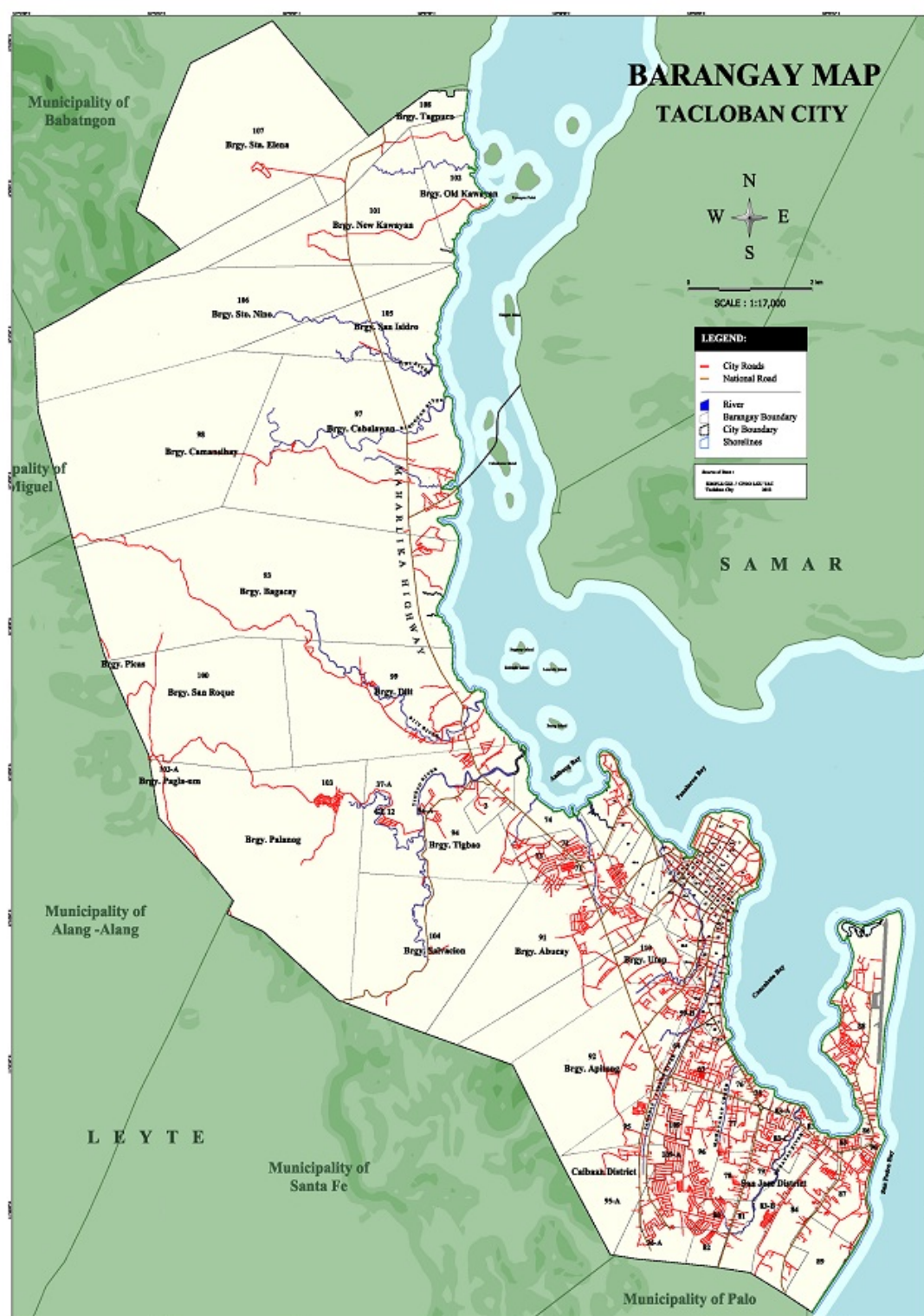
Tacloban City lies in the northeastern part of the island of Leyte in the Eastern Visayas Region, 580 km southwest of Manila (refer to **Figure IV.A.1**). Its latitude and longitude are 11° 14' 38.19" north and 125° 0' 18.24" east (Tacloban City, n.d.6). It is surrounded in the east by Anibong Bay, Panalaron Bay, Cancabato Bay and San Juanico Strait, and in the south by San Pedro Bay and Leyte Gulf (Tacloban City, n.d.3). With 138 barangays divided into 10 political sub-divisions or areas (refer to **Figure IV.A.2**), it spans a total of 20, 172 hectares of land. Its alienable and disposable land in the east comprises 9,755.18 hectares or 48.36% of the total land area while its timberland in the west covers 10,416.82 hectares, or 51.64%. Its terrain is a broad flatland interrupted by a few hills. It has a mean elevation of 3.05 meters above sea level and its highest elevation is 305 meters in the west and 575 meters in the north. The city proper in the northeastern portion is 15.09 meters above sea level (Tacloban City, n.d.2).

**Figure IV.A.1. Location Map of Tacloban City**



Source: Tacloban City, n.d.2, pp. 28-29.

Figure IV.A.2. Barangay Map of Tacloban City



Source: Tacloban City, n.d.2, p. 30.

### A.1.2. Geophysical Features and Exposure to Hazards of the City

Hazard maps show the vulnerability of several areas of the city to a multitude of disasters such as earthquakes, liquefaction, coastal and slope erosion, landslides, floods, storm surges and tsunamis (see **Annex IV.A.2**). According to the city's *2012-2022 Comprehensive Land*

*Use Plan (CLUP)*, it is near the active and high angle Philippine Fault Zone that cuts across the middle of the island of Leyte. The Philippine Trench, though relatively far, can also cause earthquakes. There are two other minor faults whose potential threats to the city are still to be studied as they have been inactive for quite some time. In the event that these fault lines move, rolling to low-lying coastal areas of the city such as the city proper, San Jose and the Airport area, the low-lying areas southeast of the city proper, and narrow low-lying portions along the coast facing San Juanico Strait have strong ground-shaking potential. San Jose is also at high risk for liquefaction and Sto Niño, San Miguel and Palanog boundary and Apitong are highly susceptible to landslides.

Coastal and slope erosion pose threats in the shoreline along San Pedro and San Pablo Bay. Flooding may occur in the lowland plains southwest of the city proper, which include portions of Apitong, Sagkahan, Caibaan, Calanipawan, all of Marasbaras and San Jose, portions of Tigbao, Diit, Cabalawan, San Isidro, Tagpuro, Old Kawayan and New Kawayan. Storm surge-prone areas include the coastal barangays of San Jose, Marasbaras and Tacloban City proper. The city is also in danger of experiencing tsunamis with even wider inundations than storm surges (Tacloban City, n.d.2).

#### **A.1.3. Climate**

Its climate, as classified by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), falls between Types II and IV with its characteristic of having no distinct dry season and no pronounced period for maximum rainfall. Its driest month is April and the wet season occurs during the rest of the year, with heavy rainfall usually from July to December. The city temperature ranges from 25 °C to 28.8 °C (Tacloban City, n.d.6).

#### **A.1.4. Population and Society**

The 2007 census revealed that the city has a total of 217,199 population distributed in 42,588 households, a 10.77 per hectare population density and 2.73 average annual population growth rate. A large majority are in urban areas (87.21%) and are economically active or at 15-59 years of age (55%). Waray-waray speakers comprise 90% of the populace. The remaining 10% account for speakers of Cebuano/Kana/Visayan (6.08%), Tagalog (0.8%), Ilocano (1.1%), Kapampangan (0.07%) and other dialects. Most are members of the Roman Catholic Church (94.52%). Other religions and denominations include Islam (0.12%), Iglesia Ni Cristo (0.83%), Evangelicals (0.94%), 7<sup>th</sup> Day Adventist (0.49%) and other faith groups (Tacloban City, n.d.2, p. 9).

#### **A.1.5. Local Economy**

Dating as far back to its beginning as a municipality, Tacloban has been known as a good trading point with the ideal location of its port. Evolving through the years into the economic hub that it is now, it keeps its economy strong mainly through local and international trade and commerce, and secondarily through agriculture, tourism, and industry. Moreover, Tacloban City is the regional center and gateway of social services, facilities, and institutions in the region. It provides quality health care through its public and

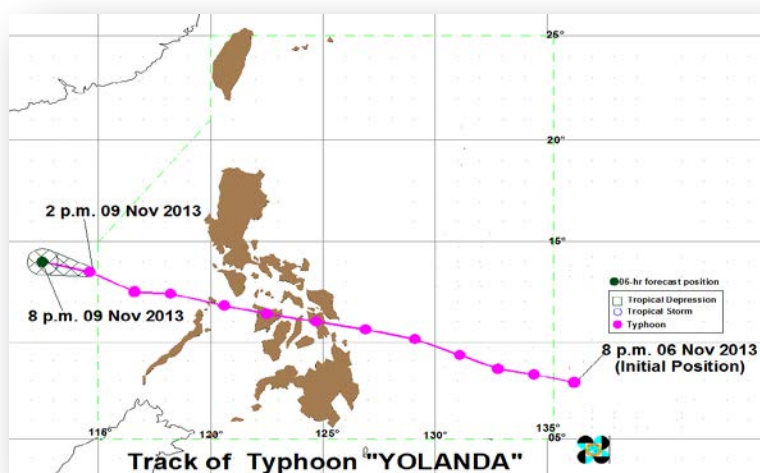
private hospitals and medical institutions, and premier education through top-notch institutions like the University of the Philippines in the Visayas - Tacloban College (Tacloban City, n.d.2, p. 15).

## A.2. In the Eye of the Storm: Destruction and Recovery Efforts in Tacloban City

### A.2.1. Damages Sustained by the City from Super Typhoon Yolanda

When Super Typhoon (ST) Yolanda (international name “Haiyan”),<sup>2</sup> one of the strongest typhoons ever recorded in the Philippines with a wind speed up to 300 km/hour, made its landfall on November 9, 2013, nine out of the 17 administrative regions in the Philippines were affected by its strong winds and the storm surge that came with it. These are the regions of Cavite-Laguna-Batangas-Rizal-Laguna (CALABARZON), Mindoro-Marinduque-Romblon-Palawan (MIMAROPA) and Bicol in Luzon, Southern Mindanao and CARAGA<sup>3</sup> in Mindanao, and the three regions comprising the entire Visayas- Eastern, Central and Western Visayas, which were the most severely affected. Reports reveal that it affected 12, 122 barangays in 44 provinces, 591 municipalities and 57 cities, and displaced more than four million people. As of December 2012, reports show that 5,982 people were killed, 27, 022 were injured, and 1, 799 are still missing.

Figure IV.A.3. Path of TS Yolanda, November 6-9, 2013



Source: Tacloban City, 2014b.

<sup>2</sup> For consistency, this paper uses the PAGASA (Philippine Atmospheric, Geophysical, Astronomical Services Administration) classification in labeling if the hazard is a tropical storm, typhoon or a super typhoon. “A **tropical storm** is an organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds between 63 to 117 KPH. A **typhoon** (sometimes simply referred to as a tropical cyclone, as opposed to a depression or storm) is a system with sustained winds of at least 118 KPH. A **super typhoon** occurs when the storm exceeds 200 kph or a PAGASA Storm Signal number 4 is raised.”Source: Manila Typhoon Center (n.d.). Tropical cyclone classifications. Retrieved August 16, 2014, from <http://typhoonmanila.weebly.com/3---tc-classification.html>.

<sup>3</sup> Composed of the provinces of [Agusan del Norte](#), [Agusan del Sur](#), [Surigao del Norte](#), [Surigao del Sur](#) and [Dinagat Islands](#).

**Figure IV.A.4. Storm Surge Risk Area**



Source: Tacloban City, 2014b.

In Tacloban, the eastern part was heavily damaged by the storm surge which rose up to 6 meters high (see **Figure IV.A.4**). While no official count is available yet, a city employee working closely with government and private groups engaged in disaster recovery efforts disclosed that fatalities are estimated at 1,800 and the number of missing persons at 800. In the TRRP, the number of damaged houses totals 28,734. Out of this number, 90% were along the coast (see **Picture IV.A.1**). Partially damaged houses total 17,643. Major damages were also sustained by all of Tacloban's seven hospitals, seven district health, birthing, and primary care facilities, 90% of schools, 36 public buildings, and the majority of its business establishments, drainage channels, and communication lines (Tacloban City, 2014b) (a summary is provided on **Table IV.A.2**). On an info-map of the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA), it is reported that buildings within 13.57 sq km of Tacloban's land area were damaged, 46.28% of which were totally damaged (refer to **Figure IV.A.5**).

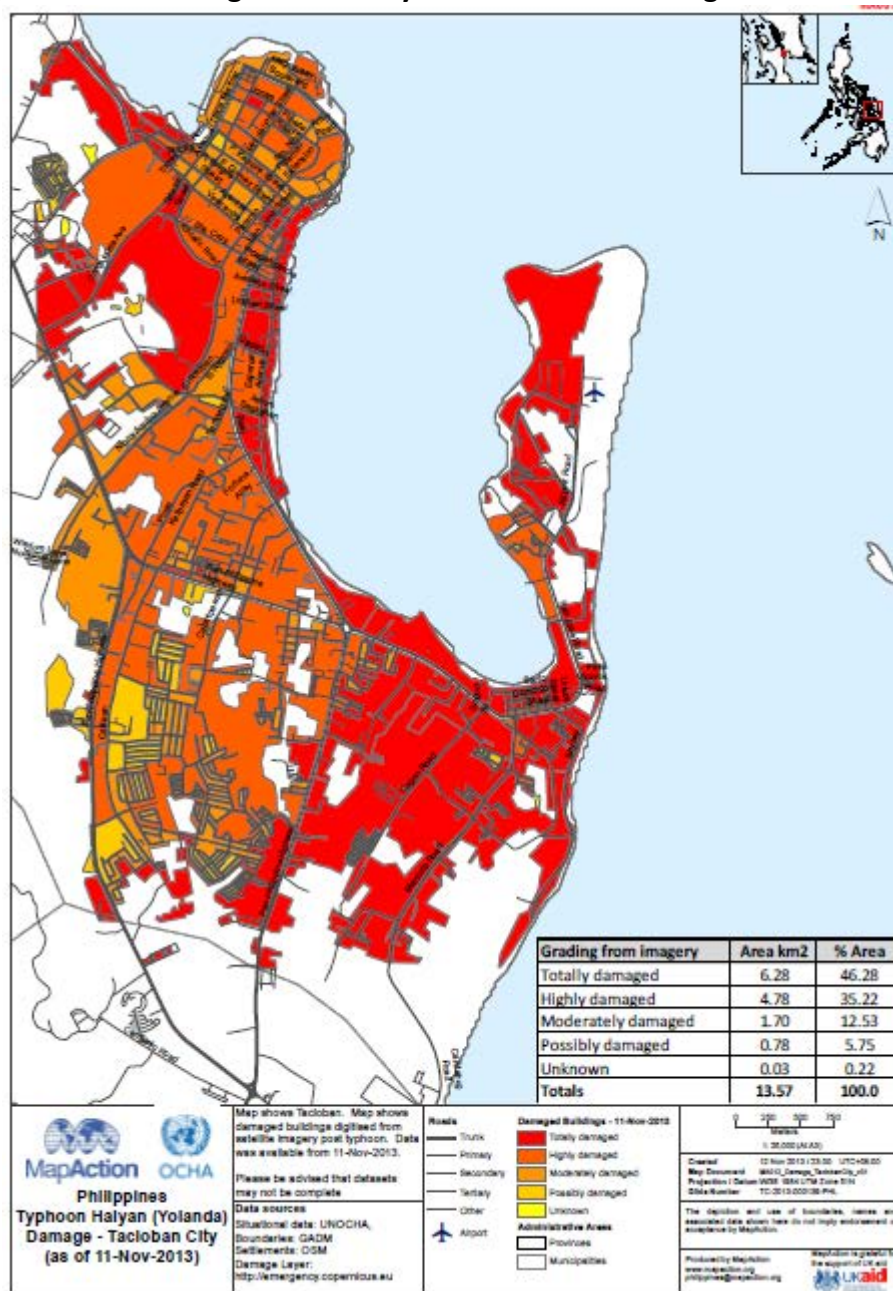
**Table IV.A.2. Damages and Casualties Caused by ST Yolanda to Tacloban City**

<b>Sector</b>	<b>Damages/Losses/Casualties</b>
<b>Effects to People</b>	
Death	1,800
Missing	800
Injury	n.d.
<b>Damages to Housing</b>	
Total destruction	28,734
Partial destruction	17,643
<b>Damages to Infrastructure</b>	
Hospitals	7
Clinics, etc.	7
Schools	90%
Public buildings	36
<b>Damages to Local Economy</b>	
Businesses	n.d.
Agriculture	n.d.
Tourism	n.d.
<b>Public utilities</b>	
Energy	Cut off
Water	Cut off
Communication	Cut off
Transportation	Cut-off (land, air and water)

*Note:* **n.d.** – no data available at the time of writing.

*Sources:* Tacloban City, 2014b.

Figure IV.A.5. Damages Caused by ST Yolanda to Buildings in Tacloban City



Source: UN-OCHA, 2013.

**Picture IV.A.1. Destruction Caused by ST Yolanda to Tacloban City**



**House-turned-debris and rubbles**



**Tacloban Airport**



**A partially-damaged house**



**Affected communities**

Source: OCD, 2014.

#### **A.2.2. Disaster Recovery and Rehabilitation Efforts in the City**

In an estimate prepared by the City Architect and the City Engineer of Tacloban, a total of P3.008 billion is needed for reconstruction, rehabilitation, repair, and replacement, and construction needs to recover from the damages sustained. P434.2 million is needed for reconstruction, rehabilitation, repair, and replacement, while P574 million is needed for construction of new buildings, equipment, facilities, fixtures, vehicles, roads, and drainage system. P1 billion each for construction of resilient housing and site development are also shown in the budgetary estimate (Tacloban City, n.d.1).

To facilitate the recovery and rehabilitation efforts and resume its track towards sustainable development, the city government came up with the TRRP where potentials and opportunities were identified.

In the Plan, the city government sees opportunities for social development, provision of shelter and livelihood opportunities to the people, economic revitalization, physical infrastructure rehabilitation and development, natural environment restoration and protection, and cultural recovery in its vast and still safe and suitable areas for urban development and other productive uses, underutilized lands for agriculture and agro-industry, timberland as possible areas for water sources and ecotourism, coastal areas for

disaster mitigation activities and other uses, except residential, and its strategic location being the gateway to and center of trade, commerce, industry, communication, and technology in the region (Tacloban City, 2014b).

In line with its vision of a resilient, vibrant and liveable city, the Plan uses the “building back better” principle in identifying immediate actions and operational strategies towards recovery, rehabilitation, economic revitalization, and sustainable and disaster-sensitive development. Anchored on appropriate and optimized land use based on site elevation and vulnerability to surges and other hazards, the city plans for an urban expansion in its northern area, which has large open lands with higher elevation, and a controlled and low-density growth in the southern part. As for the upland areas, steep slopes and fault lines make them less suitable for settlement (Tacloban City n.d.4).

To provide momentum for the plan, the city has come up with the following immediate programs, projects, and activities for shelter provision and development, social services, economic revitalization, physical infrastructure rehabilitation and development, and environment restoration and protection. Funds will come from government resources and donations.

A. Shelter

1. Approximately 3,500 new houses in Tacloban North (New Kawayan)
2. 2,248 temporary shelters for IDPs still in tents and schools
3. Community Mortgage Program in Diit, Bagacay, Cabalawan
4. Additional land (30-50 hectares) for new housing
5. 39,798 on-site shelter repair/reconstruction assistance to households in “Can Build Zones” in the mid coast
6. 4,800 temporary shelters to the IDPs living in makeshift houses within the 40m no-dwelling area in Anibong and Sagkahan
7. Household profiling in urban coastal areas at risk
8. Shelter plan enhancement, training programs on shelter construction, site development facilities, basic services, livelihood, and other support activities

B. Social Services

1. Health facility and services enhancement
2. Construction and repair of schools, provision of temporary learning spaces, psychosocial support to students and teachers, provision of equipment and supplies, feeding program
3. Protective services (contingency plan, peace and order, moral recovery program, stress debriefing, repair of police station and city jail, procurement of mobility, communication and, firefighting equipment)

C. Economic Revitalization

1. Development of Eastern Visayas Regional Growth Area (EVRGC) as light agri-industrial economic zone (for review/ study)
2. Establishment of corporate agriculture and aquaculture farms (for study)
3. Seedlings, subsidies, and cash assistance to farmers and fisherfolk
4. Establishment of Food Terminal (for study)

5. Relocation and construction of new slaughterhouse
6. Restoration of public market and fishport
7. Support to rehabilitation of private sector rice mills, warehouses, and cold storage facilities

#### D. Physical Infrastructure

1. Pilot well(s) for Tacloban Housing Site
2. Study of water system for Tacloban North
3. Site development, utilities, community facilities for Tacloban North
4. Repair of damaged roads within the city
5. Repair of City Hall Building and other city government buildings
6. Clearing and declogging of drainage system
7. Construction of Tacloban International Airport
8. Repair of bridges
9. Initiation of talks for Babatngon Port Development
10. Road widening of Maharlika Highway and other key routes
11. Construction of Permanent Evacuation Facilities
12. Master Plan of drainage system
13. Study of coastal protection options
14. Construction of four-lane road with sturdy shore protection structure in mid-coast
15. Introduction of solar-powered street lights
16. City-wide water and sanitation study
17. Review of flood control structures along major rivers

#### E. Environment

1. Safe closure and rehabilitation of existing dumpsite
2. Rainforest development project covering 4,000 hectares including riverbank protection
3. Location and establishment of new sanitary land fill
4. Review of the City's Solid Waste Management Program
5. Mangrove and beach forest development project from Payapay to Tagpuro
6. Marine and Coastal Resource Assessment Study
7. Vulnerability and risk assessment of urban coastal areas
8. Studies on coastal protection options
9. Review of CLUP and zoning ordinance
10. Establishment of rainwater catchments
11. Natural resources inventory
12. Review of septage management plan
13. Feasibility study for city-wide hospital waste management plan

On its shelter program, data from the city shows that as of April 2014, materials for the construction of housing units donated by GMA Kapuso Foundation (400 units + 20 classrooms), Operation Compassion (100 *bahay kubo* or nipa hut), and Operation Blessing (60 *bahay kubo*) have already been delivered and construction will commence the soonest possible time. The following organizations are also donating housing units. Delivery and

construction will start as soon as the National Housing Authority has developed the possible sites.

Habitat for Humanity	- 852 units
Philippine Red Cross	- 5, 000 units
Kimse Yokmu	- 50 units + 1 school (6 classrooms) and 1 medical clinic
Lions International	- 50 units
Zonta International	- 50 units
DAYANET	- 100 units
Philippine Institute of Civil Engineers	- 50 units
Operation Compassion-	1, 000 units
Global Aid	- 100 units

As for its shelter needs, the city still has a backlog of 10,000 permanent shelters, 500 temporary shelters, and 39,778 shelter kits. Site development has yet to be done for 82.4 hectares of land and the city is also looking for possible sources of additional 150 hectares of land for more than 20,000 houses (Tacloban City, 2014a).

Electricity Restoration Update from the Leyte II Electric Cooperative also shows that as of January 2014, out of the 138 barangays in Tacloban City, 82 barangays (59.42%) have already been energized. However, in terms of number of connections, only 18.53% or 6, 660 out of 35,937 connections have been restored (Leyte II Electric Cooperative, 2014). Further, as of March 2014, 60% of the city's electric power and 40% of the city water supply has been restored. Communication land-lines are not yet fully restored, while major drainage channels require further maintenance and upgrading (Tacloban City, 2014b).

Recognizing that redevelopment policies can direct growth to the proven safer areas of the city and that disaster-resilient rebuilding policies can prescribe the effective architecture and engineering provisions for future construction, the TRRP also specifies the following guidelines for building construction in its danger, high-risk, building, upland and coastal zones:

A. Danger Zone (No dwelling)

- No new buildings for dwelling purposes (houses, hotels, dorms, apartments, etc.) will be allowed.
- Existing legitimate residential buildings will be allowed to remain and operate in place subject to: (1) proof of asset ownership; (2) compliance with the minimum DRR features of the city; and (3) expressed approval from the city indicating either 'permanent structure' or 'structure for Phase-out Zoning.'

B. High Risk Zone (Alienable and disposable lands with elevation below 5 meters)

- Existing buildings shall introduce minimum DRR features required by the city. New houses on existing residential sub-divisions will be allowed subject to the DRR building policy of the city.

- New buildings for dwelling purposes will be discouraged. New buildings shall comply with the city DRR building policy for new construction (especially the requirement for stronger building superstructure and roof system).
- C. Building Zones (Alienable and disposable lands with elevation 5 meters and higher)
- Existing buildings shall introduce city DRR features, particularly a strengthened roof system. New buildings shall be compliant with the NBC and the city special building code (particularly on the design of roofs and windows).
  - Important new public investments are encouraged to be located in the city's buildable zones.
- D. Upland Zones (Non- alienable and disposable lands)
- Tacloban's mountain area shall be tapped by the city for its recreational project requirement at one extreme and irrigation projects on the other. In return, the city shall provide security, care and maintenance for the fragile upland zones.
- E. Coastal Zones (Along bays and the San Juanico Strait)
- Coastal edges shall be replanted by mangroves.
  - Selected coastal areas shall be designated as water recreation zones or mariculture economic zones.
  - Designed groynes (breakers) in the sea are proposed to mitigate damage to the ports by surges.
  - The causeway linking the airport to seaport is under consideration.

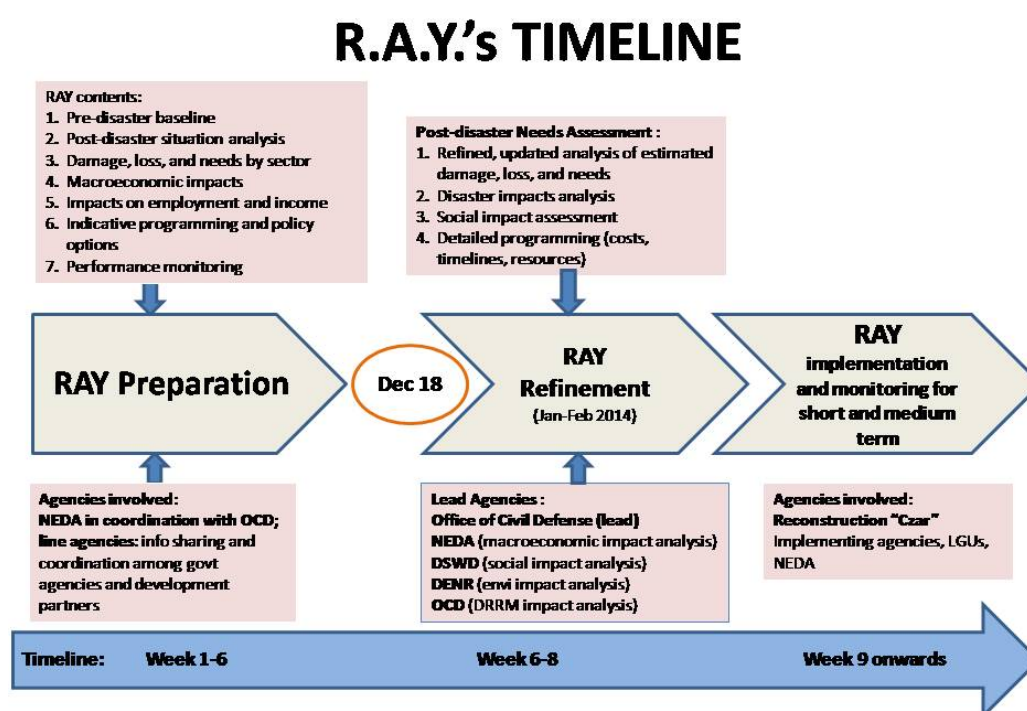
### **A.2.3. Situationer on Tacloban City's Recovery**

One month after Yolanda struck Tacloban City (December 2013), there were already signs of "recovery" in the city. According to a newspaper report, "(t)he public market and commercial center are back in business. So are several restaurants, banks and remittance centers, gasoline stations, stores and groceries.... Water, public transportation and telecommunications services have returned... 19 of the 26 government agencies in the city were now operating and about 15 percent of the city has electricity" (Gabieta, 2013). Four months after (March 2014), it is said that the city is still reeling from the aftermath of disaster. The biggest problem that the city is facing is the relocation of informal settlers who re-built their houses in the surge-inundated areas of 28 barangays. Moreover, many are still living in tent houses. For those who were relocated in bunk houses, there is the problem of loss of livelihood which is true for fisherfolk who used to live in coastal areas. In infrastructure, only 60% of the city's electric power and 40% of the water supply (mostly in the south) had been restored. Telephone landlines are not yet fully restored. Finally, less than 5% of the city's total establishments have renewed their business licenses (Tacloban City, 2014b). With these situations, city government officials professed that the city has yet

to fully recover which would take years (Anido et al., interviews, April 8, 2014). That is the reason why it formulated the TRRP, the contents of which they discussed with the residents and the various sectors and stakeholders on March 20, 2014 in a forum and consultative meeting. They are just waiting for the funds from the 2013 Supplemental Budget approved by Congress worth P14.6 billion, the 2014 General Appropriations Act worth P20 billion, and from the Office of the Presidential Assistant on Recovery and Rehabilitation (OPARR) headed by former Senator Panfilo Lacson, Jr. Anticipating “politics” as a stumbling block in accessing funds from the Supplemental Budget and the OPARR, Tacloban City Mayor Alfred Romualdez said that they would just get loans, tap donations, and use its own budget for their recovery and rehabilitation plans (Berse, 2014). See also **Table IV.A.3** for an over-all picture of the city’s state of recovery as described above.

Part of the delay in the release of funds is the absence of the approved “Master Plan” – the Reconstruction Assistance on Yolanda (RAY) 2.0. More than eight months after Yolanda Region VIII (as of 1 August 2014), disaster recovery and rehabilitation efforts for Tacloban and other areas in the region hit a snag when the national government agencies were caught in a bureaucratic maze of who-will-do-what. Originally, there are two documents that would be the bases for the recovery and rehabilitation planning for the region, namely: (1) the Reconstruction Assistance on Yolanda (RAY) coordinated by the National Economic and Development Authority (NEDA) in coordination with the Office of Civil Defense (OCD); and (2) the Post-Disaster Needs Assessment (PDNA) led by the OCD. RAY is proposed to be fed into the PDNA which will become the basis for RAY 2.0 – “the Master Plan” (see **Figure IV.A.6** for the timeline and contents of the RAY and PDNA). There was confusion on the difference between RAY of NEDA and the PDNA of OCD which seem to have similar contents and methodologies, except for the analytical parts. Both the NEDA and OCD have finished writing their RAY and PDNA, but RAY 2.0 remains unfinished. It was decided later that it will just be written as a general policy document to guide the reconstruction process (Berse, 2014). On August 1, 2014, OPARR will submit to President Aquino, for approval, the complete rehabilitation plan to construct about 205,128 houses in safe zones for Yolanda victims in 14 provinces. This will facilitate the release of P169.7 billion rehabilitation fund to Yolanda-stricken areas (Felipe, 2014).

Figure IV.A.6. The Timeline of the Reconstruction Assistance on Yolanda (RAY)



*Source: of author: NEDA, 2014a*

Sources: NEDA, 2014a and 2014b.

Table IV.A.3. Recovery Initiators, Leaders, Fund Sources, and Recovery Situation

Areas	Initiator	Manager/Leader	Source of Fund	Recovered?
a. Social recovery	Tacloban City, various national government agencies, NGOs, etc.	Tacloban City	Loans, donations, LGU budget, OPARR, 2013 Supplemental Budget, 2014 GAA	Still in recovery period
b. Economic recovery	Tacloban City, various national government agencies, NGOs, etc.	Tacloban City	Loans, donations, LGU budget, OPARR, 2013 Supplemental Budget, 2014 GAA	Still in recovery period
c. Environmental recovery	Tacloban City, various national government agencies, NGOs, etc.	Tacloban City	Loans, donations, LGU budget, OPARR, 2013 Supplemental Budget, 2014	Still in recovery period

Areas	Initiator	Manager/ Leader	Source of Fund	Recovered?
			GAA	
d. Infrastructural recovery	Tacloban City, various national government agencies, NGOs, etc.	Tacloban City	Loans, donations, LGU budget, OPARR, 2013 Supplemental Budget, 2014 GAA	Still in recovery period
e. Institutional recovery	Tacloban City, various national government agencies, NGOs, etc.	Tacloban City	Loans, donations, LGU budget, OPARR, 2013 Supplemental Budget, 2014 GAA	Still in recovery period

Sources: Anido et al.; interviews, April 8, 2014.

## B. Barangay Case Studies

Three case studies of three barangays in Tacloban City are presented in this part. These barangays are: Barangays 91 (Abucay), 81 (Marasbaras), and 62-B (Sagkahan). They were chosen based on the severity of damages and casualties that they sustained from the typhoon, i.e., least damage (Abucay), moderate damage (Marasbaras), and severe damage (Sagkahan).<sup>4</sup> They were identified in consultation with the Barangay Affairs Office of the Tacloban City Government.

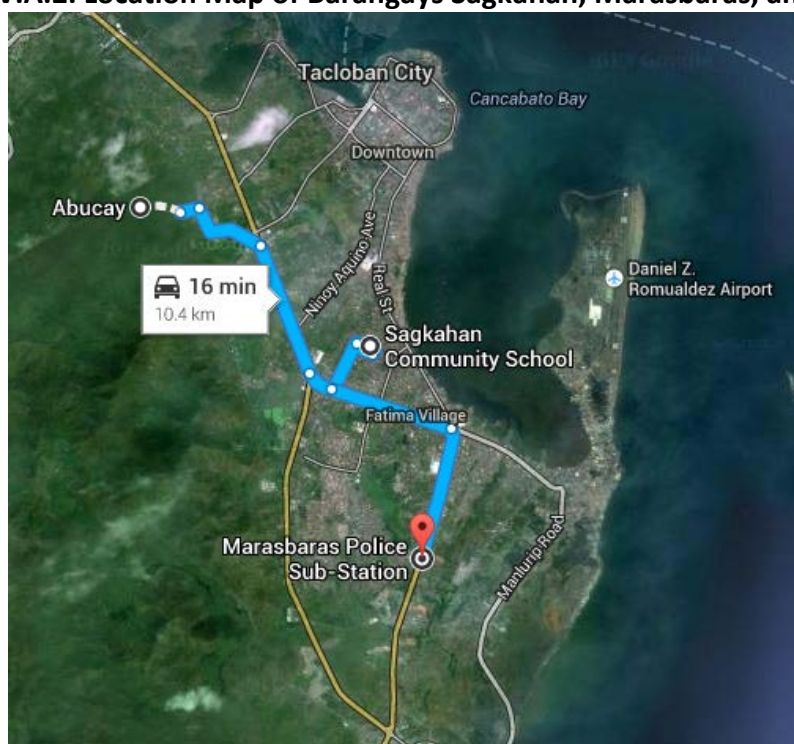
### B.1. Context and the Disaster

#### B.1.1. Geographical Locations of the Barangays

The severity of the damages and casualties sustained by three barangays could be explained by their geographical location, biophysical, and socio-economic conditions. In terms of geography, Abucay is located in the safest part of the city because it is at the mid-western side of the city which is very far from the coastal area. On the other hand, Sagkahan is the most susceptible to storm surges because it is very near the coastal area (less than 100 meters away) that opens up to Cancabato Bay. Marasbaras, on the other hand is at the southern part of the city which should have made it relatively safe for storm surges. However, it also became victim to strong winds and the surge. Refer to **Picture IV.A.1**.

<sup>4</sup> Sagkahan is only one of the most severely damaged barangays. Those in San Jose are the most severely damaged. However, only the officials in Sagkahan were available for interview during field work.

**Picture IV.A.2. Location Map of Barangays Sagkahan, Marasbaras, and Abucay**



Source: Google Maps , 2014.

### **B.1.2. Casualties and Damages in the Barangays**

After the onslaught of the typhoon, all structures, i.e., houses, churches, public buildings, commercial establishments, etc., in Sagkahan and Marasbaras were partially damaged, totally destroyed, and/or washed out due to the strong winds and the rush of sea water. All structures in Sagkahan got submerged by sea water up to a two-storey high residential structure (Luyten et al., FGD, April 8, 2014). Only the houses at the “inner/lower” part of Marasbaras, those which are hidden from motorists’ point of view at Marasbaras Road (a national road), got submerged in one- to two-storey high water, but all 22 houses were partially or totally damaged or even washed away (Ting et al., FGD, April 9, 2014). The rest of the barangay only suffered from knee-deep flood waters, especially on the highway. In Abucay, only about 80% to 90% of houses got damaged, mostly roofs blown away by the strong winds (Benitez et al., FGD, April 8, 2014). In terms of casualties, there were none in Abucay and Marasbaras. Officially, nine were confirmed dead in Sagkahan and five are still missing. However due to the absence of complete records of informal settler-residents, there could be more who could not be accounted for (Luyten et al., FGD, April 8, 2014).

**Table IV.A.4. Inundation, Casualties, and Damages Caused by ST Yolanda in the Three Barangays**

Barangay	Classi- fication	Inundation		Casualties			Damages to Properties
		Area	Maximum Height of Flood	Death	Injuries	Missing	
Sagkahan	Severely damaged	100%	2-storey high	9	No estimate	5	No estimate

Barangay	Classification	Inundation		Casualties			Damages to Properties
		Area	Maximum Height of Flood	Death	Injuries	Missing	
Maras-baras	Moderately damaged	100%	1-2 storey high	68	No estimate	No estimate	22 houses were partially or totally damaged
Abucay	Least damaged	Not affected; wind only	Low	0	0	0	80%-90% of houses got damaged by the wind

Sources: Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014.

**Figure IV.A.7. The Three Barangays and Storm Surge Risk Area**



Note: The locations of the three barangays are not GPS exact.

## **B.2. Explanations for the Vulnerabilities of the Three Barangays**

### **B.2.1. Geophysical Features**

In terms of bio-physical conditions, again, Abucay is the safest from storm surges among the three because it has higher elevation compared to Sagkahan and Marasbaras whose elevations range from 1 to 3 meters. The land area of Abucay is partly timberland and alienable and disposable (A & D) land, while those in the two other barangays are all A& D lands. The slopes in Abucay are very steep (40% to 60%), strongly sloping (15% to 25%), and slightly undulating (1 to 2%). On the other hand, the contours of the terrains in Marasbaras and Sagkahan are strongly sloping (15% to 25%).

### **B.2.2. Exposure to Hazards**

The location and geologic formations of the three barangays expose them to several hazards. Among the three, Sagkahan has the most exposure. According to hazard maps in the city's 2013-2022 CLUP, Sagkahan is highly susceptible to storm surges, tsunamis, ground shaking, liquefaction, and floods. The barangay's proximity to deeper and open waters makes it vulnerable to storm surges, tsunamis, and floods. Due to its proximity to earthquake faults in Barangay Apitong, it could suffer from ground shaking as high as intensity level VII (based on PHIVOLCS' scale), and because of looseness of soil in its area, liquefaction may occur. Marasbaras, on the other hand, based on tsunami and storm surge hazard maps, is relatively safer compared to Sagkahan because it is not highly susceptible to both hazards. However, the disaster brought by ST Yolanda revealed that even though it is not as near as Sagkahan to open waters, the surge, nevertheless, reached the barangay. In contrast, Abucay, due to the geologic formations and steep slope in its boundary, is not susceptible to storm surges and tsunamis but to floods, earthquakes, liquefaction, and landslides (rain-induced and earthquake-induced). The reason for this barangay's susceptibility is that Tacloban City is close to the Philippine Fault Zone (PFZ) and a fault line runs in the middle of the barangay. Thus, it might suffer from earthquakes from intensity level VI to VII (based on PHIVOLCS's scale). This earthquake may induce liquefaction, and because the barangay has mountainous areas, earthquake-induced landslides may occur. Strong rains, just like ST Yolanda, may also generate rain-induced landslides.

### **B.2.3. Socio-Economic Profiles of the Three Barangays**

The vulnerability of the barangays could also be attributed to their socio-economic conditions. Among the three barangays, based on official 2013 projected population, Sagkahan is the most densely populated area. On official records, its population density is 1,545 persons per hectare because it has 4,249 residents in its 2.75 hectare land area. However, according to the barangay Chairman, taking into account all the informal settlers, the estimated population is 7,000+, thus, its population density could be around 2,545 persons per hectare, the majority of whom are informal settlers (Luyten et al., FGD, April 8, 2014). Thus, it should come as no surprise that many were believed to have been killed in that barangay because there were so many residents living in a small area which is less than 100 meters away from the shore. It should be noted that with high population density in this area and high exposure to several hazards, there is not one evacuation center located

within the barangay. According to the City Disaster Risk Reduction and Management Office (CDRRMO), the designated evacuation center for this barangay is the Tacloban City Convention Center or Astrodome which is just several minutes away on foot.

On the other hand, there were no fatalities in Marasbaras and Abucay because not only are they relatively far from the open waters, but they are not as densely populated as Sagkahan. Abucay has 7,358 residents (2013 projected population) living in a wide area measuring 270.40 hectares, hence, its population density is only 27 persons per hectare. Abucay has two evacuation centers (i.e., Judge Antonio Montilla Elementary School and New Bus Terminal).

Marasbaras has a higher population density than Abucay, i.e., 83 per hectare, because its land area, 10.80 hectares, accommodates 894 residents (2013 projected population). However, around 60% of the families in Marasbaras are informal settlers who built their houses on government and private lands (Ting et al., FGD, April 9, 2014). There is no evacuation center within the barangay.

The residents in the three barangays are almost the same – mixed in terms of dialects spoken and religion. Most are Waray-waray, followed by Bisaya, Cebuanon, and Tagalog. The majority of residents are Christians and a few are Muslims. In terms of living conditions, the residents in the three barangays come from low- to middle-income families. The majority of the residents in Sagkahan are fish vendors. The rest are pedicab drivers, construction workers, and self-employed workers (Luyten et al., FGD, April 8, 2014). Hence, they lack funds to re-build their houses. However, they make do from the ruins of the typhoon; using scrap materials, they re-build or repair their houses. There is a tendency for them to depend on relief goods as their incomes are not enough to feed their families. In Abucay, the residents are mostly government or private sector employees who live in six sub-divisions in the barangay. The rest are side-walk vendors, laborers, and drivers (Benitez et al., FGD, April 8, 2014). Thus, many have financial resources from savings and insurance to re-build their houses. As for Marasbaras, 60% of the population are low-income laborers and pedicab drivers. The rest (40%) are government and private sector employees (Ting et al., FGD, April 9, 2014). Thus, like Abucay, there are some residents who have the financial means to re-build or repair their houses, and there are those who have difficulties starting life all over again due to meager financial resources.

The profiles of the three barangays are shown on **Table IV.A.3**. In a summary, the finding in this part is that **the barangay which is most vulnerable (i.e., Sagkahan) is the one which is most exposed and at risk from various hazards in general, and storm surges in particular.**

**Table IV.A.5. Overview of the Vulnerability Profiles of the Three Barangays**

Barangay	Classification	Geographical Location	Biophysical Condition	Exposure to Hazards	Socio-Economic Situation
Sagkahan (62-B)	Severely damaged (80%-90% damaged)	Near the coastal area, Cancabato Bay; exposed	- A & D lands - Low elevati	- Storm surge - Tsunami - Ground-shaking	- High populatio n density - Low-

Barangay	Classification	Geographical Location	Biophysical Condition	Exposure to Hazards	Socio-Economic Situation
	houses, zero casualty, no missing persons)	to storm surge (wind and water)	on	- Liquefaction	income class families; majority are informal settlers - Jobs: fish-vending, pedicab drivers, construction workers, and self-employed workers
Marasbaras (81)	Moderately damaged (all houses damaged, zero casualty, no missing persons)	Southern part; originally thought to be safe from storm surge, but got hit by wind and waters of ST Yolanda	- A & D lands - Low elevation	- Storm surge - Tsunami - Ground shaking - Liquefaction	- Low population density - Low to middle-income class families; 60% informal settlers - Jobs: employees, laborers, and pedicab drivers
Abucay (91)	Least damaged (80%-90% damaged houses, zero casualty, no missing)	Mid-western part; safe from storm surge waters (but not from the strong winds)	- Partly timberland and A & D lands - Has high	- Has earthquake fault - Ground shaking - Liquefaction - Earthquake-	- Low population density - Low to middle-income class

Barangay	Classification	Geographical Location	Biophysical Condition	Exposure to Hazards	Socio-Economic Situation
	persons)		and low elevations - Has very steep slope, strongly sloping, and strongly undulating	induced landslides - Rain-induced landslides	families - Jobs: employees, sidewalk vendors, laborers, and drivers

Source: Tacloban City, n.d.2.

### B.3. The Roles of the Barangays and Other Stakeholders in the Disaster Recovery and Rehabilitation Efforts

In focus group discussions held in the three barangays with barangay officials and residents who are victims of ST Yolanda, it was found that all three have very limited roles in disaster recovery and rehabilitation efforts for the city. Using the community-involvement continuum, the roles of the barangays were limited to being (scantly) informed and consulted. In the formulation of the TRRP or “Master Plan” crafted by the various city hall offices (Anido et al., interviews, 2014), the barangay officials and residents said that the only time they were informed about the TRRP was during the presentation made on 21 March 2014 (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014) at the Astrodome dubbed “Yolanda Transparency Forum” organized by the city government and Asia Foundation. They were not given copies of the TRRP. It was supposed to be a time for consultation, too, but due to the presence of a large crowd, there was no time for in-depth consultation. According to the CDRMO, they will go down to the barangay level, which is part of the consultation process of the city government, and they had already started doing this in one barangay in the first week of April 2014 (Anido et al., interviews, April 8, 2014).

