

**Post-disaster Housing and Resident-Initiated Modifications**  
**-Spontaneous housing modifications in disaster-induced**  
**resettlement sites in Cagayan de Oro, Philippines-**

災害後の住宅再建と住民主導の増改築  
ーフィリピン、カガヤンデオロ市における災害後の  
再定住地区における自発的な増改築ー

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## **ABBREVIATIONS AND ACRONYMS**

ADB:	Asian Development Bank
ADRI:	Agency-Driven Reconstruction in-Situ
ADRRS:	Agency-Driven Reconstruction in Relocation Site
ADPC:	Asian Disaster Preparedness Center
CA:	Cash Approach
CBO:	Community Based Organization
CDR:	Community-Driven Reconstruction
CEPALCO :	Cagayan Electric Power and Light Company
CLENRO:	City Local Environment and Natural Resources Office
CIA:	Central Intelligence Agency
CMP:	Community Mortgage Program
CPDO:	LGU City Planning and Development Office
CRS:	Catholic Relief Services
CSAP/MSAP :	Core/Modified Shelter Assistance Program
CSWD:	LGU City Social Welfare and Development Office
DENR:	The Philippines' Department of Environment and Natural Resources
DepEd:	The Philippines' Department of Education
DILG:	The Philippines' Department of the Interior and Local Government
DOH:	The Philippines' Department of Health
DOST :	The Philippines' Department of Science and Technology
DPWH:	The Philippines' Department of Public Works and Highways
DSWD:	The Philippines' Department of Social Welfare and Development
EMD:	LGU Estate Management Division Office
FCCC:	Filipino-Chinese Chamber of Commerce
GK:	Gawad Kalinga
HFHP:	Habitat for Humanity Philippines
HUDCC:	The Philippines' Housing and Urban Development Coordinating Council
IOM:	International Organization for Migration
IDMC:	Internal Displacement Monitoring Centre
IDP:	Internally displaced people
ISFs:	Informal settler families
IFRC:	International Federation of the Red Cross and Red Crescent
INGO:	International Non-governmental Organization

IOM:	International Organization for Migration
JICA:	Japan International Cooperation Agency
LGU:	Local Government Unit
LIAC:	Local Inter Agency Committee
MGB :	The Philippines' Mines and Geosciences Bureau
NAPC:	National Anti-Poverty Commission
NDRRMC:	The Philippines' National Disaster Risk Reduction and Management Council
NDRRMP:	The Philippines' National Disaster Risk Reduction and Management Plan
NEDA:	The Philippines' National Economic and Development Authority
NGO:	Non-governmental Organization
NHA:	The Philippines' National Housing Authority
OCD:	The Philippines' Office of Civil Defense
ODR:	Owner-Driven Reconstruction
OH:	Oro Habitat for Humanity
PAGASA:	Philippine Atmospheric, Geophysical and Astronomical Services
PAR:	Philippine Area of Responsibility
PCUP:	The Philippines' Presidential Commission for the Urban Poor
PHIVLOCS:	Philippine Institute on Volcanology and Seismology
PhP:	Philippine Peso
PNP:	Philippine National Police
SHFC:	The Philippines' Social Housing Finance Corporation
XU:	Xavier University
UAP:	United Architects of the Philippines
UN-DESA:	United Nations Department of Economic and Social Affairs
UNHCR:	United Nations High Commissioner for Refugees
UN-Habitat:	United Nations Human Settlements Programme
UNISDR:	UN Office for Disaster Risk Reduction
UNICEF:	United Nations Children's Emergency Fund
UN-OCHA:	UN Office for the Coordination of Humanitarian Affairs
USD:	US Dollar
WHO:	World Health Organization

# EXECUTIVE SUMMARY

## I. Background of the dissertation

In the Philippines the occurrence of tropical storms is recurrent; which means that the coping capacities and strategies for responding to the disasters are permanently challenged, and are likely to be changed and updated. For instance, the Internal Displacement Monitoring Centre (2013) reported that the areas that were severely affected by Typhoon Washi in December 2011 were affected again by typhoon Bopha in December 2012, causing only one casualty. Although in other areas the reported human losses were more than 1,000. The low impact on human lives in the previously affected areas was acknowledged to the pre-emptive evacuations as a preventive measure applied based on the experience and failures that occurred the previous year. In fact, the permanent hazard exposure in the country has forced the government to implement disaster prevention and response policies, the Philippines has been a global leader in enacting legislation related to disaster risk reduction.