Not only are the three barangays passive recipients/actors in the city’s disaster recovery and rehabilitation efforts, but at their own level too they do not have concrete plans for disaster recovery and rehabilitation (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014). In the area of disaster recovery and rehabilitation they leave it to families/households to re-build/repair their houses and restore their sources of livelihood destroyed by ST Yolanda due to lack of funds and technical expertise (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014).

During the FGDs, all three barangays disclosed that they do not have disaster recovery plans because they do not have sufficient knowledge to draft those plans (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014). Based on their Yolanda experiences, however, they said that they assisted their constituents in restoring their livelihoods by extending financial assistance from P1,000 to P5,000 which they sourced from the local DRRM funds. They also assisted those whose houses were damaged through “bayanihan” – good neighborliness and manual labor. As for the reconstruction of damaged infrastructure and providing psychological services for those who have been traumatized by the super typhoon and the storm surge, they said that they do not have the knowledge, skills, equipment, and funds to undertake them. From what they are able to observe in the current recovery and rehabilitation efforts, these are all being undertaken by the city government, various national government agencies, and local and international humanitarian NGOs (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014). Refer to **Table IV.A.6** for the mapping of recovery efforts of all stakeholders.

**Table IV.A.6. The Participation of the Barangays, City, NGAs, and NGOs in Disaster Recovery Efforts**

<b>Recovery Efforts</b>	<b>Household/ Family</b>	<b>Barangay</b>	<b>City</b>	<b>NGAs</b>	<b>NGOs</b>
Restore the people’s means of livelihood and continuity of economic activities and business	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Restore shelter and other buildings/installations	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Reconstruct infrastructure and other public utilities			<b>X</b>	<b>X</b>	<b>X</b>
Assist in the physical and psychological rehabilitation of persons who suffered from the effects of disaster			<b>X</b>	<b>X</b>	<b>X</b>

*Note:* Items in the “Recovery Efforts” column were taken from the “Disaster Recovery and Rehabilitation” section of the *National Disaster Risk Reduction and Management Plan 2011-2028*.

*Sources:* Anido et al., interviews, 2014; Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014.

## B.4. Disaster-Resilient Community Index

**Table IV.A.7. Computations of the DRCIs for Sagkahan, Marasbaras, and Abucay**

Thematic Areas	Weight	Barangay			Average
		Sagkahan (Severely Damaged)	Marasbaras (Moderately Damaged)	Abucay (Least Damaged)	
Governance (GOV)	16%	0.12	0.12	0.12	0.12
Knowledge and Education (KAE)	23%	0.10	0.06	0.10	0.09
Risk Assessment (RAS)	9%	0.04	0.04	0.04	0.04
Risk Management and Vulnerability Reduction (RMVR)	23%	0.09	0.10	0.07	0.09
Disaster Preparedness and Response (DPR)	29%	0.14	0.18	0.21	0.18
<b>Total</b>	100%	0.49	0.51	0.53	0.51

*Note:* For details of the computations, refer to **Annex II.E.1.**

All three barangays got very low index values (0.49-0.53) which means their resilience is low. Their index values are correlated to the damage that they sustained, i.e., the more damage a barangay sustained, the lower the value of its DRCI. In particular, Sagkahan, the severely-damaged barangay, has the lowest value, followed by Marasbaras (moderately damaged) which got a slightly higher value, and then by Abucay (least damage) which obtained the highest index value among the three.

### B.4.1. Governance

The scores of the three barangays in GOV are moderately high (0.12 for a maximum score of 0.16), but these were pulled down by one main factor: the absence of Barangay Disaster Risk Reduction and Management Plans (BDRRMPs) which had its multiplier effects, i.e., inadequate knowledge about impending hazards and disasters in their areas, ill-equipped for DRR/CCA, not organized well, and inadequate manpower to respond to emergencies and plan. The three *punong barangay* and their officials admitted lack of knowledge and skills to write their BDRRMPs (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014).

### B.4.2. Knowledge and Education

The reason why the three barangays do not have BDRRMPs can be explained by the low scores they obtained in KAE (between 0.06 to 0.10). First, they admitted having insufficient knowledge about disasters, the vulnerability of their communities, and the risks involved. Second, they professed that they do not have technical and organizational knowledge and skills on disaster risk reduction/climate change adaptation. Third, they do not know how and where to access/get information, resources, and assistance in times of emergency (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014).

In the FGDs conducted in the three barangays, three reasons were cited for the absence of concrete plans on disaster recovery and rehabilitation: (1) lack of knowledge on climate change, DRR/CCA and disaster recovery and rehabilitation, (2) lack of skills or training on DRR/CCA and disaster recovery and rehabilitation, and (3) insufficient 5% Calamity Fund (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014).

As for their knowledge about the hazards in their areas, officials and residents in barangays Abucay and Marasbaras exhibited a high level of awareness because they were able to enumerate all the hazards that they are susceptible to as indicated in the hazard maps in the city's CLUP. Marasbaras even added "fires" (Ting et al., FGD, April 9, 2014) as one man-made hazard that is not included in the CLUP. They admitted, though, that all of these came from what they experienced, heard/learned from television, radio, newspapers, and the internet. The city government has rarely informed them about these hazards. Moreover, they have not been properly apprised of the risks involved caused by the hazards and their vulnerabilities to them except for the storm surge which they just experienced (Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014). On the other hand, Sagkahan officials and residents have good knowledge of the 7.2 intensity earthquake in 2012, the floods that keep occurring, and the storm surge brought on by ST Yolanda. All of these, just like in Abucay and Marasbaras, learned from experience and the media. However, they did not know that their area is highly susceptible to ground shaking, tsunami and liquefaction. During the FGD, they confused tsunami with storm surge, the latter, according to them, being caused by earthquake (Luyten et al., FGD, April 8, 2014). Similar to those in Abucay and Marasbaras, they said they have not been properly informed by the city government about their vulnerabilities and the risks involved (Luyten et al., FGD, April 8, 2014).

#### **B.4.3. Risk Assessment**

They all got 0.04 values in RAS which is understandable because, according to the FGDs, they do not have hazard and risks maps and have not participated in the city's risk assessment activities, if any were conducted at all by the city government or national government agencies (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014).

#### **B.4.4. Risk Management and Vulnerability Reduction**

For RMVR, four reasons emerged for why the three barangays obtained low scores (0.09 out 0.23). First, all three said that they do not have access to cheap insurance (i.e., life insurance, home insurance, etc.). Second, they do not know the relevant provisions of the national building code on erecting resilient structures. Third, they admitted that they do not have the financial capabilities to renovate or improve the structural integrity of their houses to make them resilient to disasters. And last, except for Abucay, they stated that they are not strict when it comes to land use planning, and more specifically, prohibiting the building of structures in dangerous areas in their barangays (Luyten et al., FGD, April 8, 2014; Ting et al., FGD, April 9, 2014; and Benitez et al., FGD, April 8, 2014).

#### B.4.5. Disaster Preparedness and Response

In the area of DPR, the pattern observed is that the more severely damaged the barangay was from Yolanda, the more the shortcomings and weaknesses the officials enumerated. Expectedly, Sagkahan, the severely-damaged barangay, enumerated many based on their recent experience with Yolanda. It is followed by Marasbaras, the moderately-damaged barangay, and lastly, as could be expected, Abucay, the least damaged. **Table IV.A.8** lists the inadequacies of the three barangays in DPR.

**Table IV.A.8. Weaknesses of the Three Barangays in Disaster Preparedness and Response**

<b>Sagkahan (Severely Damaged)</b>	<b>Marasbaras (Moderately Damaged)</b>	<b>Abucay (Least Damaged)</b>
<ol style="list-style-type: none"> <li>1. Insufficient emergency facilities</li> <li>2. Inadequate manpower for search and rescue, communication, first aid, relief distribution, etc.</li> <li>3. Lack of regular training for practice drill</li> <li>4. Lack of coordination mechanism among experts, local authorities, and NGOs</li> <li>5. Lack of agreements on coordination and decision-making between the barangay and neighboring communities</li> <li>6. No participation in the crafting of disaster plans</li> <li>7. Insufficient ability to handle crisis situations</li> <li>8. Lack of well-maintained evacuation routes</li> <li>9. Lack of trust with agencies handling response and recovery</li> <li>10. Lack of recovery plans</li> <li>11. Undefined roles, responsibilities, and coordination for activities</li> <li>12. Non-integration of CCA/DRR in BDRRMPs</li> </ol>	<ol style="list-style-type: none"> <li>1. Insufficient emergency facilities</li> <li>2. Inadequate manpower for search and rescue, communication, first aid, relief distribution, etc.</li> <li>3. Lack of regular training for practice drill</li> <li>4. Lack of coordination mechanism among experts, local authorities, and NGOs</li> <li>5. Lack of agreement on coordination and decision-making between the barangay and neighboring communities</li> <li>6. No family disaster plan based on the BDRRMPs</li> <li>7. Lack of trust with agencies handling response and recovery</li> <li>8. Non-integration of CCA/DRR in BDRRMPs</li> <li>9. Lack of barangay organization/unit to handle contingency and response plans</li> </ol>	<ol style="list-style-type: none"> <li>1. Inadequate manpower for search and rescue, communication, first aid, relief distribution, etc.</li> <li>2. Lack of regular training for practice drill</li> <li>3. Lack of coordination mechanism among experts, local authorities, and NGOs</li> <li>4. Lack of agreement on coordination and decision-making between the barangay and neighbouring communities</li> <li>5. Insufficient ability to handle crisis situations</li> </ol>

<b>Sagkahan (Severely Damaged)</b>	<b>Marasbaras (Moderately Damaged)</b>	<b>Abucay (Least Damaged)</b>
13. Lack of barangay-wide participation in crafting and implementing contingency and response plans		

*Note:* Ranking based on Questionnaire C tallies.

### **C. Summary of Findings and Analyses**

In this section, the results of the testing of the hypotheses and analyses are presented.

*a. The more exposed a community is to hazards and disasters, the greater is its preparedness for disaster recovery.*

This hypothesis is refuted in the case of Tacloban City's three barangays. The city and the barangays are exposed to many hazards (i.e., earthquakes, liquefaction, coastal and slope erosion, landslides, floods, storm surges, and tsunamis), and have had disastrous experiences with them in the past as recorded in the city's *Comprehensive Land Use Plan*. Yet, not one barangay has a disaster recovery plan. They do not even have local DRRM plans. The barangays reveal that they did not know they have not been informed of the various hazards in their localities. Had they been properly informed and trained in disaster recovery planning and given financial support, they could have prepared their disaster plans.

*b. The more socio-economically developed a community is, the more prepared it is for disaster recovery.*

This is proven false in the situations of the Tacloban barangays. All three do not have disaster recovery plans regardless of their socio-economic stature. This can be a function of the absence of local DRRM plans in all three barangays.

*c. The more involved a community in recovery planning and implementation, the faster is its recovery.*

Although it might be too early to assess the state of recovery in the city, still, nine months after, it is acknowledged that recovery is too slow. It was observed that the city government utilizes a mixture of top-down and bottom-up approaches with the formulation of its TRRP. The barangays were only consulted after the city had drawn up its Master Plan. Still, there is no assurance that even if the barangays were consulted before hand, recovery would be faster. The disaster could be too big to handle by the city government. Other areas in countries like Banda Aceh, Indonesia and Kobe, Japan, took a long time to recover.

*d. The more stakeholders involved in disaster recovery, the faster is the recovery of a community.*

Just like the second hypothesis, it might be too early to accept or refute this hypothesis because the Yolanda disaster is less than a year. However, it has been observed that there is no guarantee that the involvement of more stakeholders could facilitate the recovery process. In the case of Tacloban City, there is a delay in the recovery stage due to the late publication of the Post-Disaster Needs Assessment (PDNA) by the national government. The PDNA is a product of collective data-gathering and analyses of several government agencies. It was only in the first week of August 2014, more than nine months after Yolanda ravaged Tacloban City and other areas in Region VIII, that it was released. In this case, a more streamlined and coordinated disaster recovery planning through the production of the PDNA could have expedited recovery in the affected areas.

*e. The faster the recovery of a community, the more resilient it becomes.*

Again, it is too early to accept or refute this hypothesis because the Yolanda disaster is still less than a year. However, the DRCI computations reveal that there is a correlation between the extent of damages sustained from the Yolanda disaster to the resilience of the barangays. In the cases of the three barangays, the less resilient are those which sustained severe damages. Perhaps, this could be perceptual because the respondents have just experienced the vulnerabilities of their barangays to the super typhoon and storm surge. Yet, it can also be argued that because the risk assessment, knowledge, education, and risk reduction in DRCI are very low among the three Tacloban barangays, the perception could be true – that they are vulnerable to hazards and disasters.

## **Chapter IV.B**

### **CASE STUDY ON ILIGAN CITY**

#### **A. Context and the Disaster**

##### **A.1. Profile of Iligan City**

**Table IV.B.1. Overview of the Profile of Iligan City**

<b>Item</b>	<b>Description</b>
Geographical Location	Northern coast of Mindanao facing Iligan Bay
Year of Establishment	Founded in 1832; June 16, 1950 (as a city)
Income Classification	1 <sup>st</sup> class highly urbanized city
Political Sub-division	44 barangays
Land Area	813.37 km <sup>2</sup> (314.04 sq mi)
Elevation	100 meters (328 feet) – 300 meters (984 feet) above mean sea level
Climate	Type III with short dry season for 3 months and the rainfall is evenly distributed throughout the year
Natural Hazards	Flood, landslide, earthquake/ground shaking/liquefaction, and storm/typhoon
Population (2010)	322,821
Population Density	400/km <sup>2</sup> (1,000/sq mi)
Annual Population	1.25 %

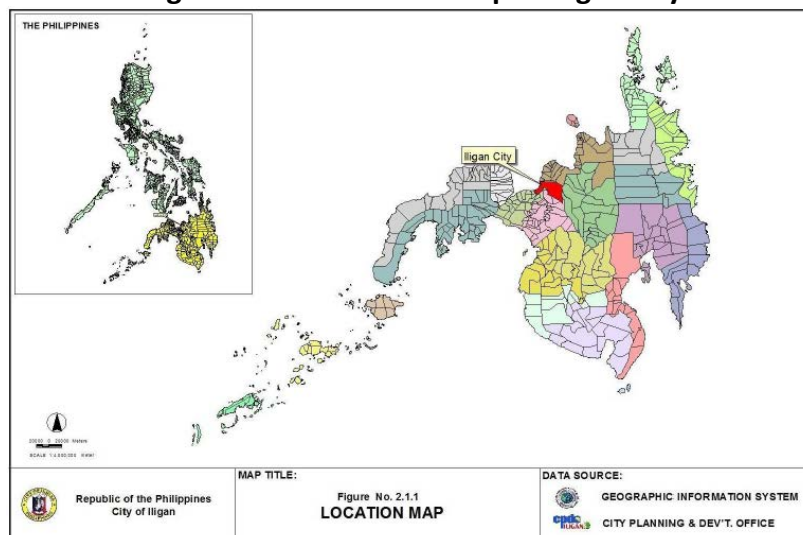
Growth Rate	
Society (ethnicity and religion)	Higaonons, Maranao, and Kolibugan; but Christians still are a majority
Local Economy	Manufacturing. Four major leading crops – coconut, corn, banana, and coffee.

Sources: ICDRRMO, n.d. and LGIC, 2012.

#### A.1.1. Geographical Location of the City

Iligan City is about 795 km southeast of Manila and is located in the northern coast of Mindanao facing Iligan Bay. It is bounded on the north by the coastal province of Misamis Oriental, on the east by the highland provinces of Bukidnon and Lanao del Sur, and in the south by the coastal province of Lanao del Norte. Its geographical grid coordinates are 8°13'56" north latitude and 124°13'54" east longitude (ICDRRMO, n.d., p. 10). Refer to **Figure IV.B.1**.

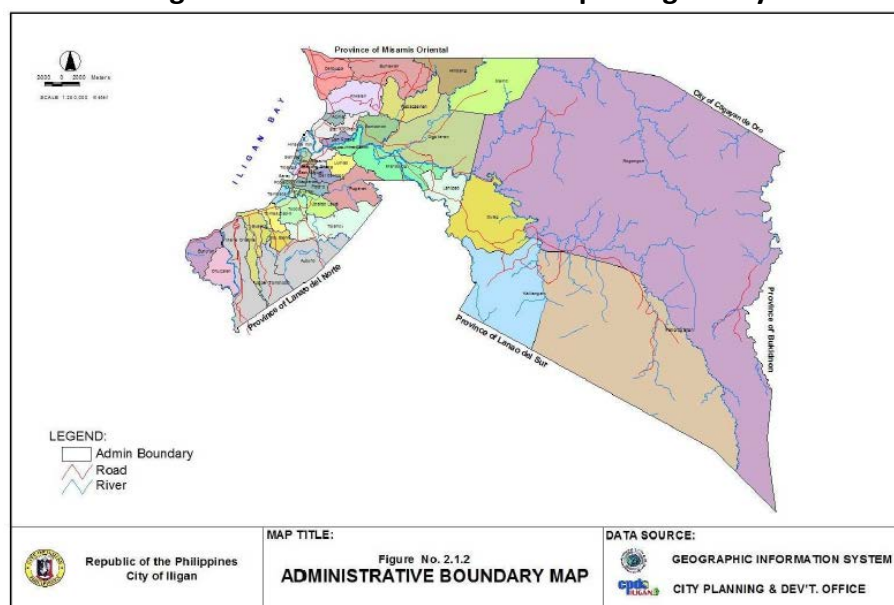
**Figure IV.B.1. Location Map of Iligan City**



Source: LGIC, 2012, p. 4.

Iligan City was created under Republic Act 525 on June 16, 1950. The city is classified as a lone district and was separated from the first district of the Province of Lanao del Norte on October 20, 2009. It is classified as a highly urbanized city. It has a total land area of 81,337 hectares (81.337 sq km) distributed over 44 barangays (see **Figure IV.B.2**).

**Figure IV.B.2. Administrative Map of Iligan City**



Source: LGIC, 2012, p. 5.

### **A.1.2. Geophysical Features and Exposure to Hazards of the City**

The city's topography is characterized by a narrow coastal alluvial plain fronting Iligan Bay at the foot slopes of rolling hills and mountains. There are several river valleys that are found in the city with relatively steep slopes. At the mouth of the Agus River, very steep slopes that separate the coast line and the highland areas are observed. More than 65% of the city's land area has elevations of 300 meters above mean sea level (amsl), 21% are within 100 to 300 meters amsl, and the rest (12%) are 100 meters amsl (LGIC, 2012, p. 3). The City of Iligan is covered with three watersheds, namely: Iligan River Watershed, Mandulog River Watershed, and Agus River Watershed (ICDRMO, n.d., p. 10). In the city's *Comprehensive Land Use Plan* (CLUP), the following were identified as natural hazards that have brought damage to the city: flood, landslide, earthquake/ground shaking/liquefaction, and storm/typhoon (refer to **Annex IV.B.2**).

### **A.1.3. Climate**

The city's climate is characterized as Type III with a short dry season for three months and the rainfall is evenly distributed throughout the year (ICDRMO, n.d., p. 10).

### **A.1.4. Population and Society**

Iligan has a population of 322,821 residents (2010 census) with 1.25% average growth rate. It has 67,965 households (2010 census) with the average size of 4.73 or five per household. The average family income per annum is 106,897 (ICDRMO, n.d., p. 15). It is home to diverse cultural groups such as Higaonons, Maranao, and Kolibugan, but Christians are still the majority. Cebuano is considered as the major dialect. Roman Catholic is the predominant religion (ICDRMO, n.d., p. 15).

### **A.1.5. Local Economy**

Iligan City has 10 manufacturing plants with the following major products: uPVC fabricated pipes and fittings, crude coconut oil, cochin oil, edible oil, coco pellets, acid oil, refined bleached and deodorized oil, solvent extraction pellets, cement, caustic soda, liquid chlorine, sodium hypochlorite, hydrochloric acid, feeds, flour, ferronickel, feedmill, excel, premium, wallright, and pozzolan. As of 2011, the city has four major leading crops. These are coconut (11,037 hectares), corn (1,539.90 hectares), banana (1,477.71 hectares), and coffee (1,674.45 hectares). The city is full of tourist destinations ranging from natural to man-made attractions. Iligan is known as the city of majestic waterfalls because it is blessed with 21 waterfalls. Other natural attractions include nine springs, 15 caves, and seven mountains. Man-made attractions consist of industrial sites and parks, resorts, Buhanginan Hill, Amphitheatre, annual fiesta celebration and cultural presentation, and historical sites (ICDRRMO, n.d., p. 20).

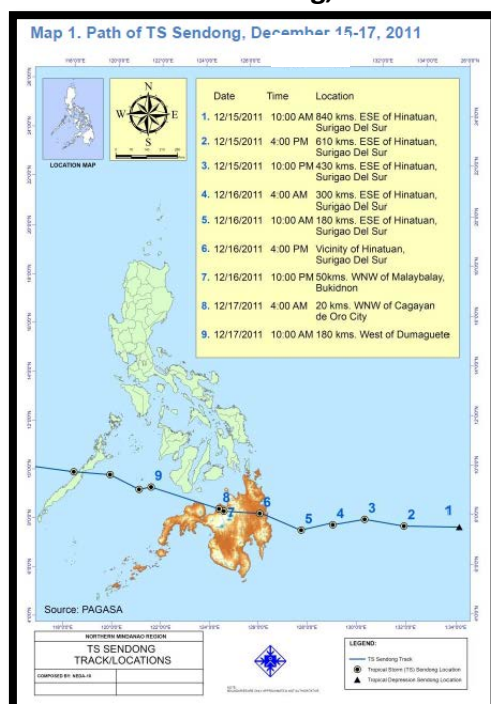
## **A.2. In the Eye of the Storm: Destruction and Recovery Efforts in Iligan City**

### **A.2.1. Damages Sustained by the City from Tropical Storm Sendong**

It was on December 16 and 17, 2011 when tropical storm (TS) Sendong (international name “Washi”) struck Northern Mindanao. The typhoon brought massive destruction of property and even loss of many lives. According to the final report of the NDRRMC, a total of 131,618 families/698,882 persons were affected by the tropical storm Sendong in 866 barangays of 60 municipalities and nine cities in the 13 provinces of Regions VI, VII, IX, X, XI, CARAGA, and ARMM. However, it was stated that Region X suffered the most which, on the other hand, affirmed that Iligan City along with Cagayan de Oro City experienced enormous infrastructure damage and loss of lives, among others (NDRRMC, 2012).

From midnight of December 16 until dawn of December 17, 2011, TS Sendong hit Iligan City. The city experienced heavy rains which led to flashfloods in the flood-prone areas and landslides in the mountainous areas. Based on the NDRRMC report, in 2011, TS Sendong was considered to be the most disruptive cyclone with the number of dead reaching 1,268 (NDRRMC, 2012). Hence, in Iligan City alone there are 666 persons who died and 224 of whom were unidentified; 566 persons were missing; and 4,511 individuals were injured. There were 22,522 families who were affected while there were 1,800 families inside the evacuation centers (RDC X, 2012).

**Figure IV.B.3. Path of TS Sendong, December 15-17, 2011**



Source: PAGASA as cited in ICDRRMO, 2012.

Moreover, the damages related to the city's properties and utilities with its corresponding estimated cost were: infrastructure and utilities (P17.2 million), social sectors (P72.7 million), and economic sectors (P371.6 million).

According to the report of the City Engineer's Office and the Department of Public Works and Highways of Iligan, as of January 2012, the city incurred P136.095 million on urban and rural roads that had been damaged by the tropical storm Sendong. Also, work on the concrete and gravel national roads that were partially destroyed and others that were covered by mud and debris amounted to P50 million (ICDRRMO, 2012).

Barangays along Mandulog River experienced water disruptions after the Sendong incident. These barangays were Upper Hinaplanon, Hinaplanon, Rogongon, and Bonbonon. Hence, the Iligan City Water Service came up with a total of P17.203 million for the damages to the water utilities as of January 17, 2012. The biggest water pump that supplies potable water in the area exploded after the incident (UN-OCHA, 2012, p. 5).

The estimated cost for the housing damaged by Sendong in Iligan City was P2.5 million. Based on the report of the City Engineers Office, 13 were totally destroyed and nine were partially destroyed day care centers. The total cost for all of these was P7 million.

Hospitals were less damaged because most are located in the central business district. However, those health centers which were situated in the affected communities did not escape from the wrath of Sendong. In sum, private hospitals and health centers incurred P4.020 million in damages (ICDRRMO, 2012).

The Department of Trade and Industry reported a total damage of P182.214 million as of January 16, 2012. Most of this amount came from construction firms (P56.600 million) and manufacturing sector (P47.441 million), which were partially destroyed after the Sendong incident. On the other hand, a total of P182.214 million was estimated for crops and livestock. In the fisheries sector, there were 156 motorized and non-motorized bancas/boats amounting to P7.218 million that were lost and destroyed (ICDRRMO, 2012).

**Table IV.B.2. Damages and Casualties Caused by TS Sendong to Iligan City**

Sector	Damages/Losses/Casualties
Effects to People	
Death	666
Missing	566
Injury	4,511
Damages to Housing	
Total destruction	Worth P2.5 million
Partial destruction	
Damages to Infrastructure	
Infrastructure	Worth P17.2 million
Hospitals & health centers	Worth P4.020 million
Social sector	Worth P72.7 million
Schools	n.d.
Public buildings	n.d.
Damages to Local Economy	
Economic sector	P371.6 million
Agriculture	Worth P182.214 million
Tourism	n.d.
Fishing	Worth P7.28 million
Public utilities	
Energy	Cut off
Water	Worth P17.203 million
Communication	Cut off
Transportation	Interruption

*Note: n.d.* – no data available at the time of writing.

*Source: ICDRRMO, 2012.*

#### **A.2.2. DISASTER RECOVERY AND REHABILITATION EFFORTS IN THE CITY**

In issuing Proclamation No. 303 dated December 20, 2011, President Benigno C. Aquino III, declared Iligan City together with Cagayan de Oro City under a “State of Calamity.” The rescue, relief, and early responses were undertaken by the government in cooperation with various sectors ranging from: (1) search and rescue operations, (2) relief operations, (3) psycho-social support, (4) restoration of power and water supply, (5) setting up of temporary shelters, (6) distribution of agriculture and fishery subsidies, (7) installation of temporary transport facility and, (8) assessing the remaining needs for rehabilitation and recovery (RDC X, 2012, p. 51).

The succeeding part of this report discuss the disaster recovery and rehabilitation activities of Iligan City. It highlights the role of governance in the following sections: (1) creation of the *Strategic Action Plan for the Rehabilitation and Recovery of the Areas Affected by Tropical Storm Sendong (Washi)* by the National Economic and Development Authority (NEDA), (2) *Disaster Risk Assessment Report* by Iligan City, (3) drafting of *Flood Contingency Plan 2013*, and (4) *Iligan City Disaster Risk Reduction and Management Plan 2013-2020*.

#### **A.2.2.1. Strategic Action Plan for the Rehabilitation and Recovery of the Areas Affected by Tropical Storm Sendong (“Washi”) by the National Economic and Development Authority**

Headed by NEDA, which serves as the Vice-Chair for Disaster Rehabilitation and Recovery mandated in Republic Act (RA) 10121, the *Strategic Action Plan* (SAP) was created to identify the post-disaster programs and policies related to the rehabilitation and recovery of the typhoon-stricken communities. Specifically, these areas were the cities of Cagayan de Oro, Iligan and Valencia, and the provinces of Bukidnon, Misamis Oriental, Misamis Occidental, and Lanao del Norte. This plan institutionalized governance with regard to the reduction of disaster risks. Correspondingly, it entailed a holistic recovery process leading to the creation of sustainable and disaster-resilient communities. Thus, it aims to “direct post-disaster actions and responses of the government, the private sector, and the Official Development Assistance (ODA) community towards the immediate and medium to long term programs and projects wherein these programs and projects will be mainstreamed in the appropriate national, regional, local as well as the agency development plans and investment programs (RDC X, 2012, p. 1).

The plan strongly recommended that environmental laws and land use policies be strictly implemented. In the aspect of land use, the inclusion of geo-hazard assessment data (maps and reports) in all development undertakings, the role of the LGU to update and review their land use plans to include hazard mapping/ disaster risk assessment and enforce zoning ordinances, and the review/ enforcement of the *Revised Manual of Land Surveying Regulation in the Philippines* (DENR Administrative Order No. 98-12) covering esteros, and rivers to ensure compliance along land limitations were suggested. In the area of governance, the enforcement of environmental laws particularly on prohibiting settlements in identified “danger zones,” the institutionalization of RA 10121 at all levels of governance, the establishment of early warning systems, and strengthening the relationship between the LGU and civil society groups were encouraged (RDC X, 2012, p. 78).

The implementing agencies of SAP are the concerned national/regional line agencies, local government units, private sector, non-government organizations, civil society organizations and other stakeholders. Furthermore, the Regional Development Council and the Regional Disaster Risk Reduction and Management Council were tasked to monitor and evaluate the implementation of SAP. SAP, together with the disaster risk reduction programs and projects, shall be integrated and mainstreamed in the Comprehensive Development Plan (CDP) and CLUP (RDC X, 2012, p. 80). Furthermore, Executive Committee Resolution No. 1, promulgated in 2012, known as “Endorsing the Priority Programs and Projects for Immediate Funding by the Office of the President to Hasten the Rehabilitation and Recovery of Areas Affected by Tropical Storm (TS) Sendong” proposed a budgetary requirement of

P5,185,980.50 for Iligan alone for the implementation of the city's programs and projects stated on the SAP (RDC X, 2012, p. iv).

#### **A.2.2.2. Disaster Risk Assessment Report by Iligan City**

Iligan City conducted a disaster risk assessment whose report was published in August 2012. The report identifies the hazards present in Iligan, their consequences, the vulnerability analysis by sectors, and the estimated and evaluated risks that can be brought by various hazards. The proneness of 44 barangays to environmental hazards such as flood, landslide, typhoon/ tropical storm, storm surge, earthquake, liquefaction, and drought were mapped out under the hazard characterization section. It is followed by the discussions on the "hows" and "whys" those areas in the city are prone or susceptible to such risks. Finally, the risk evaluation part estimates the losses that will occur from the hazards (Disaster Risk Assessment (DRA) Report by Iligan City, 2012).

#### **A.2.2.3. Flood Contingency Plan 2013**

In line with RA 10121, City Ordinance No. 14-6162 known as "An Ordinance Approving and Adopting the Iligan City Flood Contingency Plan" was adopted in August 2013. The ordinance authorizes the activation of the *Iligan City Flood Contingency Plan*. The experiences of the city from TS Sendong were taken into account in crafting this plan. Specifically, the plan has the following objectives: (1) strengthen and harmonize all existing policies at the national and local levels; (2) empower all LDRRM cluster structures in handling the specific tasks accordingly; (3) strictly utilize all donations in money value as an addition to the 30% of the 5% of the Local DRRM Fund (Calamity Fund); (4) ensure the IDPs' needs are properly addressed; (5) institutionalize policies that address vulnerable groups, rights, gender-sensitive policy guidelines in order to ensure the efficient delivery of basic social services to IDPs in disaster-stricken areas; (6) provide immediate intervention to IDPs until they are able to re-establish themselves in resettlement areas; (7) establish partnership between foreign or international agencies; and (8) establish an information management system (ICDRRMO, 2013).

#### **A.2.2.4. Iligan City Disaster Risk Reduction and Management Plan 2013-2020**

Broad sectors of Iligan constituencies were consulted in the making of the plan ranging from the local government, national line agencies, barangay leaders, civil society organizations (CSO)/NGOs, international non-governmental organizations (INGOs), United Nations (UN) agencies, academe, church, professionals, and business groups (ICDRRMO, n.d., pp. 48-56). The plan has four priority areas with four long-term goals, 14 objectives, 37 outcomes, 83 outputs, and 211 activities.

The four thematic areas of RA 10121 are the priority areas of the ICDRRMP. Aligned with these are its long-term goals and objectives. The plan was anchored on the following legal bases: the *Hyogo Framework for Action*, *Philippine Development Plan*, *National Climate Change Action Plan*, *National DRRM Framework*, and the *City DRRM Plan*. The main implementing agency is the City DRRMO with its head as Vice-Chairperson of the ICDRRMC. The other members and officials of the ICDRRMC are: CENRO as Vice-Chairperson for

Disaster Prevention and Mitigation, City DILG as Vice-Chairperson for Disaster Preparedness, CSWDO as Vice-Chairperson for Disaster Response, and CPDO as Vice-Chairperson for Rehabilitation and Recovery (ICDRMO, n.d., pp. 21-24).

For the funding of the plan, the following sources were recommended for the DRRM programs and projects: (1) General Appropriations Act through the existing budgets of the national line and government agencies, (2) National Disaster Risk Reduction and Management Fund, (3) Local Disaster Risk Reduction and Management Fund, (4) Priority Development Assistance Fund, (5) donor funds, (6) adaptation and risk financing, and (7) Disaster Management Assistance Fund. In addition to these are four non-monetary resources provided by the DRRM Plan that can help realize the targets of the plan. These are community-based good practices for replication and scaling up, indigenous practices on DRRM, public-private partnerships, and networks of key stakeholders on DRR and CCA. Furthermore, the ICDRRMO and the ICDRRMC in particular were mandated to monitor and evaluate the Plan (ICDRMO, n.d., pp. 46-47). Refer to **Table IV.B.3** for details.

**Table IV.B.3. Priority Areas, Long-Term Goals, and Objectives of the ICDRRM Plan**

<b>PRIORITY AREA</b>	<b>LONG-TERM GOALS</b>	<b>OBJECTIVES</b>
Prevention and Mitigation	Avoid hazards and mitigate their potential impacts by reducing vulnerabilities and exposure and enhancing capacities of communities	Reduce vulnerability and exposure of communities in Iligan City to all identified hazards
		Enhance capabilities and collaboration of stakeholders and service providers in the performance of roles and functions in disaster prevention and mitigation
Disaster Preparedness	Establish and strengthen capacities of communities to anticipate, cope and recover from the negative impacts of emergency occurrences and disasters	Increase the level of awareness of the communities, authorities, responders and volunteers, NGOs/POs and other stakeholders to the threats and impacts of natural and human induced calamities/hazards
		Equip the communities, authorities and other stakeholders with necessary knowledge, skills and values in responding to emergencies/disasters
		Formulate and develop a doable, gender and culture sensitive disaster preparedness plan at the city

PRIORITY AREA	LONG-TERM GOALS	OBJECTIVES
		and all barangays
		Establish and install equipment, infrastructure, facilities and systems for Early Warning, communication, information management, rescue, etc.
		Strengthen and sustain partnership and coordination between and among Government, Non-Government, INGOs, UN agencies, CSOs, International Humanitarian Agencies, Church-based organizations (CBOs), academe and others
		To ensure the integrity of infrastructure and buildings
Disaster Response	Provide life preservation and meet the basic subsistence needs of affected populations based on acceptable standards during or immediately after a disaster	To avoid loss of lives and prevention of injuries
		To provide all basic services in accordance with local standards and culture to meet the differing needs of the affected population and vulnerable groups and to activate the cluster system
		To immediately restore basic social services and integrate early recovery activities through debris clearing, emergency livelihood and early restoration of life-saving facilities
Rehabilitation and Recovery	Restore and improve facilities, livelihood and living conditions and organizational capacities of affected communities and reduce disaster risks in accordance with the “building back better” principle	To conduct rehabilitation and recovery needs assessment in all sectors
		To mainstream DRR and CCA in the recovery and rehabilitation plan
		To restore, rehabilitate, improve and enhance basic social services, livelihood and economic activities, infrastructure facilities and

PRIORITY AREA	LONG-TERM GOALS	OBJECTIVES
		ecological sustainability

Source: ICDRRMO, n.d., pp. 5-6.

### A.2.3. Situationer on Iligan City's Recovery

As summarized by a technical staff of the Iligan City Disaster Risk Reduction and Management Office, the following are the initiators, manager, leader, and sources of funds of recovery and rehabilitation efforts after the onslaught of TS Sendong:

**Table IV.B.4. Recovery Initiators, Leaders, Fund Sources, and Rapid Assessment**

Areas	Initiator	Manager/ Leader	Source of Funds	Recovered?
Social recovery	Iligan City & various NGOs, etc.	Housing and Resettlement Office	National government, NGOs, religious organizations, etc.	Not yet – relocation not yet completed
Economic recovery	Department of Agriculture (DA) & Iligan City	DA & Iligan City	DA	Not yet – unemployment
Environmental recovery	Iligan City, Mines and Geo-Sciences Bureau	City Environment and Management Office	Iligan City DRRM Fund	Not yet – IDPs return to dangerous areas
Infrastructural recovery	City Engineer's Office (CEO)	CEO Head	Department of Public Works & Highways	Not yet – repair not yet completed
Institutional recovery	ICDRRMO & Sangguniang Panglungsod	ICDRRMO & ICDRRM Council	ICDRRMO Fund	Not yet – still institutionalizing BDRRMCs

Sources of data: Mejia, interview, May 18, 2014 and Picio, interview, May 18, 2014.

In a general assessment, it was disclosed that the city and its people feel that they have not yet completely recovered from the damages and losses that TS Sendong brought. Roughly three years after, Iligan City is still in the process of acquiring land for relocation sites of internally displaced persons (IDPs). Unemployment of IDPs is still a major concern since some of them were relocated, and some of them have returned to heavily affected/flooded areas. While the silting of the Mandulog River has already been completed, the repair of the damaged bridge is still on-going. The institutionalization of the Barangay Disaster Risk Reduction and Management Committee is still to be fully completed. Finally, flood drills and training have yet to be conducted for all of the barangays (Picio, interview, May 18, 2014).

## A. Barangay Case Studies

Three barangays in Iligan City were selected for case studies. These are Barangays Hinaplanon, Sta. Filomena, and Tubod. They were chosen based on the recommendation of the City Planning and Development Office. Among the three, Hinaplanon is considered the severely damaged barangay by TS Sendong and its floods, followed by Sta. Filomena as moderately damaged, and last, Tubod, as least damaged.

### A.1. Context and the Disaster

#### A.1.1. Geographical Locations of the Barangays

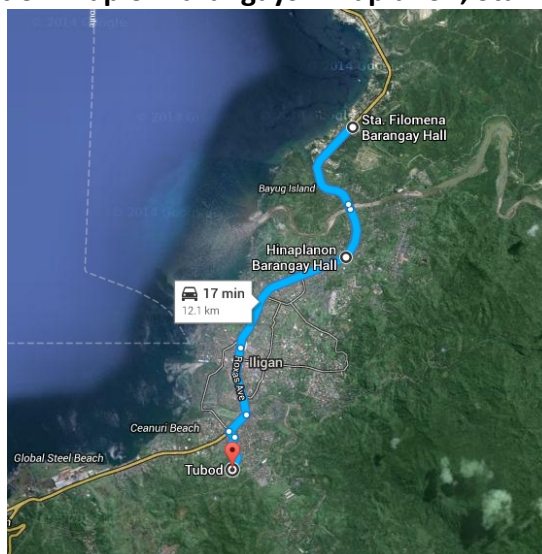
All three barangays are located near the Iligan. Hinaplanon is located in the interior part of the city with an approximate distance of 4.20 km from the city proper. It is bounded on the north by Barangay Sta. Filomena, on the northeast by Barangay Upper Hinaplanon, on the southwest by Barangay Luinab, on the south by Barangay Del Carmen, on the southwest by Barangay Sto. Rosario and Barangay Silang, on the west by Barangay Santiago, and on the northwest by the coastal line of Iligan Bay.

Sta. Filomena is about 6.7 km away from the city proper. It is bounded on the north by Barangay Acmac, on the west by Barangay Bonbon, on the southwest by Barangay San Roque, on the south by Hinaplanon, and on the east by Iligan Bay.

Tubod is located at about 2.10 km from the city proper. It is bounded on the north by Barangay Mahayahay, on the northeast by Barangay Ubaldo; on the southeast by Barangay Tipanoy, and on the west by Barangay Tomas Cabili.

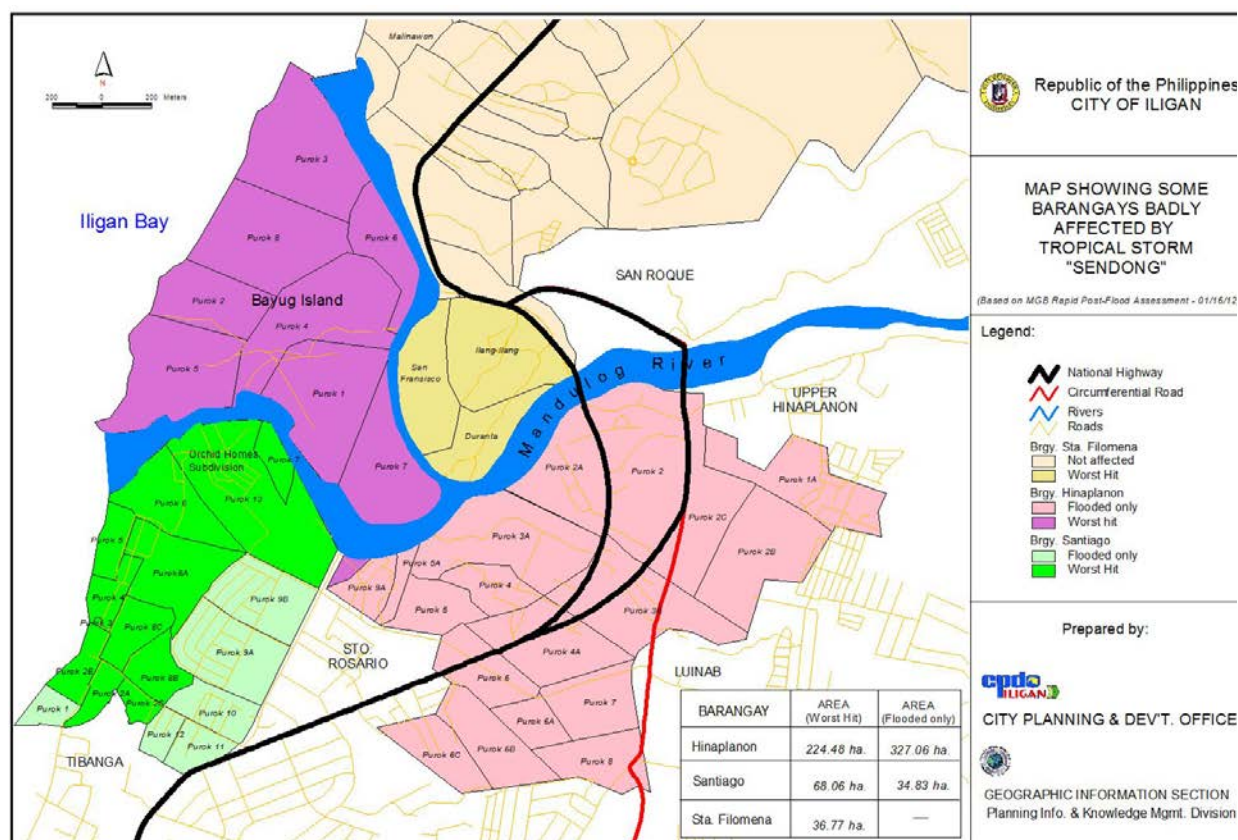
**Picture IV.B.1** shows the locations of the three barangays while **Figure IV.B.4** highlights the inundated areas by the floodwater caused by TS Sendong to Barangays Hinaplanon and Sta. Filomena and Tubod.

**Picture IV.B.1. Location Map of Barangays Hinaplanon, Sta. Filomena, and Tubod**



Source: Google Maps, 2014.

**Figure IV.B.4. Map Showing Some Barangays Badly Affected by Tropical Storm Sendong**



Source: Sheltercluster.org, 2012.

### A.1.2. Casualties and Damages in the Barangays

Among the three barangays, Hinaplanon was the most severely damaged by TS Sendong. Unfortunately, the barangay hall does not have records on the casualties, injuries, missing persons, and damages. All the barangay officials could recall was that all of the houses, including those of the officials and those in Bayug Island, were washed out by the floodwater and logs that came from the mountains. However, from the *Situational Report No. 47* (as of 26 January 2012, 8:00 a.m.) of the NDRRMC, around 140 died from Hinaplanon, including those from Bayug Island. See **Picture IV.B.2**.

**Picture IV.B.2. Barangay Hinaplanon Before and After TS Sendong**



Photo on the left shows a Google map image of Hinaplanon area in Iligan City before Sendong. Photo on the right shows the change in the town's landscape after the typhoon hit (Courtesy of UP-NIGS).

*Source:* Arcangel, 2012.

Like those in Hinaplanon, the residents of Sta. Filomena were awakened by the rumbling sound of water and logs from the mountains on the night of December 17, 2011. First, the water and logs hit the bridge on the Mandulog River. The logs were stopped for a while by the Mandulog Bridge (see **Picture IV.B.3** for the location of the Mandulog Bridge). However, due to the strong force of the water, the bridge broke, let loose all the floodwater and logs which crashed into the houses in Sta. Filomena and Hinaplanon. The floodwater rose as high as 10-15 feet. Seven out of the 26 *puroks* (sub-villages) of Sta. Filomena were inundated. Sixty-eight persons were killed, many were injured, and around 60+ residents went missing (Palafox et al., FGD, May 16, 2014).

Tubod is far from Hinaplanon and Sta. Filomena. That is why it was not affected by the rampaging floodwater and logs that hit the latter barangays. However, floods as high as 1.5 meters inundated the barangay. It caused the death by drowning of one resident. Around 20 persons got injured and one was declared missing. The floods and strong winds caused partial damage to 1,800 houses and complete destruction of 135 houses (Alcuizar et al., FGD, May 16, 2014).

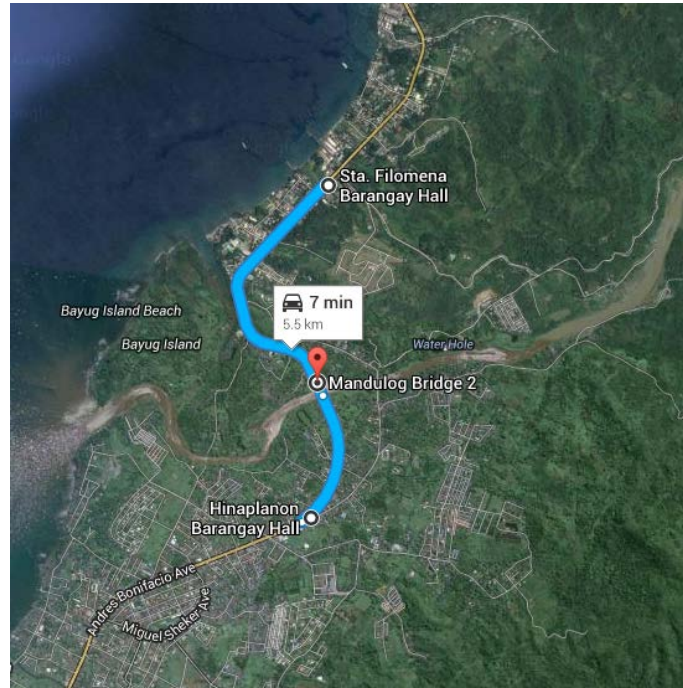
**Table IV.B.5. Inundation, Casualties, and Damages Caused by TS Sendong  
in the Three Barangays**

Barangay	Classi- fication	Inundation		Casualties			Damage to Properties
		Area	Maximum Height of Flood	Death	Injuries	Missing	
Hinaplanon	Severely damaged	100%	No estimate	140	No estimate	No estimate	No estimate
Sta. Filomena	Moderately damaged	100%	10-15 feet	68	Many	60+	Destroyed houses in 7 out of 26 puroks (sub- villages)
Tubod	Least damaged	No estimate	1.5 meters	1	20	1	1,800 houses partially destroyed; 135 houses totally destroyed

*Note:* Except for the number of deaths in Hinaplanon, all data were obtained from FGDs in the barangays.

*Source:* Echavez et al., interview, May 27, 2014; Palafox et al., FGD, May 16, 2014; and Alcuizar et al., FGD, May 16, 2014.

**Picture IV.B.3. Location Map of Mandulog Bridge**



*Note:* The map shows Mandulog Bridge 2. The old Mandulog Bridge, destroyed by TS Sendong, is near it.

*Source:* Google Maps, 2014.

**Picture IV.B.4. The old Mandulog Bridge Washed Out/Destroyed by TS Sendong**



*Source:* Generalao, 2012.

**Picture IV.B.5. Logs that Rolled Out from the Mountains with the Floodwater**



*Source: Generalao, 2012.*

**Picture IV.B.6. Logs that Jammed the Mandulog River Along the Coastal Area of Bayug Island**



*Source: Yap, 2011.*

**Picture IV.B.7. Two Girls from Bayug Island being Rescued from the Logs on the Mandulog River**



*Source: Quijano, 2011.*

## **B.2. Explanations for the Vulnerabilities of the Three Barangays**

### **B.2.1. Geophysical Features**

All three barangays are in a narrow coastal alluvial plain fronting Iligan Bay at the foot slopes of undulating hills and mountains. Their level of elevation is less than 100 meters above mean sea level. They are in built-up areas with pockets of brushland and open/grassland. Their lands are classified as alienable and disposable. The Mandulog River cuts across Hinaplanon and Sta. Filomena and isolates Bayug Island from its mother barangay, i.e., Hinaplanon (LGIC, 2012). Many of their residents are informal settlers (see **Figure IV.B.5**)

### **B.2.2. Exposure to Hazards**

The three barangays are susceptible to various hazards. Among the three barangays, Sta. Filomena has the most number of hazards. According to hazard characterization of various government agencies, Sta. Filomena is vulnerable to flood, landslide, earthquake/ground shaking/liquefaction, and storm/typhoon. Tubod and Hinaplanon have the same kind of hazards, i.e., flood, landslide, liquefaction, and storm/typhoon, but the former has higher probability of landslide than the latter (LGIC, 2012, p. 17-18).

### **B.2.3. Socio-Economic Profiles of the Three Barangays**

Hinaplanon is ranked fourth among the 44 barangays of Iligan City in terms of population growth. As of 2012, it has a total population of 15,967 living in 551.54 hectares (5.5154 sq km). Thus, it has a population density of 29 persons per hectare. It has 3,887 households. The residents are mostly engaged in business and employed in private corporations and

government agencies. There are no existing home-based industries in the barangay but there are 183 business establishments (Barangay Hinaplanon , 2013).

A close neighbour of Hinaplanon, Sta. Filomena has a population of 7,387 in its land area of 503.9 hectares. Its population density is 15 persons per hectare. There are 1,635 households in this barangay. Thirty percent of the total land area of Sta. Filomena is classified as vacant or idle land while 50% is classified as residential (Barangay Sta. Filomena, 2013).<sup>5</sup>

Tubod is ranked first in terms of population - 28,000. With 320.67 hectares land area, its population density is 87 persons per hectare. There are 5,834 households in the barangay. The majority of residents are engaged in commerce and trade. Crops and livestock production are minimal. Some are engaged in backyard gardening for vegetables and fruit-bearing trees. Many are tricycle or triscad drivers (Barangay Tubod , 2013).

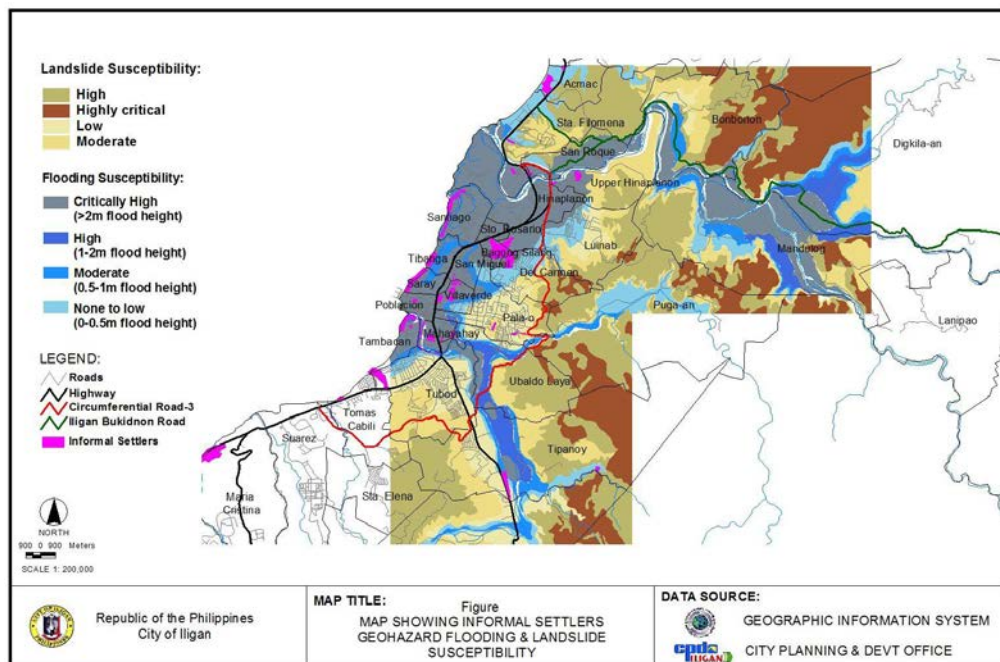
**Table IV.B.6. Overview of the Profiles of the Three Barangays**

Barangay	Biophysical Condition	Exposure to Hazards	Socio-Economic Situation
Hinaplanon	<ul style="list-style-type: none"> <li>- In a narrow coastal alluvial plain fronting Iligan Bay</li> <li>- At the foot slopes of undulating hills and mountains</li> <li>- Elevation is less than 100 meters above mean sea level.</li> <li>- In built-up areas with pockets of brushland and open/grassland</li> </ul>	<ul style="list-style-type: none"> <li>- Flood</li> <li>- Landslide</li> <li>- Earthquake/ground shaking</li> <li>- Liquefaction</li> <li>- Storm/typhoon</li> </ul>	<ul style="list-style-type: none"> <li>- Ranked 4<sup>th</sup> in population growth</li> <li>- The residents are mostly engaged in business and employed in private corporations and government agencies</li> <li>- No existing home-based industries</li> </ul>
Sta. Filomena		<ul style="list-style-type: none"> <li>- Flood</li> <li>- Landslide</li> <li>- Liquefaction</li> <li>- Storm/typhoon</li> </ul>	<ul style="list-style-type: none"> <li>- No data available</li> </ul>
Tubod		<ul style="list-style-type: none"> <li>- Flood</li> <li>- Landslide</li> <li>- Liquefaction</li> <li>- Storm/typhoon</li> </ul>	<ul style="list-style-type: none"> <li>- Ranked no. 1 in population</li> <li>- Majority of the residents are engaged in commerce and trade</li> </ul>

*Sources:* LGIC, 2012; Barangay Hinaplanon, 2013; Barangay Sta. Filomena, 2013; and Barangay Tubod, 2013.

<sup>5</sup> Unfortunately, there are no records for the economic activities in the barangay. According to the incumbent officials, they are still writing the socio-economic profile of their barangay.

**Figure IV.B.5. Map Showing Informal Settlers' Locations in Iligan City**



Source: LGIC, 2012.

### B.3. The Roles of the Barangays and Other Stakeholders in Disaster Recovery and Rehabilitation Efforts

As in other barangays of cities included in this study, it was found from focus group discussions that disaster recovery and rehabilitation is still the least prioritized even more than three years after ST Sendong's devastation. In fact, officials of the three barangays say that their villages have yet to recover, especially in housing. For their other needs like medical expenses, burial expenses, food, etc., the respondents complained about not receiving enough from the local and national governments. They were thankful for assistance from civic-minded business corporations and NGOs (Palafox et al., FGD, May 16, 2014; and Alcuizar et al., FGD, May 16, 2014).

The barangays admitted that the majority of them depend on the city government and NGOs for their housing needs (Palafox et al., FGD, May 16, 2014; and Alcuizar et al., FGD, May 16, 2014). Records show that the city government purchased and developed lands for resettlement sites from the private sectors such as *Gawad Kalinga*, Good Shepherds Sisters, Granexport, Pilmico Foods Corporation, Holcim Cement, Iligan Chamber of Commerce, Answering the Cry of the Poor (ANCOP) International, and *Lig-ong Hiniusang Kusog sa Kabus* (LIHUK)-Iligan. In addition, the city government helped informal settlers acquire lots through the Community Mortgage Program in coordination with the National Housing Authority, Department of Social Welfare and Development, Gawad Kalinga, Habitat for Humanity, Diocese of Iligan, and many others (LGIC, 2012). For an overview of the roles of the various stakeholders on the disaster recovery efforts for Iligan City, see **Table IV.B.7**.

**Table IV.B.7. The Participation of the Barangays, City, NGAs, and NGOs  
in Disaster Recovery Efforts**

<b>Recovery Efforts</b>	<b>Household/ Family</b>	<b>Barangay</b>	<b>City</b>	<b>NGAs</b>	<b>NGOs</b>
Restore the people's means of livelihood and continuity of economic activities and business	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Restore shelter and other buildings/installations	<b>X (shelter only)</b>		<b>X</b>	<b>X</b>	<b>X</b>
Reconstruct infrastructure and other public utilities			<b>X</b>	<b>X</b>	
Assist in the physical and psychological rehabilitation of persons who suffered from the effects of disaster			<b>X</b>	<b>X</b>	<b>X</b>

*Note:* Items in the “Recovery Efforts” column were taken from the “Disaster Recovery and Rehabilitation” section of the *National Disaster Risk Reduction and Management Plan 2011-2028*.

*Sources:* Echavez et al., interview, May 27, 2014; Palafox et al., FGD, May 16, 2014; and Alcuizar et al., FGD, May 16, 2014.

#### **B.4. Disaster-Resilient Community Index**

**Table IV.B.8. Computations of the DRCIs for Hinaplanon, Sta. Filomena and Tubod**

<b>Thematic Areas</b>	<b>Weight</b>	<b>Hinaplanon (Severely Damaged)</b>	<b>Sta. Filomena (Moderately Damaged)</b>	<b>Tubod (Least Damaged)</b>	<b>Average</b>
Governance (GOV)	16%	0.09	0.08	0.09	0.09
Knowledge and Education (KAE)	18%	0.11	0.08	0.10	0.10
Risk Assessment (RAS)	11%	0.10	0.07	0.09	0.09
Risk Management and Vulnerability Reduction (RMVR)	25%	0.10	0.08	0.10	0.09
Disaster Preparedness and Response (DPR)	30%	0.14	0.10	0.12	0.12
<b>Total</b>	100%	0.53	0.42	0.49	0.48

*Note:* For the details of the computations, refer to **Annex II.E.2**.

The three barangays obtained low index values (0.42-0.53), which indicate their seemingly low resilience to disasters. They obtained low scores in all five thematic areas of the DRCI. Among the three barangays, surprisingly, it is not the severely damaged which obtained the lowest index value but the moderately-damaged barangay – Sta. Filomena. Ironically, the severely damaged barangay – Hinaplanon – obtained the highest index value.

#### **B.4.1. Governance**

In GOV, the low DRCI values (0.08-0.09 for a maximum value of 0.16) can be attributed to the absence of local disaster risk reduction and management plans of the Hinaplanon and Sta. Filomena. Officials of both barangays admitted that they do not have plans yet because they are still busy with recovery efforts and they are not knowledgeable on how to write those plans (Echavez et al. 2014), or, in the case of Sta. Filomena, they are still writing another plan because the previous barangay administration did not turn over a copy of their plan to the new set of officials (Palafox et al., FGD, May 16, 2014). On the other hand, Tubod has written, on its own volition and using its own resources, its Disaster Risk Reduction Management Plan (DRRM Plan) supported by a barangay council resolution (Resolution No. 02-02-2014) and funded by its 5% Local DRRM Fund. The plan contains projects, activities, evacuation sites and drills, committees and staff, etc. However, all are meant for disaster risk reduction and response. There are no plans on recovery and rehabilitation. Another major reason for the low scores in GOV is the non-integration of local DRRM plans to the city's comprehensive land use plan, zoning ordinance (ZO), and comprehensive development plan, again, because many barangays do not yet have local DRRM plans. More importantly, the city is still preparing its CLUP, which would serve as the basis for the ZO and the CDP (Mejia, interview, May 18, 2014).

#### **B.4.2. Knowledge and Education**

The low DRCI value in KAE (0.08-0.11 for a maximum value of 0.18) reveals that disaster awareness among the three barangays is low. This is expected because of the absence of Local DRRM Plans (with the exception of Tubod), hence, nothing can be cascaded to the residents for them to prepare for future disasters.

During the FGDs, it was revealed that while barangay officials and residents understand the importance of BDRRM Plans, they said that they do not understand them and the roles they have in its implementation. They also do not know the services and facilities that they could avail of in times of disaster. This is aggravated by the fact that, compared to highly urbanized cities, modern communication gadgets, e.g., television, radio, cellphone, fax machines, telephone, internet news, social media, etc., are limited in Iligan. And, there is no known "indigenous" or "traditional" communication system or practice in the barangays that can be used for early warning (Echavez et al., interview, May 27, 2014; Palafox et al., FGD, May 16, 2014; and Alcuizar et al., FGD, May 16, 2014).

### **B.4.3. Risk Assessment**

The relatively high index values in RAS (0.09-0.10 for a maximum value of 0.11) is due to the fact that there is high awareness of the hazards in the barangays. However, the respondents perceive that no honest-to-goodness risk assessments had so far been conducted in their areas. Or, if they were, they were not involved. Thus, there was no way that they could integrate these assessments in their Local DRRM Plans. Moreover, they think that because risk assessment is highly technical, they are not competent enough to conduct them on their own (Echavez et al., interview, May 27, 2014; Palafox et al., FGD, May 16, 2014; and Alcuizar et al., FGD, May 16, 2014). These observations were echoed predominantly in Sta. Filomena in its DRCI scores.

### **B.4.4. Risk Management and Vulnerability Reduction**

For RMVR, all barangays got low index values (0.08-0.10 for a maximum value of 0.25) due to their inability to reduce their vulnerability in the face of disasters in terms of wise environmental and natural resource management, adoption of social and financial protection measures, and erecting safe physical/structural protection measures (see questionnaires for the details). Specifically, all three barangays pointed out that they do not have insurance or savings for emergencies, alternative livelihoods, they do not know their evacuation centers and routes, and they do not have knowledge about the relevant provisions of the national building code for building houses.

### **B.4.5. Disaster Preparedness and Response**

In DPR, again, the barangays obtained low DRCI index values (0.10-0.14 for a maximum value of 0.30). In general (with the exception of Tubod), in the absence of Local DRRM Plans, there are no early warning systems, communication protocols, and evacuation provisions, procedures and rules for disasters. This is especially true for Hinaplanon and Sta. Filomena which are near the Mandulog River. They just depend on their hindsight and foresight when monitoring the river during rainy seasons. However, all three barangays have equipment to deal with floods and other calamities (Echavez et al., interview, May 27, 2014; Palafox et al., FGD, May 16, 2014; and Alcuizar et al., FGD, May 16, 2014). Sta. Filomena officials, however, complained about the missing equipment they received from the city government and other donors as soon as they assumed their position in October 2013 (Palafox et al., FGD, May 16, 2014).

## **C. Summary of Findings and Analyses**

In this section, the results of the testing of the hypotheses and analyses are presented.

*f. The more exposed a community is to hazards and disasters, the greater is its preparedness for disaster recovery.*

Just like the case in Tacloban City, this hypothesis is refuted in the case of Iligan City's three barangays. The city and the barangays are exposed to many hazards (i.e., flood, landslide, earthquake/ground shaking/liquefaction, and storm/typhoon) and have had disastrous

experiences with them in the past as recorded in the city's *Comprehensive Land Use Plan*. Yet, not one barangay has a disaster recovery plan. Of all the three barangays, it is only Tubod which has a DRRM plan. However, it equates a DRRM plan with a disaster recovery plan. The barangay officials and residents of Sta. Filomena, on the other hand, complain about "politics" for having lost their local DRRM plans and equipment to the previous set of officials who did not turn them over to the new officials.

*g. The more socio-economically developed a community is, the more prepared it is for disaster recovery.*

This is proven true in the situations of the Iligan barangays. Tubod, the least-damaged yet relatively progressive barangay among the three, has a local DRRM plan which it constantly updates even before the occurrence of Sendong. Thus, although there were casualties and damages, they were as not as devastating as those in Hinaplanon and Sta. Filomena. The latter, the moderately-damaged barangay, had local DRRM plans and equipment, yet, all of these were not turned over to the new barangay officials by the past barangay administration due to politics.<sup>6</sup>

*h. The more involved a community in recovery planning and implementation, the faster is its recovery.*

This hypothesis is proven true in an indirect or reverse manner, i.e., the city and its barangays have yet to fully recover and recovery is slow, and the communities are mere "passive" recipients of recovery projects. City government and barangay officials admit that the biggest problem in recovering from Sendong is the relocation of internally displaced families. Until now, not all have been given proper relocation sites and housing. Unfortunately, the barangays could only assist in identifying project beneficiaries but cannot provide financial assistance because their local DRRM funds are hardly enough for themselves.

*i. The more stakeholders involved in disaster recovery, the faster is the recovery of a community.*

This hypothesis has been proven false in the case of Iligan City. Thirty-two months (or two years and eight months as of writing) after Sendong ravaged the city, barangay officials and internally displaced families of Hinaplanon, Sta. Filomena, and Tubod still complain about the shortage of relocation sites and housing for them. This is in spite of the fact that there is no shortage of stakeholders/donors and plans (i.e., Strategic Action Plan for the Rehabilitation and Recovery of the Areas Affected by Tropical Storm Sendong ("Washi") of NEDA ). The inability of the city government to submit technical plans for infrastructure and housing on time to funding agencies which is aggravated by local politics (i.e., non-approval of the city's CLUP due to internal disputes between the incumbent mayor and members of the city council or *Sangguniang Panglungsod*) has been cited as the delaying factor in the speedy recovery of the city.

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<sup>6</sup> Hinaplanon barangay officials did not respond to the request for copies of their local DRRM plans.

j. *The faster the recovery of a community, the more resilient it becomes.*

This is proven true in the case of the barangays in Iligan City, again, in a reverse manner. The barangays and the city have yet to fully recover, and their DRCI values indicate their low resilience. This means that with their lingering housing problem, they feel that they are exposed and, as such, vulnerable to hazards and disasters. As indicated in their low DRCI risk assessment, the vulnerability comes also with their insufficient knowledge of the hazards in their areas.

## Sub-Chapter IV.C

### CASE STUDY ON DAGUPAN CITY

#### A. Context and the Disaster

##### A.1. Profile of Dagupan City

**Table IV.C.1. Overview of the Profile of Dagupan City**

Item	Description
Geographical Location	Northern portion of Pangasinan Province
Year of Establishment	Founded in 1590; attained cityhood on June 20, 1947
Income Classification	2 <sup>nd</sup> class independent component city (of Pangasinan Province)
Political Sub-division	31 barangays
Land Area	44.4 km <sup>2</sup> (17.17 sq mi)
Elevation	Lies only one meter above sea level.
Climate	Type I - it experiences both wet (May-November) and dry seasons (December-April)
Natural Hazards	Earthquakes, ground shaking, liquefaction, coastal erosion, floods, storm surges, and tsunamis
Population (2010)	163,676
Population Density	4,400/km <sup>2</sup> (11,000/sq mi)
Annual Population Growth Rate	2.30%
Society (ethnicity and religion)	Local residents are called "Pangasinenses." Majority are Christian.
Local Economy	Dependent on trade, services, fishing, and aquaculture

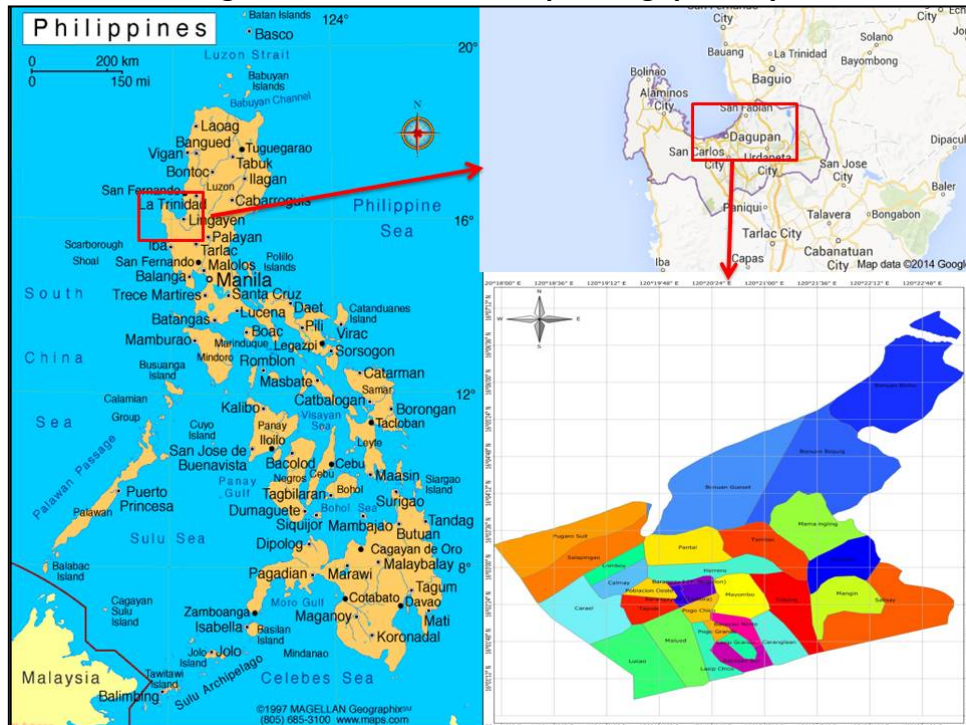
Sources: Dagupan City, 2013 and DCPDO, 2013.

##### A.1.1. Geographical Location of the City

Five hours away via public transport from the country's busiest streets of Metro Manila, Dagupan City lies in the northern portion of Region I's Pangasinan province (see **Figures IV.C.1 and IV.C.3**). It is 212 km from the national capital and is bounded by both bodies of water—that part of the Lingayen Gulf—and land territories that include the municipalities of San Fabian, Calasiao, Mangaldan and Binmaley. Traversing the city is the Sinocalan-Pantal river system. Part of the city's territory are seven other rivers that integrate with the larger

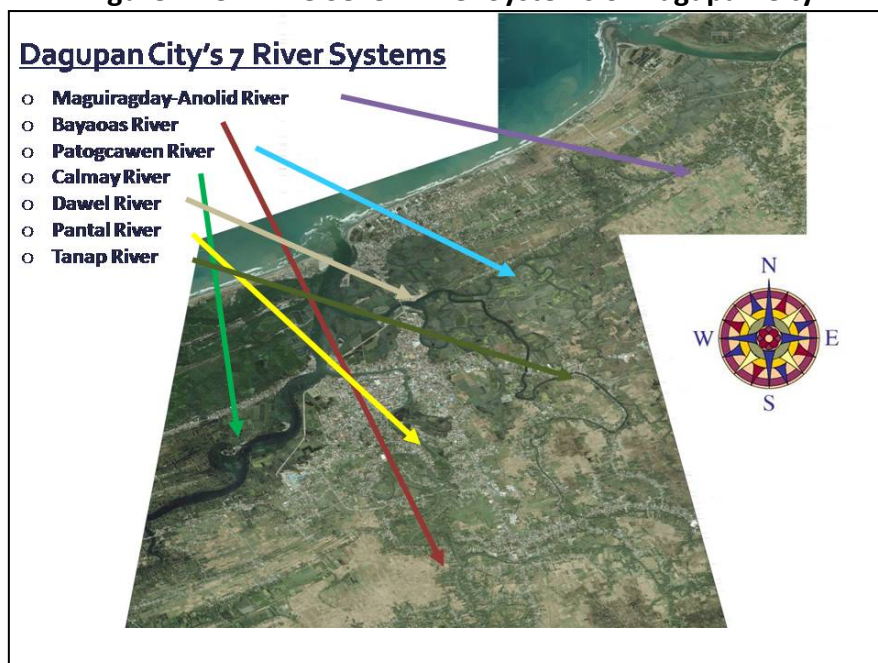
Agno River—these are Magueragday-Anolid River, Bayaoas River, Patogcawen River, Calmay River, Dawel River, Tanap River, and Pantal River (Dagupan City, 2013, p. 5) (refer to **Figure IV.C.2**).

**Figure IV.C.1. Location Map of Dagupan City**



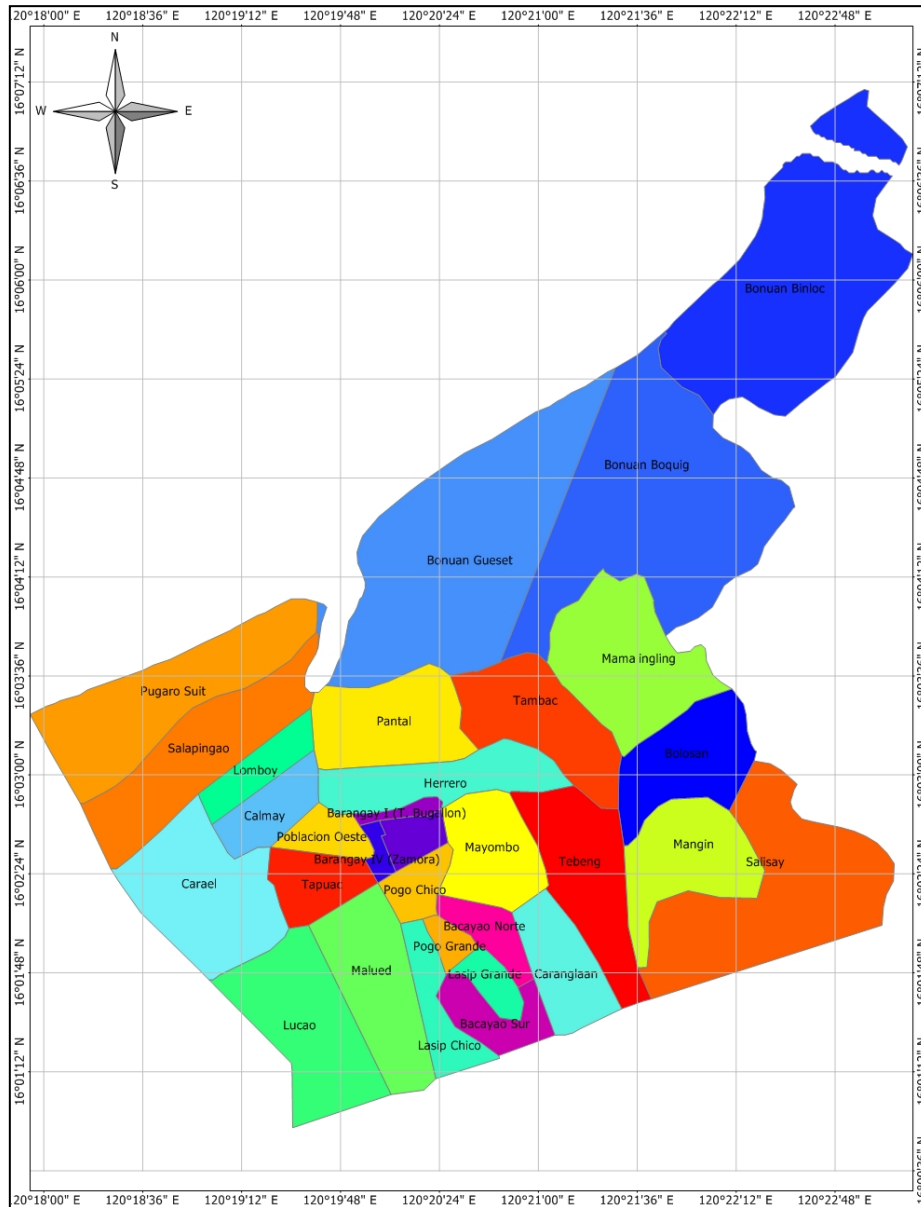
Sources: Infoplease, n.d.; Google Maps, 2014, and Dagupan City map created by the author using Manifold 8.0.

**Figure IV.C.2. The Seven River Systems of Dagupan City**



Source: Carbonell, 2011.

**Figure IV.C.3. Barangay Map of Dagupan City**



*Note:* Created by the author using Manifold 8.0.

### **A.1.2. Geophysical Features and Exposure to Hazards of the City**

Politically and geographically sub-divided into 31 barangays, the city has a total land area of 4,446.43 hectares. Fifty-eight percent of this figure comprises water areas including fish ponds, salt beds, beach sands, swampy areas, rivers and river beds; while 42% is composed of land areas (CDP 2013-2016). While the city is generally a continuously urbanizing one, many of its barangays have remained engaged in the rural practice of agriculture and fisheries. Dagupan's land area is characterized as generally flat terrain "with slopes ranging from zero to three percent" (Dagupan City, 2014). The city lies only one meter above sea level.

The city is exposed to several hazards. Foremost is the 1990 earthquake which affected the entire island of Luzon and caused ground shaking and liquefaction in the city. Many

residential houses and buildings collapsed, titled, or sank. The city is also prone to floods because it serves as a catch basin for run-off from the mountains/highlands of northern Luzon. With the combined low level of elevation and silted rivers and high tide, the streets get flooded easily. Finally, with a low elevation, it is feared that the city can become a victim of tsunamis and storm surges (Dagupan City, 2014). Refer to **Annex IV.C.2** for the hazard maps of the city.

### **A.1.3. Climate**

Dagupan City has a Type I climate which means that it experiences both wet and dry seasons, the former takes place from May to November while the latter from December to April. In April 2012, the city has experienced a maximum temperature of 35.20 degrees Celsius based on records from the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) and by the Dagupan City Planning and Development Office. On the other hand, the lowest temperature for that year was recorded in January at 21.50 degrees Celsius (DCPDO, 2013).

### **A.1.4. Population and Society**

The city has a total population of 163,676 according to the National Statistics Office's (now Philippine Statistical Administration) *2010 Census of Population and Housing*, the latest census the PSA has conducted to date. The total population of the city comprises 5.89% of the total population of the Pangasinan province which is 2,779,862. The city's population density is high at 36.8 people per hectare—a figure that is even slightly higher than its recorded population density of 36 people per hectare in 2000. In 2012, the city registered a total of 36,740 households. Using an annual average growth rate of 2.30%, it is projected that the city's population will balloon to 205,468 by year 2020. Pangasinenses are the major people in Dagupan City who are known to be businessmen and traders (Dagupan City, 2013).

### **A.1.5. Local Economy**

As reported on its recent Comprehensive Development Plan (CDP 2014-2016), the city's local economy is largely dependent on trade and services. Considered as the Pangasinan province's industrial and commercial hub, Dagupan had a total of 5,576 business establishments from 2008 to 2012 based on records from the Department of Trade and Industry (DTI) (PPDO, 2013). Such establishments are classified as coming from the trade sector (42.18%), personal services (51.47%), manufacturing (3.86%), and industrial services (2.49%) (DCPDO, 2013).

Dagupan also highlights its fisheries sector given that the majority of its territory is composed of water bodies. Fishing and aquaculture are the most prominent activities in this sector. Over the years, Dagupan has capitalized on *bangus* (milkfish) as its most popular product and has been actively branding itself as the Bangus Capital of the North and aiming to be the "Bangus Capital of the World." Among its branding mechanisms is the celebration of the month-long Bangus Festival which takes place from April to May each year since 2002 (DCPDO, 2013).

Aside from being an economic and commercial hub of the province, Dagupan is also a medical and educational center of Pangasinan. Out of the 50 hospitals in the province, 11 are located in Dagupan. The city is also home to 14 colleges, 18 vocational schools, three technical learning centers, and private and public elementary and secondary schools (Dagupan City, 2014).

## **A.2. In the Eye of the Storm: Destruction and Recovery Efforts in Dagupan City**

### **A.2.1. Damages Sustained by the City from Tropical Storm Pepeng**

Tropical Storm (TS) Pepeng (international name “Parma”) hit the Philippines on September 29 – October 10, 2009. It officially entered the Philippine Area of Responsibility (PAR) on September 30, 2009 via Northern Mindanao with initial maximum winds of 120 kph (km per hour) and gustiness of 150 kph. During its entire duration in the PAR, TS Pepeng had a maximum center winds of 195 kph with gustiness of 230 kph (NDCC, 2009).

Gaining more strength as it approached Northern Luzon, the tropical storm made its first landfall over the eastern coast of Cagayan (second and third landfalls were in the northern tip of Ilocos Norte and back to the eastern coast of Cagayan). It traversed the areas of Northern Luzon and moved slowly and remained almost stationary over the region (October 3-9, 2009) as it interacted with a low pressure area which later entered the PAR as Typhoon Quedan. Experts noted that the track taken by TS Pepeng was rather unusual, with a case of reversing back as opposed to the regular track of continuously trudging a direction that goes out of the country’s area of responsibility. Due to the tropical storm’s overstaying, affected areas also experienced extended heavy rains which caused the massive flooding across provinces and landslides in some (NDCC, 2009).

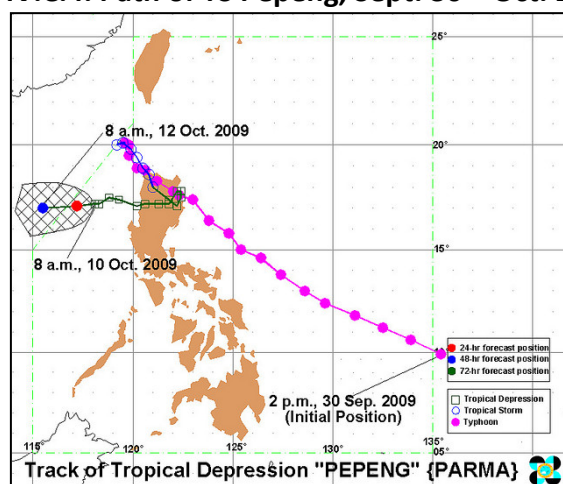
Reports from the National Disaster Coordinating Council (NDCC)<sup>7</sup> indicated that more than 5,000 barangays from 334 municipalities and 33 cities in 27 provinces were affected by the tropical storm (NDCC, 2009). These came from seven regions—Regions I, II, III, V, VI, Cordillera, and NCR. Overall, 954,087 families were affected and casualties reached a total of 719 with 465 deaths, 207 injuries, and 47 missing persons. A total of 61,869 houses were damaged, 11% of which were totally wrecked (NDCC, 2009).

Damages in infrastructure (including school buildings and health facilities) and agriculture hit a total of P27.297 billion, broken down to P 6.799 billion and P20.495 billion, respectively (NDCC, 2009).

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<sup>7</sup> The NDCC was later replaced by the National Disaster Risk Reduction and Management Council (NDRRMC).

**Figure IV.C.4. Path of TS Pepeng, Sept. 30 – Oct. 12, 2009**



Source: PAGASA as cited in NDCC, 2009.

The province of Pangasinan was among the most affected areas by TS Pepeng. The NDCC reported that massive flooding occurred in the province due to the extended heavy rains brought on by the long duration of the tropical storm. Added to the rainwater coming from it is the water from the San Roque Dam. The dam needed to release water through its various gates to ensure that the volume it contains is within its capacity to avoid further and more serious and dangerous problems should the dam break (NDCC, 2009).

Based on the interviews conducted with officials of the city government (Rosario et al., FGD, May 8, 2014) and officials of selected barangays (Parcera et al. 2014, Rosal et al. 2014 and Mejia 2014), the strength of the tropical storm (winds) was “ordinary.” It was really the massive flooding that almost crippled the city. The flooding experienced by Dagupan is a confluence of various sources. As stated earlier, the large volume of water from heavy rainfall from the tropical storm was compounded by the water released from the San Roque Dam (which is also basically a result of the accumulated rainfall caused by the tropical storm) (see **Picture IV.C.1** and **Figure IV.C.5**), and the cyclical tidal rise of the sea surrounding the city. Massive as it is, data from the Dagupan City Disaster Coordinating Council indicated that 100% of the city was flooded and all 31 barangays were covered with floodwater in various degrees. The height of the flood ranged from four to 12 feet, prompting most Dagupeños to ensure their safety by seeking the safest place on the roof of their respective houses. In addition to being deep, floodwaters also had a strong current that was enough to move large objects (such as cars), and pull away and drown people. In fact, the NDCC did not recommend the use of rubber boats because of the depth and strength of the flood (Español, interview, May 8, 2014).

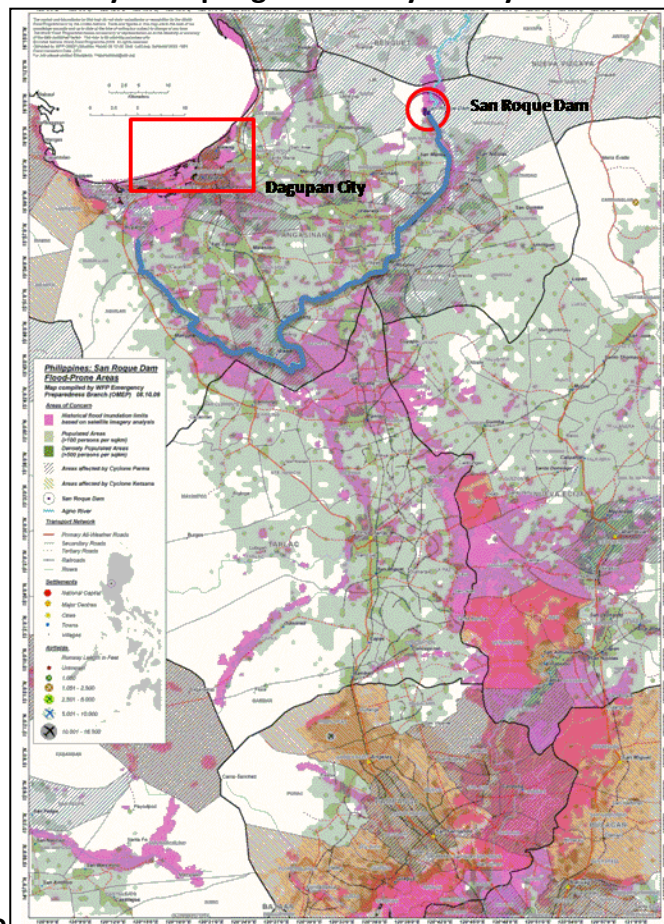
**Picture IV.C.1. The San Roque Dam**



Photo by Willie Lomibao©2013.

Source: Cardinoza, 2013.

**Figure IV.C.5. Areas Affected by TS Pepeng and Ondoy and by the San Roque Dam Water**



Release

Note: Shapes, labels, and the highlighting of the Agno River by the author.

Source: HEWS, 2009.

The 2009 Pepeng flooding is now considered the worst flooding the city (and the province) has ever experienced. It has surpassed the two great floods of 1935 and 1972 both in terms of the height of floodwater and the areas inundated. Like the other areas in the province, Dagupan City did not escape from the wrath of a tropical storm which seemed to enjoy overstay in the country's area of responsibility. Dagupan City experienced massive flooding, power outage, water system failure, agricultural damage, and infrastructure breakdown. Even the Dagupan City Hall which is the center of the government has sustained flooding in some of its offices.

Losses and damages to Dagupan City occurred primarily in its fisheries sector, totaling an estimated P471.5 million. This amount is equivalent to 920 hectares of affected fishponds and 720 units of fishpens and cages (DCDCC, 2009).<sup>8</sup>

Initial estimates released by the city government in terms of damages to structures and infrastructure reached P200 million and these include roads, government buildings, and other facilities. Damage to rice lands and rice crops was estimated at P2 million (DCDCC, 2009).

A total of 32,172 families—or 155,071 individuals—were affected by the flooding and were temporarily housed in 18 evacuation centers, while another 6,000 families or 30,000 individuals were housed in 26 high-rise buildings and private residences located in the city. According to a report available at PreventionWeb.net<sup>9</sup> there is no casualty from the flooding, contrary to the Youtube video prepared by the City's Information Office which indicated three deaths by way of drowning and one missing.<sup>10</sup>

Other effects of the tropical storm and the flooding it caused were power outages for two days and the interruption of water services for at least three days, causing the lack of clean and potable water. Transportation was also interrupted in the city as a result of the flooding and the damage to bridges and dikes in nearby municipalities, thus making response and relief efforts more difficult (Español, interview, May 8, 2014).

**Table IV.C.2. Damages and Casualties Caused by TS Pepeng to Dagupan City**

Sector	Damages/Losses/Casualties
Effects to People	
Death	0-3
Missing	0-1
Injury	n.d.
Damages to Housing	
Total destruction	Flooded
Partial destruction	Flooded

<sup>8</sup> This report relied heavily on the damage assessment report of the City Disaster Coordinating Council dated October 13, 2009.

<sup>9</sup> The report was an accomplished nomination form for the "Model Cities and Local Governments" submitted to the UNISDR. The nomination for Dagupan City is available at [http://www.preventionweb.net/files/section/230\\_DagupanNominationfortheweb.pdf](http://www.preventionweb.net/files/section/230_DagupanNominationfortheweb.pdf).

<sup>10</sup> The Youtube video can be found at the following links: Part 1: <http://www.youtube.com/watch?v=LbD8dlB3SjA>; Part 2: <http://www.youtube.com/watch?v=So0eJalyVs>.

Sector	Damages/Losses/Casualties
Damages to Infrastructure	
Hospitals	Flooded
Clinics, etc.	Flooded
Schools	Flooded
Public buildings	Flooded
Damages to Local Economy	
Businesses	n.d.
Agriculture	n.d.
Fishing	Worth P471.5 million
Tourism	n.d.
Public utilities	
Energy	2-day interruption
Water	3-day interruption
Communication	Not affected
Transportation	Interruption

*Note: n.d.* – no data available at the time of writing.

*Sources:* DCDCC, 2009.

**Picture IV.C.2. The Flooded A. B. Fernandez Street**



Photo by A. Boyette.

*Source:* Panoramio, 2009.

**Picture IV.C.3. Downtown Dagupan flooded after Tropical Storm Pepeng**



Photo by Eugenio Carlos Paragas.

Source: Flickr, 2009.

### **A.2.2. Disaster Recovery and Rehabilitation Efforts in the City**

Dagupan's path to rehabilitation and recovery would have been difficult had it been less prepared in facing the wrath of a tropical storm that imposed its power over the whole of Northern Luzon. Fortunately, Dagupan was ready to face this kind of ordeal with the preparations it had undertaken prior to the arrival of this natural monster. While disaster preparedness is closer to risk reduction than to rehabilitation and reconstruction, the case of Dagupan is something that cannot isolate preparedness to recovery. This is primarily because the quality of preparedness a city has is inversely proportional to the amount of effort it has to undertake to rehabilitate and fully recover—that is, the more prepared, the less the effects, the less the damage to address.

#### **A.2.2.1. Program for Hydro-Meteorological Disaster Mitigation in Secondary Cities in Asia**

Among the risk reduction and preparedness mechanisms undertaken by the city are capacity building, and the more active participation and involvement of the citizenry in the process. Dagupan City benefitted through the PROMISE (Program for Hydro-Meteorological Disaster Mitigation in Secondary Cities in Asia) Project (implemented by the Center for Disaster Preparedness or CDP) in Dagupan City<sup>11</sup> (as the local partner) with the support of the Asian Disaster Preparedness Center (APDC) as overall coordinator, and USAID as the funding agency. This project aimed to “reduce vulnerability of urban communities through

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<sup>11</sup> Other pilot cities in this program included Chittagong in Bangladesh, Hyderabad (Sindh) in Pakistan, Kalutara in Sri Lanka, and Da Nang in Vietnam.

enhanced preparedness and mitigation of hydro-meteorological disasters” (Dagupan City, 2013, p. 11). The project was able to train representatives from eight pilot barangays<sup>12</sup> in Dagupan and this has increased their capacity and knowledge, as well as their consciousness and involvement in disaster preparedness. The implementation of the PROMISE project in the city was an impetus that finally made Dagupan take the path of disaster mitigation (Carbonell, 2008).