The context for post-disaster housing provision in the Philippines is mainly top-down resettlement, focusing on agency-driven housing planning and construction. The process for housing supply clearly establishes the role of the stakeholders involved. The role of coordinating body is undertaken by the government, NGOs or other partners are implementing agencies, and the private sector or corporations are donors. In such process there is limited or no involvement of local communities, they are observers of the process, but without a voice. The general approach for reconstruction in the Philippines apparently opposes to the different discussions in favor of a participative approach for housing reconstruction conducted by researchers and practitioners (Barenstein, J. D., 2006; Davidson, C. H., et al., 2006; Jha, A. K., & Barenstein, J. D., 2010; Arroyo, I., 2015).

Consequently, a top-down approach and especially resettlement, in theory would produce negative outcomes, failure of the housing projects in terms of occupancy rates or abandonment of the houses (Oliver-Smith, A., 1991), destruction of livelihoods and community ties (Barenstein, J. D., 2006; Jha, A. K., & Barenstein, J. D., 2010), and alien or non-culturally appropriate houses . This would be evidenced in low satisfaction rates of resettles (Lizarralde, G. and Bouraoui, D., 2010; Barenstein, J. D., 2012) and further change of their housing conditions, in other words, they would choose to move out or to modify the houses (Clark, W.A. and Onaka, J., 1983).

Resident-initiated housing modifications represent the households' efforts to fulfill the mismatches in the provided house. As a result of low levels of residential satisfaction, unsatisfied residents' needs and lack of understanding of the local conditions. Thus, it is important to conduct a study to address these issues understanding that the analysis of housing modification should be carried out in the short, middle and long

terms from the occupancy of the provided houses by residents affected by the disaster. Subsequently, the results of the study would mean a fundamental contribution to the improvement of the established system of post-disaster housing provision to affected communities.

Therefore, the Philippines result in an environment with potentialities for this kind of studies, the recurrence of disastrous events, and consequently the need of permanent improvement of response and reconstruction policies and mechanisms. Typhoon Washi hit an area that is not frequently affected by tropical storms with an intensity that causes massive destruction. Thus, Washi was an unusual event that challenged the whole response and management structure. In addition, by the time this study is conducted, the residents have inhabited the provided houses in average one and a half years, and results ideal for the analysis of housing modification in the short term of occupancy. These issues were determinant for the selection of Cagayan de Oro and the Post Typhoon Washi reconstruction process for the analysis in this study.

## **II. Research questions**

The study proposes following key questions that are aimed to be answered through the development of the research:

- To identify the pros and cons of the top-down resettlement project in Cagayan de Oro and the strategic relationships between stakeholders.
- To analyze how residents modify their houses, patterns, motivations and reasons for the construction of housing extensions.
- To identify issues for the improvement of the post-disaster housing provision based on the analysis of the disaster recovery process in the aftermath of typhoon Washi in order to enable the residents' initiated housing modifications.

## **III. Aim of the study**

The aim of this research is to explore the outcomes of a top-down resettlement process in Cagayan de Oro and to analyze the residents' capacities to adapt the provided houses to their needs and living conditions in order to provide a feedback for the improvement of the established procedure for post-disaster housing reconstruction in the Philippines.

## **IV. Objectives of the study**

The research objectives are as follows:

- To identify the pros and cons of the top-down resettlement project in Cagayan de Oro and the strategic relationships between stakeholders.
- To analyze how residents modify their houses, patterns of modification, and reasons for the construction of housing extensions.
- To explore the effects of resident-initiated modifications of the houses and to identify issues for the improvement of the post-disaster housing provision based on the analysis of the disaster recovery process in the aftermath of typhoon Washi in order to enable residents to adapt their houses to their needs and preferences.

## **V. Research scope**

The data collection was conducted between July and August 2014, 32 months after the typhoon Washi hit Cagayan de Oro, and 20 months after the first group of beneficiaries were allocated in the completed permanent houses in Calaanan site. This study is centered on the situation of the resettlement at the time of the field research which was still in progress and the housing modifications built by the residents in the short term. Therefore, the present study might be complemented by further analysis of housing modifications in the middle and long term in order to understand the impact on households of resettlement programs, which would also prove useful for the improvement of resettlement and social housing programs in the Philippines in the future.