#### **A.2.2.2. Emergency Operations Center and the “Culture of Safety”**

Aside from capacity building, Dagupan City has also embraced the concept of a “culture of safety” as a response to its vulnerability to various risks and disasters, including sea level rise, tropical storms and flooding, earthquakes, storm surges, and even tsunamis. Particularly focusing on one of the most vulnerable members of the city’s population, the city has partnered with schools to teach children about this “culture of safety” by means of conducting drills. Such a culture has been institutionalized in the city by way of a resolution (No. 5469-2006) that has adopted July 16 of every year as “Dagupan City Disaster Preparedness Day.” In 2007, the city reinforced priority to disaster risk reduction through the passing of an ordinance (No. 1908-2007) by the *Sangguniang Panlungsod* (City Council) that created the Emergency Operations Center (EOC) of Dagupan City.

Thus, even before the advent of TS Pepeng, many of the city’s residents had embraced the “culture of safety” and they willingly evacuated to safer areas (of course, those who did not were an exception. This has been noted during the FGDs conducted with the officials and citizens of three select barangays, namely Barangay Uno (1), Pantal, and Bonuan Gueset. According to them, the “culture of safety” has become part of their lives, not only because the city government has embraced it, but also because they are used to such disasters as they experience the same even in the case of something as simple as a sea level rise (high tide).

Specifically in the case of TS Pepeng, the city’s preparations came in the form of equipping the evacuation centers, conducting inventory of response assets and resources, as well as inventory of medicines. During the focus group discussion (May 2014) conducted for this research, the representative from the city’s Social Welfare Office indicated that there has not been much problem in the management of the evacuation centers. The FGD indicated that the problem encountered—and now a lesson learned—is the management of space within the evacuation centers to address special needs such as breastfeeding, among others.

#### **A.2.2.3. Typhoon Pepeng Fisheries Rehabilitation Plan**

Because fisheries were the most affected among all the sectors in the city—and many of the city’s population have fisheries for their livelihood—it was also rational to focus rehabilitation efforts in this sector. Thus, a “Typhoon Pepeng Fisheries Rehabilitation Plan” was pushed by the Office of the City Agriculture to reduce the stress absorbed by the sector

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<sup>12</sup> The eight barangays were Mangin, Salisay, Tebeng, Bacayao Norte, Bacayao Sur, Lasip Chico, Lasip Grande and Pogo Grande.

and the constituents who rely on it such as fishermen, fish vendors, port employees, etc. The plan proposed a budget of almost P114 million for reconstruction of fishpens, purchase of fingerlings, subsidy for feeds, repair of damaged dikes and gates, and purchase of nets and other fishery implements. In December 2009, an initial support estimated at P3.5 million<sup>13</sup> reached the Office of the Agriculture. Still part of the rehabilitation plan, the city received a total of 278,000 bangus fingerlings (roughly P19.5 million at P7/fingerling) from the Food and Agriculture Office – United Nations Development Programme that benefitted 211 fisherfolk from 13 barangays of Dagupan.

Efforts to rehabilitate the city after the massive flooding (or even as it strikes) were a confluence of many actors. While the local government is in the lead in terms of managing the evacuation of its citizens, other actors including the national government, non-government organizations, other local governments, the private sector, and elected national officials joined hands to bring Dagupan (as well as other affected areas) back to normalcy.

### **A.2.2.3. Assistance from Various Sectors**

The Local Water Utilities Administration, which is part of the national government structure, has brought in two tankers which provided potable water to two barangays in the city. Manila Water, a private company, and a local firefighter volunteer group called “Panda” provided trucks which ensured the availability of clean and potable water for the affected citizens. The Philippine National Red Cross, a non-government and non-profit organization, also caused the installation of two chlorinated tanks to ensure that drinking water is free of bacteria to avoid diseases, particularly among children. At that time, then President Gloria Macapagal-Arroyo ordered the installation of a water treatment facility which allowed the conversion of water from the river to potable and safe drinking water. Reports from the DCDCC indicated that the facility can process 4,000 liters of water per hour and it served as a temporary source of water for many of the affected Dagupeños.

Solving the problem on power outages was, of course, lodged with the private sector, the Dagupan Electric Corporation. Looking at the report of the DCDCC, there seemed to be a strong coordination between the company and the local government. Information from the city government indicated that power outages were solved within two days in some of the barangays while it lasted for a few more days in others.

All these are extremely short-term measures that address the problems immediately occurring after the tropical storm. In fact, such measures can be considered as approaches that lie between disaster response and rehabilitation. Nonetheless, these stop-gap measures can surely be considered as efforts to rebuild and bounce back, and thus start of the longer rehabilitation and recovery process.

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<sup>13</sup> The amount is an estimate by the author based on the P 7/fry cost as provided in the rehabilitation plan and on the number of bangus fry received in December 2009 which is at 498,149 pieces. The document did not indicate the source of in-kind resources.

### A.2.3. Situationer on Dagupan City's Recovery

Social recovery of the citizenry took place two weeks after the onslaught of the catastrophe. This is according to the department heads who attended the FGD conducted for this research. Two weeks was what it took for the citizens—the majority are informal settlers—to be able to go back to their respective residents. From another perspective, recovery from TS Pepeng was a continuous process. Provision of housing (occupancy), for example, took place in March 2012 where many of the families affected by Pepeng were the beneficiaries of a free housing unit each through the Bangusville, a joint project of the city government and the Philippine National Red Cross (Rosario et al., FGD, May 8, 2014).

In terms of economic recovery, drivers, street vendors, and other trades were back to normal as soon as the flood waters subsided. Transportation within the city also became normal immediately after the waters receded. In the economic sector, the fisheries sub-sector was seen as the most affected and it took months before it fully recovered. From the quick assessment conducted by the city government's department heads who attended the FGD, the fisheries sector was able to recover after three months (Rosario et al., FGD, May 8, 2014).

Environment has been a long-standing problem in the city because rivers surrounding the city are already silted. Thus, environmental recovery in this aspect has been a continuous process and has been in place years before the arrival of TS Pepeng. The FGD noted that the rivers have undergone dredging several times. Currently, efforts at dredging the river remain to improve its absorption capacity and reduce flooding in the city (Rosario et al., FGD, May 8, 2014).

As for infrastructural problems, the city suffered from structures and infrastructure which include roads, government buildings, and other facilities. The City Engineer's Office (CEO) led the rehabilitation or reconstruction of the public infrastructures. It took them two years to do their work. Private structures were repaired by the owners (Rosario et al., FGD, May 8, 2014).

In terms of institutional recovery, the FGD indicated that the city government and its different departments were intact and operational before, during, and after the disaster (Rosario et al., FGD, May 8, 2014). Thus, institutional recovery is something that is not applicable to discuss.

**Table IV.C.3. Recovery Initiators, Leaders, Fund Sources, and Rapid Assessment**

<b>Areas</b>	<b>Initiator</b>	<b>Manager/ Leader</b>	<b>Source of Fund</b>	<b>Recovered?</b>
f. Social recovery	Dagupan City – City Social Work & Development Office (CSWDO), City Health Office (CHO) and Philippine	CSWDO & other department heads	City budget, national government	Within two weeks – resettlement of internally displaced families

Areas	Initiator	Manager/ Leader	Source of Fund	Recovered?
	Red Cross (PRC)			
g. Economic recovery	Dagupan City-CSWDO, City Administrator's Office (CAO), City Engineer's Office (CEO), PRC, International Federation of Red Cross	City Mayor , CAO, PRC-Pangasinan Chapter	City budget	Within three months – fishery and service sectors
h. Environmental recovery	Dagupan City-CSWDO, City Agriculture Office (CAgO)	CEO, City Disaster Risk Reduction & Management Office	City budget	Within three to six months - Silted river a continuing problem
i. Infrastructural recovery	Dagupan City-CEO	Office of the City Mayor, CEO	City budget, 5 % Calamity Fund, PRC, UNDP, International Organization of Migration	Range from 1 month, 6 months and up to 2 years
j. Institutional recovery	Was not a problem Effects of the typhoon negligible			

Sources: Rosario et al., FGD, May 8, 2014.

## B. Barangay Case Studies

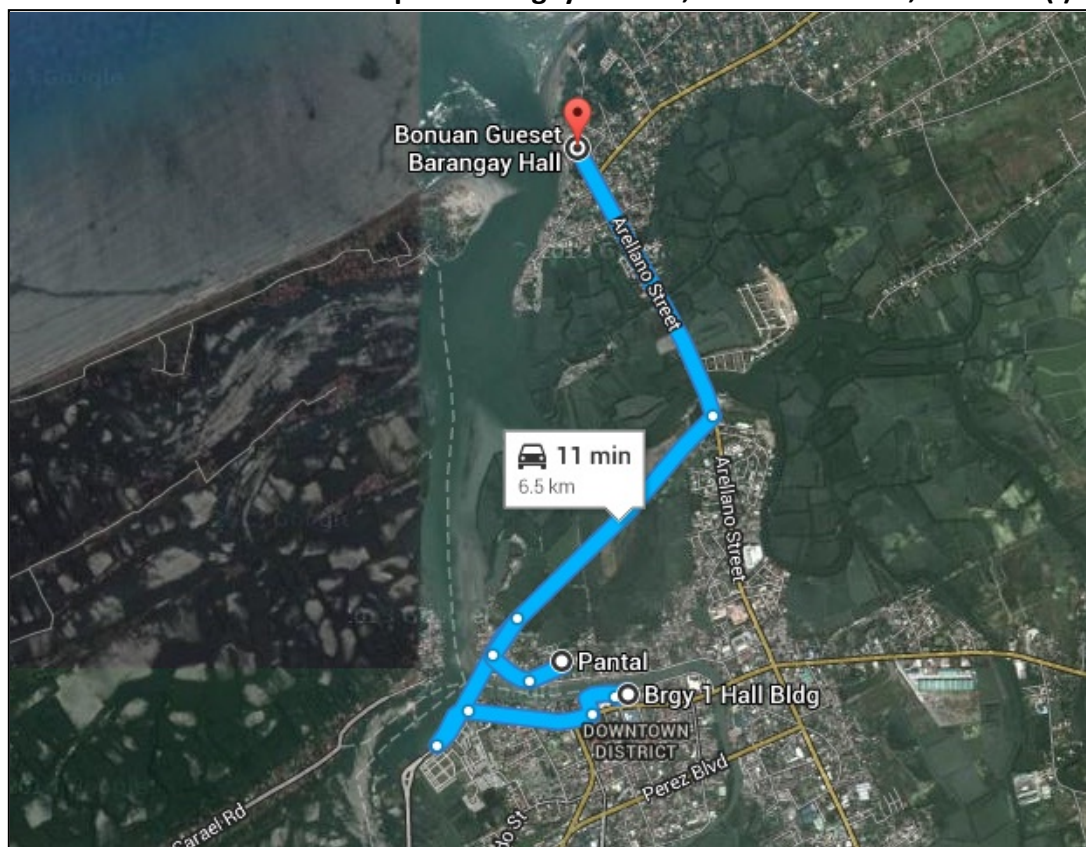
For Dagupan City, Barangays Pantal, Bonuan Gueset, and Uno (I) were recommended by the City Disaster Risk Reduction and Management Office (CDRRMO) for inclusion in this study as severely-damaged, moderately-damaged, and least-damaged barangays, respectively, by the week-long continuous rain caused by TS Pepeng. They were classified as such based on the maximum flood level rise, damages, and injuries. Casualties were no longer considered because the city had zero casualties after the onslaught of TS Pepeng.

### B.1. Context and the Disaster

#### B.1.1. Geographical Locations of the Barangays

Barangays Uno (I) and Pantal are at the center of the city and lie at the river bank of the Pantal River. They face each other on both sides of the river. On the other hand, Bonuan Gueset is located at the northern coastal area facing the Lingayen Gulf. It is also surrounded by water from the Bonuan River (see **Picture IV.C.4**).

**Picture IV.C.4. Location Map of Barangays Pantal, Bonuan Gueset, and Uno (I)**



Source: Google Maps, 2014.

### **B.1.2. Casualties and Damages in the Barangays**

Barangay Pantal, just like Barangay Uno (I), is at the river bank of the silted Pantal River. Hence, when the river swelled after TS Pepeng brought heavy volume of rain water, 100% of the barangay's land area was inundated by floods which reached up to the first floor of houses. Luckily, no one died, or went missing. However, a few got minor injuries but there are no records for the count. In addition, 20% of the houses got partially damaged, while around 10% got totally damaged by the strong winds (Parcera et al., FGD, May 9, 2014).

**Picture IV.C.5. The Overflowing of Pantal River Under the Pantal Bridge on the Side of Barangay Pantal during the Onslaught of TS Pepeng**



Source: WN News, 2009.

**Picture IV.C.6. A Car Submerged in the Flooded Nable Street, Barangay Pantal**



Photo by Genecarl.

Source: Flickr, 2009.

The residents of Barangay Bonuan Gueset cannot forget what happened when TS Pepeng hollered with strong winds. That day many roofs were blown away especially in Sitio Sabayan, which is situated near the Lingayen Gulf. They are used to floods caused by high tide but it was their first experience of chest-deep floods which inundated around 50% of their barangay. There were no casualties, injuries, or missing persons reported, but residents estimated that 40% of the houses were damaged (Santillan et al., interview, May 10, 2014).

Barangay Uno (I) was the least damaged among the three barangays. Like Pantal, which is at the river bank of Pantal River, 100% of the barangay's land area got flooded by 5 to 6 feet of water which led to the evacuation of 70% of the residents to designated evacuation centers, i.e., the barangay hall, barangay outpost, West Central Elementary School, and nearby hotels such the popular Star Plaza Hotel and its Star Value Inn. Around 70% of the houses in the barangay were damaged (Rosal et al., FGD, May 9, 2014).

**Picture IV.C.7. Overflowing Pantal River on the Side of Barangay Uno (I)**



Photo by Genecarl.

Source: Flickr, 2009.

**Picture IV.C.8. The Flooded Magsaysay Road in Barangay Uno (I) caused by the Overflowing of Pantal River**



Photo by Joriz.

Source: Demotix, 2009.

**Table IV.C.4. Inundation, Casualties, and Damages Caused by TS Ondoy in the Three Barangays**

Barangay	Classification	Inundation		Casualties		Damage to Properties
		Area	Maximum Height of Flood	Death	Missing	
Pantal	Severely damaged	100%	up to the first floor of houses	0	0	20% of houses had partial damages, 10% got totally damaged
Bonuan Gueset	Moderately damaged	50%	chest-deep flood	0	Few (no official count)	Around 50% of the houses were damaged
Uno (I)	Least damaged	100%	5 to 6 feet of water	0	0	Around 70% of the houses were damaged

Sources: Parcera et al., FGD, May 9, 2014; Rosal et al., FGD, May 9, 2014; and Santillan et al., interview, May 10, 2014.

## **B.2. Explanations for the Vulnerabilities of the Three Barangays**

### **B.2.1. Geophysical Features**

Barangays Uno (I) and Pantal are at the center of the city and lie at the river bank of the Pantal River. They face each other on both sides of the river. On the other hand, Bonuan Gueset is located at the northern coastal area facing the Lingayen Gulf (see **Figure IV.C.1**).

The terrains of the three barangays are mostly flat with parts that are mildly sloping. Some parts of Bonuan Gueset are swampy. All three barangays have two to three meters of elevation. Their land areas are sub-divided into nine general areas, namely: agriculture (i.e., fishponds and croplands), residential, commercial, industrial, institutional, parks and playground, open spaces, roads, and water bodies (DCPDO, 2013).

### **B.2.2. Exposure to Hazards**

The hazard and risk mappings conducted for the city reveal that the three barangays are susceptible to combinations of the following hazards: floods, earthquakes, ground shaking, ground rupture, liquefaction, tsunamis, storm surges, and sea level rise (see hazard maps in **Annex III.C**).

Being a coastal city where seven river systems pass through, Dagupan City serves as a catch basin of waters coming from the Central Luzon highlands which exits through the Pantal-Sinocalan River. Because of its unique topography and the Pantal-Sinocalan basin drainage character, the city is frequently devastated by the unparalleled city-wide flooding due to typhoons, receiving record amounts of water from the huge volume of rainfall and dam releases from upstream, further aggravated by the onset of high tide. All three barangays are susceptible to floods caused by the factors mentioned above (Dagupan City, 2014).

Dagupan City is one of the major cities gravely affected by the 1990 Luzon Earthquake. It is but only one of the many earthquakes that severely affected the city as recorded by the Philippine Institute of Volcanology and Seismology (PHIVOLCS). From earthquake records of Dagupan compiled by PHIVOLCS since 1985, it has been concluded by the latter that the city is prone to the hazards posed by earthquakes. These hazards may include ground shaking, liquefaction, landslides, ground rupture, and tsunami. Hence, the three barangays are, by default, prone to these hazards (Dagupan City, 2014).

The city has already experienced storm surges. On November 27, 2007, TS Mina brought strong winds which triggered big waves and rising tide level. These factors complicated the situation along the coastal areas and the area of fishpens immediately located at the river mouth in Bonuan Gueset (Sabangan area). The strong currents of water caused by big waves from the sea and the rising tide entered the river mouth and clashed with the Dawel River water which was the exit of the Eastern Barangay river water tributaries. Fishpens located near the area where Dawel and Pantal river intersected were worst hit with 97% of stocks damaged (Dagupan City, 2014).

Located just below the Lingayen Gulf and characterized by low land elevation of two meters, Dagupan is the most vulnerable area to sea level rise not just in the province of Pangasinan, but in the Philippines as a whole. Barangays along the coastal area and river banks are the most susceptible to the effects of sea level rise. Bonuan Gueset is easily susceptible to this threat and, due to the river systems in the city, Pantal and Uno (I) are also vulnerable to the same threat (Dagupan City, 2014).

**Picture IV.C.9. Tsunami Warning Siren Installed near the Barangay Hall of Bonuan Gueset**



### **B.2.3. Socio-Economic Profiles of the Three Barangays**

Among the three barangays, Pantal, the severely damaged, is the most densely populated. Its population is 5,184.79 persons per sq km. Its total population, as of 2010, was 16,835 who live in 3.25 sq km land area. Forty percent of the employed individuals are fisherfolk and another 40% are professionals. The remaining 20% are skilled workers (Parcera et al., FGD, May 9, 2014). The residents are mostly Pangasinense, Tagalog, and Muslim.

Bonuan Gueset, the moderately damaged barangay, has a lower population density compared to Pantal. Its population density is 4,386.34 persons per sq km because it had 16,835 residents, as of 2010, living in a land area measuring 4.8576 sq km. The majority (80%) of residents are fisherfolk while the remaining 20% are professionals (Manuel, 2014). Like in Pantal, the majority of residents are Pangasinense and Tagalog, coming in third are Ilocanos (Santillan et al., interview, May 10, 2014).

Barangay Uno (I), the least damaged, has the lowest population (784 as of 2010) and a small land area (0.1107 sq km). Thus, its population density is 70.82 persons per sq km. Due to its location in the central business district, the majority of residents are employed professionals or service workers (estimated at 80%) while the rest are fisherfolk (10%-20%) (Rosal et al., FGD, May 9, 2014).

**Table IV.C.5. Overview of the Profiles of the Three Barangays**

Barangay	Geographical Location	Biophysical Condition	Exposure to Hazards	Socio-Economic Situation
Pantal	At the center of the city and lie at the river bank of the Pantal River	- generally flat terrain with parts that are mildly sloping	<ul style="list-style-type: none"> <li>- Floods</li> <li>- Earthquake</li> <li>- Ground shaking</li> <li>- Ground rupture</li> <li>- Liquefaction</li> <li>- Tsunami</li> <li>- Storm Surge</li> </ul>	<ul style="list-style-type: none"> <li>- Highest population density among the three barangays</li> <li>- Middle- to low-income families</li> </ul>
Bonuan Gueset	At the center of the city and lie at the river bank of the Pantal River	- generally flat terrain with parts that are mildly sloping; swampy	<ul style="list-style-type: none"> <li>- Floods</li> <li>- Earthquake</li> <li>- Ground shaking</li> <li>- Ground rupture</li> <li>- Liquefaction</li> <li>- Tsunami</li> <li>- Storm Surge</li> </ul>	<ul style="list-style-type: none"> <li>- Low- to middle-income residents</li> <li>- Majority are employed in the fishing industry</li> </ul>
Uno (I)	Located at the northern coastal area facing the Lingayen Gulf and surrounded by the water flowing from the Pantal River	- generally flat terrain with parts that are mildly sloping	<ul style="list-style-type: none"> <li>- Floods</li> <li>- Earthquake</li> <li>- Ground shaking</li> <li>- Ground rupture</li> <li>- Liquefaction</li> <li>- Tsunami</li> <li>- Storm Surge</li> </ul>	<ul style="list-style-type: none"> <li>- Lowest population density due to few residents</li> <li>- Low- to middle-income residents</li> <li>- Residents are employed as professionals, service workers, or fishermen</li> </ul>

*Sources:* Parcera et al., FGD, May 9, 2014; Rosal et al., FGD, May 9, 2014; and Santillan et al., interview, May 10, 2014.

### **B.3. The Roles of the Barangays and Other Stakeholders in the Disaster Recovery and Rehabilitation Efforts**

In the FGDs and interviews conducted in the three barangays (Parcera et al., FGD, May 9, 2014; Rosal et al., FGD, May 9, 2014; and Santillan, interview, May 10, 2014), it was revealed that recovery and rehabilitation is the least of their concerns in the aftermath of disasters. They have all been prepared for disaster prevention and response, hence, the barangay officials see themselves more as “first responders” to rescue people and provide relief

assistance. Recovery is treated as an individual responsibility, rather than a collective undertaking with the barangay as lead organization. However, in times of disasters, it was noted that Dagupuenos help other at the community level through what is known as “bayanihan” (i.e., good neighborliness) (Parcera et al., FGD, May 9, 2014; and Rosal et al., FGD, May 9, 2014). Examples of these are illustrated in helping neighbors fix their damaged houses, lending capital to re-start business (especially for fisherfolk and farmers whose livelihoods were destroyed, partially or totally, by the storm. They expect their local government and national government agencies to provide assistance. And, they surely appreciate financial assistance from international and national humanitarian NGOs like the Tsu-Chi Foundation (Parcera et al., FGD, May 9, 2014; and Rosal et al., FGD, May 9, 2014).

On the part of city government officials (Rosario et al., FGD, May 8, 2014), they see barangays playing various roles in disaster recovery and rehabilitation. First, they are seen as first responders immediately after a disaster has struck because they are at the ground level – closest to the people (which is actually more a disaster response than recovery and rehabilitation). Second, they are seen as coordinators of recovery and rehabilitation activities because being at the ground level, barangay officials are in the best position to make immediate damage assessment and recommend proper actions to higher level authorities. Hence, it is suggested that they should have household databases. Third, they are perceived as partners for bottom-up planning. And last, city government officials perceive them as end-users of disaster recovery and rehabilitation programs and projects. However, they admit that not all of these roles can be fulfilled. They have tried empowering eight pilot barangays to fulfil these roles through Project PROMISE but only one of them, so far, has succeeded – Barangay Mangin which has received a Regional Kalasag Award in 2012 for its early warning system and 3-dimensional (3D) map (Rosario et al., FGD, May 8, 2014) (which is again actually about disaster response, not recovery and rehabilitation. See “Recovery and Rehabilitation Efforts of the City” for more details about Project PROMISE).

As for the roles of other stakeholders, the city government officials believe that disaster recovery and rehabilitation is mainly a primary function of the city because it is their responsibility to their people as enunciated in the 2010 DRRM Law. However, given that some disasters are too big for one local government to handle alone, they believe that external assistance from national government agencies, NGOs, international and national humanitarian organizations should be welcomed (Rosario et al., FGD, May 8, 2014).

**Table IV.C.6. The Participation of the Barangays, City, NGAs, and NGOs in Disaster Recovery Efforts**

<b>Recovery Efforts</b>	<b>Household/ Family</b>	<b>Barangay</b>	<b>City</b>	<b>NGAs</b>	<b>NGOs</b>
Restore the people means of livelihood and continuity of economic activities and business	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Restore shelter and other buildings/installations	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

Recovery Efforts	Household/ Family	Barangay	City	NGAs	NGOs
Reconstruct infrastructure and other public utilities			X	X	X
Assist in the physical and psychological rehabilitation of persons who suffered from the effects of disaster			X	X	X

*Note:* Items in the “Recovery Efforts” column were taken from the “Disaster Recovery and Rehabilitation” section of the *National Disaster Risk Reduction and Management Plan 2011-2028*.

*Sources:* Parcera et al., FGD, May 9, 2014; Rosal et al., FGD, May 9, 2014; and Santillan et al., interview, May 10, 2014.

**Table IV.C.6** summarizes how the barangay officials and residents feel about disaster recovery. When it comes to restoring people’s livelihood and houses, they feel that all should help, i.e., it is the primary responsibility to rebuild their houses and look for jobs if their homes have been badly affected by the disaster. However, they feel that all should help in whatever way they can in providing houses and jobs to the poorest sectors of the society. For the reconstruction of infrastructure and other public utilities and in providing psycho-social support to disaster victims, they said that the families and baranagys do not have the competence to undertake these activities. Again, those with capabilities, they said, should help (Parcera et al., FGD, May 9, 2014; Rosal et al., FGD, May 9, 2014; and Santillan, interview, May 10, 2014).

#### B.4. Disaster-Resilient Community Index

**Table IV.C.7. Computations of the DRCI for Pantal, Bonuan Gueset, and Uno (I)**

Thematic Areas	Weight	Barangay			Average
		Pantal (Severely-Damaged)	Bonuan Gueset (Moderately-Damaged)	Uno (I) (Least-Damaged)	
Governance (GOV)	16%	0.13	0.13	0.13	0.13
Knowledge and Education (KAE)	23%	0.13	0.14	0.14	0.14
Risk Assessment (RAS)	9%	0.03	0.07	0.07	0.06
Risk Management and Vulnerability Reduction (RMVR)	23%	0.15	0.16	0.16	0.16

Thematic Areas	Weight	Barangay			Average
Disaster Preparedness and Response (DPR)	29%	0.23	0.24	0.24	0.24
<b>Total</b>	100%	0.66	0.73	0.75	0.71

All three barangays obtained passing DRCI values (0.66 to 0.75), which means that they are somewhat “resilient.” The less resilient among the three is Pantal, which was classified as the most severely-damaged barangay, followed by Bonuan Gueset (moderately-damaged), and Uno (I) (least-damaged). So, it is safe to say that their index values are correlated to the damages that they sustained, i.e., the more damage a barangay sustained, the lower the value of its DRCI.

#### B.4.1. Governance

On average, all three barangays got high ratings in GOV, i.e., 0.13 out of the 0.16 maximum value. In the FGDs, the participants expressed confidence that they are prepared for disasters because they have organized their Barangay Disaster Risk Reduction and Management Committees (BDRRMCs), they understand their local DRR action plans, and have integrated them into their local plans.

The BDRRMCs of Pantal Bonuan Gueset and Uno (I) were created by two- to three-page executive orders issued early in 2014 (i.e., Executive Order No. 08, Executive Order No. 3, and Executive Order No. 4, respectively). They enumerated the composition of the BDRRMCs, identified members, and very briefly, the duties and functions of the team (not clear whether the BDRRMC as a team or the several teams under it). Both have the same contents and format, hence, one can infer that they were made using a pro-forma template issued by a higher level authority.

**Table IV.C.8. Teams of the Barangay Disaster Risk Reduction and Management Committees of Barangays Pantal, Bonuan Gueset and Uno (I)**

Pantal	Bonuan Gueset	Uno (I)
<ul style="list-style-type: none"> <li>• BDRRMC – Punong Barangay as Chairman</li> <li>• Supply Team</li> <li>• Security Team</li> <li>• Transportation Team</li> <li>• Communication Team</li> <li>• Warning Team</li> <li>• Rescue Team</li> <li>• Evacuation Team</li> <li>• Relief Team</li> <li>• Medical Team</li> <li>• Fire Brigade</li> <li>• Damage Control Team</li> </ul>	<ul style="list-style-type: none"> <li>• BDRRMC – Punong Barangay as Chairman</li> <li>• Supply Team</li> <li>• Security Team</li> <li>• Transportation Team</li> <li>• Communication Team</li> <li>• Warning Team</li> <li>• Rescue Team</li> <li>• Evacuation Team</li> <li>• Relief Team</li> <li>• Medical Team</li> <li>• Fire Brigade</li> <li>• Damage Control Team</li> </ul>	<ul style="list-style-type: none"> <li>• BDRRMC – Punong Barangay as Chairman and all Kagawads as Members assisted by Barangay Tanods with two representatives from civil society organizations</li> <li>• Supply Team</li> <li>• Security Team</li> <li>• Transportation Team</li> <li>• Communication Team</li> <li>• Warning Team</li> <li>• Rescue Team</li> <li>• Evacuation Team</li> <li>• Relief Team</li> </ul>

Pantal	Bonuan Gueset	Uno (I)
		<ul style="list-style-type: none"> <li>• Medical Team</li> <li>• Fire Brigade</li> <li>• Damage Control Team</li> </ul>

*Sources:* Executive Order No. 08 (Pantal), Executive Order No. 3 (Bonuan Gueset), and Executive Order No. 4 (Uno).

The BDRRMCs, as a whole, are given 10 duties and functions like conduct continuous disaster monitoring; formulate and implement a comprehensive DRR plan; identify, assess, and manage hazard vulnerabilities and risks in the locality; maintain a database; establish a Barangay Disaster Risk Reduction Management Operations Center, etc.

#### **B.4.2. Knowledge and Education**

In KAE, the three barangays got high scores. On average, they got a 0.16 value of a maximum 0.23 value which means that they have high public awareness on hazards and disasters in their communities, have knowledge skills to deal with them, have good information management and sharing systems, and have healthy attitude, motivation, and culture towards disasters. However, when asked about the possession of hazard maps, vulnerability and risk analysis reports, and barangay disaster management plans, the officials could not show anything. Officials of Pantal and Uno (I) said that past administrations could have been given the maps and equipment but they do not have them in their possession because they were not turned over after the November 2013 barangay elections (Parcera et al., FGD, May 9, 2014; and Rosal et al., FGD, May 9, 2014). They blame local politics for the lost records and equipment. On the other hand, an official of Bonuan Gueset claimed that they manually drew a hazard map for their barangay in a workshop organized by the PHIVOLCS in July 2012, but could no longer find it (Santillan et al., interview, May 10, 2014).

#### **B.4.3. Risk Assessment**

Out of the 0.09 value, on average, the three barangays obtained a 0.06 value. This might seem high. However, a perusal of the barangays officials' and residents' responses in Questionnaire C reveals what has been cited as a weakness in KAE – the lack of risk assessment – which was apparent in the severely- and moderately-damaged barangays (Pantal and Bonuan Gueset). Based on the tabulations, the majority of the respondents indicated that Pantal and Bonuan Gueset have no hazard/risk assessment, have never been involved in the conduct of such assessments, and have thus never discussed among the officials and the residents anything related to them, incorporated them in their local disaster planning, or made available data or information about vulnerability and risk assessments to all interested sectors. In the FGDs, these were all validated. However, officials are quick to point out that they have assumed office as recently as November 2013 and there was no handing over of documents, maps, and equipment from the past administrations (Parcera et al., 2014 and Mejia et al., 2014).

#### **B.4.4. Risk Management and Vulnerability Reduction**

In RMVR, on average, the three barangays got a 0.16 value out of the maximum 0.23 value, which is high. They obtained favorable marks in the areas of environmental and natural resource management, and physical protection measures. The former refers to the protection of the environment and natural resources which would lessen the communities' vulnerability to hazards. The latter, meanwhile, includes structural mitigation measures, hazard-resilient construction and maintenance, and resilient, reliable, and accessible transportation. All three barangays, on the other hand, admitted that the majority of respondents do not have insurance (i.e., life insurance, home insurance) which can be used for emergency purposes, and they do not have alternative livelihoods aside from fishing, aquaculture, etc., which are severely affected by floods (Parcera et al., 2014, Mejia et al., 2014, and Rosal et al., 2014). Officials and residents of Pantalan, the severely-damaged barangay, admitted that aside from having no insurance, they are not knowledgeable about the rules on building houses under the national building code, and they do not have the capabilities to build, maintain, or repair their houses (Parcera et al., FGD, May 9, 2014).

#### **B.4.5. Disaster Preparedness and Response**

In DRP, on average, the barangays obtained a 0.24 value out of the maximum value which is high. In general, they received good marks in organizing their community for disaster response, installing early warning systems, identifying evacuation routes and centers, and recruiting volunteers for disaster response. However, there are specific problems peculiar to each barangay that are worth mentioning. It was pointed out by the officials and residents that Barangays Pantalan and Bonuan Gueset do not have coordinating mechanism with its neighbours and external organizations on decision-making that requires inter-barangay/community cooperation for transboundary disaster problems. In Barangay Pantalan alone, respondents had a lot to complain about. First, they do not have a barangay disaster plan. Second, there is no psycho-social support or counseling service in their barangay. Third, they do not know the roles of residents and responsibilities for recovery activities. Lastly, they admit that because they do not have a recovery plan, they have not considered climate change and disaster risk reduction seriously in their barangay.

### **C. Summary of Findings and Analyses**

In this section, the results of the testing of the hypotheses and analyses are presented.

*k. The more exposed a community is to hazards and disasters, the greater is its preparedness for disaster recovery.*

Just like the cases of Tacloban and Iligan Cities, this hypothesis is also refuted in the cases of Dagupan City's three barangays. They have local DRRM plans and equipment, and they have been trained. However, disaster recovery is not a priority – disaster prevention and response are. They do not have disaster recovery plans. Having survived floods every year, and a strong earthquake in 1990 and with strong faith in God, they have a false sense of resilience, i.e., they can survive the next round of disasters.

- l. The more socio-economically developed a community is, the more prepared it is for disaster recovery.*

This is proven true in the cases of the Dagupan barangays. Among the three barangays, it was revealed in the interviews that Barangay Uno (I), the more socio-economically developed because it covers the city business district and the seat of government, gets more attention from the city government and business establishments because of the urgency to restore normalcy so that business can open immediately. The same is true with Pantal, which is a neighbour of Uno (I), separated only by the Pantal River.

- m. The more involved a community in recovery planning and implementation, the faster is its recovery.*

This hypothesis is proven true in the cases of the three barangays because even though they do not have disaster recovery plans, they were able to recover immediately after the Pepeng disaster with minimum damage and zero casualty (or with near-zero casualty). In this case, it can be inferred that perhaps with sufficient disaster prevention and mitigation preparations, there would only be minimal casualties and damage. Thus, faster disaster recovery, even unplanned, can be achieved.

- n. The more stakeholders involved in disaster recovery, the faster is the recovery of a community.*

This hypothesis is refuted in the cases of the three barangays of Dagupan City. Taking off from the finding above (item b), it is necessary that there should be many stakeholders involved in community disaster recovery. However, the three Dagupan barangays have shown that with enough preparation, damage and casualties can be avoided. Thus, recovery would not be much of a problem.

- o. The faster the recovery of a community, the more resilient it becomes.*

This hypothesis is proven true in the cases of the three Dagupan barangays. This is supported by the fact that they obtained high DRCI index values (0.66 to 0.75) compared to Tacloban City (0.49 to 0.51) and Iligan City (0.42-0.53) and have suffered from negligible damage and zero (or near-zero) casualty during the onslaught of TS Pepeng and other succeeding storms. The city got high values in the five DRCI thematic areas, especially in knowledge and education, and risk management and vulnerability reduction.

## CHAPTER IV.D

### CASE STUDY OF MARIKINA CITY

#### A. Context and the Disaster

##### A.1. Profile of Marikina City

**Table IV.D.1. Overview of the Profile of Marikina City**

Item	Description
Geographical Location	Eastern part of Metro Manila
Year of Establishment	Settled on April 16, 1630; attained cityhood on December 8, 1996
Income Classification	1 <sup>st</sup> class highly urbanized city
Political Sub-division	16 barangays clustered into 2 congressional districts
Land Area	21.52 km <sup>2</sup> (8.31 sq mi)
Elevation	14.7 m (48.2 ft)
Climate	Type I – with two pronounced seasons. Dry from November to April, and wet during the rest of the year
Natural Hazards	Earthquake from the West Valley Fault and the East Valley Fault, floods from Marikina River, and landslides
Population (2010)	424,150
Population Density	20,000/km <sup>2</sup> (51,000/sq mi)
Annual Population Growth Rate	1.14% (estimated)
Society (ethnicity and religion)	Populated by Tagalog, <u>Bicolano</u> , <u>Ilocano</u> , <u>Cebuano</u> , and <u>Visayan</u> settlers. Foreign nationals include Koreans, Americans, Chinese and Japanese. With diverse religions – Christianity, Buddhism, Hinduism, and Islam.
Local Economy	The biggest manufacturer of quality shoes, and produces 70% of the shoe production in the <u>Philippines</u> .

Sources: Marikina City, n.d.1; Marikina City, n.d.2; and Marikina City, n.d.3.

##### A.1.1. Geographical Location of the City

Located at the eastern part of Metro Manila, approximately 21 km away from the capital of the Philippines and elevated only 15 feet from sea level is the City of Marikina (see **Figure IV.D.1**). The city is situated between the mountains of Sierra Madre to its east and Quezon City to its west. Located below Marikina is the City of Pasig, while to its north is the province of Rizal. Marikina is situated in the “Marikina Valley”<sup>14</sup> which extends southward passing through Pasig City and Cainta, Rizal (Marikina City, n.d.1).

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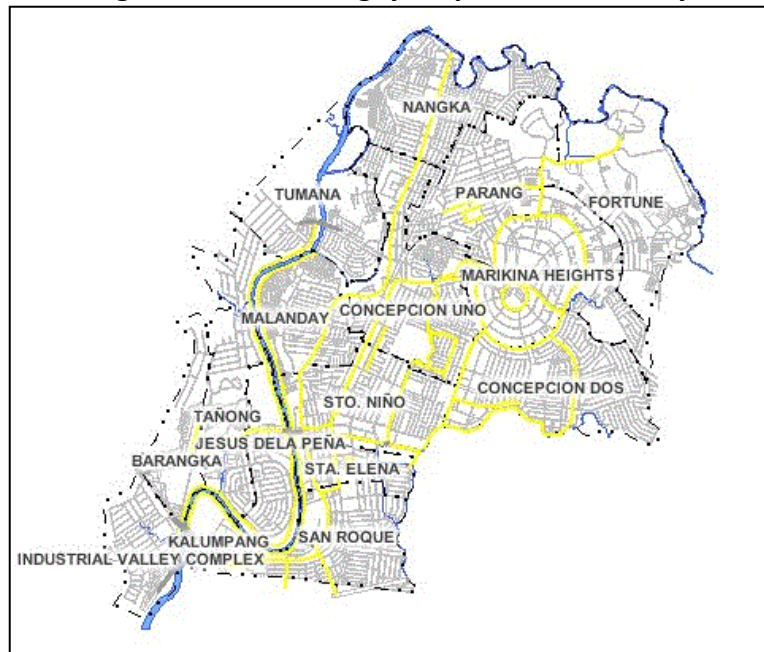
<sup>14</sup>The coined term describes the condition of Marikina wherein it is comparatively a low-lying area in contrast to the Sierra Madre Mountains to its east and the higher grounds of Quezon City to its west.

**Figure IV.D.1. Location Map of Marikina City**



Source: Google Maps, 2014.

**Figure IV.D.2. Barangay Map of Marikina City**



Source: Marikina City, n.d.1.

The jurisdiction of Marikina City spreads across 21.52 sq km of land covering 16 barangays clustered into two congressional districts. Barangays Barangka, Calumpang, Industrial Valley Complex, Jesus dela Peña, San Roque, Sta. Elena, Santo Niño, and Tañong all belong to District 1, while Barangays Concepcion Dos, Concepcion Uno, Fortune, Malanday, Nangka, Parang, and Tumana are under District 2. The barangays are further classified by the local government unit in consideration of their physiographical features. Barangays Sto. Niño, Sta.

Elena, San Roque, Calumpang are classified as “bayan” or centers for economic activity. Barangays Jesus dela Peña, Tañong, Barangka, and Industrial Valley are “ibayo” or upcoming and growing barangays. Barangays Malanday, Tumana, Concepcion Uno, and Nangka are classified as “*tabingilog*” because they are established near the riverside, while Barangays Parang, Fortune, Marikina Heights, and Concepcion Dos are called “bundok” because of their mountainous location (refer to **Figure IV.D.2**).

### A.1.2. Geophysical Features and Exposure to Hazards of the City

The Marikina Valley houses two nearby fault lines, namely, the West Valley Fault and the East Valley Fault (see **Figure IV.D.3**). The West Valley fault line passes through the Sierra Madre mountain range, up, near Brgy Industrial Valley Complex and Brgy. Malanday, then through Muntinlupa City until it reaches all the way down to the Carmona, Cavite. On the other hand, the East Valley fault line passes through the province of Rizal, slowly approaching the area of Brgy. Fortune (Marikina City, n.d.1).

Aside from fault lines, Marikina also coexists with large waterways including the Pasig-Marikina River Basin which spreads across a total of 377.82 sq km and reaches up to 42.85 km of flow path, the 27-kilometer-long Marikina River that is divided into two parts with the upper portion flowing from the Montalban water level gauging station down to the Mangahan Floodway and the lower portion running from the Mangahan station down to Napindan channel, and the Mangahan Floodway spanning 9 kilometers with a capacity of 2,400 cubic meters that transmits excess water from Marikina River down to Laguna Lake (Badilla, 2008, pp. 6-8).

**Figure IV.D.3. West and East Marikina Valley Faulty Lines**



Source: Nelson et al., 2014.

### A.1.3. Climate

Marikina experiences an average temperature of 27.6 degrees Celsius with peaks of 31.5 degrees Celsius high temperature and 23.5 degrees Celsius low temperature throughout the year (Myforecast.com 2014). The city shares a common experience with its neighboring

cities in terms of climate. The Southwest Monsoon (*Habagat*) passes through the country during the month of June causing frequent rainfall until September, while the Northeast Monsoon (*Amihan*) arrives during the month of December to bring cool air with little rainfall until early March. The amount of precipitation experienced peaks in the month of July and August with 27.79 centimeters and 27.72 centimeters of precipitation on average. The least amount of rainfall occurs in the month of January and February with 0.75 centimeters and 0.99 centimeters average amount of rainfall (Marikina City, n.d.1).

#### **A.1.4. Population and Society**

A population of 513,570 residents, with an average of 4.71 members per household, resides within the city, corresponding to a total of 108,958 households (NSO, 2012). Marikina covers 3.37% of the whole Metro Manila with an average of 23,878 people per sq km. As of 2010, Marikina City shoulders 3.58% of the whole population of Metro Manila (NSO, 2010). The estimated population growth rate is 1.14%. The city is populated by Tagalog ,Bicolano, Ilocano, Cebuano , and Visayan settlers. Foreign nationals include Koreans, Americans, Chinese, and Japanese. Due to the diversity of residents in the city, various religions like Christianity, Buddhism, Hinduism, and Islam are also practiced (Marikina City, n.d.2).

#### **A.1.5. Local Economy**

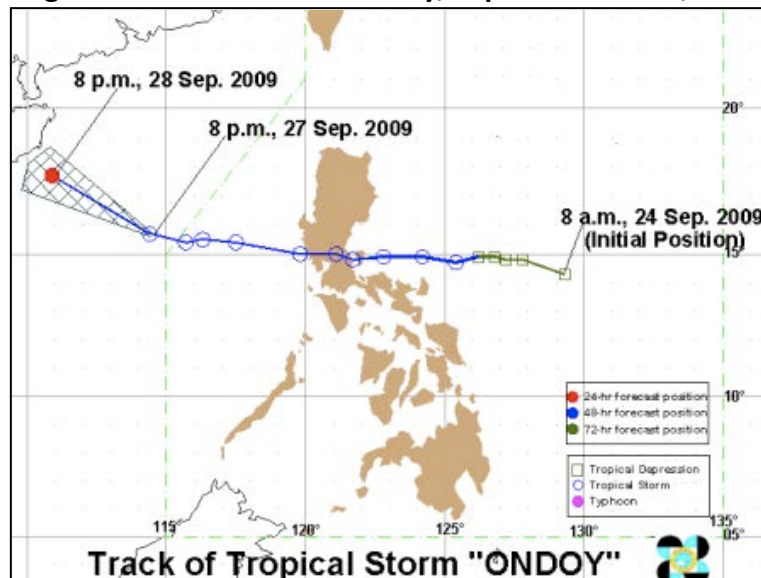
Recognized for its shoe industry, Marikina has been labeled as the Shoe Capital of the Philippines, which is symbolized by the exaggeratedly large shoes displayed in prime locations. The city provides 78% of shoe production in the Philippines (Marikina City, n.d.5).

### **A.2. In the Eye of the Storm: Destruction and Recovery Efforts in Marikina City**

#### **A.2.1. Damages Sustained by the City from Tropical Storm Ondoy**

In 2009, Tropical Storm Ondo (international name “Ketsana”) hit Central and Northern Luzon on September 25 with maximum center winds of 105 kilometers per hour with gustiness of 135 kilometers per hour while traveling at a rate of 11 to 19 kilometers per hour. TS Ondoy left the Philippine Area of Responsibility (PAR) on September 27 (NDCC, October 1, 2009, p. 1).

**Figure IV.D.4. Path of TS Ondoy, September 24-28, 2009**



Source: PAGASA 2009 as cited in NDCC, October 1, 2009.

Three days after, Tropical Storm Pepeng entered PAR with maximum winds of 120 kilometers per hour and gustiness of 150 kilometers per hour. On October 3, TS Pepeng had made its first landfall over the east coast of Cagayan. Its second landfall occurred on October 6 to the north of Ilocos Norte, and its third landfall occurred at the eastern coast of Cagayan on October 8 before it finally left the Philippine Area of Responsibility on October 10 with center winds at 195 kilometers per hour and gustiness at 230 kilometers per hour (NDCC, September 2009, p. 2).

The incident caused the overflow of the Marikina River which has a capacity of about 3,000 cubic meters per second of flowing water. The massive rainfall caused an estimated 5,500 cubic meters per second of flowing water, resulting in spillages which reached nearby barangays. The total damage to flood management infrastructure caused by excessive floodwater stood at about P238 million (PDRF, November 28, 2009, pp. 86-87).

A total of 239 barangays in Metro Manila were affected by TS Ondoy with Marikina having 11 of those barangays, resulting in 65,360 people and 13,072 families being affected by the incident.<sup>15</sup> The tally for the City of Marikina was 48 casualties<sup>16</sup> out of the 277 confirmed by NDCC (NDCC, October 2009, p. 1). Half of the barangays of Marikina City were submerged in floodwaters, namely Brgy. Tumana, Malanday, Tañong, Barangka, Industrial Valley Complex, Concepcion Uno, Concepcion Dos, and Jesus dela Peña (Pulumbarit, September 11, 2010).<sup>17</sup>

<sup>15</sup> Marikina had the second most number of people affected, trailing Quezon City by about 11,100 people.

<sup>16</sup> Most, if not all, of the casualty died from drowning in Marikina City.

<sup>17</sup> Reports about the damage and losses brought by TS Ondoy are aggregated for the whole Metro Manila. The researchers could no longer disaggregate the data for Marikina City.

**Table IV.D.2. Damages and Casualties Caused by TS Ondoy to Marikina City**

Sector	Damages/Losses/Casualties
Effects to People	
Death	48
Missing	n.d.
Injury	n.d.
Damages to Housing	
Total destruction	Flooded
Partial destruction	Flooded
Damages to Infrastructure	
Hospitals	Flooded
Clinics, etc.	Flooded
Schools	Flooded
Public buildings	Flooded
Damages to Local Economy*	
Businesses	n.d.
Agriculture	n.d.
Fishing	n.d.
Tourism	n.d.
Public utilities	
Energy	Less than a week interruption
Water	Less than a week interruption
Communication	Less than a week interruption
Transportation	Less than a week interruption

*Note:* **n.d.** – no data available at the time of writing.

\*Reports about the damage and losses brought by TS Ondoy are aggregated for the whole of Metro Manila. The researchers could no longer disaggregate the data for Marikina City.

*Source:* NDCC, October 1, 2009.

## **A.2.2. Disaster Recovery and Rehabilitation Efforts in the City**

The recovery and rehabilitation process for Metro Manila, especially for Marikina City, was initiated by several grants funded to support the restoration of damaged infrastructure. Given that the entire Metro Manila was declared under a state of calamity, the region as well as its cities had no immediate capacity to restore and rebuild itself by its own means.

### **A.2.2.1. Donations, Grants and Loans for Recovery and Rehabilitation**

Grants and aid were offered by international organizations and foreign governments to support the recovery and rehabilitation of ruined cities, on condition that these donations will go directly to the target beneficiaries. These donations are coursed through the UN

Resident Coordinator, UNDP Country Director, and through embassies of different countries. Grants such as the Global Facility for Disaster Reduction and Recovery (GFDRR) Trust Fund which were set up in response to the recommendations of the Post-Disaster Needs Assessment (PDNA) regarding the damages brought about by the heavy floods of TS Ondoy and TS Pepeng, were granted for the purpose of enabling Metro Manila to reduce its vulnerabilities and be able to build back better. The GFDRR Trust Fund had granted an amount equivalent to \$1.5 million or P66.79 million<sup>18</sup> for the development of a flood control master plan that would promote the region's resilience against natural disasters (WB, January 2011).

Donations in kind have also been provided by organizations such as World Vision in order to immediately respond to the needs of the victims. Seventy sets of medical equipment inclusive of a sphygmomanometer, stethoscope, weighing scale, examination tables, and Tetanus toxoid vaccines were granted to the Marikina City Public Health Centers in order to revive the healthcare centers (WV, September 2010, p. 6).

Loans such as the Japan International Cooperation Agency for the Short-Term Infrastructure Rehabilitation Project<sup>19</sup> aimed at reconstructing roads, bridges, and flood control facilities, (JICA, May 2010) and the World Bank for Food Crisis Response Development Policy Operation and Supplemental Support for Post-Typhoon Recovery<sup>20</sup> (WB, January 2011).

#### **A.2.2.2. Cash-for-Work Program**

A Cash-for-Work (CFW) project was provided for the early recovery of highly devastated areas in Marikina, Pasig, and Cainta. A thousand volunteers have been employed to clean up the streets and de-clog drainages in exchange for daily allowances<sup>21</sup> (WV, September 2010, p. 6). Other organizations have also provided alternative forms of CFW projects by mobilizing and actualizing households to act as manpower for disaster relief efforts. (Tzu Chi Publication, Issue No. 32).

#### **A.2.2.3. Relocation of Internally Displaced Persons**

Little attention was given to the restoration of daily living, and no information was given regarding plans for relocation of affected households (PDRF, *Sector Reports*, pp. 135-137). In the case of Marikina City, 1,182 households from Brgy. Fortune, Nangka, Concepcion and Tañong had been relocated to Southville 4 Housing Project, Sta. Rosa, Laguna and to Southville 5-A Housing Project, Barangay Langkiwa, Biñan, Laguna (Reliefweb.int, December 2009). The relocation site was ensured to have access to electricity, garbage disposals, and sanitation facilities. Problems were, however, noted for access to piped water (IPC, December 2011, pp. 58-60)

Efforts from the Philippine Red Cross came in the form of sanitation efforts achieved by dispatching six units of water bladders and three units of T11 tanks to provide potable

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<sup>18</sup> Exchange rate used is at \$1 = P44.53.

<sup>19</sup> Yen 9.912 billion in total.

<sup>20</sup> \$250 million or equal to P11.1 billion.

<sup>21</sup> \$6.38 or P284 a day for urban, \$5.30 or P236 a day for rural areas.

water. Rehabilitation efforts were done soon after and were geared towards the immediate construction of building transitional shelters and schools (Alacapa, n.d.).

After the deployment of medical teams to affected areas, efforts on reviving the healthcare services were put in place. Provision of disease surveillance, sanitation, infant feeding, psycho-social care, and reproductive health were priorities acted upon to provide for the needs of the victims (Reliefweb.int, October 2009).

#### **A.2.2.4. Zero-Tax Policy**

The Marikina City's local government had been proactive in efforts to revive the business and livelihood sector as it had implemented a zero-tax policy for the shoe industry and an ordinance granting a 50% discount on residential real property tax.<sup>22</sup> Marikina City also provided 50,000 pairs of shoes to children as a means of rehabilitating the victims as well as the shoe industry (Aquino, July 2013). As of November 2009, 85% of the business establishments have resumed operations (Pulumbarit, September 1, 2010).

#### **A.2.2.5. Reconstruction**

A disaster management office pursuant to Republic Act 10121 was established by Marikina City to institutionalize efforts on Disaster Risk Reduction and Management (DRRM).<sup>23</sup> Part and parcel of its institutionalization were the procurement of disaster-related equipment and capacity training for disaster preparedness (Aquino, July 2013).

Hard measures that were introduced involve retrofitting of damaged facilities to be flood-proof, establishment of sirens that serve as early warning devices, building of pumping stations for low-lying areas, building of road dikes, rehabilitation of currently available drainages, and the slope-strengthening of Marikina River with the implementation of a three-meter no-build zone around the river (Aquino, July 2013).

#### **A.2.2.6. Institutional Recovery**

Soft measures adopted after TS Ondoy involve capability building of all sectors/organizations in Marikina to handle disasters, and strengthened partnerships with "Alliance of 7"<sup>24</sup> and "Metro Manila-Rizal Network"<sup>25</sup> (Aquino, July 2013).

#### **A.2.2.7. Flood Contingency Plan**

The synthesis of the implemented hard and soft measures of Marikina into a complete plan is done through the city's Flood Contingency Plan. Drawn from numerous experiences, the contingency plan aims to organize the lessons learned from previous struggles. The

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<sup>22</sup> Ordinance No. 162, series of 2009.

<sup>23</sup> Executive Order No. 014-11, series of 2011.

<sup>24</sup> Members of the alliance are as follows: Quezon City, Pasig City, Antipolo City, Marikina City, and the municipalities of Cainta, Rodriguez, and San Mateo.

<sup>25</sup> Members of the network are Marikina, Pasig, Quezon City, Malabon, Mandaluyong, Valenzuela, Caloocan for Metro Manila, and Antipolo, Rodriguez, San Mateo, Cainta, and Taytay for the province of Rizal.

objectives of the flood contingency plan is to ensure that communities are knowledgeable and prepared for floods with respondents and implementers being knowledgeable of the actual operation, as well as the preparation of emergency goods during and after the floods.

The contingency plan features a comprehensive enumeration of the guidelines to follow, including the division of action plans for the different offices of the local government to perform. These action plans are grouped into sectors that have certain standard operating procedures to follow.

The contingency plan can be classified into three major parts: the pre-disaster (early warning systems), evacuation proper (evacuation proper), and the post-disaster (Recovery and Rehabilitation).<sup>26</sup> The Flood Contingency Plan states that Recovery and Rehabilitation efforts should be led by the City Environmental Management Office (CEMO), in coordination with MCDRRMO and Volunteer Management Office (VMO). Psycho-social support is the responsibility of CHO and CSWDO. Information coordination and dissemination are done by the Public Information Office (PIO) and Management Information System and Call Center (MISCC). The City Engineering Office is responsible for the assessment of structures, with LRPESO responsible for the jobs affected and the Marikina Livelihood Training Center (MLTC) responsible for livelihoods affected. MERALCO, Manila Water Company, and other Telecommunications Companies will be responsible for the restoration and maintenance of services within the city.

### **A.2.3. Situationer on Marikina City's Recovery**

Within 30 days (and even less) after Ondoy struck Marikina, city officials and residents interviewed were unanimous in that they immediately recovered from the destruction in five areas of recovery, namely: social, economic, environment, infrastructure, and institutional (Santiago et al., 2014; Ancheta et al., 2014; Leal et al., 2014; and Briones et al., 2014) (see **Table IV.D.1** for details). The primary reason for the speedy recovery in Marikina is that the city government, within a week after Ondoy, drafted its *Marikina Recovery Plan*. All relevant offices of the city government provided inputs for the post-disaster damage and needs assessment. They came up with short-, medium-, and long-term recovery plans and programs for the city worth around P81 million in the following areas:

- Infrastructure - repair of Marikina City Hall, de-clogging of canals/drainage system, patching of potholes, dredging of river, repair of public health centers, public schools, etc.
- Environment – clearing of debris, rehabilitation of prioritized open spaces, etc.
- Economic – repair of public economic enterprises (e.g., theaters, museums, sports parks, hotels, markets, etc.)
- Social – new textbooks, instructional equipment, financial assistance for minor house repairs, balik-probinsya fares for displaced families, relocation of 1,000 families living in dangerous areas, etc.
- Administrative – procurement of office supplies, furniture and equipment, repair/reconstruction of government buildings, etc.

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<sup>26</sup> Classification was done in order to easily present the contingency plan's content.

In the implementation stage, they were assisted by national government agencies (e.g., DSWD, DPWH, NHA, etc.), private sector (e.g., telecommunication companies), NGOs (e.g., Tsu-Chi Foundation), and volunteer residents. However, some “positive problems” emerged like uncoordinated efforts, unequal distribution of relief funds and goods, and dependency of beneficiaries on government assistance (Santiago et al., interviews, April 24, 2014). See **Table IV.D.3** for the overview of the roles of the various stakeholders on Marikina’s disaster recovery efforts.

**Table IV.D.3. Recovery Initiators, Leaders, Fund Sources, and Rapid Assessment**

<b>Areas</b>	<b>Initiator</b>	<b>Manager/ Leader</b>	<b>Source of Funds</b>	<b>Recovered?</b>
k. Social recovery	Marikina City, NGOs/Pos, private sector, etc.	Marikina City	Mainly from 5% Calamity Fund	Has recovered within 30 days
l. Economic recovery	Marikina City, NGOs/Pos, private sector, etc.	Marikina City	Mainly from 5% Calamity Fund	Has recovered within 30 days
m. Environmental recovery	Marikina City, NGOs/Pos, private sector, etc.	Marikina City	Mainly from 5% Calamity Fund	Has recovered within 30 days
n. Infrastructural recovery	Marikina City, NGOs/Pos, private sector, etc.	Marikina City	Mainly from 5% Calamity Fund	Has recovered within 30 days
o. Institutional recovery	Marikina City, NGOs/Pos, private sector, etc.	Marikina City	Mainly from 5% Calamity Fund	Has recovered within 30 days

*Sources:* Santiago et al., interviews, April 24, 2014.

## B. Barangay Case Studies

Three barangays in Marikina were selected for case studies: Barangays Tumana, Malanday, and Nangka. They were selected based on the recommendation of the City Planning and Development Office. Tumana is considered a severely damaged barangay by TS Ondoy and its floods, followed by Malanday as moderately-damaged, and last, Nangka, as least-damaged.

### B.1. Context and the Disaster

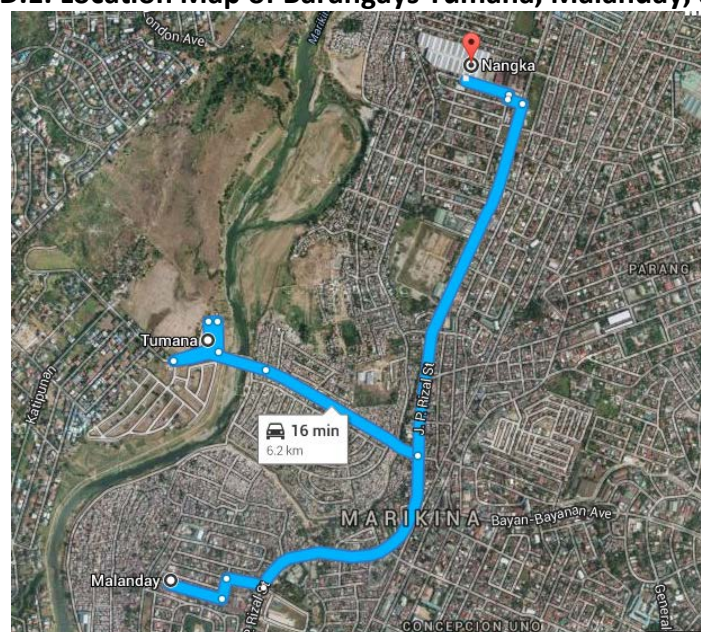
#### B.1.1. Geographical Locations of the Barangays

All three barangays are on the east side of the Marikina River and the West Valley Fault. Being in a small city, they are near each other. Tumana is in the middle of Nangka and Malanday. **Picture IV.D. 1** shows the locations of the three barangays while **Picture IV.D. 2** highlights the inundated areas by the floodwaters caused by the storm to the barangays.

#### B.1.2. Casualties and Damages in the Barangays

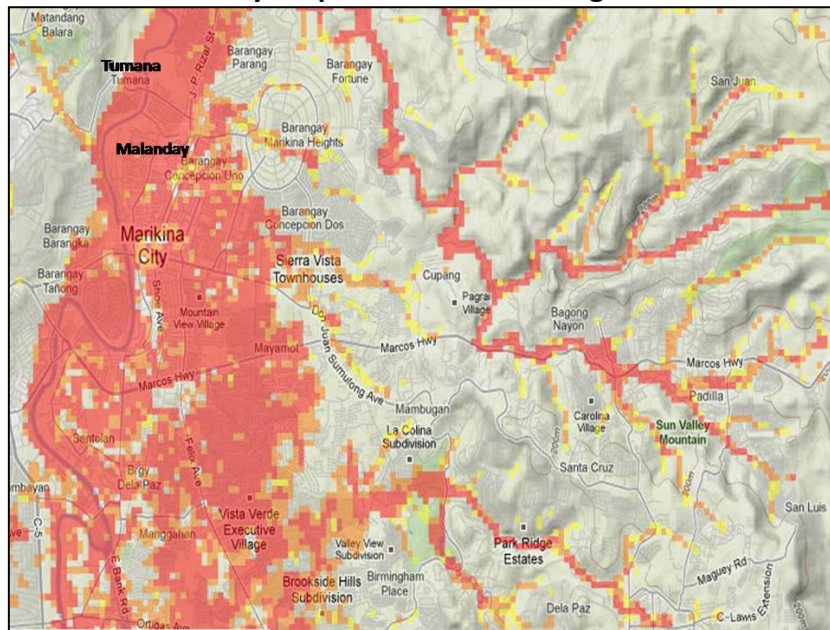
All three barangays suffered mostly from the floods caused by the rains brought off the typhoon (see **Pictures IV.D.2 to IV.D.4**). The most severely damaged was Tumana. Although only about 95% of the barangay was flooded (the remaining 5% were in the highly elevated upscale Loyola Grand Villas area), the waters rose to as high as 23 meters which subsided 14 hours after Ondoy struck (Ancheta et al., FGD, April 25, 2014). As a consequence, eight people died due to drowning, while another 24 died due to leptospirosis. In addition, 30 houses were destroyed (Ancheta et al., FGD, April 25, 2014).

**Picture IV.D.1. Location Map of Barangays Tumana, Malanday, and Nangka**



Source: Google Maps, 2014.

**Picture IV.D.2. Map Showing Some Barangays Badly Affected by Tropical Storm “Sendong”**



*Note:* Nangka is not shown on the map.

*Source:* Nababaha.com, n.d.

**Picture IV.D.3. The Upswelling of Marikina River**



*Source:* Magaru n.d.

**Picture IV.D.4. Barangay Tumana after the Storm**



*Source: Philstar, 2009.*

The moderately damaged barangay was Malanday, which was 100% inundated from waist-deep water to as high as two meters, which subsided immediately in a matter of hours (Briones, interview, April 25, 2014). Only one person died from drowning, but 35 persons were struck with leptospirosis. Around 60% of the houses in the barangay were either partially or totally damaged (Briones, interview, April 25, 2014).

Nangka was the least damaged among the three barangays in this study. Unlike Tumana and Malanday, areas and houses along the river bank were the only ones that got flooded. This constituted 50% of the barangay area. The waters reached the second or third floors of the houses (Leal et al., FGD, April 25, 2014). Like those in the other two barangays, six residents died due to leptospirosis. One died from electrocution. More than 100 houses were partially destroyed, and 50 were fully destroyed (Leal et al., FGD, April 25, 2014). The overview of the devastations in the three barangays are in **Figure IV.D.4**.

**Table IV.D.4. Inundation, Casualties, and Damages Caused by TS Ondoy in the Three Barangays**

Barangay	Classification	Inundation		Casualties		Damage to Properties
		Area	Maximum Height of Flood	Death	Missing	
Tumana	Severely-damaged	95%	23 meters	32	0	30 houses destroyed
Malanday	Moderately-damaged	100%	2 meters	36	0	Around 60% of the houses damaged

Nangka	Least-damaged	50%	Until the 3 <sup>rd</sup> floor of houses	7	0	100 houses partially damaged, 50 houses totally damaged
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*Sources:* Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; Briones et al., FGD, April 25, 2014; and Briones, interview, April 25, 2014.

## **B.2. Explanations for the Vulnerabilities of the Three Barangays**

### **B.2.1. Geophysical Features**

The three barangays have generally flat terrain with parts that are mildly sloping, especially in the case of Tumana where, during heavy rains, river water flows at the Tumana-Malanday Bridge. More than two decades ago, the topographical features of the eastern part of the city, which include the three barangays, favor agricultural land use. However, due to the influx of migrants in recent years, the three barangays became a haven for urban settlements as evidenced by the increasing number of sub-divisions and industrial establishments (Marikina CLUP, n.d., p. 15).

### **B.2.2. Exposure to Hazards**

All three barangays are highly vulnerable to floods caused by two major factors. One, it is caused by increase in water level of the Marikina River and the six creeks (i.e., Bangkaan Creek, Park Creek, Concepcion Creek, Usiw Creek, Balante Creek, and Sapang Baho) which overflow from the riverbanks to low-lying areas throughout the city. Flash floods caused by heavy rains in the upstream of Montalban, Rizal also make the Marikina River overflow (MCPDO , n.d.1, p. 16).

Aside from floods, the three barangays are susceptible to earthquakes, landslides, liquefaction, and fires. The movement of the West Valley Fault can wreak havoc to the city. Landslides threaten the barangays because the soil in the city is malleable. Due to loose soil, earthquakes may cause liquefaction in the barangays. Lastly, fires are constant threats because Marikina is highly congested with houses due to accelerated urbanization in recent years (MCPDO , n.d.1, p. 16). See **Annex IV.D** for the hazard maps.

### **B.2.3. Socio-Economic Profiles of the Three Barangays**

Among the three barangays, Tumana, severely damaged by ST Ondoy, is the poorest of the poor in the city. In fact, it is a Socialized Housing Zone and a place where migrants prefer to stay. As of 2012, there were 34,344 residents and 7,370 households living in a 1.82 sq km land area. Hence, its population density was 18.870 persons per sq km (MCPDO , n.d.2, p. 7). Although Marikina has declared itself as a “Squatter (Informal Settlers)-Free City,” a risk map reveals that there are 328 makeshift houses within the barangay which are vulnerable to floods, earthquakes, etc. Eighty percent of the residents belong in the low-income group. They are mostly vendors and engage in the service sector – pedicab drivers, jeepney drivers, construction workers, waiters, etc. The more affluent are overseas Filipino workers (OFWs).

In a stroke of irony, the richest of the rich in Marikina also live in the barangay in the upscale sub-division Loyola Grand Villas which occupies around 5% of the total land area of that barangay (Ancheta et al., FGD, April 25, 2014).

Malanday, the moderately damaged barangay, is populated by low- to middle-income residents who are service workers, laborers, unskilled workers, clerical positions, teachers, etc. As of 2012, there were 55,802 residents and 11,976 households in the 0.87 sq km land area, the smallest among the three, and has the highest population density of 64.140 persons per sq km. Among the three barangays, Malanday has the second highest number of makeshift houses, i.e., 157 (MCDRMO, 2012, p. 18). Refer to **Figure IV.D.5** to see the locations of makeshift houses in the city.

Nangka, the least damaged, had 37,629 residents and 7,802 households (as of 2012) who live in 1.84 sq km. Thus, the population density in Nangka was estimated at 20.451 persons per sq km, the second highest among the three barangays. It has several settlement sites (MCDRMO, 2012, p. 18).

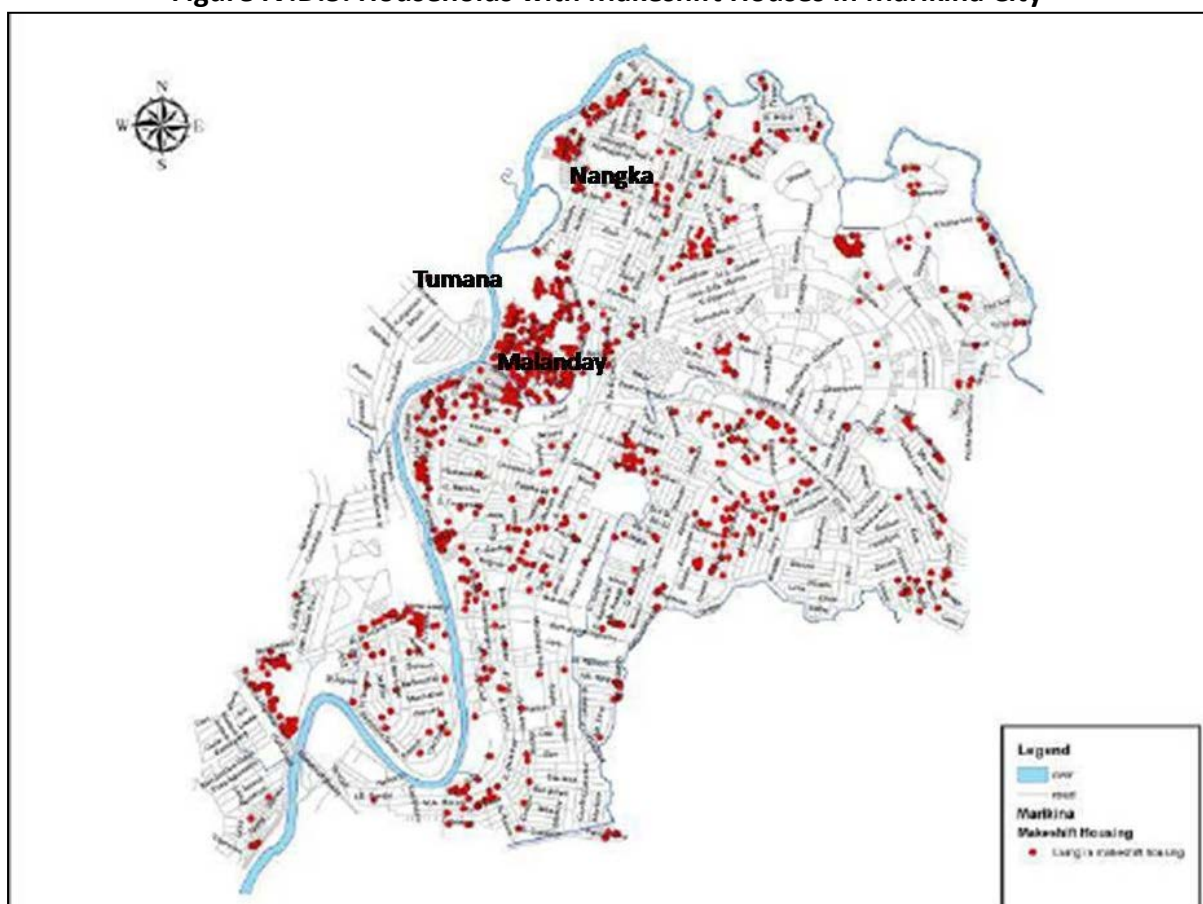
**Table IV.D.5. Overview of the Profiles of the Three Barangays**

<b>Barangay</b>	<b>Geographical Location</b>	<b>Biophysical Condition</b>	<b>Exposure to Hazards</b>	<b>Socio-Economic Situation</b>
Tumana	East of Marikina River and West Valley Fault; in the middle of Malanday and Nangka	- generally flat terrain with parts that are mildly sloping	- Floods - Earthquakes - Liquefaction - Landslides - Fires	- Poorest of the poor barangay - Majority are vendors - Has the highest number of makeshift houses
Malanday	East of Marikina River and West Valley Fault; south of Tumana	- generally flat terrain with parts that are mildly sloping	- Floods - Earthquakes - Liquefaction - Landslides - Fires	- Low- to middle-income residents - Majority are in the service sectors - Has the highest population density among the 3 brgys.
Nangka	East of Marikina River and West Valley Fault; north of Tumana	- generally flat terrain with parts that are mildly sloping	- Floods - Earthquakes - Liquefaction - Landslides	- Low- to middle-income residents

Barangay	Geographical Location	Biophysical Condition	Exposure to Hazards	Socio-Economic Situation
			- Fires	- Majority are in the service sectors

Sources: MCDRRMO, 2012; Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; Briones et al., FGD, April 25, 2014; and Briones, interview, April 25, 2014.

**Figure IV.D.5. Households with Makeshift Houses in Marikina City**



Source: MCDRRMO, 2012, p. 18.

### **B.3. The Roles of the Barangays and Other Stakeholders in the Disaster Recovery and Rehabilitation Efforts**

Responses obtained from interviews and focus group discussions reveal that even though the barangays are equipped with knowledge and skills on DRR, disaster recovery and rehabilitation is still the least prioritized among the four pillars of DRR, even more than four years after ST Ondoy devastated them.

Several weeks after the onslaught of Ondoy, the barangays were dependent on international humanitarian non-governmental organizations for recovery and rehabilitation assistance, i.e., UN Habitat and Tsu-Chi Foundation of Taiwan. The UN Habitat provided free construction materials to residents whose houses were destroyed by the strong winds and floods. The Tsu-Chi Foundation, on the other hand, gave P5,000.00 for each family for burial

and hospital expenses. For construction workers who lost their jobs, the foundation provided funds for the government's Cash-for-Work Program, which employed them to clear debris in streets and houses and paid the daily minimum salary rate prescribed by the Department of Social Welfare and Community Development (Briones, interview, April 25, 2014).

Among the three barangays, Malanday is the only one which provided P5,000.00 interest-free loan to 500 ambulant vendors to be used as capital to start all over again (Briones, interview, April 25, 2014). On the other hand, Tumana claimed that it provides psycho-social counseling and health services to its residents who experience trauma and health problems from the fury and devastation caused by Ondoy (Ancheta et al., FGD, April 25, 2014).

Several years after Ondoy, all three barangays have been prepared by the city government for disasters caused by typhoons, floods, and earthquakes. Barangay officials undertook training programs on DRR, in particular hazard and risk mapping. They also purchased equipment and supplies for their DRR activities (Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; and Briones et al., FGD, April 25, 2014) using funds from the 5% Barangay Risk Reduction and Management Fund. In cooperation with some business corporations and their foundations, and international agencies (e.g., Petron, Corporate Network for Disaster Response, Ayala Foundation, UN Habitat, Smart Telecommunication Company, etc.), they produced, under the Noah's Ark Project, *Barangay Disaster Risk Management Manuals (BDRRMC Manuals)* which were written according to the unique conditions of the barangays. Each manual contains sections on hazard and risk mapping, vulnerability analysis, list of vulnerable residents, disaster preparedness, organization and management of the Barangay Disaster Risk and Management Committee (BDRRMC), early warning system, communication protocols, evacuation procedures, and telephone numbers of DRR-related government agencies and organizations. See **Table IV.D.6** for the overview of the roles of the various stakeholders in Marikina's disaster recovery efforts.

**Table IV.D.6. The Participation of the Barangays, City, NGAs, and NGOs in Disaster Recovery Efforts**

<b>Recovery Efforts</b>	<b>Household/ Family</b>	<b>Barangay</b>	<b>City</b>	<b>NGAs</b>	<b>NGOs</b>
Restore the people's means of livelihood and continuity of economic activities and business	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Restore shelter and other buildings/installations	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Reconstruct infrastructure and other public utilities		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Assist in the physical and psychological	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

Recovery Efforts	Household/ Family	Barangay	City	NGAs	NGOs
rehabilitation of persons who suffered from the effects of disaster					

*Note:* Items in the “Recovery Efforts” column were taken from the “Disaster Recovery and Rehabilitation” section of the *National Disaster Risk Reduction and Management Plan 2011-2028*.

*Sources:* MCDRRMO, 2012; Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; Briones et al., FGD, April 25, 2014; and Briones, interview, April 25, 2014.

Among the 12 barangays studied for this research, the officials of the three barangays in Marikina City are confident that, within their financial limitations, they can help in some ways in the restoration of their residents’ livelihood, reconstruct their houses, and assist in providing psycho-social support to traumatized disaster victims. However, they still need financial and logistical assistance from the city government, national government agencies, and humanitarian organizations. Their confidence stems from the fact that they receive high internal revenue allotment (IRA) shares from the government,<sup>27</sup> and being in the capital region of the country, they have easy access to funds from government and private firms. Moreover, they can easily tap technical assistance from the academe (e.g., University of the Philippines) and major scientific organizations (e.g., PAGASA, PHIVOLCS ) to improve their local DRRM activities just like the publication of their *BDRRM Manuals* (Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; and Briones et al., FGD, April 25, 2014).

#### B.4. Disaster-Resilient Community Index

**Table IV.D.7. Computations of the DRCI for Tumana, Malanday, and Nangka**

Thematic Areas	Weight	Barangay			Average
		Tumana (Severely-Damaged)	Malanday (Moderately-Damaged)	Nangka (Least-Damaged)	
Governance (GOV)	16%	0.14	0.14	0.14	0.14
Knowledge and Education (KAE)	18%	0.18	0.15	0.18	0.17
Risk Assessment (RAS)	11%	0.09	0.09	0.09	0.09
Risk Management and Vulnerability Reduction (RMVR)	25%	0.21	0.18	0.19	0.19
Disaster Preparedness and Response (DPR)	30%	0.27	0.21	0.27	0.25
<b>Total</b>	100%	0.89	0.77	0.87	0.84

<sup>27</sup> P18.1 million for Tumana; P22.4 million for Malanday, and P17.7 million for Nangka according to 2014 computations by the Department of Budget and Management. See <http://www.dbm.gov.ph/wp-content/uploads/Issuances/IRA/IRA2014/Barangay/NCR/NCR.pdf>

Among the 12 barangays studied in this research, the three Marikina barangays obtained the highest DRCI index values (0.77 to 0.89). Interestingly, the moderately-damaged barangay, i.e., Malanday, obtained the lowest index value (0.77) while Tumana, the severely-damaged, got the highest value (0.89). This could mean that Tumana, after having been devastated by TS Ondoy, might have done a tremendous job to make itself (more) resilient (especially in the area of Risk Management and Vulnerability Reduction) and might have surpassed the level of preparedness of Nangka.

#### B.4.1. Governance

In the area of GOV, all three obtained high index values (0.14 out of the maximum 0.16 value). This can be explained by the following reasons. All three barangays have BDRRMCs headed by the *Punong Barangay* or Barangay Chairman. The BDRRMCs are part of the Barangay Development Council (BDCs), also headed by the Chairman. Each BDRRMC has seven to 10 units headed by unit chairmen who are usually the *barangay kagawad* (councilman), and in some cases, school principals as evacuation managers, policemen from the Philippine National Police for the security unit. The units are usually for evacuation, rescue, relief, transportation, supplies, communication, security, warning, fire brigade, health, etc. Tumana and Nangka even have Barangay Disaster Operation Centers. The roles and tasks of the chairman and members of each unit are spelled out in the *BDRRMC Manual*. The BDRRMCs that they had are more or less similar structures in the past (i.e., NDCC years), but with the enactment of the DRRM Law of 2010, these were strengthened to be able to become more responsive to disasters (Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; and Briones et al., FGD, April 25, 2014). The compositions of the BDRRMC in each barangay are shown on **Table IV.D. 8**.

**Table IV.D.8. Units in the Barangay Disaster Risk Reduction and Management Committees of Barangays Tumana, Malanday, and Nangka**

<b>Tumana</b>	<b>Malanday</b>	<b>Nangka</b>
<ul style="list-style-type: none"> <li>Barangay Disaster Operation Center Secretariat</li> <li>Warning</li> <li>Communication</li> <li>Evacuation</li> <li>Security</li> <li>Sanitation</li> <li>Transportation</li> <li>First Aid &amp; Rescue</li> <li>Relief</li> <li>Intelligence and Damage Control</li> </ul>	<ul style="list-style-type: none"> <li>Security</li> <li>Supply</li> <li>Transportation</li> <li>Communication</li> <li>Warning</li> <li>Rescue</li> <li>Evacuation</li> <li>Relief</li> <li>Medical</li> <li>Fire Brigade</li> <li>Damage Control &amp; Assessment</li> <li>Evacuation Procedure</li> <li>Camp Management</li> </ul>	<ul style="list-style-type: none"> <li>Barangay Disaster Operation Center</li> <li>Warning Task Unit</li> <li>Communication Task Unit</li> <li>Evacuation Task Unit</li> <li>Transportation Task Unit</li> <li>Security Task Unit</li> <li>Health Task Unit</li> <li>Relief &amp; Supply Task Unit</li> </ul>

Sources: *BDRRM Manuals* of the three barangays.

From the compositions of each BDRRMMC, it is noticeable that all units are those necessary for disaster response – relief and rescue – which is just one pillar of DRR. According to barangay officials, all the other pillars, i.e., prevention and mitigation, preparedness, and recovery and rehabilitation, are performed by their Barangay Development Councils (Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; and Briones et al., FGD, April 25, 2014). However, the DRRM Law of 2010 lodges all four pillars under all Local DRRM Councils, including the BDRRMCs.

#### **B.4.2. Knowledge and Education**

In the area of KAE, again, the three barangays got perfect or near-perfect index values (0.15 and 0.818 out of the maximum 0.18). This can be explained by the fact that the three barangays have produced their *BDRRMC Manuals* which they themselves wrote with the assistance of a DRR consultant and their CDRRMO, and financial assistance from a private corporation. However, during the FGDs, it was revealed that while barangay officials (especially in the case of Malanday) understand the BDRRM Plans, residents said that they do not understand them and the roles they have in its implementation. They also do not know the services and facilities that they could avail of in times of disaster.

The majority of the three barangay respondents pinpointed that there is no “indigenous” or “traditional” communication in their barangays because they use modern communication gadgets, e.g., television, radio, cellphone, fax machines, telephone, internet news, social media, etc., which are easily accessible in their highly urbanized city. Moreover, the sources of information (e.g., PAGASA, PHIVOLCS, NDRRMC/OCD, MMDA etc.) are relatively near the city or just a telephone call away. As for indigenous disaster management techniques, they resort to *bayanihan*, a traditional cooperation movement among village residents who help neighbors in need of assistance like house relocation. However, this is more apparent in closely-knit neighborhoods than in gated upscale sub-divisions.

In the FGDs, the barangay officials and residents of the three barangays showed a high level of awareness about climate change, climate change adaptation, and disaster risk reduction. They were also able to enumerate all hazards that may occur in their barangays and the disasters (i.e., flooding, earthquakes, liquefaction, landslides, and fires) that they experienced and will still experience. They learned about these through experiences and training programs and fora they attended organized by the city government and NGOs (Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; and Briones et al., FGD, April 25, 2014). However, their manuals do not have any write-up about climate change, the effects of climate change to their barangays, barangay climate change action plans, and the relationship between CCA and DRR.

Even though they have basic knowledge about disaster recovery and rehabilitation, barangay officials admitted that the latter is not thoroughly fully operationalized in their barangays and not even discussed in their manuals because they prioritize disaster prevention and mitigation and preparedness (where they think disaster recovery and rehabilitation is already part and parcel), and they have insufficient knowledge and skills to undertake it. Thus, they echoed the need for more capacity building programs on the various aspects of DRR, especially because every after election (every three years), the

knowledge and skills get lost – the documents are not handed over, equipment gets lost, trained elective personnel are no longer available, etc. (Ancheta et al., 2014; Leal et al., 2014; and Briones et al., 2014). In addition, they complain that their 5% BDRRM Fund is already insufficient to buy relief goods (Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; and Briones et al., FGD, April 25, 2014). In the financial plan of Tumana for 2013, for example, repair and rehabilitation is lumped together with relief, medicines, and supplies and materials under the 30% Quick Response Fund (QRF) of the 5% BDRRM Fund. Hence, they could no longer provide financial assistance to their residents after a disaster strikes because the whole 30% QRF is inevitably used for relief, even though the usual flood that they experience yearly is not as severe compared to Ondoy.

#### **B.4.3. Risk Assessment**

In RAS, the three barangays obtained the same index values (0.09 out of the maximum 0.09). The reason is obvious: they have hazard and risk maps for flooding which they themselves made manually with technical assistance from the CDRRMO and a DRR consultant. Tumana has flood hazard and risk maps with a list of the number of vulnerable residents by street, the level of the flood, and recommended actions. Malanday, on the other hand, has three maps – flood hazard map, resource map, and vulnerable map – all drawn manually. Like Tumana, it has a matrix of vulnerable population which enumerates all affected areas, the number of residents who are affected, and the problems that the floods could bring. Nangka has only one map, i.e., the community and resource map, which provides an illustration of the flooded areas and resources within the barangay. However, this is complimented by hazard history narratives (that shows the significant historical disaster-related information from 1960 to 2012), hazard assessment, capacities and vulnerabilities assessment, and a seasonal calendar (that shows the record of distribution of seasonally varying phenomena/hazard/disaster in Nangka in a year).

#### **B.4.4. Risk Management and Vulnerability Reduction**

In RMVR, they all obtained high index values (0.18 to 0.21 out of the maximum 0.25). The high values are supported by the enormous preparations the barangays undertake. In the FGDs, officials discussed the preparations they make once an impending typhoon has been announced. All officials and volunteers are called to activate their teams/units to monitor the water level in the Marikina River. If needed, they warn residents and if the situation calls for it, they evacuate them. Food, water, and medicines are prepared beforehand (Ancheta et al., FGD, April 25, 2014; Leal et al., FGD, April 25, 2014; and Briones et al., FGD, April 25, 2014). However, in the aftermath of a disaster, officials and residents of the three barangays admitted having no insurance and sufficient savings that they could turn to to finance their families' recovery and rehabilitation needs, e.g., repair their damaged houses, capital to restart their small-scale enterprises (i.e., *sari-sari* store or convenience store), pay hospital and/or burial expenses, or even to tide them over in cases where they lost their jobs, livelihoods, or sources of income. This is apparent in all three barangays where many of the residents are either self-employed (vendors, pedicab drivers, etc.) or working in the service sector.

#### B.4.5. Disaster Preparedness and Response

In the last thematic area DPR, again, the three barangays got high index values (0.21-0.27 out of the maximum 0.30). Again, these are supported by the disaster preparations they have undertaken so far. All three barangays have early warning systems (EWS), communication protocols, and evacuation procedures and rules for disasters caused by floods which are well discussed in their manuals. However, they differ from one barangay to another. For the EWS, each barangay has its own warning criteria. A normal situation for Tumana is for the Marikina River to not exceed 8 meters, but for Malanday, it is 12 meters. Tumana and Nangka start to monitor flooding when the water reaches 15 meters, but for Malanday, it has to be only 12.5 meters. Tumana and Nangka are at the preparedness (to evacuate) status when the water rises to 16 meters, while for Malanday, only 14 meters. Evacuation starts in Tumana and Nangka at 17 meters, while for Malanday, at 15 meters. See **Table IV.D.9** for the EWS codes of the three barangays.

**Table IV.D.9. Codes for the Early Warning System of the Three Barangays for Marikina River**

Status/Code	Tumana (in meters)	Malanday (in meters)	Nangka (in meters)
Normal	8	12	No rain, typhoon
Alert/Monitoring	15	12.5	15
Preparation	16	14	16
Evacuation	17	15	17

Sources: *BDRRM Manuals* of the three barangays.

As for communication protocols, again, they differ from one another. Tumana does not identify its sources of information about floods. But, from its radio base, it relays information to barangay employees, *tanods* (patrolmen), and police/army who are expected to inform block leaders, religious leaders, youth leaders, and NGOs. They are, then, required to inform the vulnerable population of the barangay. Malanday, on the other hand, obtains its information from various sources, e.g., PAGASA, city hall, television and radio news, its consultant based in Albay, and staff units. Information is then relayed to the *purok* leaders who forward the message to the residents. Nangka has another communication protocol. First, it relies on information from the CDRRMO of Marikina. The information is then relayed by the barangay chairman to the various BDRRMC units. The Communication Task Unit is tasked to inform homeowners' associations and community leaders who will forward the warning to families. All three barangays have pro-forma weather advisory letters for alert, preparation, and evacuation status.

The majority of the units created in the BDRRMCs of the three barangays are meant for evacuation – from warning up to moving to the evacuation centers. The evacuation is usually assigned to the security or evacuation task forces but when the evacuees are already in schools, the school principals usually become the camp managers.

## A. SUMMARY OF FINDINGS AND ANALYSES

In this section, the results of the testing of the hypotheses and analyses are presented.

*p. The more exposed a community is to hazards and disasters, the greater is its preparedness for disaster recovery.*

Just like the cases of Tacloban, Iligan, and Dagupan Cities, this hypothesis is also refuted in the case of Marikina City's three barangays. The barangays in Marikina have comprehensive local DRRM plans, sophisticated equipment, and their officials are well trained. However, again, disaster recovery is not a priority – disaster prevention and response are. Some barangays claimed that their disaster recovery plans are already tucked into the other areas of DRRM, i.e., prevention and mitigation and preparedness. This is actually a claim worth studying – can recovery be made part of other pillars of DRRM? The literature on DRR and even the NDRRM Plan of the Philippines claims that all pillars of DRRM overlap with one another.

*q. The more socio-economically developed a community, the more prepared it is for disaster recovery.*

This is proven true in the three Marikina barangays. Their being situated in the national capital region is a double-edged sword for disaster recovery. As with other cities located in Metropolitan Manila, they attract migrants, thus increasing the risks from casualties and damages. However, the migrants bring with them income for the city government through taxes, which are given back to the barangays. These, together with the accessibility of technical knowledge from the academe, disaster-related government agencies, and finance from business establishments, have enabled them to publish their own *BDRRM Manuals*, which other barangays in the study do not have, purchase equipment for disaster preparation and response, reserve some funds to financing livelihood projects of affected residents, etc.

*r. The more involved a community in recovery planning and implementation, the faster is its recovery.*

This hypothesis is proven true in the cases of the three Marikina barangays because, just like those in Dagupan, even though their disaster recovery plans are not explicitly stated, they were able to rise up from the Ondoy devastation with minimum damages and casualties. This confirms the emerging idea in the Dagupan cases that perhaps with sufficient disaster prevention and mitigation preparations, there would only be minimal casualties and damages, thus, faster disaster recovery, even unplanned, can be immediately achieved.

*s. The more stakeholders involved in disaster recovery, the faster is the recovery of a community.*

Again, just like the cases of Dagupan City's barangays, this hypothesis is refuted in the cases of the Marikina barangays. It is a necessary condition to have many stakeholders involved in the recovery period. However, this is not enough. It seems that preparation on the part of

the barangays is also needed to reduce damages and casualties. This would probably translate to speedy recovery as Marikina has shown.

*t. The faster the recovery of a community, the more resilient it becomes.*

This hypothesis is proven true in the cases of the three Marikina barangays. This is supported by the fact that they obtained the highest DRCI index values (0.77 to 0.89) compared to those of Dagupan (0.66 to 0.75), Tacloban City (0.49 to 0.51) and Iligan City (0.42-0.53) and have suffered from negligible damages and casualties during the onslaught of TS Ondoy and other succeeding storms. However, it can also be argued that this can be a time-lapse function, i.e., over time, the barangays in Marikina (and even Dagupan) have acquired knowledge and skills in, and equipment for, DRRM, and the more recent victims of disasters (Tacloban and Iligan) have just discovered their vulnerabilities and have thus rated themselves low in resilience. Like Dagupan City, Marikina got high values in the five DRCI thematic areas, especially in disaster preparedness and response, and risk management and vulnerability reduction.

#### **SUB-CHAPTER IV.E**

#### **INTEGRATION AND SUMMARY**

The table below gives a glimpse of how the hypotheses fared in the barangays of each city. In a nutshell it can be said that, in general, the following hypotheses are proven true:

- **Hypothesis 3:** The more involved a community is in recovery planning and implementation, the faster is its recovery.
- **Hypothesis 5:** The faster the recovery of a community, the more resilient it becomes.

In contrast, the following hypotheses are refuted:

- **Hypothesis 1:** The more exposed a community is to hazards, the more prepared it is for disaster recovery.
- **Hypothesis 4:** The more stakeholders involved in disaster recovery, the faster is the recovery of a community.

The hypothesis below is proven true for barangays in Iligan, Dagupan, and Marikina Cities, while false in the case of the recently-hit Tacloban City (2013):

- **Hypothesis 2:** The more socio-economically developed a community is, the more prepared it is for disaster recovery.

The succeeding paragraphs summarize the explanations for these findings.

**Table IV.E.1. Overview of the Hypothesis-Testing Results**

<b>Hypothesis No.</b>	<b>Tacloban (2013)</b>	<b>Iligan (2011)</b>	<b>Dagupan (2009)</b>	<b>Marikina (2009)</b>
1 <sup>st</sup>	False	False	False	False
2 <sup>nd</sup>	False	True	True	True
3 <sup>rd</sup>	True	True	True	True
4 <sup>th</sup>	False	False	False	False
5 <sup>th</sup>	True	True	True	True

*Note:* Based on the summaries of each sub-chapter.

**Hypothesis 1: The more exposed a community is to hazards and disasters, the more prepared it is for disaster recovery.**

The case studies of the 12 barangays dispute this hypothesis. Even though all of them have experienced devastating disasters from strong typhoons/tropical storms in the past, and are exposed to other hazards, e.g., earthquakes, ground shaking, liquefaction, tsunamis, storm surges, etc., they still do not have concrete disaster recovery plans. Even the more DRRM-prepared barangays in Marikina and Dagupan have no concrete written plans for disaster recovery.

**Hypothesis 2: The more socio-economically developed a community is, the more prepared it is for disaster recovery.**

This hypothesis is proven false in the case of Dagupan City because the state of socio-economic development of the barangays does not have any association with the fact that all of them do not have post-disaster recovery plans. It is reasonable to argue that the disaster that befell them was too strong and that no local government is prepared enough to prevent casualties and damages. However, it was made clear during the field work that recovery planning only started at the initiative of the city government. The barangays were consulted only after the city government formulated the *Tacloban Recovery and Rehabilitation Plan*.

On the other hand, this hypothesis is proven true in the cases of Iligan, Dagupan, and Marikina. The more affluent barangays of these cities which were studied in this research pointed out that they prepared well for disasters, hence, even though they have no detailed written recovery plans, damages and casualties were minimal. For example, in the case of Dagupan, Barangay Uno (I) was mentioned to have recovered quickly because it is part of the city business district where the seat of government is located. Thus, it receives more attention from the city government and business establishments to reduce further disaster risks.

**Hypothesis 3: The more involved a community in recovery planning and implementation, the faster is its recovery.**

This hypothesis is *directly* proven true in the cases of Marikina and Dagupan because of the closer coordination between the city government and the barangays. The latter coordinated the recovery assistance from the city government, national government agencies, NGOs,

and other humanitarian organizations to their communities. That is why, as of this writing, their recovery periods are relatively shorter (one month to two years) compared to those in Iligan (the hypothesis was *indirectly* proven true) because three years have passed, city government, barangay officials, and residents admit that they have not yet fully recovered, especially in the area of housing and livelihood because all officials (in the city hall and barangays) are in a state of confusion due to internal politics which delay recovery implementation. Moreover, the barangay officials expect more assistance from their city and humanitarian organizations. The case of Tacloban cannot be assessed yet because it would be unfair to compare a less-than one-year old case to those of the three other cities.

**Hypothesis 4: The more stakeholders involved in disaster recovery, the faster is the recovery of a community.**

This hypothesis is proven false in all the cases. There is no guarantee that the quantity of stakeholders involved in providing assistance to disaster-stricken communities would lead to fast recovery. In the cases of Tacloban and Iligan Cities, recovery is hampered due to the inability of the local government to present master plans, which will be financed by the national budget and loans/grants from international financing institutions. While there are many who contributed to Dagupan's and Marikina's recovery, still, the city government and barangay's disaster prevention and mitigation efforts reduced the risks, thus, facilitating their early recovery.

**Hypothesis 5: The faster the recovery of a community, the more resilient it becomes.**

Without inferring causality, the case studies affirm this hypothesis because barangays in cities which recovered faster are the ones which got the highest DRCI values. These are the cases of those in Marikina and Dagupan which took only a relatively short period of time for disaster recovery (from one month to two years). On the other hand, Tacloban and Iligan, which obtained lower DRCIs, have yet to rise up from the destruction caused by the strong storms that ravaged them. These are illustrated by the table below.

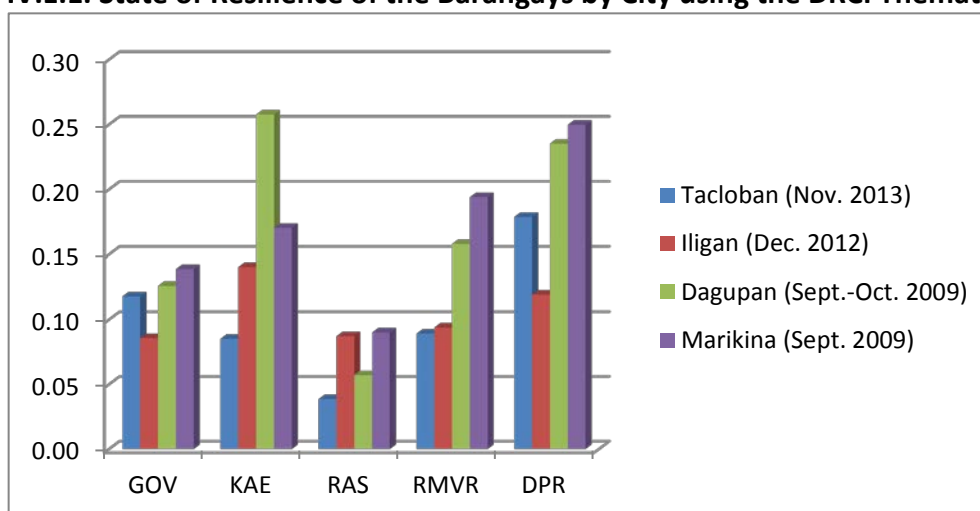
**Table IV.E.2. State of Recovery and Resilience of the Barangays in the Four Cities**

State	City			
	Tacloban	Iligan	Dagupan	Marikina
<b>Recovered</b>	No	Partial (<50%)	Partial (>50%)	Full
<b>Resilience</b>	Low	Low	High	High

*Note: "Recovery" is based on the assessments of the city government officials. "Resilience" is based on the average DRCI computations.*

In terms of resilience, those who recovered fast (barangays in Dagupan and Marikina) obtained higher DRCI values in all five thematic areas, except for RAS, compared to those which still have to recovery fully.

**Figure IV.E.1. State of Resilience of the Barangays by City using the DRCI Thematic Areas**



Source: Drawn based on the average DRCI computations for each thematic area per city. Refer to **Annexes II.E.1 to II.E.4** for the details.

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### 1. Conclusions

The following are the conclusions of the study arranged in terms of the recovery and resilience-related issues being considered:

##### A.1. Role of Communities and Other Stakeholders in Disaster Recovery

In general, much remains to be desired from communities or barangays in the cities that were investigated in this study in the area of disaster recovery. With the paradigm shift to pro-active DRRM, it is to be expected that they are now also pro-active in disaster recovery. On the contrary, it is in this area of DRRM where they have remained “passive-reactive,” stuck in the old school of the pre-NDRRMC era. “Passive” because there are no concrete local recovery plans (e.g., housing, livelihood for those who lost jobs, availing of home and life insurance, charting out an alternative development path in the aftermath of a worst-case disaster scenario, etc.) even in the most DRRM-prepared barangays of Marikina and Dagupan. The majority of the barangays stated that should another catastrophe hit them, they would rely on the “spirit of *bayanihan*” (good neighborliness) to help each other. There is a feeling that this kind of spirit that has helped them rise from previous disasters will not let them down in future disasters. Furthermore, they expect that their city governments will come to their rescue to resuscitate their damaged local economies. And they hope that humanitarian organizations and NGOs will come to their rescue if and when their communities are again pummelled by disasters.

The “reactive” recovery planning at the barangays could be an offshoot of the post-disaster recovery planning at the national government planning level. With their dependency on assistance from the higher authorities, barangays and even higher LGUs just wait for

directives to assess damages and losses and propose recovery and reconstruction plans from the NDRRMC and member-agencies. This has been the norm even during the NDCC days when local chief executives submitted damage and loss assessment upon the instruction of the President. The only difference today is that the evaluations are more rigorous with the use of the Post-Disaster Needs Assessment methodology.

## **A.2. Community Governance for Disaster Recovery**

In the barangays that were studied, there are no plans, organizations, and capacity building for disaster recovery. For example, even the most-DRRM prepared barangays in Marikina and Dagupan boast of policies, plans, preparations, skills training, and equipment for disaster prevention, mitigation, and response, yet none for disaster recovery. Hence, it can be inferred from this study that disaster recovery is the weakest link in the country's DRRM system.

## **A.3. Susceptibility to Hazards and Disasters and Recovery Planning**

The exposure to hazards and experiences from previous disasters have influenced barangays to prepare to prevent serious damages and casualties. However, as has been pointed out above, all the preparations have been made by the barangays for all thematic areas of DRRM except for disaster recovery. This conclusion was arrived at because there are no concrete plans to “build back better” once a worst-case disaster scenario hits them. In such cases, there is a preponderance on the part of barangay officials and residents to rely on God's help (“*Bahala na ang Diyos sa amin*” or “God will take care of us”), and even fatalism (“*Kapag araw mo na, wala ka nang magagawa*” or “Nothing else can be done if it is already your turn [to die]”). On a positive note, barangays' officials and residents expressed willingness to undertake recovery planning if they are trained and guided.

## **A.4. Recovery and Resilience**

In general, the DRCI computations reveal two lessons. First, cities which recovered relatively faster (Marikina and Dagupan vis-à-vis Iligan; Tacloban excluded due to its recency) may have made themselves more resilient over time. This may mean that building resilience does not happen overnight; it takes time. In the meantime, issues and problems related to disaster recovery like housing and livelihood, the two most cited problems by disaster victims, should be addressed immediately to reduce their exposure to hazards and vulnerabilities. Second, it was found that barangays which have been severely damaged received lower DRCI which means they are less resilient compared to moderately- and least-damaged barangays. This might be perceived as logical because those which suffered more would tend to see themselves as more vulnerable. However, the self-ratings by barangays' officials and residents were made separately; hence, there was no way that the responses were influenced by other barangays. Moreover, this pattern was observed to be the same through time, i.e., 2009 to 2013), hence, “recall” as a perception influencing factor can be eliminated.

Make a summary of the conclusion which will relate your conclusions to the hypotheses made earlier. Were your hypotheses shown to be true or not?

## 2. Recommendations

### B.1 Policy recommendations

**Based on the different results, findings, and conclusions of the study, the following are our recommendations:**

As has been pointed out, disaster recovery is the weakest link in the DRRM system at the local level. It is usually conducted after a disaster has struck, leaving little time to gather data and plan for immediate recovery. This is unfortunate because no matter how much preparation is made to reduce disaster risks, following Murphy's Law (i.e., "anything that can go wrong will go wrong"), damages and casualties will inevitably follow the onslaught of hazards, especially now that the world is experiencing climate change. And the most affected and vulnerable are poor people who reside in dangerous coastal areas. They prefer to live there to be near their sources of livelihood. This in no way will help build resilient communities, societies, and countries. The policy recommendations of this paper, therefore, are:

- **Amend Republic Act 10121 (Philippine Disaster Risk Reduction and Management Act of 2010) to include "Pre-Disaster Recovery Planning" (PDRP)** as a key component of recovery and rehabilitation of the DRRM. PDRP is a "proactive process of anticipating future recovery issues, developing a scenario based recovery plan, and building the capacity to improve recovery outcomes – all before a disaster happens" (IRP n.d.: 1). Plans made before a disaster strikes can be used for Post-Disaster Needs Assessment (PDNA), which will speed up disaster recovery planning. There are government entities which have used PDRP, namely: Hillsborough County, Monroe County, and Panama City (all in Florida, USA), Los Angeles (USA), the US Federal Emergency Management Agency, and those in Japan, and some Latin American countries. The International Recovery Platform based in Kobe, Japan (the site of the 1995 Great Hanshin Earthquake) has written a guidance note and has been providing training on this.
- **Complimentary to the institutionalization of the PDRP is to require all government agencies to draft their own continuity plans through a new law or amendment to RA 10121.** More often than not, post-disaster recovery efforts are focused on reviving the economy, infrastructure, agriculture, tourism, etc. Little or no attention at all is given to revive governance institutions like the seats of government, the various government offices, legislative council offices, etc. These are essential offices for the implementation of recovery programs, plans, and projects; hence, there is need for continuity plans for them. "Continuity planning is simply the good business practice of ensuring the execution of essential functions through all circumstances, and it is a fundamental responsibility of public institutions and private entities responsible to their stakeholders" (US-FEMA 2013: 1).
- **Relocate the poor from dangerous areas to safer places and provide alternative sources of livelihood with proper consultation.** This study has proven that the poor people are the most affected sectors of the society in the aftermath of a disaster because they live in dangerous areas for lack of money to build houses in safer communities and to be near their sources of livelihood which is usually the coastal

areas. Before a disaster strikes, they should be relocated, which is more cost-efficient than providing rescue operations with relief goods every time there is a calamity. They should also be provided with alternative sources of livelihood so they do not return to disaster-prone areas. All of these should be done in consultation with them because experience has shown that relocation without consultation fails.

## **B.2 Recommendations for Future Research**

- In support of the policy recommendation above for government agencies to draft their continuity plans, it is recommended that research be undertaken to gather experiences of frontline offices of various government agencies (national government agencies, local government units, government-owned and/or -controlled corporations, and other government entities) on how they prepared, recovered, and restored their frontline services after the onslaught of disasters.
- This study is limited to typhoon-related disasters and barangays and cities. The literature on disaster recovery and resilience can be broadened by doing similar studies on other hazards, e.g., earthquakes, tsunamis, and even man-made disasters like terrorism, etc., and at other local government levels, e.g., municipalities, provinces, and regions.
- The DRCI used in this study should be applied in other areas to test its reliability.
- A more rigorous quantitative approach in measuring “recovery” and “resilience” should be undertaken so that statistical techniques for inference, association, and causality can be undertaken.

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## **Chapter V. Conclusions and Recommendations**

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## ANNEX II.A

### QUESTIONNAIRE A. DOCUMENTS REVIEW AND ANALYSIS CHECKLIST

Name \_\_\_\_\_ of \_\_\_\_\_ LGU:

Reviewer/Analyst: \_\_\_\_\_ Date:

Check which among the following documents the LGU has:

- \_\_\_\_\_ Local Disaster Risk Reduction and Management Plan
- \_\_\_\_\_ Local Climate Change Action Plan
- \_\_\_\_\_ Comprehensive Land Use Plan
- \_\_\_\_\_ Zoning Ordinances
- \_\_\_\_\_ Comprehensive Development Plan
- \_\_\_\_\_ Ecological Profile/ Socio-Economic Physical Profile (latest)
- \_\_\_\_\_ Annual Report (3 years, latest)
- \_\_\_\_\_ Annual Investment Plans (3 years, latest)
- \_\_\_\_\_ Local Budget Ordinances (3 years, latest)
- \_\_\_\_\_ Local DRRM/CCA Ordinances

#### GOVERNANCE

Component	Question	Answer		Remarks
		Yes	No	
1. DRR/CCA policy, planning, priorities, and political commitment	1. Is there a shared vision of a prepared and resilient community?			
	2. Are the vision and DRR/CCA plans informed by understanding of underlying causes of vulnerability and other factors outside community's control?			
	3. Were the local DRR/CCA plans developed through participatory processes?			
	4. Were the local DRR/CCA plans put into operation?			
	5. Were the local DRR/CCA plans updated periodically?			
2. Integration with development policies and planning	1. Are the LDRR/CCA Plan and/or LCCA Plan integrated in the:			
	a. Comprehensive Land Use Plan			
	b. Zoning Ordinances			
3. Integration with emergency response	c. Comprehensive Development Plan			
	1. Are the responsibilities, resources, etc., defined in community disaster plans?			

Component	Question	Answer		Remarks
		Yes	No	
and recovery				
4. Partnerships	1. Are there clear, agreed and stable DRR/CCA partnerships between local stakeholder groups and organizations (communities and CBDs with local authorities, NGOs, businesses, etc.)?			
	2. Are the processes community-led (supported by external agencies)?			
5. Accountability and community participation	1. Is there a participatory monitoring and evaluation systems to assess resilience and progress in DRR/CCA?			
	2. Is there inclusion/representation of vulnerable groups in community decision making and management of DRR/CCA?			

#### KNOWLEDGE AND EDUCATION

Component	Question	Answer		Remarks
		Yes	No	
1. Information management and sharing (more formal)	1. Were contents and methods of communicating information developed with communities (i.e., 'communication' not 'information dissemination')?			
	2. Is there maximum deployment of indigenous, traditional, informal communications channels?			
	3. Were impact of information materials and communication strategies evaluated?			
2. Education and Training	1. Do local schools provide education in DRR/CCA for children through curriculum and, where appropriate, extra-curricular activities?			
	2. Were the DRR/CCA and other training address priorities identified by community and based on community assessment of risks, vulnerabilities and associated problems?			
	3. Are community members and organizations trained in relevant skills for DRR/CCA and DP (e.g., hazard-risk			

Component	Question	Answer		Remarks
		Yes	No	
	vulnerability assessment, community DRM planning, search and rescue, first aid, management of emergency shelters, needs assessment, relief distribution, fire fighting)?			
	4. Are construction companies and builders trained in safe construction and retrofitting techniques, and other practical steps to protect houses and property?			
	5. Are community members skilled or trained in appropriate agricultural, land use, water management and environmental management practices?			
	6. Are community experience of coping in previous events/crises, or knowledge of how this was done, used in education and training?			
3. Learning and research	1. Are there documentation, use and adaptation of indigenous technical knowledge and coping strategies?			
	2. Are there participatory monitoring and evaluation (M&E) systems to assess resilience and progress in DRR/CCA?			

#### RISK MANAGEMENT AND VULNERABILITY REDUCTION

Component	Question	Answer		Remarks
		Yes	No	
1. Environmental and natural resource management	1. Is there adoption of sustainable environmental management practices that reduce hazard risk?			
	2. Is there preservation of biodiversity (e.g., through community-managed seed banks, with equitable distribution system)?			
	3. Are there preservation and application of indigenous knowledge and appropriate technologies relevant to environmental management?			
2. Sustainable livelihoods	1. Is there a high level of local economic activity and employment (including among vulnerable groups); stability in economic activity and employment levels?			
	2. Is there equitable distribution of			

Component	Question	Answer		Remarks
		Yes	No	
	wealth and livelihood assets in community?			
	3. Is there livelihood diversification (household and community level), including on-farm and off-farm activities in rural areas?			
	4. Are there fewer people engaged in unsafe livelihood activities (e.g., small-scale mining) or hazard-vulnerable activities (e.g., rain-fed agriculture in drought-prone locations)?			
	5. Is there adoption of hazard-resistant agricultural practices (e.g., soil and water conservation methods, cropping patterns geared to low or variable rainfall, hazard-tolerant crops) for food security?			
	6. Do small enterprises have business protection and continuity/ recovery plans?			
	7. Are local trade and transport links with markets for products, labour and services protected against hazards and other external shocks?			
3. Social protection (including social capital)	1. Are there mutual assistance systems, social networks and support mechanisms that support risk reduction directly through targeted DRR/CCA activities, indirectly through other socioeconomic development activities that reduce vulnerability, or by being capable of extending their activities to manage emergencies when these occur?			
	2. Are there mutual assistance systems that cooperate with community and other formal structures dedicated to disaster management?			
	3. Are there established social information and communication channels; vulnerable people not isolated?			
	4. Are there collective knowledge and experience of management of previous events (hazards, crises)?			

Component	Question	Answer		Remarks
		Yes	No	
4. Financial instruments (including financial capital)	1. Are household and community asset bases (income, savings, and convertible property) sufficiently large and diverse to support crisis coping strategies?			
	2. Are costs and risks of disasters shared through collective ownership of group/ community assets?			
	3. Are there community/group savings and credit schemes, and/or access to micro-finance services?			
	4. Are there community disaster fund to implement DRR/CCA, response and recovery activities?			
	5. Is there access to money transfers and remittances from household and community members working in other regions or countries?			
5. Physical protection; structural and technical measures (including physical capital)	1. Are there safe locations: community members and facilities (homes, workplaces, public and social facilities) not exposed to hazards in high-risk areas within locality and/or relocated away from unsafe sites?			
	2. Are structural mitigation measures (embankments, flood diversion channels, water harvesting tanks, etc.) in place to protect against major hazard threats, built using local labor, skills, materials and appropriate technologies as far as possible?			
	3. Is there adoption of hazard-resilient construction and maintenance practices for homes and community facilities using local labour, skills, materials and appropriate technologies as far as possible?			
	4. Is there adoption of physical measures to protect items of domestic property (e.g., raised internal platforms and storage as flood mitigation measure, portable stoves) and productive assets (e.g., livestock shelters)?			
	5. Is there adoption of short-term protective measures against impending			

Component	Question	Answer		Remarks
		Yes	No	
	events (e.g., emergency protection of doors and windows from cyclone winds)?			
	6. Are there infrastructure and public facilities to support emergency management needs (e.g., shelters, secure evacuation and emergency supply routes)?			
	7. Are there resilient and accessible critical facilities (e.g., health centres, hospitals, police and fire stations – in terms of structural resilience, back-up systems, etc.)?			
	8. Are there resilient transport/service infrastructure and connections (roads, paths, bridges, water supplies, sanitation, power lines, communications, etc.)?			
	9. Are there locally owned or available transport sufficient for emergency needs (e.g., evacuation, supplies), at least in the event of seasonal hazards; transport repair capacity within community?			

#### DISASTER PREPAREDNESS AND RESPONSE

Component	Question	Answer		Remarks
		Yes	No	
1. Organizational capacities and coordination	1. Are there local organizational structures for DP/ emergency response (e.g., disaster preparedness/evacuation committees)?			
	2. Are local DP/response organizations community managed?			
	3. Are there local DP/response organizations community representative?			
2. Early warning systems 2	1. Is there a community-based and people-centred EWS at local level?			
	2. Is the EWS capable of reaching whole community (via radio, TV, telephone and other communications technologies, and via community EW mechanisms such as volunteer			

Component	Question	Answer		Remarks
		Yes	No	
	networks)?			
	3. Do EWS provide local detail of events and takes local conditions into account?			
	4. Is the EWS based on community knowledge of relevant hazards and risks, warning signals and their meanings, and actions to be taken when warnings are issued?			
	5. Are technical resources (monitoring and communications equipment) in place, with systems and trained personnel for maintenance and operation?			
3. Preparedness and contingency planning	1. Does a community DP or contingency plan exist for all major risks?			
	2. Are plans co-ordinated with official emergency plans and compatible with those of other agencies?			
	3. Are roles and responsibilities of different local and external actors defined, understood and agreed – and appropriate?			
	4. Do planning processes build consensus and strengthen relationships and coordination mechanisms between various stakeholders?			
	5. Are there linkages (formal/informal) with technical experts, local authorities, NGOs, etc., to assist with community planning and training?			
	6. Are plans tested regularly through community drills or simulation exercises?			
	7. Are plans reviewed and updated regularly by all relevant stakeholders?			
	8. Do local businesses develop their own continuity and recovery plans within the context of community plan?			
	9. Are contingency planning informed by understanding of broader local planning provisions and facilities?			

Component	Question	Answer		Remarks
		Yes	No	
4. Emergency resources and infrastructure	1. Are there emergency shelters (purpose built or modified): accessible to community (distance, secure evacuation routes, no restrictions on entry) and with adequate facilities for all affected population?			
	2. Are there emergency shelters for livestock?			
	3. Are there secure communications infrastructures and access routes for emergency services and relief workers?			
	4. Are there two-way communications systems designed to function during crises?			
	5. Are there emergency supplies (buffer stocks) in place, managed by community alone or in partnership with other local organizations (incl. grain/seed banks)?			
5. Participation, voluntarism, accountability	1. Are there local leadership of development and delivery of contingency, response, recovery plans?			
	2. Are organized volunteer groups integrated into community, local and supra-local planning structures?			
	3. Are there self-help and support groups for most vulnerable (e.g., elderly, disabled)?			
	4. Are there mechanisms for disaster-affected people to express their views, for learning and sharing lessons from events?			

## ANNEX II.B

### QUESTIONNAIRE B. KEY INFORMANTS' INTERVIEW CHECKLIST

Name \_\_\_\_\_ of \_\_\_\_\_ LGU: \_\_\_\_\_

Reviewer/Analyst: \_\_\_\_\_ Date: \_\_\_\_\_

Name \_\_\_\_\_ of \_\_\_\_\_ Interviewee: \_\_\_\_\_ Position \_\_\_\_\_

Title: \_\_\_\_\_

## GENERAL QUESTIONS

1. What were the disaster recovery policies, programs, projects, and activities initiated by the LGU after the disaster in the following areas?

a. Social recovery

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b. Economic

recovery

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c. Environmental

recovery

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d. Infrastructural

recovery

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e. Institutional

recovery

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2. Who initiated, managed/ led, and funded these disaster recovery efforts?

Areas	Initiator(s)	Manager/Leader (s)	Source(s) of Fund
p. Social recovery			
q. Economic recovery			
r. Environmental recovery			
s. Infrastructural recovery			
t. Institutional recovery			

3. What were the roles of the communities in the disaster recovery efforts in the following areas?

a. Social recovery

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b. Economic

recovery

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c. Environmental

recovery

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d. Infrastructural \_\_\_\_\_ recovery

e. Institutional \_\_\_\_\_ recovery

4. From the day the hazard and disaster hit, how many months/years did it take the LGU and the affected communities to recover from them in the following areas?

a. Social recovery \_\_\_\_\_

b. Economic recovery \_\_\_\_\_

c. Environmental recovery \_\_\_\_\_

d. Infrastructural recovery \_\_\_\_\_

e. Institutional recovery \_\_\_\_\_

5. What problems, issues, and challenges did the LGU, communities, NGOs/POs, and other stakeholders encounter during the post-disaster recovery efforts in the following areas? What recommendations would you like to propose to improve disaster recovery efforts in your LGU and at the community level?

Areas	Problems, Issues and Challenges	Recommendations
a. Social recovery		
b. Economic recovery		
c. Environmental recovery		
d. Infrastructural recovery		
e. Institutional recovery		

## CHECKLIST QUESTIONS

### GOVERNANCE

Component	Question	Answer		Remarks
		Yes	No	
1. DRR/CCA policy, planning, priorities, and political commitment	1. Do barangay officials have a consensus view of risks faced, risk management approach, specific actions to be taken and targets to be met?			
	2. Are there committed, effective and accountable barangay leaders for DRR/CCA planning and implementation?			
5. Institutional mechanisms, capacities and structures; allocation of responsibilities	1. Is there a shared understanding among all local stakeholders regarding DRR/CCA responsibilities, authority and decision making?			
7. Accountability and community participation	1. Is there capacity among barangay leaders to challenge and lobby external agencies on DRR/CCA plans, priorities, actions that may have an impact on risk?			
	2. Is there a high level of volunteerism in the barangays on DRR/CCA activities?			

### RISK ASSESSMENT

Component	Question	Answer		Remarks
		Yes	No	
1. Hazards/risk data and assessment	1. Were barangay hazard/risk assessments carried out which provide comprehensive picture of all major hazards and risks facing barangay (and potential risks)?			
	2. Was the hazard/risk assessment participatory (including representatives of all sections of barangay and sources of expertise)?			
	3. Were the hazard/risk assessment findings shared, discussed, understood and agreed among all stakeholders?			
	4. Were the hazard/risk assessment findings fed into barangay disaster planning?			
	5. Were the findings made available to all interested parties (within and outside			

Component	Question	Answer		Remarks
		Yes	No	
	barangay, locally and at higher levels) and fed into their disaster planning?			
	6. Is there on-going monitoring of hazards and risks?			
	7. Is there on-going updating of hazards and risks assessments?			
	8. Are skills and capacity to carry out barangay hazard and risk assessments maintained through support and training?			
2. Vulnerability/ capacity and impact data and assessment	1. Were barangay vulnerability and capacity assessments carried out which provide comprehensive picture of vulnerabilities and capacities?			
	2. Were the vulnerability and capacity assessments participatory (including representatives of all vulnerable groups)?			
	3. Were the vulnerability and capacity assessment findings shared, discussed, understood and agreed among all stakeholders?			
	4. Were the vulnerability and capacity assessment findings fed into barangay disaster planning?			
	5. Were the vulnerability and capacity assessments used to create baselines at start of barangay DRR/CCA projects?			
	6. Were the findings made available to all interested parties (within and outside barangay)?			
	7. Were the findings fed into the disaster and development planning of all interested parties (within and outside barangay)?			
	8. Is there an on-going monitoring of vulnerability?			
	9. Is there an on-going updating of vulnerability assessments?			
	10. Are skills and capacity to carry out barangay vulnerability and capacity assessments maintained through support and training?			
3. Scientific and technical	1. Are barangay members and organizations trained in hazards, risk			

Component	Question	Answer		Remarks
		Yes	No	
capacities and innovation	and vulnerability and capacity assessment techniques?			
	2. Are barangay members and organizations supported to carry out hazards, risk and vulnerability and capacity assessments?			
	3. Do barangays use indigenous knowledge and local perceptions of risk as well as other scientific knowledge, data and assessment methods?			

#### RISK MANAGEMENT AND VULNERABILITY REDUCTION

Component	Question	Answer		Remarks
		Yes	No	
2. Health and well being (including human capital)	1. Are there adequate food and nutrition, hygiene and health care for the people to maintain and sustain their physical ability to labour and good health?			
	2. Are there high levels of personal security and freedom from physical and psychological threats?			
	3. Are food supplies and nutritional status secure (e.g., through reserve stocks of grain and other staple foods managed by communities, with equitable distribution system during food crises)?			
	4. Is there access to sufficient quantity of water for domestic needs during crises?			
	5. Is there access to sufficient quality of water for domestic needs during crises?			
	6. Is there awareness among residents of means of staying healthy (e.g., hygiene, sanitation, nutrition, water treatment)?			
	7. Is there awareness among residents of life-protecting/saving measures?			
	8. Do barangay structures and culture support self-confidence and assist management of psychological consequences of disasters (trauma, PTSD)?			

Component	Question	Answer		Remarks
		Yes	No	
	9. Are barangay health care facilities and health workers, equipped and trained to respond to physical and mental health consequences of disasters and lesser hazard events?			
	10. Are barangay health care facilities and health workers supported by access to emergency health services, medicines, etc.?			
6. Physical protection; structural and technical measures (including physical capital)	1. Do barangay decisions and planning regarding built environment take potential natural hazard risks into account (including potential for increasing risks through interference with ecological, hydrological, geological systems) and vulnerabilities of different groups?			
	2. Is there security of land ownership/tenancy rights, example: low/minimal level of homelessness and landlessness?			

#### DISASTER PREPAREDNESS AND RESPONSE

Component	Question	Answer		Remarks
		Yes	No	
2. Early warning systems	1. Are early warning messages presented appropriately so that they are understood by all sectors of community?			
	2. Do early warning systems provide local detail of events and takes local conditions into account?			

#### ANNEX II.C.1 (FILIPINO VERSION)

#### QUESTIONNAIRE C. FOCUS GROUP DISCUSSION CHECKLIST (rev 2.0)

Name of LGU and Barangay: \_\_\_\_\_

Reviewer/Analyst: \_\_\_\_\_

Date: \_\_\_\_\_

Participants: \_\_\_\_\_

\_\_\_\_\_

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**GOVERNANCE**

Component	Question	Answer		Remarks
		Yes	No	
1. DRR/CCA policy, planning, priorities, and political commitment	1. Ang inyong barangay ba ay may pang-matagalang pananaw ukol sa resulta at epekto ng pagbabawas ng panganib sa kalamidad at pag-aangkop sa klima (disaster risk reduction/climate change adaptation o DRR/CCA)?			
2. Legal and regulatory systems	1. Naiintindihan ba ng inyong barangay ang mga batas, regulasyon, at mga pamamaraan ukol sa DRR/CCA at ang kanilang kahalagahan?			
	2. Alam ba ninyo ang inyong mga karapatan, o mga legal na obligasyon ng gobyerno na kayo ay protektahan bago, sa panahon, at pagkatapos ng isang kalamidad?			
3. Integration with development policies and planning	1. Sa palagay ninyo ba ang DRR/CCA ay dapat kabahagi ng mga plano upang makamit ang mga mas mataas pang mithiin ng inyong barangay katulad ng kaunlaran at pagtaas sa kalidad ng buhay?			
4. Integration with emergency response and recovery	1. Ang inyo bang barangay ba ay kasali sa sama-samang pagpa-plano ng emergency team ng inyong pamahalaang lungsod?			
5. Institutional mechanisms, capacities and structures; allocation of responsibilities	1. Ang inyo bang barangay ba ay may kinatawan sa pagpa-plano at implementasyon ng DRR/CCA sa inyong lungsod?			
	2. Ang mga non-governmental organizations (NGOs) at people's organizations (POs) ay sinasali ba sa mga usapin na sumusuporta sa DRR/CCA?			

Component	Question	Answer		Remarks
		Yes	No	
	3. Mayroon bang pinamamahalaang pondo ang inyong barangay para sa DRR/CCA at disaster recovery?			
	4. Mayroon bang paraan ang inyong barangay na makakuha ng pondo at iba pang suporta mula sa gobyerno para sa DRR/CCA at disaster recovery?			
6. Partnerships	1. Kayo ba ay buong naniniwala sa tunay na partnership na may bukas at pinagkasunduang mga prinsipyo ng pagtutulungan at mataas na lebel ng pagtitiwala?			
	2. Kayo ba ay may kapasidad at sigasig na itaguyod ang DRR/CCA at iangat ito sa pamamagitan ng partnership ng barangay sa mga panlabas na mga organisasyon?			
	3. May kapasidad ba ang inyong barangay na mangalap ng volunteers, sanayin sila, suportahan, at udyukan na sama-samang magtulungan para sa DRR/CCA?			
7. Accountability and community participation	1. Hinahayaan ba ng desentralisadong pamamahala na kayo ay makilahok sa mga gawain ukol sa DRR/CCA?			
	2. Mayroon ba kayong paraan para makakuha ng impormasyon sa mga planong at istruktura ng pamahalaang lungsod ukol sa DRR/CCA?			
	3. Mayroon ba kayong tiwala inyong pamahalaang lungsod at iba pang organisasyon sa labas ng inyong barangay?			

#### KNOWLEDGE AND EDUCATION

Component	Question	Answer		Remarks
		Yes	No	
1. Public awareness, knowledge and skills	1. Ang inyong buong barangay ba ay nakasali na sa mga kasalukuyang kampanyang pangkaalaman (awareness campaign) na nakatugon na sa inyong mga pangangailangan at kapasidad ukol sa DRR/CCA?			
	2. Ang kaalaman ba ng inyong barangay			

Component	Question	Answer		Remarks
		Yes	No	
	ukol sa kalamidad, mga kahinaan ng komunidad na tumugon sa kalamidad, panganib, at risk reduction (pagbawas sa panganib) ay sapat upang magkaroon ng epektibong pagtugon?			
	3. Ang inyo bang barangay ba ay may angkop na teknikal at organisasyonal na kaalaman at kasanayan para sa DRR/CCA at pagtugon sa oras ng kalamidad?			
	4. Mayroon bang bukas na diskusyunan/usapan sa inyong barangay na nagre-resulta sa pagkakaroon ng mga kasunduan ukol sa mga problema, solusyon, priyoridad, atbp.?			
2. Information management and sharing (more formal)	1. Ipinapaalam ba ang mga impormasyon ukol sa panganib, kahinaan, disaster management practices (mga gawain sa pamamahala sa kalamidad), atbp. sa mga residente na maapektuhan?			
	2. Mayroon bang planong pang-barangay para sa kalamidad ?			
	3. Naiintidihan ban ng mga residente ang planong pang-barangay para sa kalamidad?			
	4. Alam ba ng lahat ng sektor ng barangay ang mga pasilidad, serbisyo,at kasanayan na maaaring magamit bago dumating ang kalamidad, sa panahon ng kalamidad, at pagkatapos ng kalamidad?			
4. Cultures, attitudes, Motivation	5. Ang inyo bang barangay ay mayroong pinagkasunduan na mga pagpapahalaga (value), aspirasyon, at layunin?			
	6. Ang mga kaugalian at pagpapahalaga base sa kultura ba ng inyong barangay (katulad ng ekspektasyon sa pagtulong, sariling pagsisikap, relihiyon, mga ideolohohiyang pananaw) ay nakakatulong sa inyo upang maka-angkop at makaahon sa mga shock at stress?			

Component	Question	Answer		Remarks
		Yes	No	
	7. Kayo ba ay may realistikong pananaw ukol sa panganib ng kalamidad at pamamahala nito?			
	8. Kayo ba ay may sapat na tiwala at kapasidad ukol sa kaligtasan ninyo sa panahon ng kalamidad?			
	9. Kayo ba ay may sapat na kaalaman, mga resources at kinakailangang suporta upang matiyak ang kaligtasan ng lahat sa kalamidad?			
	10. Kayo ba ay may pananaw na personal na responsibilidad upang maghanda sa mga kalamidad at bawasan ang mga panganib nito?			
	11. Kumpara noon kayo ay sinalanta, kayo ba ngayon ay mas nag-iingat na sa kalamidad?			
	12. Ang pag-iinigat na ito ba ay dulot ng kampanyang pangkamalayan (awareness raising)?			

#### RISK ASSESSMENT

Component	Question	Answer		Remarks
		Yes	No	
1. Hazards/risk data and assessment	9. Nagsagawa na ba sa inyong barangay ng hazard/risk assessments (o pagtatantiya ng panganib sa kalamidad) na nagpapakita ng lahat na malalaking kalamidad at mga panganib na kasama nito?			
	10. Ang inyo bang barangay ay sinama sa hazard/risk assessments (o pagtatantiya ng panganib sa kalamidad)?			
	11. Ang resulta ba ng hazard/risk assessments (o pagtatantiya ng panganib sa kalamidad) ay ipinaalam sa inyo, pinag-usapan, at pinagkasunduan?			
	12. Ang mga resulta bang hazard/risk assessment (o pagtatantiya ng panganib sa kalamidad) ay isinama sa inyong barangay disaster planning?			
	13. Ang mga resulta ba ng hazard/risk			

Component	Question	Answer		Remarks
		Yes	No	
	assessment (o pagtatantiya ng panganib sa kalamidad) ay ipinamahagi sa mga interesadong partido bukod sa inyong barangay?			
	14. Ang mga kasanayan at kapasidad upang gumawa ng hazard/risk assessments (o pagtatantiya ng panganib sa kalamidad) ay naipagpapatuloy sa pamamagitan ng suporta at training/pagsasanay?			
2. Vulnerability/ capacity and impact data and assessment	1. Nagsagawa na ba sa inyong barangay ng vulnerability assessment (o pagtatantiya ng kahinaan sa kalamidad)?			
	2. Ang inyo bang barangay ay sinama sa vulnerability assessment (o pagtatantiya ng kahinaan sa kalamidad)?			
	3. Ang resulta ba ng vulnerability assessment (o pagtatantiya ng kahinaan sa kalamidad) ay ipinaalam sa inyo, pinag-usapan, at pinagkasunduan?			
	4. Ang mga resulta ba ng vulnerability assessment (o pagtatantiya ng kahinaan sa kalamidad) ay isinama sa inyong barangay disaster planning?			
	5. Ang mga resulta ba ng pagtatantiya ukol sa kahinaan sa panganib ng kalamidad at kapasidad na tumugon dito ay ginamit upang maging basihan sa paggawa ng mga proyekto na may kinalaman sa pag-aangkop sa klima at pagbabawas ng panganib dulot ng kalamidad (climate change adaptation/disaster risk reduction)?			
	6. Ang mga resulta ba ng vulnerability assessment (o pagtatantiya ng kahinaan sa kalamidad) ay ipinamahagi sa mga interesadong partido bukod sa inyong barangay?			
	7. Ang mga resulta ba ng vulnerability assessment (o pagtatantiya ng kahinaan sa kalamidad) ay isinama sa inyong barangay disaster planning?			

Component	Question	Answer		Remarks
		Yes	No	
	8. Ang mga kasanayan at kapasidad upang gumawa ng vulnerability assessment (o pagtatantiya ng kahinaan sa kalamidad) ay naipagpapatuloy sa pamamagitan ng suporta at training/pagsasanay?			
3. Scientific and technical capacities and innovation	1. Ang inyo bang barangay at mga opisyal ay sinanay na ukol sa pagtatantiya ng panganib dulot ng kalamidad, kahinaan ng inyong barangay sa kalamidad, at kapasidad sa pagtugon dito?			
	2. Ang inyo bang barangay at mga opisyal ay suportado upang magtantiya ng panganib dulot ng kalamidad, kahinaan ng inyong barangay sa kalamidad, at kapasidad sa pagtugon dito?			
	3. Ang inyo bang barangay ay gumagamit ng lokal na kaalaman/pananaw at siyentipikong pamamaraan upang magtantiya ng panganib ng kalamidad?			

#### RISK MANAGEMENT AND VULNERABILITY REDUCTION

Component	Question	Answer		Remarks
		Yes	No	
1. Environmental and natural resource management	1. Naiintidihan ba ng inyong barangay ang kahalagahan at kung paano nakakatulong ang inyong kapaligiran at kalikasan sa inyong buhay?			
	2. Naiintidihan ba ng inyong barangay ang nakaambang panganib na dulot ng inyong kapaligiran at kalikasan?			
	3. Ang inyo bang barangay ay may paraan upang magamit ang inyong kalikasan upang magamit sa panahon ng normal na sitwasyon at sa panahon ng kalamidad?			
4. Social protection (including social capital)	1. Ang inyo bang barangay ay nakakatanggap ng serbisyo sa pangunahing pangangailangan?			

Component	Question	Answer		Remarks
		Yes	No	
5. Financial instruments (including financial capital)	1. Ang inyong barangay ba ay may paraan upang makakuha ng murang insurance (life insurance, home insurance, at iba pa) mula sa insurance companies o kooperatiba?			
6. Physical protection; structural and technical measures (including physical capital)	1. Marami ba ang nakakaaalam ng nilalaman ng building code sa inyong barangay?			
	2. Mayroon bang kakayanan ang mga residente ng inyong barangay na magtayo, magsa-ayos, at mag-mintina ng mga bahay?			
7. Planning régimes	1. Ang inyo bang barangay ay gumagawa ng desisyon ukol sa paggamit at pamamahala ng lupa na kinukunsidera ang mga peligro ng kalamidad at kahinaan ng inyong lugar?			
	2. Ang inyo bang barangay disaster plan ay isinama sa city development plan at city land use plan?			

#### DISASTER PREPAREDNESS AND RESPONSE

Component	Question	Answer		Remarks
		Yes	No	
1. Organizational capacities and coordination	1. Ang inyo bang barangay disaster plan/kakayanang rumesponde ay ini-evaluate ng komunidad (o kasama ang ibang organisasyon)?			
	2. Malinaw, napagkasunduan at naiintindihan ba ng mga residente ang kanilang mga parte o role at responsibilidad ukol sa city disaster plan o pagtugon sa kalamidad?			
	3. Mayroon ba kayong emergency facility (komunikasyon, shelter, control center, atbp.) na pinamamahalaan ng inyong barangay?			
	4. Mayroon bang sapat na bilang ng mga tauhan at residente na sinanay ukol sa mga kaukulang gawain katulad ng search and rescue, komunikasyon, first aid, pamamahagi ng relief goods, atbp?			
	5. Ang mga regular training ba ay			

Component	Question	Answer		Remarks
		Yes	No	
	isinagawa para sa inyo ng lokal na organisasyon katulad ng regular practice drill, mga pagsasanay sa maaaring mangyaring sakuna/kalamidad, atbp?			
	6. Mayroon bang klaro at pinagkasunduang mekanismo sa koordinasyon at paggawa ng desisyon sa pagitan ng inyong barangay at mga eksperto, lokal na awtoridad, mga NGO, atbp?			
	7. Mayroon bang klaro at pinagkasunduang mekanismo sa koordinasyon at paggawa ng desisyon sa pagitan ng inyong barangay at mga katabing komunidad at kanilang mga organisasyon?			
2. Early warning systems 2	1. May kakayahan ba ang inyong barangay upang magpalabas ng early warning?			
	2. May kakayahan ba ang inyong barangay upang mag-likas o mag-evacuate ng mga residente?			
	3. May tiwala ba kayo sa inyong early warning system?			
	4. May tiwala ba kayo sa organisasyon na nangangasiwa ng inyong early warning system?			
3. Preparedness and contingency planning	1. May partisipasyon ba kayo sa paggawa ng disaster plan?			
	2. Ang inyo bang barangay disaster plan ay nauunawaan at suportado ng mga residente?			
	3. Ang mga pamilya ba ay gumawa na ng disaster plans ayon sa konteksto ng plano ng barangay?			
4. Emergency resources and infrastructure	1. Ang inyong barangay ba ay may kakayanang pangasiwaan ang mga krisis at kalamidad na nag-iisa at/o kasama ang iba pang mga organisasyon?			
	2. Mayroon ba kayong evacuation routes			

Component	Question	Answer		Remarks
		Yes	No	
	na minimintina at alam ng mga residente?			
	3. Alam bang puntahan ng mga residente ang kanilang evacuation routes?			
	4. Mayroon bang emergency funds na pinamamahalaan ang inyong barangay?			
5. Emergency response and recovery	1. Ang inyo bang barangay ay sinanay upang makapagbigay ng epektibo at emergency response tulad ng search and rescue, first aid/medical assistance, needs and damage assessment, atbp.?			
	2. Pinangungunahan ba ng barangay at iba pang mga lokal na ahensya ang koordinasyon sa disaster response at recovery?			
	3. Ang lahat bang aksyon ukol sa disaster response and recovery nakakarating sa lahat ng residente?			
	4. Mayroon bang psychosocial support o counselling sa inyong barangay?			
	5. May kaalaman ba ang buong barangay ukol sa kung papaano makakuha ng tulong sa relief at recovery?			
	6. Ang inyong barangay ba ay may tiwala sa epektibo at pagkapantay-pantay na aksyon ng mga ahensya sa relief at recovery?			
	7. Ang inyo bang barangay ay mayroong recovery planning at implementasyon na nag-uugnay sa social, pisikal, economic at pangkapaligiran na aspeto na base sa paggamit ng lubusan ng lokal na kakayahan?			
	8. Mayroon bang pinagkasunduang parte o role, responsibilidad at koordinasyon sa recovery activities na kasama ang mga lokal at panlabas na stakeholders?			
	9. Ang mga plano ukol sa pag-aangkop sa klima at pagbabawas ng panganib ng kalamidad (climate change adaptation at disaster risk reduction) ay naisama na ba sa recovery plan ng barangay?			

Component	Question	Answer		Remarks
		Yes	No	
6. Participation, voluntarism, accountability	1. Nagkaroon ba ng malawakang partisipasyon sa inyong barangay sa paggawa at pagpapatupad ng contingency, response plans, at ng organisasyong tagapamahala ng mga ito?			
	2. May organisasyon ba namamahala sa inyong barangay contingency at response plans?			
	3. Mayroon ba kayong mataas na tiwala sa early warning at emergency system at sa akayanan nitong gumawa ng epektibong aksyon sa oras ng kalamidad?			
	4. Mayroon bang mataas na lebel ng bolunterismo sa inyong barangay sa lahat ng aspeto ng paghahanda, pagtugon at pagbangon kasama ang lahat ng sektor ng barangay?			
	5. Ang inyo bang barangay ay handang makibagay sa pagpasok ng mga bagong bolunter at isama sila sa gawaing pagtugon at pagbangon (recovery and rehabilitation)?			

**ANNEX II.C.2  
(VISAYAN VERSION)**

**QUESTIONNAIRE C. FOCUS GROUP DISCUSSION CHECKLIST (rev 2.0)**

Name \_\_\_\_\_ of \_\_\_\_\_ LGU \_\_\_\_\_ and \_\_\_\_\_ Barangay: \_\_\_\_\_

Reviewer/Analyst: \_\_\_\_\_ Date: \_\_\_\_\_

Participants: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
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 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## GOVERNANCE

Component	Question	Answer		Remarks
		Yes	No	
1. DRR/CCA policy, planning, priorities, and political commitment	2. Naa ba'y lawum nga panan-aw ang inyong barangay bahin sa resulta ug epekto sa pagpa- minus sa kakuyaw nga dala sa katalagman ug sa <i>climate change adaptation</i> (disaster risk reduction/ climate change adaptation o DRR/CCA)?			
2. Legal and regulatory systems	3. Nasabtan ba sa inyong barangay ang mga balaod, ang mga bawal, ug ang mga pamaagi mahitungod sa DRR/CCA apil ang pagkamahinungdanun niani?			
	4. Kabalo ba mo sa inyong mga katungod, o sa mga legal nga obligasyon sa goberno nga protektahan mo sa dili pa muabot, sa naabot na, ug sa paghuman sa isa ka katalagman?			
3. Integration with development policies and planning	2. Sa imong huna-huna, ang DRR/CCA ba kay kinahanglan gyud e-apil o mahimong parte sa plano sa pagkab-ot sa damgo unya sa inyong barangay sama sa kalamboan ug ang pagpauswag sa kalidad sa atong mga kinabuhi?			
4. Integration with emergency response and recovery	4. Apil ba ang inyong barangay sa pagplano sa kinatibuk-an sa <i>emergency team</i> diha sa inyong lokal nga pangkagamhanan?			
5. Institutional mechanisms, capacities and structures; allocation of responsibilities	5. Naa ba'y pinili nga grupo sa inyong barangay diin sila responsible sa pagplano ug sa pag-implementar sa DRR/CCA?			
	6. Ginapaapil ba ang mga non-governmental organizations (NGOs) ug people's organizations (POs) sa pagpakig storya bahin sa DRR/CCA?			
	7. Naa ba'y ginadala nga pondo ang inyong barangay para sa DRR/CCA ug para sa <i>disaster recovery</i> ?			
	8. Naa ba'y pamaagi ang inyong barangay nga makakuha ug pondo ug uban pang suporta gikan sa goberno para sa DRR/CCA ug <i>disaster recovery</i> ?			
6. Partnerships	1. Nagatu-o ba mo sa tinud-anay nga			

Component	Question	Answer		Remarks
		Yes	No	
	pagpakig-kauban o partnership nga abri para kaninyo ug na-ay nasabutan nga baroganan ug daku ang mga pagsalig?			
	5. Naa ba mo'y kapasidad ug kadasig nga ipadayon ang DRR/CCA ug ipalambo kini pinaagi sa pagpakig-kauban o partnership sa barangay ug sa organisasyon nga naa sa gawas sa inyong barangay			
	6. Naa ba'y kapasidad ang inyong barangay na mangita ug "volunteers", tudlu-an sila, suportahan, ug dasigon nga kita magkahiusa ug magtinabanga'y para sa DRR/CCA?			
7. Accountability and community participation	4. Ginatugtan ba mo sa lokal nga pangkagamhanan nga muapil mo sa mga trabahuon nga may kalabutan sa DRR/CCA?			
	5. Naa ba mo'y pamaagi para makakuha ug impormasyon sa mga plano ug <i>istruktura</i> sa lokal nga pangkagamhanan bahin sa DRR/CCA?			
	6. Naa ba kamo'y pagsalig sa inyong lokal nga pangkagamhanan ug sa uban pa nga organisasyon nga naa sa gawas sa inyong barangay?			

#### KNOWLEDGE AND EDUCATION

Component	Question	Answer		Remarks
		Yes	No	
1. Public awareness, knowledge and skills	5. Nakaapil na ba ang inyong tibuok barangay sa ginahimong kampanya mahitungod sa kahibalo nga diin kini usab gatubag sa inyong panginahanglan ug kapasidad bahin sa DRR/CCA?			
	6. Ang kahibalo ba sa inyong barangay bahin sa katalagman, ang kaluya sa inyong komunidad nga mu-respond sa katalagman, sa kakuyaw, ug sa pagpaminus niini, kay insakto na ba para maka-angkon kita ug epektibo nga pag-respond?			
	7. Naa na ba'y insakto nga teknikal ug			

Component	Question	Answer		Remarks
		Yes	No	
	organisasyonal nga kahibalo ang inyong barangay para sa DRR/CCA ug apil na ang pag-responde sa oras sa katalagman?			
	8. Naa ba'y lugar diin kamu maka sabot sabot o maghisgot bahin sa inyong barangay nga musangpot dayon sa pagkahimu sa isa ka kasabutan nga may kalambigitan sa mga problema, solusyon, priyoridad, ug uban pa.?			
2. Information management and sharing (more formal)	13. Ginapahibalo ba ang mga impormasyon bahin sa kakuyaw, kaluya sa inyong barangay, <i>disaster management practices</i> (mga himuonon alang sa pagdumala sa kalamidad), ug uban pa sa mga residente nga maapektuhan?			
	14. Naa ba'y plano nga para sa lang gyud sa barangay kung naa unya'y kalimidad?			
	15. Nasabtan ba sa mga lumulupyo ang mga planong pang-barangay para sa kalamidad?			
	16. Kabalo ba ang tanan grupo nga anaa sa barangay sa mga gamit, serbisyo, ug kahibalo na pweding magamit sa dili pa muabot ang kalamidad, sa dihang naa na ang kalamidad, ug paghuman sa kalamidad?			
4. Cultures, attitudes, Motivation	17. Naa ba'y nasabutan ang inyong barangay nga mga maayong pamatasan, pangandoy, ug mga tumong ug tinguha?			
	18. Ang mga naandan nga batasan base ba sa kultura sa inyong barangay (pareha sa paglaum nga mutabang sa isigkatawo, pagpaningkamut sa kaugalingon, relihiyon, ug tinuohan) nakatabang ba sa inyo aron makasakay ug maka alingkawas gikan sa shock ug stress?			
	19. Naa ba mo'y tinud-anay nga pananaw bahin sa kakuyaw/ kadaut nga mahitabo gikan sa kalamidad ug sa pagdumala niini?			

Component	Question	Answer		Remarks
		Yes	No	
	20. Naa ba kamo'y insakto nga pagsalig ug kapasidad nga may kalambigitan sa inyong pagkasalbar sa panahon unya sa kalamidad?)			
	21. Naa ba kamo'y sakto nga kahibalo, mga posibling makuhaan ug gikinahanglan nga suporta para masiguro ang inyong kaluwasan sa tanang kalamidad?			
	22. Naa ba mo'y panglantaw nga kamu usab na'ay responsibilidad para mangandam sa mga kalamidad ug minusan ang kadaot niini?			
	23. Kumpara sauna, katong naigo mo ug nakasinati sa kadaut ni Sendong, mas ga-amping ba mo karon batok sa mga kalamidad?			
	24. Kini ba nga pag-amping mao ang resulta sa kapanya kanato sa kahibalo?			

#### RISK ASSESSMENT

Component	Question	Answer		Remarks
		Yes	No	
1. Hazards/risk data and assessment	15. Naghimu ba ang inyong barangay ug hazard/ risks assessments nga gapakita sa tanang dagku nga kalamidad uban ang kakuyaw nga mahimong dad-on niini?			
	16. Giapil ba ang inyong barangay sa hazard/ risk assessments?			
	17. Ang resulta ba sa sa hazard/ risk assessments gipahibalo ba sa inyo, ug inyo dayun bang gihisgutan kini ug gikasabutan?			
	18. Giapil ba sa inyong barangay disaster planning ang mga resulta sa hazard/ risk assessment?			
	19. Gitagaan ba ang mga interesadong partido sa mga resulta sa inyong hazard/ risk assessment gawas sa inyong barangay?			
	20. Napadayun ba ang mga inyong mga nahibal an ug kapasidad para maghimu ug hazard/ risk assessments pinaagi sa suporta ug training?			
2.	9. Nakahimu na ba ug vulnerability			

Component	Question	Answer		Remarks
		Yes	No	
Vulnerability/ capacity and impact data and assessment	assessment (o ang pagtag-an sa kaluyahon sa barangay kung na-ay katalagman) sa inyong barangay?)			
	10. Giapil ba ang inyong barangay sa pagpahigayon ug vulnerability assessment?			
	11. Gipahibalo ba sa inyo, ug inyo dayon gihisgutan ug gikasabutan ang resulta sa vulnerability assessment?			
	12. Giapil ba sa inyong barangay disaster planning ang resulta sa inyong vulnerability assessment?			
	13. Ang resulta ba sa vulnerability assessment sa mga kalamidad ug ang kapasidad sa pagpakigbatok niini maoy gigamit nga basihan sa paghimu ug mga laraw/proyekto nga na'ay kalabutan sa CCA/DRR?			
	14. Gitagaan ba ang mga interesadong partido sa resulta sa inyong vulnerability assessment gawas sa inyong barangay?			
	15. Giapil ba sa inyong barangay disaster planning ang resulta sa inyong vulnerability assessment?			
	16. Napadayun ba ang mga inyong mga nahibal an ug kapasidad para maghimu ug vulnerability assessment pinaagi sa suporta ug training?			
3. Scientific and technical capacities and innovation	4. Gitudloan ba ang inyong barangay ug mga opisyal bahin sa pagtag-an/pag-analisa sa kakuyaw nga dala sa katalagman, kaluyahon sa inyong barangay sa katalagman, ug sa kapasidad sa pagpakigbatok niini?)			
	5. Suportado ba ang inyong opisyal sa barangay sa ilang pag-analisa sa kakuyaw nga dala sa kalamidad, kaluyahon sa inyong barangay diha sa katalagman, ug sa kapasidad sa pagpakigbatok niini?			
	6. Nigamit ba ang inyong barangay ug tradisyunal na kahibalo/ panan aw ug <i>siyentipikong</i> pamaagi para mahibal an ang kakuyaw nga dala sa kalamidad?			

## RISK MANAGEMENT AND VULNERABILITY REDUCTION

Component	Question	Answer		Remarks
		Yes	No	
1. Environmental and natural resource management	4. Nasabtan ba sa inyong barangay ang kabililhon ug sa kung unsang paagi ta ginatabangan sa atong palibot ug kinaiyahan dinhi sa atong tagsa-tagsa ka kinabuhi?			
	5. Nasabtan ba sa inyong barangay ang nakahikot nga kakuyaw/kadaot gikan sa atong palibot ug sa atong kinaiyahan?			
	6. Naa ba'y pamaagi ang inyong barangay para magamit ang inyong kinaiyahan sa normal nga panahon ug sa panahon sa kalamidad?			
4. Social protection (including social capital)	2. Nakadawat ba ang inyong barangay ug pag-alagad sa mga panginahanglanon?			
5. Financial instruments (including financial capital)	3. Naa ba'y pamaagi ang inyong barangay para makakuha ug barato nga insurance (life insurance, home insurance, ug uban pa) gikan sa mga insurance companies o kooperatiba?			
6. Physical protection; structural and technical measures (including physical capital)	3. Daghan ba nakabalo bahin sa sulod sa building code sa inyong barangay?			
	4. Kaya ba sa inyong mga lumulupyo diri nga magtukod, mag-ayo, ug magmintina sa balay?			
7. Planning régimes	1. Nagahimu ba ang inyong barangay ug lakang bahin sa pag-gamit ug pagdumala sa yuta nga giisip nga delikado sa katalagman ug posibli nga mahimong babag sa inyong lugar?			
	4. Giapil ba ang inyong barangay disaster plan sa city development plan ug city land use plan?			

## DISASTER PREPAREDNESS AND RESPONSE

Component	Question	Answer		Remarks
		Yes	No	
1. Organizational capacities and coordination	8. Ang inyo bang barangay disaster plan/abilidad sa pagpakigbatok kay gihukman sa mga lumulupyo (o kauban pa nga uban nga organisasyon)?			
	9. Tin-aw, nasabutan, ug nasabtan ba usab sa mga lumulupyo ang ilang responsibilidad bahin sa city disaster plan o ang pagpakigbatok ngadto sa kalamidad?			
	10. Naa ba mo'y emergency facility (komunikasyon, dangpanan, control center, ug uban pa) nga gidumala sa inyong barangay?			
	11. Duna ba mo'y sakto nga tawo ug lumulupyo nga gitudloan bahin sa gimbuhaton sama sa search and rescue, kumunikasyon, first aid, pagpanghatag ug relief goods, ug uban pa?			
	12. Ang mga regular training ba ginapahigayon para sa inyo sa lokal nga organisasyon pareha anang regular practice drill, ug ang mga pag kat-on sa mga posible nga mahitabo kung na'ay mga kalamidad?			
	13. Duna ba'y klaro nga kasabutan bahin sa mekanismo sa koordinasyon ug sa paghimu ug mga desisyon sa inyong barangay gikan sa mga eksperto, lokal nga awtoridad, mga NGO, ug uban pa?			
	14. Naa ba'y klaro ug nasabutan bahin sa mekanismo sa koordinasyon ug sa paghimu ug desisyon gikan sa barangay ug sa tapad nga komunidad ug sa ilang mga organisasyon?			
2. Early warning systems 2	5. Kaya ba sa inyong barangay nga magpagawas ug early warning?			
	6. Naa ba'y kapasidad ang inyong barangay nga magpabalhin o magpa-evacuate sa ilang mga lumulupyo?			
	7. Naa ba mo'y pagsalig sa inyong early warning system?			
	8. Naa ba mo'y pagsalig sa organisasyon			

Component	Question	Answer		Remarks
		Yes	No	
	nga gadumala sa inyong early warning system?			
3. Preparedness and contingency planning	4. Nakaapil ba mo sa paghimu sa disaster plan?			
	5. Nasabtan ug suportado ba sa mga lumulupyo dinhi ang inyong barangay disaster plan?			
	6. Ang mga pamilya ba naghimu napod ug disaster plan haum sa plano sa barangay?			
4. Emergency resources and infrastructure	5. Kaya ba sa inyong barangay nga mudumala sa inyo nga siya ra isa o kauban ang uban pa nga grupo sa panahon sa krisis ug sa kalamidad?			
	6. Naa ba mo'y evacuation routes nga gina-mintinar ug diin kini usab nahibal an sa mga residente?			
	7. Kabalo ba muadto ang mga lumulupyo sa ilang evacuation routes?			
	8. Naa ba'y emergency funds nga gidumala ang inyong barangay?			
5. Emergency response and recovery	10. Gitudloan ba ang inyong barangay para makahatag ug epektibo nga emergency response sama sa search and rescue, first aid/medical assistance, needs and damage assessment, ug uban pa?			
	11. Gidumalaan ba sa inyong barangay ug uban pang mga lokal nga mga ahensya ang koordinasyon sa disaster response ug recovery?			
	12. Ang tanan ba nga aksyon mahitungod sa disaster response ug recovery nakaabot sa tanang lumulupyo?			
	13. Duna ba'y psychosocial support o counselling sa inyong barangay?			
	14. Naa ba'y kahibalo ang tibuok barangay bahin sa mga pamaagi para makakuha ug tabang para sa relief ug recovery?			
	15. Naa ba'y salig ang inyong barangay sa epektibo ug kaangayan nga aksyon sa mga ahensya diha sa relief ug recovery?			

Component	Question	Answer		Remarks
		Yes	No	
	16. Naa ba'y recovery planning ug na-implementar nga na'ay kalambigitan sa social, pisikal, economic ug pang-kinaiyahan nga parte nga diin kini base usab sa paggamit sa nakat-unan sa lokal?			
	17. Naa ba'y nasabutan nga mga gimbuhaton o responsibilidad ug koordinasyon sa recovery activities nga kauban sa mga lokal ug mga stakeholder sa gawas?			
	18. Ang mga plano ba bahin sa CCA/DRR naapil na ba sa recovery plan sa barangay?			
6. Participation, voluntarism, accountability	6. Naa ba'y daku nga partisipasyon ang inyong barangay sa paghimu ug pag-implementar ug contingency, response plans, ug ang mga organisasyon nga gadumala niini?			
	7. Naa ba'y organisasyon nga gadumala sa inyong barangay contingency ug response plans?			
	8. Daku ba mo ug pagsalig sa inyong early warning ug emergency system ug sa kaya ani nga muhimu ug epektibo nga aksyon sa oras sa kalamidad?			
	9. Naa ba'y taas nga lebel sa bolunterismo sa inyong barangay sa tanang matang sa pagpangandam, pag-respond ug pagbangon kauban ang tanang sector sa barangay?			
	10. Andam ba ang inyong barangay nga mudawat sa pagsulod unya sa mga bag-ong bolunter ug ubanon sila sa trabahong pag-respond ug pagbangon?			

## ANNEX II.D

### STEPS IN ADMINISTERING THE CHECKLISTS OF THE DISASTER-RESILIENT COMMUNITY INDEX

This tool is an indexing system used to measure the resilience of communities to disasters in the five thematic areas, namely: governance, risk assessment, knowledge and education, risk management and vulnerability reduction, and disaster preparedness and response.

## **Steps**

### **1. Analysis of LGU Documents**

- a. Convey (by telephone, e-mail or post) requests to see the Mayor or his/her representative. Briefly explain the purpose and the survey to be conducted.
- b. Request from the Mayor copies of documents that will provide basic information on the recovery and rehabilitation policies, plans, and activities of the LGU.
- c. Get copies of local disaster risk reduction plan, local climate change action plan, comprehensive land use plan, zoning ordinances, comprehensive development, three-year annual investment plans, and three-year annual budget ordinances.
- d. Read through the documents and answer Questionnaire A. Consult with the relevant LGU officials if there are questions on the documents or to clarify contents.

### **2. Key Informants' Interview**

- a. Set an appointment with Mayor, Vice Mayor, Local DRR/CCA Management Office Head, Administrator, Budget Officer, and Sanggunian Member on CCA/DRR/CCAM.
- b. Conduct the interview using Questionnaire B. Ask questions for clarification.

### **3. Focus Group Discussion**

- a. With assistance from the LGU, approach the barangay captains of the selected sample barangays. Sample barangays must represent the total number of barangays affected by the disaster.
  - b. Explain FGD, its background, purpose and intents, and the requirements to select three stakeholder-respondents that will be interviewed together as a group for the FGD.
  - c. The three stakeholder-residents in each barangay should consist of: one local official one local official (barangay captain or kagawad), one resident to be randomly selected from the voters' list in the barangay, and one officer or member of an NGO or PO residing or operating in the area.
  - c. Conduct the FGD using Questionnaire C. Ask questions for clarification.
4. Collate and compute the index using the formula below. "Yes" answers will be added together whose sums will be used as score for each indicator.

$$DRCI = \Sigma (GOVw_1 + RASw_2 + KAEw_3 + RMVRw_4 + DPRw_4)$$

where: DRCI = disaster-resilient community index

GOV = index value in governance

RAS = index value in risk assessment

KAE = index value in knowledge and education

RMVR = index value in risk management and vulnerability reduction

DPR = index value in disaster preparedness and response

w = weight assigned based on the number of indicators for each thematic area

## ANNEX II.E.1

### DRCI COMPUTATIONS FOR COVERED BARANGAYS IN TACLOBAN CITY

#### A. Sagkahan

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	8	2	15	25	0.76	0.12
KAE	36	23%	2	0	13	15	0.42	0.10
RAS	21	9%	0	9	0	9	0.43	0.04
RMVR	49	23%	14	1	5	20	0.41	0.09
DPR	60	29%	11	0	18	29	0.48	0.14
<b>Total</b>	199	100	N.A.					<b>0.49</b>

#### B. Marasbaras

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	8	2	14	24	0.73	0.12
KAE	36	23%	2	0	8	10	0.28	0.06
RAS	21	9%	0	9	0	9	0.43	0.04
RMVR	49	23%	14	1	7	22	0.45	0.10
DPR	60	29%	11	0	27	38	0.63	0.18
<b>Total</b>	199	100	N.A.					<b>0.51</b>

#### C. Abucay

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	8	2	14	24	0.73	0.12

KAE	36	23%	2	0	13	15	0.42	0.10
RAS	21	9%	0	9	0	9	0.43	0.04
RMVR	49	23%	14	1	8	15	0.31	0.07
DPR	60	29%	11	0	17	44	0.73	0.21
<b>Total</b>	199	100	N.A.					<b>0.53</b>

## ANNEX II.E.2

### DRCI COMPUTATIONS FOR COVERED BARANGAYS IN ILIGAN CITY

#### A. Hinaplanon

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	0	3	15	18	0.55	0.09
KAE	36	23%	0	8	16	24	0.67	0.15
RAS	21	9%	6	0	17	23	1.10	0.10
RMVR	49	23%	7	6	8	21	0.43	0.10
DPR	60	29%	7	0	22	29	0.48	0.14
<b>Total</b>	199	100	N.A.					<b>0.58</b>

#### B. Sta. Filomena

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	0	3	14	17	0.52	0.08
KAE	36	23%	0	8	11	19	0.53	0.12
RAS	21	9%	6	0	11	17	0.81	0.07
RMVR	49	23%	7	6	5	18	0.37	0.08
DPR	60	29%	7	0	14	21	0.35	0.10
<b>Total</b>	199	100	N.A.					<b>0.46</b>

#### C. Tubod

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	0	3	15	18	0.55	0.09

KAE	36	23%	0	8	15	23	0.64	0.15
RAS	21	9%	6	0	15	21	1.00	0.09
RMVR	49	23%	7	6	8	21	0.43	0.10
DPR	60	29%	7	0	17	24	0.40	0.12
<b>Total</b>	199	100	N.A.					<b>0.54</b>

### ANNEX II.E.3

#### DRCI COMPUTATIONS FOR COVERED BARANGAYS IN DAGUPAN CITY

##### A. Pantal

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	6	6	14	26	0.79	0.13
KAE	36	23%	4	2	14	20	0.56	0.13
RAS	21	9%	0	0	7	7	0.33	0.03
RMVR	49	23%	14	12	6	32	0.65	0.15
DPR	60	29%	17	2	28	47	0.78	0.23
<b>Total</b>	199	100	N.A.					<b>0.66</b>

##### B. Bonuan Gueset

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	6	6	14	26	0.79	0.13
KAE	36	23%	4	2	16	22	0.61	0.14
RAS	21	9%	0	0	16	16	0.76	0.07
RMVR	49	23%	14	12	8	34	0.69	0.16
DPR	60	29%	17	2	30	49	0.82	0.24
<b>Total</b>	199	100	N.A.					<b>0.73</b>

##### C. Uno (I)

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	6	6	14	26	0.79	0.13

KAE	36	23%	4	2	16	22	0.61	0.14
RAS	21	9%	0	0	17	17	0.81	0.07
RMVR	49	23%	14	12	9	35	0.71	0.16
DPR	60	29%	17	2	31	50	0.83	0.24
<b>Total</b>	199	100	N.A.					<b>0.75</b>

## ANNEX II.E.4

### DRCI COMPUTATIONS FOR COVERED BARANGAYS IN MARIKINA CITY

#### A. Tumana

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	9	5	15	29	0.88	0.14
KAE	36	23%	2	1	25	28	0.78	0.18
RAS	21	9%	0	15	6	21	1.00	0.09
RMVR	49	23%	24	11	9	44	0.90	0.21
DPR	60	29%	22	2	32	56	0.93	0.27
<b>Total</b>	199	100	N.A.					<b>0.89</b>

#### B. Malanday

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	9	5	14	28	0.85	0.14
KAE	36	23%	2	1	21	24	0.67	0.15
RAS	21	9%	0	15	6	21	1.00	0.09
RMVR	49	23%	24	11	4	39	0.80	0.18
DPR	60	29%	22	2	19	43	0.72	0.21
<b>Total</b>	199	100	N.A.					<b>0.77</b>

#### C. Nangka

Thematic Area	Total No. of Indicators/ Questions (A)	Percentage per Thematic Area (B)	Quest. A "Yes" Scores (C)	Quest. B "Yes" Scores (D)	Quest. C "Yes" Scores (E)	Total of "Yes" Scores = C+D+E (F)	=F/A (G)	Index Value =B x G (H)
GOV	33	16%	9	5	15	29	0.88	0.14

KAE	36	23%	2	1	25	28	0.78	0.18
RAS	21	9%	0	15	6	21	1.00	0.09
RMVR	49	23%	24	11	6	41	0.84	0.19
DPR	60	29%	22	2	32	56	0.93	0.27
<b>Total</b>	199	100	N.A.					<b>0.87</b>

## **ANNEX IV.A.1**

### **PARTICIPANTS**

#### **Key Informants Interview**

#### **Tacloban City Hall**

**April 8, 2014**

<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
1. Federico Anido Management	Head, City Disaster Risk Reduction and Office (Tel. No.: 0917-323-7107)
2. Jonathan R. Hijama Resources Office	Head, City Environment and Natural
3. Jaime M. Opinion	City Health Office
4. Lilosia R. Baltazar	City Social Welfare and Development
5. Roland Hidalgo	City Planning and Development Office
6. Malou R. Tabao	City Tourism Office

### **PARTICIPANTS**

#### **Focus Group Discussion**

#### **Barangay Sagkahan, Tacloban City**

**April 10, 2014**

<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
1. Rosita A. Luyten	Punong Barangay
2. Violeta A. Macarayon	Kagawad
3. Fe M. Quijano	Kagawad
4. Norma P. Macayon	Kagawad
5. Cristina Catalong	Kagawad
6. Wilma M. Almeria	Kagawad
7. Lorenza B. Sales	Kagawad

### **PARTICIPANTS**

#### **Focus Group Discussion**

#### **Barangay Marasbaras, Tacloban City City**

**April 9, 2014**

<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
1. Iris Ting	Punong Barangay
2. Alex B. Esquierdo	Kagawad
3. Realizo Triunfo T. Pesuda	Kagawad
4. Ralph C. Sabungan	Kagawad
5. Erwin B. Cubilla	Kagawad
6. Marilou C. Gomez	Kagawad
7. Mitchell U. Omayno	Kagawad
8. Paul E. Dans	Resident

- |                               |          |
|-------------------------------|----------|
| 9. Cresanto B. Estojero       | Resident |
| 10. Ethel P. Eval             | Resident |
| 11. Ma. Cristina F. Quinanoza | Resident |
| 12. Vivian N. Cañas           | Resident |

**PARTICIPANTS**

**Focus Group Discussion  
Barangay Abucay, Tacloban City  
April 9, 2014**

<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
1. Ricardo Benitez	Punong Barangay
2. Petra A. Añosa	Brg. Secretary
3. Narisa G. Dilho	Brgy. Treasurer
4. Elma S. Caninong	Resident
5. Felisa A. Abayan	Resident
6. Benedicta R. Perante	Resident
7. Yonida C. Asuncion	Resident

**8. ANNEX IV.A.2**

**9.**

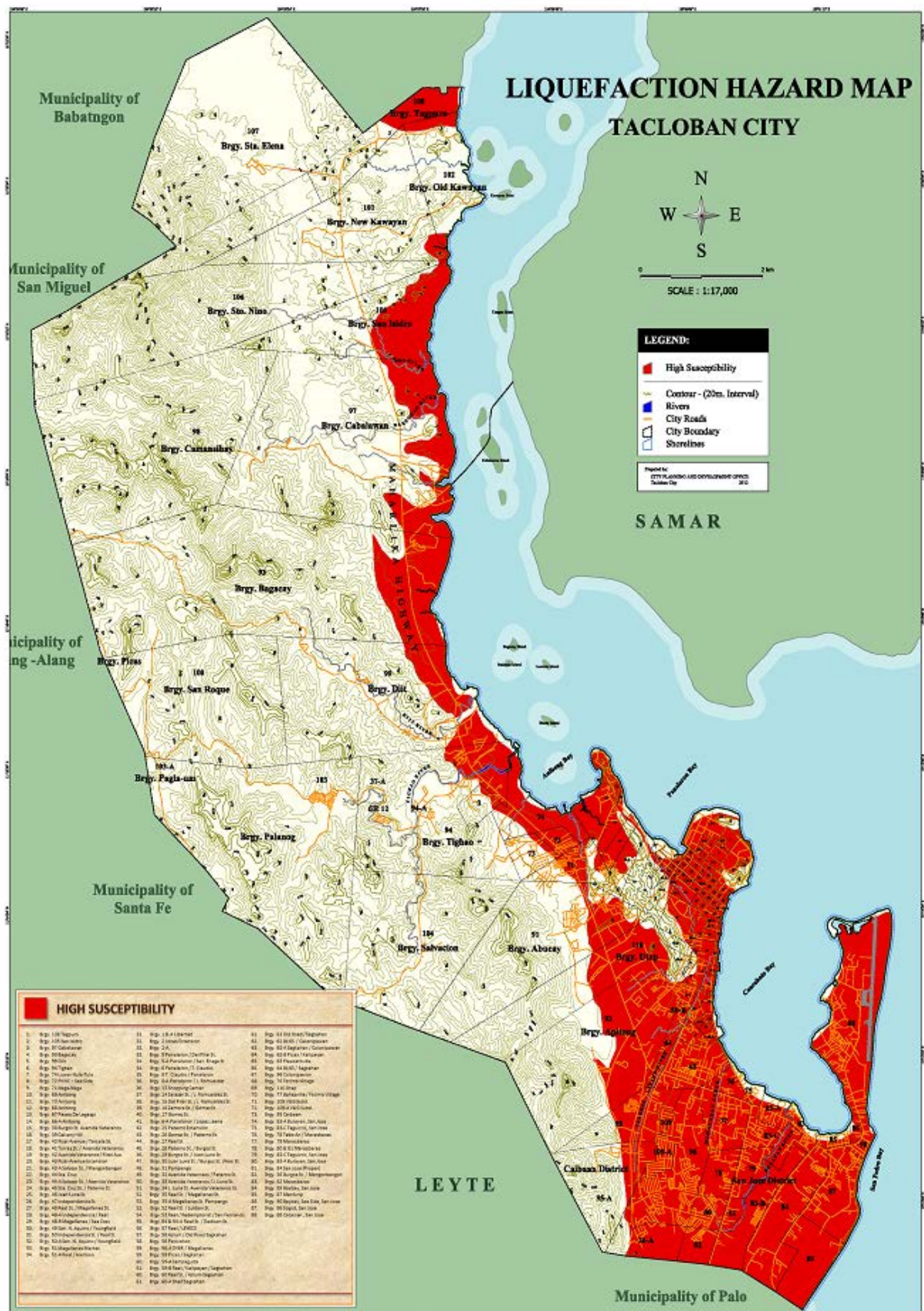
## 10. HAZARD MAPS OF TACLOBAN CITY



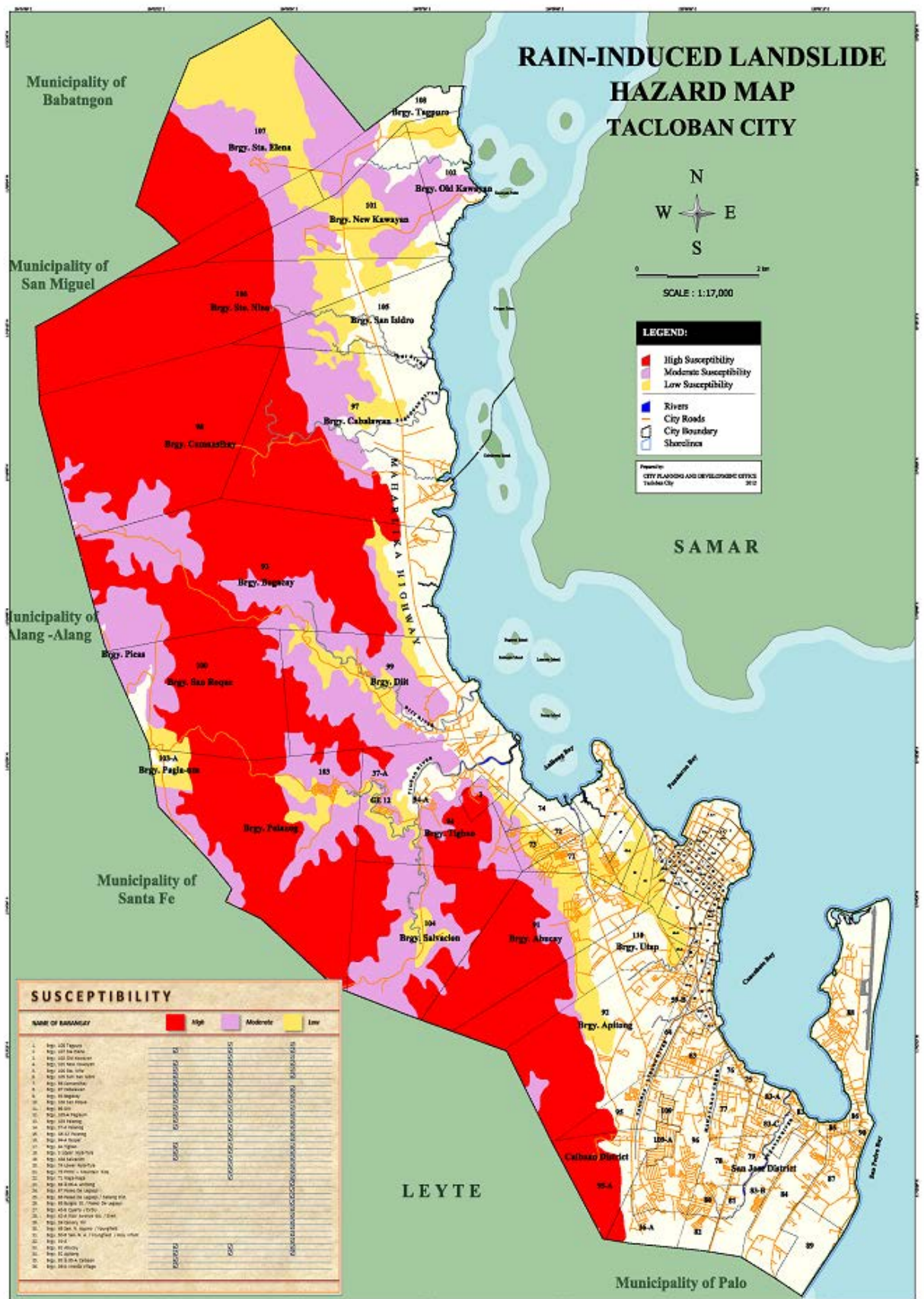
Source: All maps were taken from Tacloban City, n.d.2.







Pre-Yolanda Storm Surge Hazard Map





**PARTICIPANTS**  
**Key Informants Interview**  
**Iligan City Hall and Its Annexes**  
**May 13-18, 2014**

<u>NAME</u>	<u>POSITION/OFFICE</u>
7. Ernesto P. Piccio, Jr.	ICDRMO, Research and Planning
8. Agnes Maingat (Tel. No.:	City Social Welfare and Development Office  0917-716-8316)
9. Peregrina L. Mantos	City Social Welfare and Development Office
10. Rice Mejia	City Planning and Development Office
11. Anonymous respondent <sup>28</sup>	
12. Anonymous respondent <sup>29</sup>	

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay Hinaplanon, Iligan City**  
**May 27, 2014**

Mr. Veronico S. Echavez Punong Barangay (Tel. No.: 063-221-9678; 0919-474-8467)  
 Note: Except for the punong barangay, the 13 participants did not write their names in Questionnaire B and would not want to be identified.

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay Sta. Filomena, Iligan City City**  
**May 16, 2014**

<u>NAME</u>	<u>POSITION/OFFICE</u>
1. Editha Y. Palafox	Punong Barangay (Tel. No.: 063-225-9062; 0916-838-9678)
2. Glecerio G. Casas	Kagawad
3. Roland G. Diez	Kagawad
4. Panfilo T. Tanggan	Kagawad
5. Victor J. Ramayan	Kagawad
6. Marijoy Alitor	Kagawad
7. Geraldine U. Tagalimot	Kagawad
8. Sergio Raymond E. Ong	Resident
9. Dulcesima R. Fiel	Resident
10. Henrick Q. Tagalimot	Resident
11. Fely M. Bahian	Resident
12. Maria Luisa B. Quimada	Resident

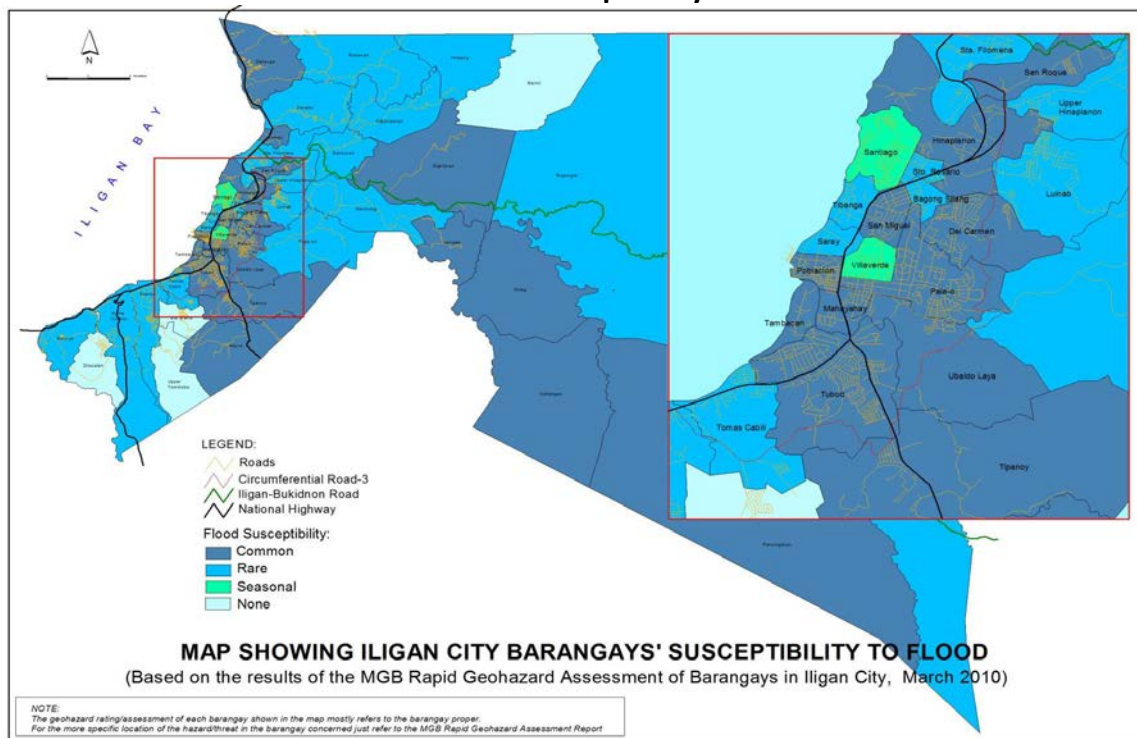
<sup>28</sup> Did not want to be identified as a pre-condition for answering the questionnaire.

<sup>29</sup> Did not want to be identified as a pre-condition for answering the questionnaire.

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay Tubod, Iligan City**  
**May 16, 2014**

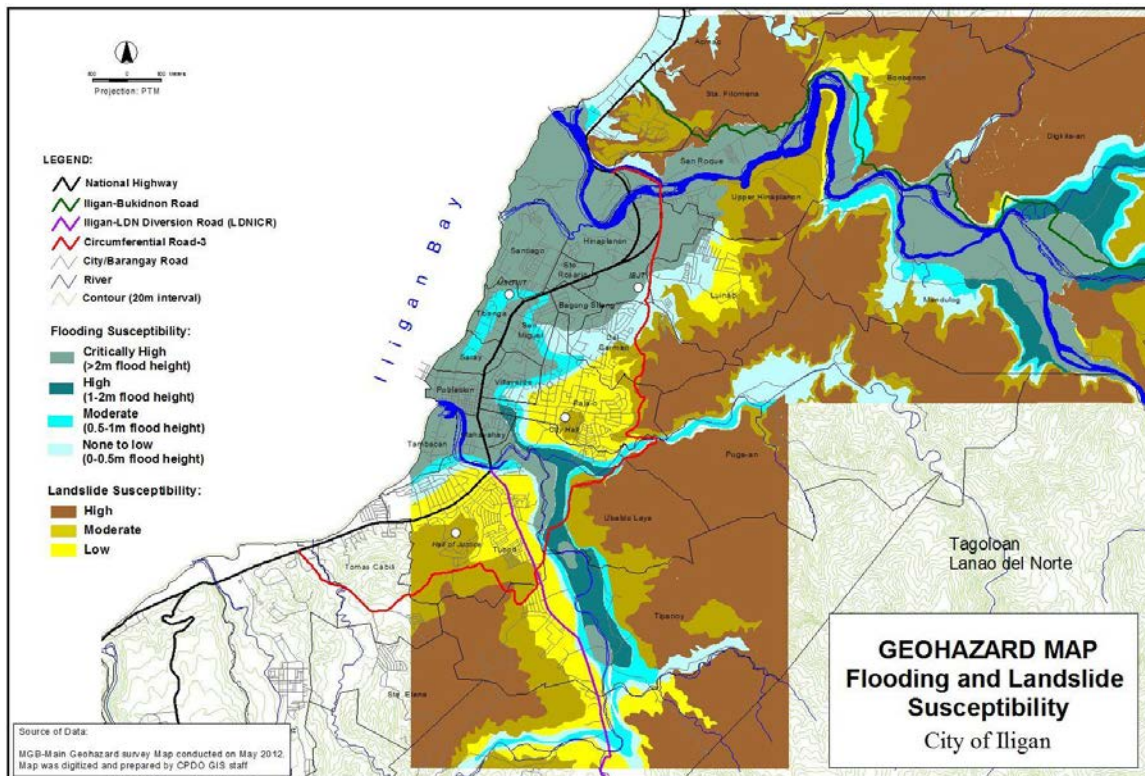
<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
11. Jocelyn Y. Alcuizar 0905-	Punong Barangay (Tel.: 063-221-3437; 270-9675)
12. Edwin Estoque	Resident/Brgy. Secretary
13. Jimmy D. Vitor	Kagawad
14. Rancel P. dela Calzada	Kagawad
15. Nilo Paras	Kagawad
16. Alejandro C. Pepito	Kagawad
17. Maricris O. Codearos	Kagawad
18. Teresita V. Israel	Kagawad
19. Liwayway M. Teblaleing	Kagawad
20. Oligario A. Junlawan	Kagawad

# **ANNEX IV.B.2** **HAZARD MAPS OF ILIGAN CITY** **Flood Susceptibility**



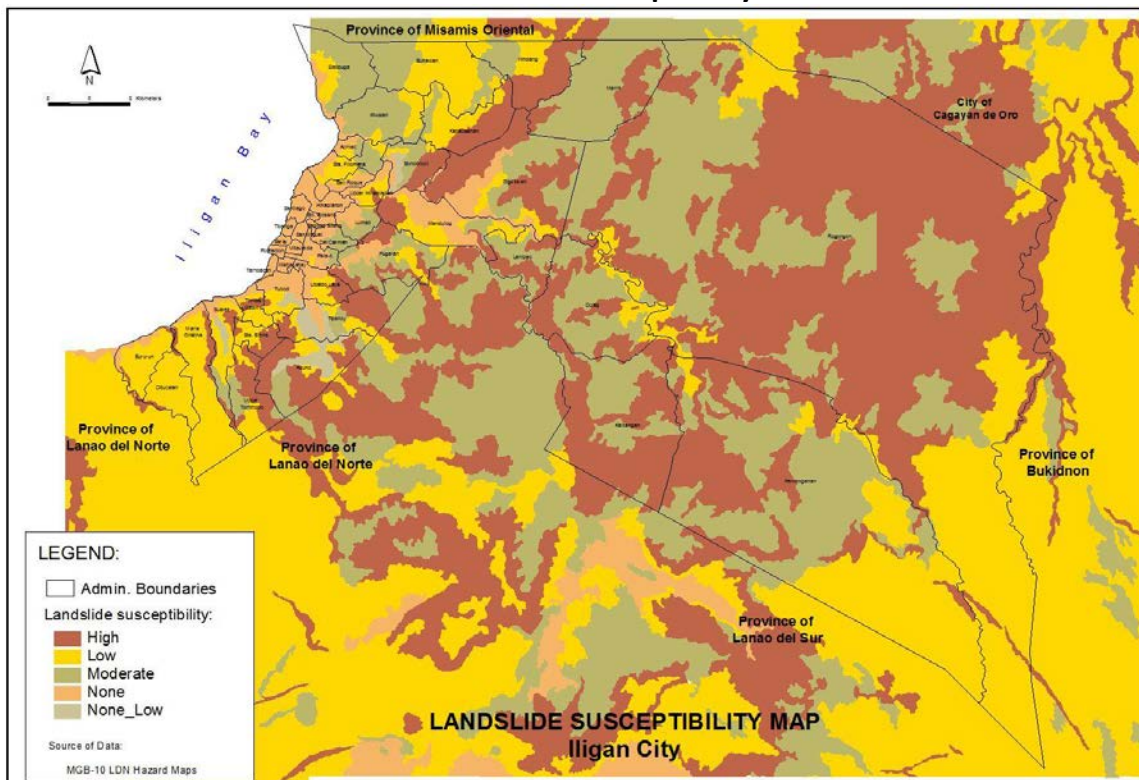
Source: ICDRRMO, n.d.

## Flooding and Landslide Susceptibility



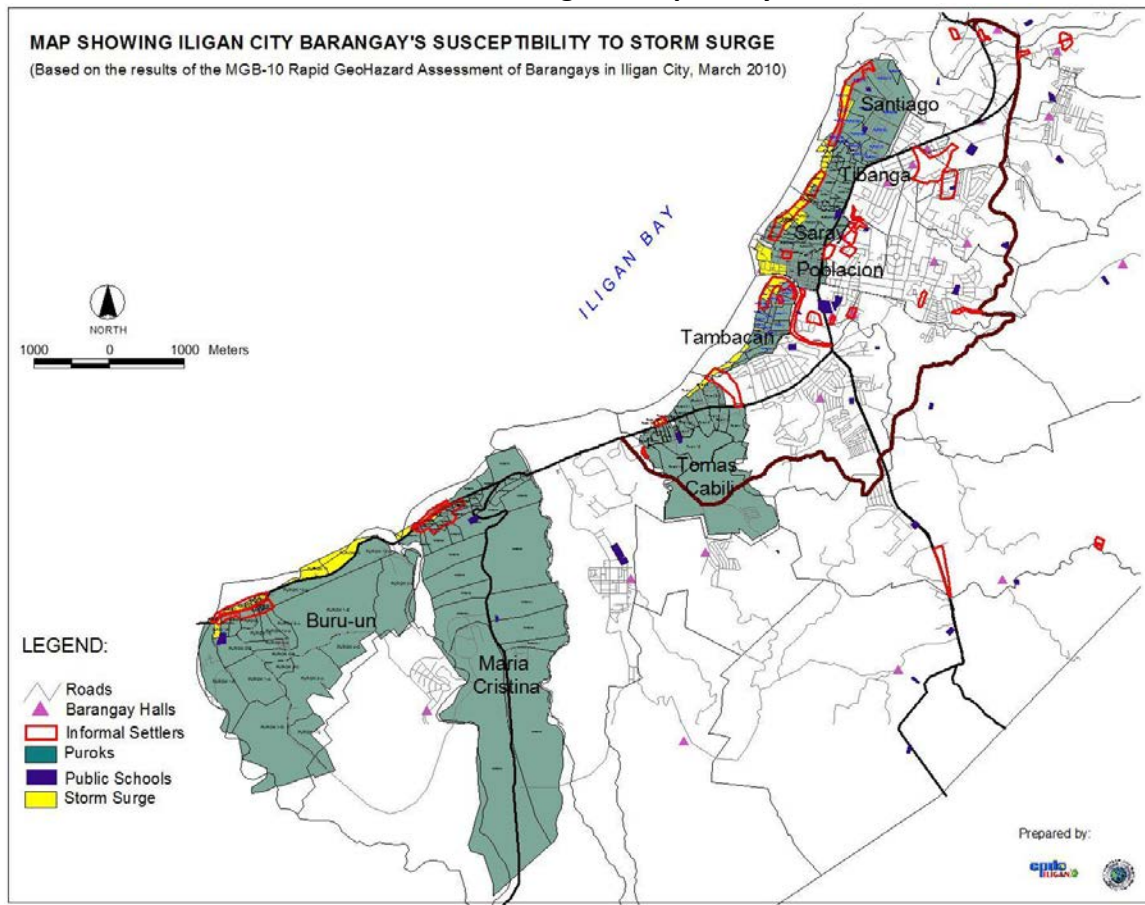
Source: ICDRRMO, n.d.

## Landslide Susceptibility



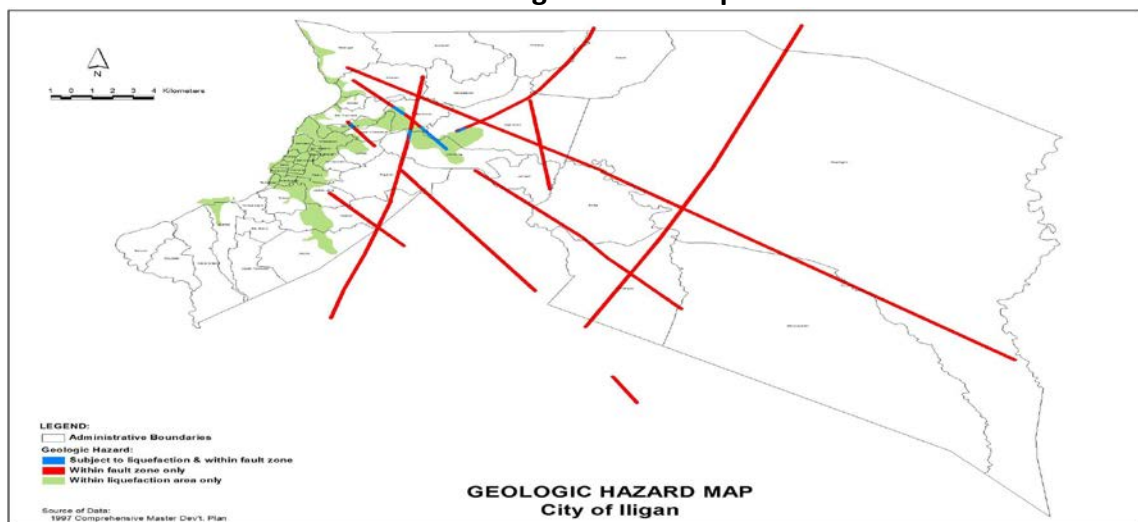
Source: ICDRRMO, n.d.

## Storm Surge Susceptibility



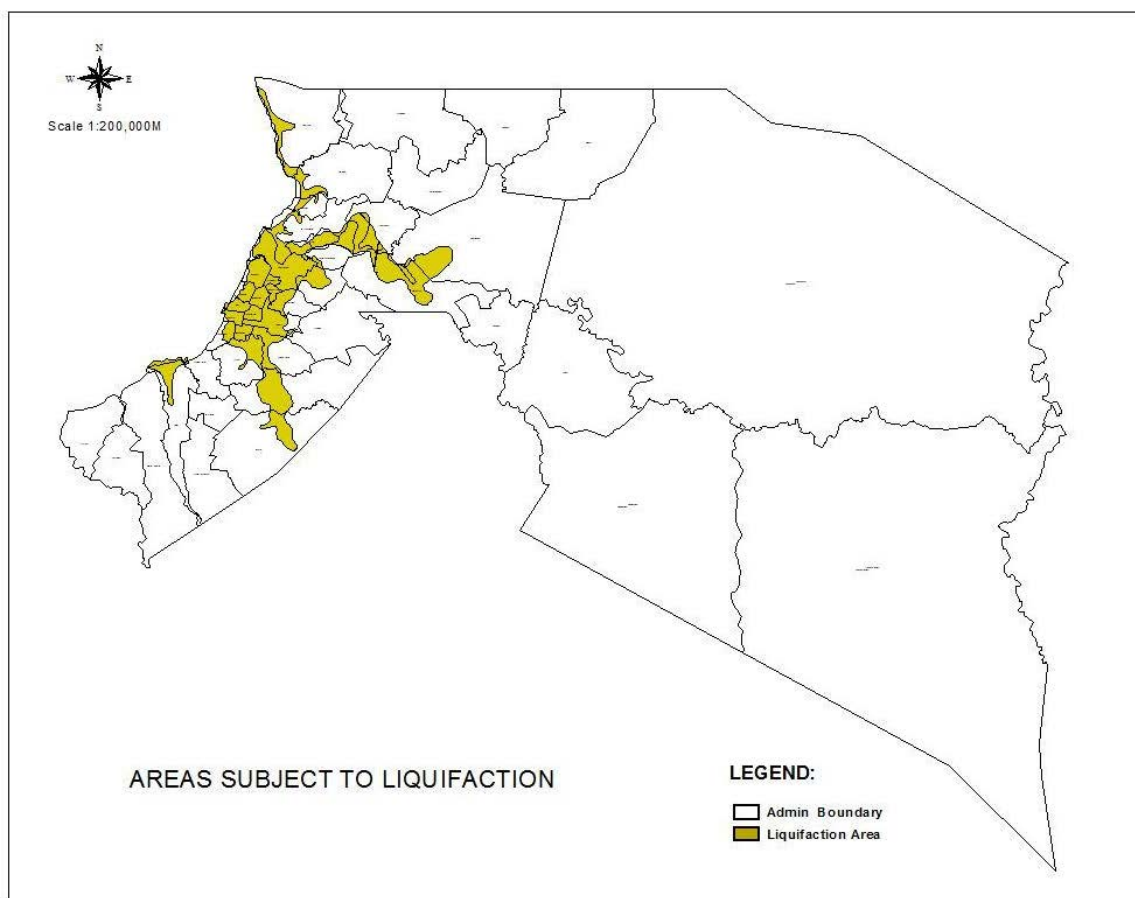
Source: ICDRRMO, n.d.

## Geologic Hazard Map



Source: ICDRRMO, n.d.

## Liquefaction Susceptibility



Source: ICDRRMO, n.d.

### ANNEX IV.C.1

#### PARTICIPANTS

#### Key Informants Interview

Dagupan City Hall

May 8, 2014

#### NAME

1. Romeo C. Rosario  
and
2. Carol Ann Español
3. Arsenia Toralba
4. Emma J. Molina
5. Lorna M. Fernandez  
Office
6. Sharon Maramba

#### POSITION/OFFICE

City Development Council/City Planning

Development Office  
CDRRMO

CDRRMO

City Agriculture Office

City Social Work and Development

City Tourism Office

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay Pantal, Dagupan City**  
**May 9, 2014**

<u><b>NAME</b></u>	<u><b>POSITION/OFFICE</b></u>
8. Robert A. Parcera	Brgy. Administrator
9. Orlando F. Flores	Kagawad
10. Maxie Emmanuelle B. Ferrer	Kagawad
11. Rommel F. Agui	Kagawad
12. Mirasol B. Manahan	Resident
13. Sheryl Aquino	Resident
14. May Gay M. Vinoya	Resident
15. Dennis G. Viray	Resident
16. Linda Rose P. Salayog	Resident
17. Angelita B. Carreon	Resident
18. John Rey C. Javier	Resident
19. Ricardo I. Pascua	Resident

Contact Person: Mr. Wangyu Aqui (0922-987-3596)

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay Bonoan Gueset, Dagupan City**  
**May 10, 2014**

<u><b>NAME</b></u>	<u><b>POSITION/OFFICE</b></u>
1. Ricardo C. Mejia	Punong Barangay
2. Ferdinand M. Soy	Kagawad
3. David C. Raguindin, Jr.	Kagawad
4. Renato M. Castres	Kagawad
5. Rosejene S. Pal	Kagawad
6. Seguindino DC Ayson, Jr.	Kagawad
7. Sonny V. Manuel	Kagawad
8. Rosemarie Q. Santillan	Resident
9. Alfonso P. Legaspi, Jr.	Resident (0917-512-6075)

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay 1, Dagupan City**  
**May 9, 2014**

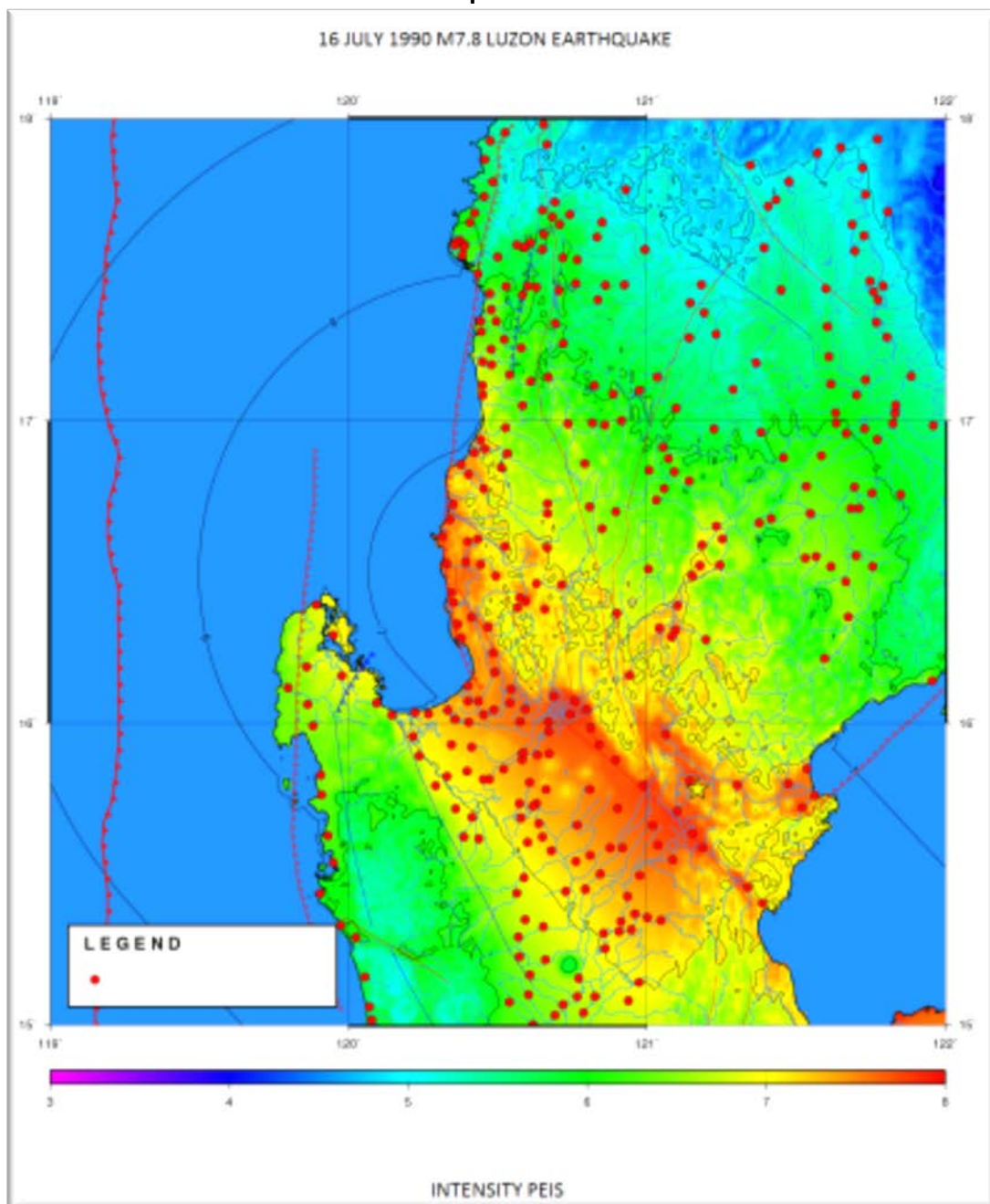
<u><b>NAME</b></u>	<u><b>POSITION/OFFICE</b></u>
21. Dr. Herminigildo "Capdoc" J. Rosal 3648)	Punong Barangay (0922-884-
22. Gilbert Valencrerina	Kagawad
23. Emma S. Arenos	Kagawad

24. Alberto V. Quebral	Kagawad
25. Roberto P. Llamas	Kagawad
26. Michael Jade M. Rosal	Kagawad
27. Delfino C. Villaruel	Resident
28. Joel V. Munda Cruz	Resident
29. Priscilla V. M. Cruz	Resident
30. Alicia A. Tiri	Resident

## ANNEX IV.C.2

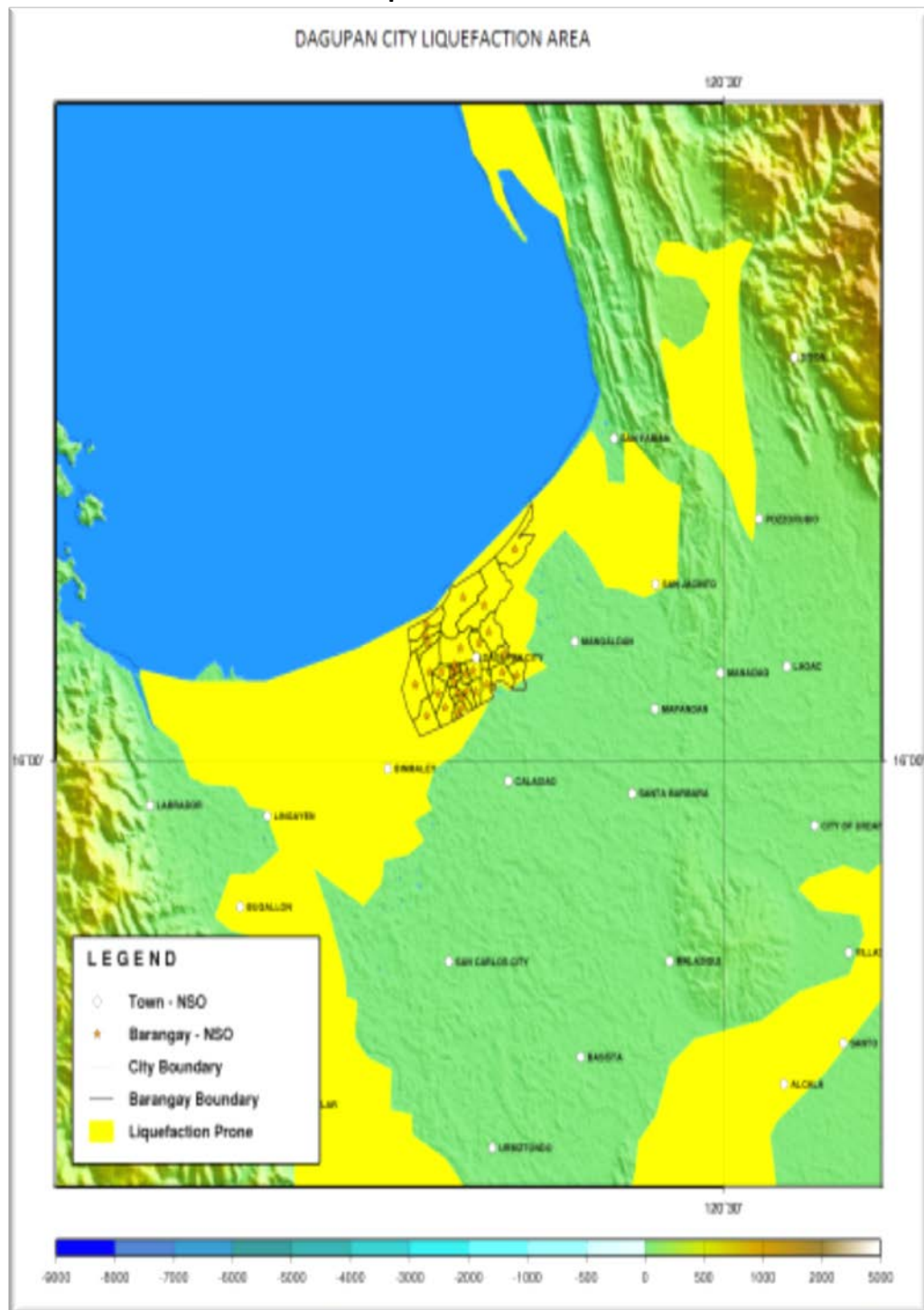
### HAZARD MAPS OF DAGUPAN CITY

#### Earthquake 1990



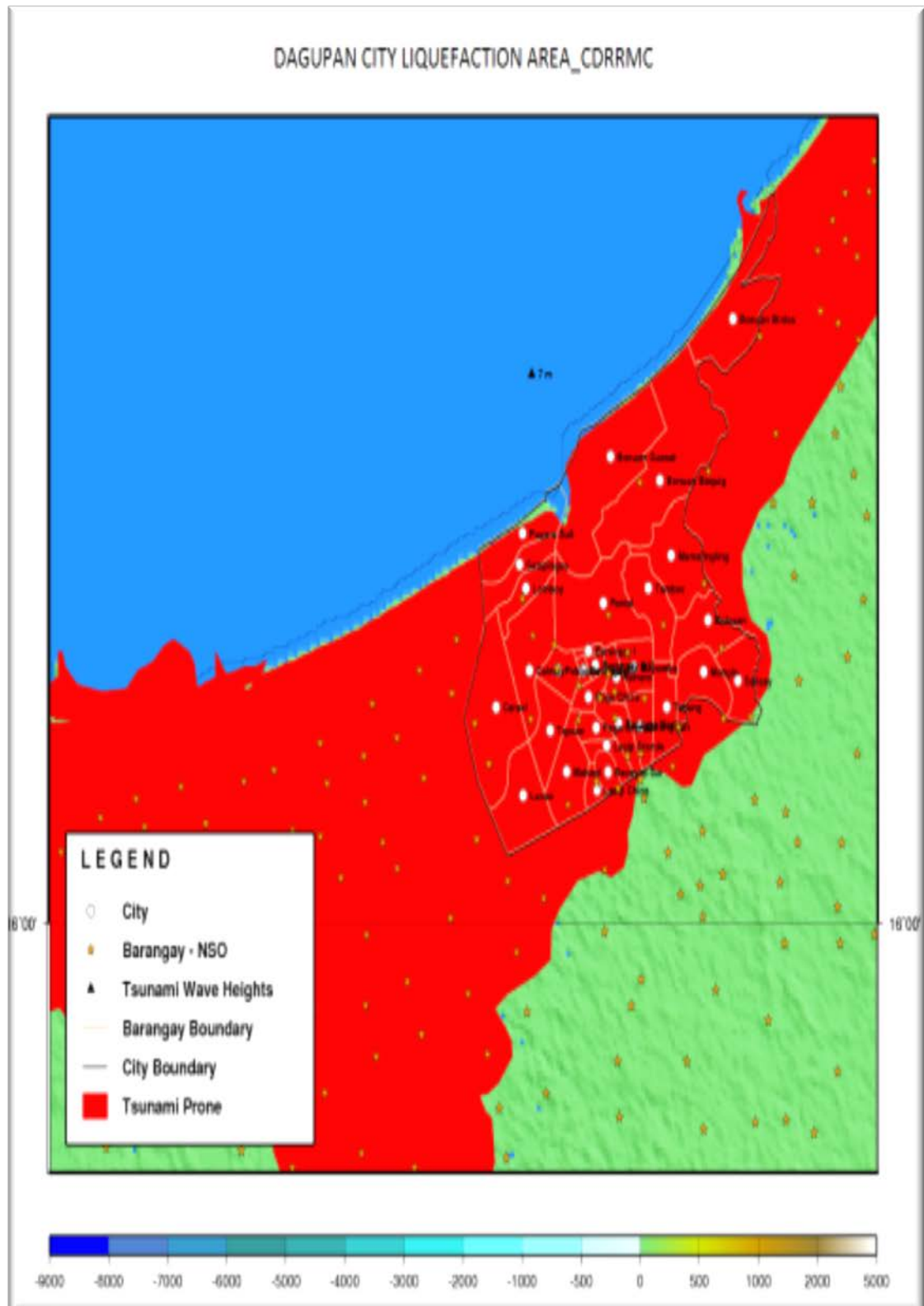
Source: Dagupan City, 2014

## Liquefaction Area



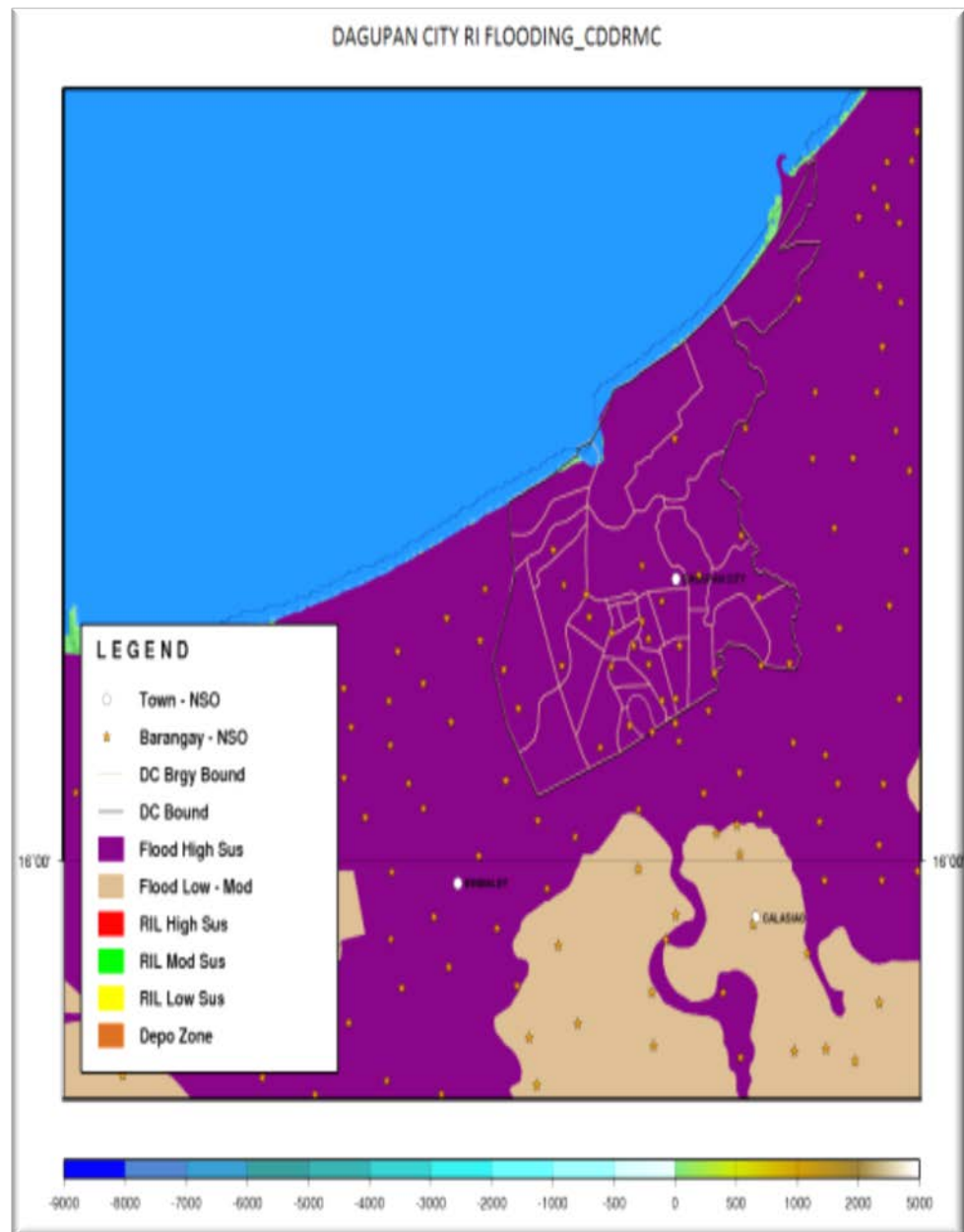
Source: Dagupan City, 2014

## Tsunami-Prone Area



Source: Dagupan City, 2014

## Flood-Prone Area



Source: Dagupan City, 2014

**ANNEX IV.D.1**  
**PARTICIPANTS**  
**Key Informants Interview**  
**Marikina City Hall**  
**April 24, 2014**

<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
1. Rosalie R. Santiago	Planning Officer
2. Jennifer Anne S. Jimenez Disaster	Research and Planning Division, City  Risk Reduction and Management Office (Tel. No.: 646-0427; 0927-589-2459)
3. Rodrigo Domingo Office (Tel.	City Social Work and Development  No.: 622-8143)
4. Bonie Dula	City Health Office

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay Tumana, Marikina**  
**April 25, 2014**

<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
10. Ziffred Ancheta	Punong Barangay
11. Geronides E. Capacio	Kagawad
12. Francisco G. de los Santos	Kagawad
13. Perlito E. Colasino	Kagawad
14. Crispin E. Carurucan	Kagawad
15. Lisa d C. Lucero	Resident
16. Lorenzo Portento	Resident
17. Ma. Leonor P. Lorenzo	Resident
18. Lydia S. Ciriaco	Resident
19. Juvy Santiago	Resident

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay Malanday, Marikina**  
**April 25, 2014**

<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
20. Joseph Briones	Punong Barangay
21. Gina F. Vargus	Kagawad
22. Roger V. Santiago	Kagawad

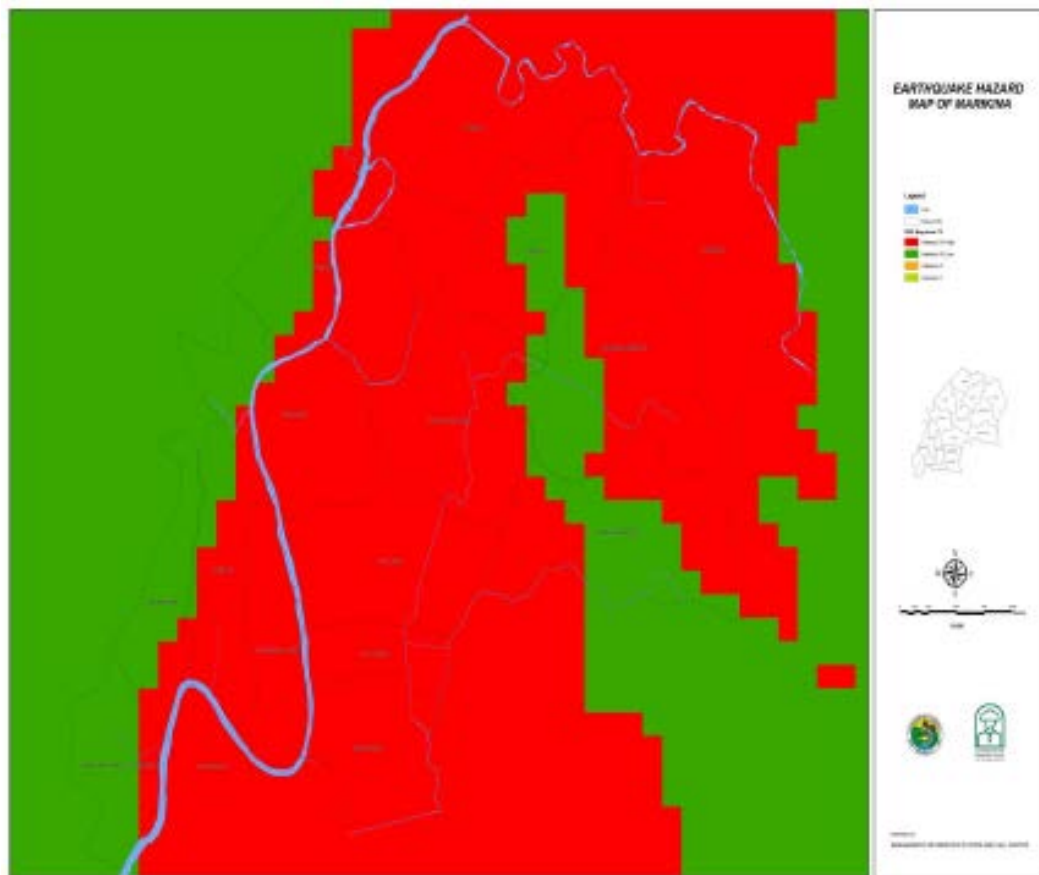
23. Leo Rejano	Resident
24. Joey Morilla	Resident
25. Armando L. Milanes	Resident
26. Zenaida R. Cajayon	Resident
27. Fernando d. G. Felipe	Resident
28. Maribel D. de la Cruz	Resident
29. Ledivina D. de la Cruz	Resident
30. Emelita R. Sola	Resident
31. Conchita B. Palanan	Resident
32. Wildredo E. Aquino	Resident

**PARTICIPANTS**  
**Focus Group Discussion**  
**Barangay Nangka, Marikina**  
**April 25, 2014**

<b><u>NAME</u></b>	<b><u>POSITION/OFFICE</u></b>
1. Randy G. Leal	Punong Barangay (Tel. No.: 934-8626)
2. Maria Cristina Cruz Balmores	Kagawad
3. Marlon Mejia	Kagawad
4. Valentin C. Pascua, Jr.	Kagawad
5. Apolonio C. Pangyarihan	Kagawad
6. Nanilita R. Alburo	Resident
7. Violy Bumatay	Resident
8. Asela S. Ragaodao	Resident
9. Anita R. de Vera	Resident
10. Alicia B. dela Cerna	Resident
11. Nimfa D. Cachila	Resident

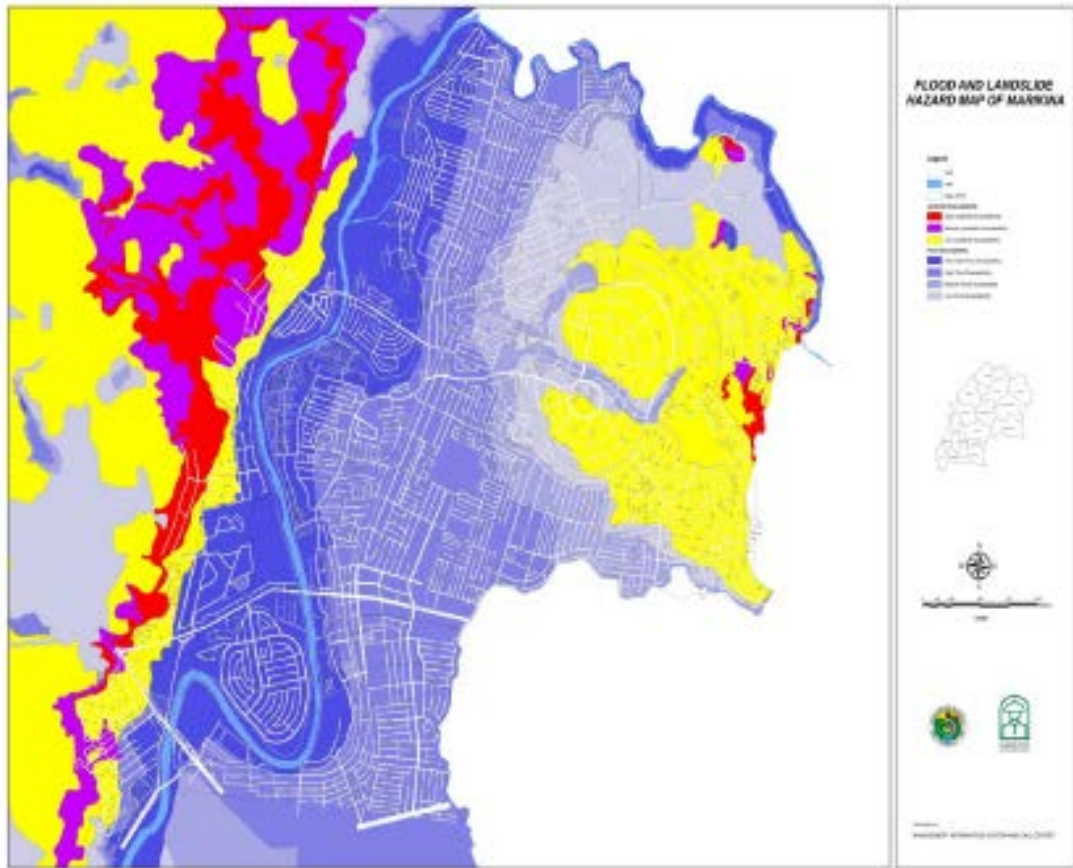
## ANNEX IV.D.2 HAZARD MAPS OF MARIKINA CITY

### Ground Shaking Hazard Map



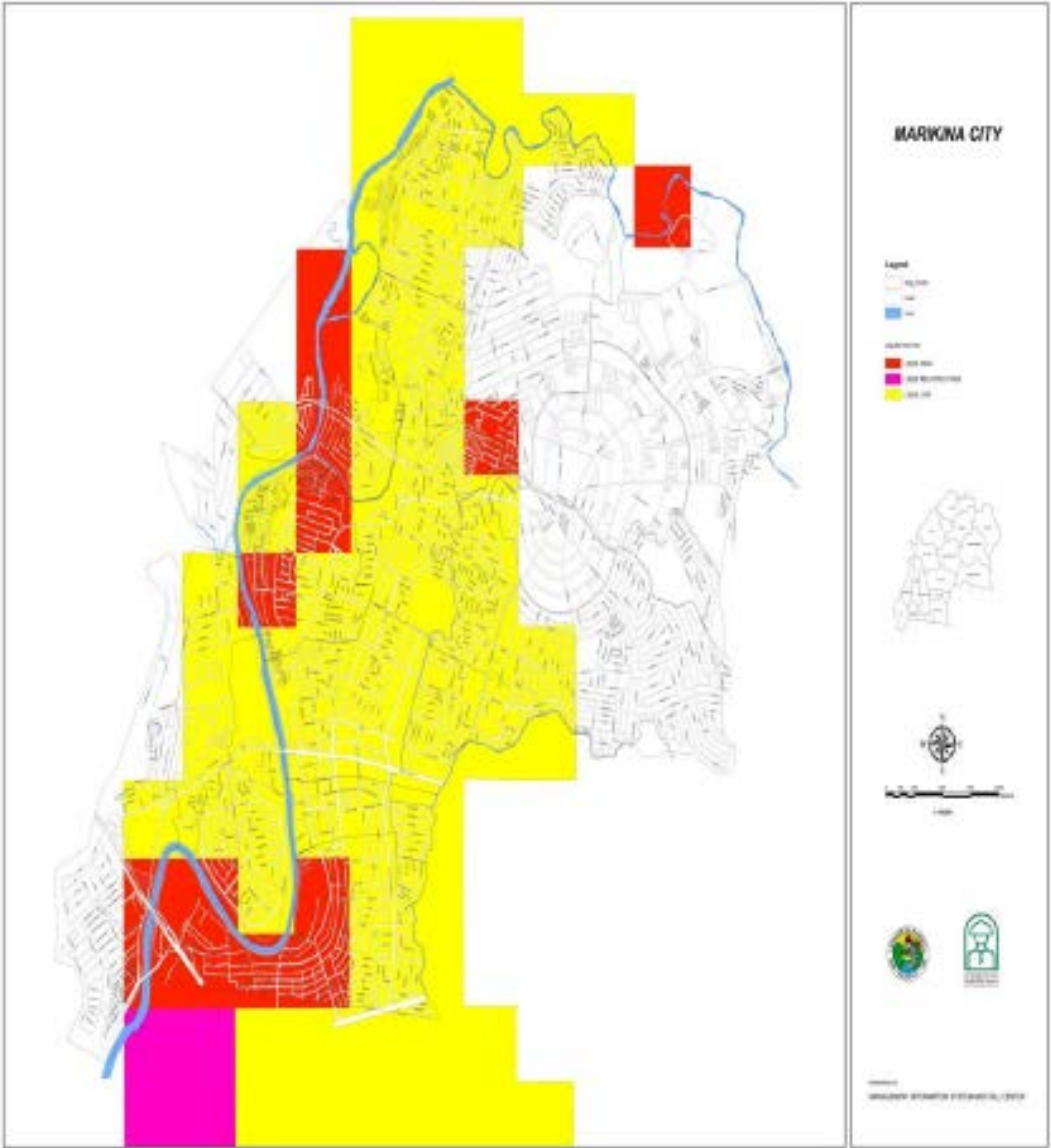
Source: MCPDO, n.d.3.

## Flood and Landslide Hazard Map



Source: MCPDO, n.d.3.

## Liquefaction Hazard Map



Source: MCPDO, n.d.3.

**ANNEX V**  
**PICTURES OF INTERVIEWS AND FOCUS GROUP DISCUSSIONS**

**A. Tacloban City**  
**(April 8-10, 2014)**

Tacloban City Hall (April 8, 2014, Conference Room)



*With representatives (clockwise) from City Public Information Office, City Planning and Development Office, City Social Welfare and Development Office, City Health Office, City Disaster Risk Reduction and Management Office, and City Tourism Office.*



Disaster damaged Tacloban City Hall

Marasbaras Barangay Hall (April 9, 2014, around 2:00 pm)



FGD with officials and residents headed by Punong Barangay Irish Ting (seated at the front).



Barangay Hall of Marasbaras.

Abucay Barangay Hall (April 9, 2014, around 10:00 am)



FGD with officials and residents headed by Punong Barangay Ricardo Benitez (seated at the front)



The damaged Barangay Hall of Abucay.

Sagkahan Barangay Hall (April 10, 2014, around 2:00 pm)



With Punong Barangay Rosita Luyten. The officials and residents had already left, hence, group picture was not taken.



The Barangay Hall of Sagkahan.

**B. Iligan City  
(May 13-18, 2014)**

At various offices of Iligan City Hall (May 13-18, 2014)



With the research officer (seated) of the Iligan City Disaster Risk Reduction and Management Office.



Interviewing the Social Welfare and Development Officer (seated).



Iligan City Hall.

Sta. Filomena Barangay Hall (May 16, 2014, around 4:00 pm)



FGD with officials and residents headed by Punong Barangay Editha Palafox (seated at the front)



The Barangay Hall of Sta. Filomena.

Tubod Barangay Hall (May 16, 2014, around 10:00 am)



FGD with officials and residents headed by Punong Barangay Jocelyn Alcuizar (bespectacled lady)



The Barangay Hall of Tubod.

**C. Dagupan City  
(May 8-10, 2014)**

Dagupan City Hall (May 8, 2014, Conference Room, around 10:00 am)



Conducting FGD with representatives (clockwise) from City Planning and Development Office, City Tourism Office, City Social Welfare and Development Office, City Agriculture Office, City Health Office, and City Disaster Risk Reduction and Management Office.

Pantal Barangay Hall (May 9, 2014, around 3:00 pm)



FGD with officials and residents headed by Barangay Administrator Robert Parcera (in blue shirt)



The Barangay Hall of Pantal along Pantal River.

Barangay Uno (I) Hall (May 9, 2014, around 9:00 am)



FGD with officials and residents headed by Punong Barangay Herminigildo Rosal (seated at the front)



Barangay Uno (I) Hall along Pantan River.

Bonuan Gueset Barangay Hall (May 10, 2014, around 2:00 pm)



Interviewing a barangay resident.



The Barangay Hall of Bonuan Gueset.

**D. Marikina City  
(April 24-25, 2014)**

Marikina City Hall (Conference Room, Conference Room, around 10:00 am)



Photo opportunity after the FGD with representatives from (front to back, left to right): City Social Welfare Office, City Disaster Risk Reduction and Management Office, City Planning and Development Office, and City Health Office.

Malanday Barangay Hall (April 25, 2014, Conference Room, around 10:00 am)



With representatives from Barangays Tumana, Malanday, and Nangka after the FGDs.



The Malanday Barangay Hall.