## **VI. Key issues for the improvement of the process of housing supply**

The findings of this study are centered on the following issues that answer the research questions posed in the first chapter:

### ***a) Positive outcomes from an entirely top-down resettlement process:***

Resettlement is generally seen as the worst scenario for a post-disaster housing recovery. To remove communities from their land is considered to leave uprooted communities, lack of livelihood opportunities, destroy community links and cultural backgrounds. Therefore, resettlement is the less advised approach and is expected to be adopted in extreme cases where the vulnerabilities are the result of highly vulnerable settlement locations. On the other hand, resettlement is one of the approaches that is widely adopted in post-disaster housing recovery in the Philippines. Therefore, it is important to analyze the outcomes in Cagayan de Oro that may be useful at the time to plan future resettlement projects.

The study revealed that the process resulted fast in the provision of permanent housing considering the high housing needs. This was possible due to the available land purchased by the local government before the disaster through the land-banking program. In addition, the national and local coordination structure worked in a way that allowed the deployment of stakeholders' capacities and promoted the leadership of the local

government in the process. Issues regarding the security of land and housing tenure were partially assured through usufruct, which provides limited ownership rights to the housing beneficiaries, but prevents from future evictions.

***b) Despite of high residential satisfaction households actively modify their homes***

In the analysis of housing satisfaction, residents' expressed positive attitudes about their housing conditions after the resettlement. Negative perceptions were related to the considerations of local conditions in the design of the houses.

The residents stressed the lack of spaces for the development of their daily activities and the high temperatures in the interior of the provided houses as main indicators for housing modification. Additionally, residents expressed the lack of livelihood opportunities as one of their main difficulties. However, despite their economic limitations, residents are willing to invest in the improvement of their housing and living conditions.

***c) Multiple reasons and multiple features of housing extensions***

Housing extensions can be located around the provided house as well as outside the assigned lot, even in neighboring private property. The construction can be precarious or planned for a longer lifespan; they can be one or two stories. The initial motivations can change and the final use can be different. There are no single reasons for housing modification. In fact, reasons can be overlapped and are changing as a result of the process of inhabitation.

***d) Failure of the prohibition and success of persuasion***

Although the lack of community control over housing planning and construction resulting from an entirely top-down resettlement process, it is evident that residents are not passive receivers or external support from the government or NGOs. Instead, they built housing extensions attached to the original houses in a progressive way. Despite their economic situation, there is an active attitude to improve their houses. The priorities of the residents about their houses are evident since housing modifications spread in the settlements analyzed despite the prohibition set by the local government.

However, in Village 3, that was built by Gawad Kalinga, and where this NGO is still working actively with the community on development projects, there is a permanent discourse of discouragement of the construction of housing extensions. The NGO were success restricting the construction of extensions in front of the houses where they are more evident, however, it was not possible to completely avoid their construction.

***e) Permissiveness may lead to reduce negative impacts***

In the study, there was no clear evidence of the deterioration of the housing conditions as the result of the construction of housing extensions in the villages analyzed in Calaanan site. Although, there is a poor quality

of construction and limited considerations about safety in case of earthquakes and strong winds observed in the extensions built by residents. The lack of technical support and professional supervision resulted in a failure of the fulfillment of national construction regulations and technical guidelines.

However, the only housing modifications that are authorized in the occupancy conditions, the lofts or mezzanines, have been considered by NGOs as a way to support the most vulnerable families. For instance in villages 1 (Mahogany) and 4 (Oro Habitat), NGOs built the lofts for selected households. In the comparison of the quality of construction between NGO assisted and the owner built lofts it is clearly shown the improvement in the quality and stability of the construction.

Consequently, it is important to consider a flexible approach from the local government about the construction of extensions that allow NGOs to support financially and technically the construction of the extension through the direct involvement in the construction or through training households in safer construction practices that promote the fulfillment of minimum construction standards.

## **VII. Implications for future research**

This research was conducted 20 months after the first housing beneficiaries moved in the provided houses in Calaanan site. As it was observed throughout the research, in this short term there were diverse changes in the houses and settlements; however these changes are in progress of consolidation. Therefore, it is important to consider the middle and long term evaluation timeframes in order to have a broader scenario of the advantages and limitations of post-disaster resettlement projects for the resettled communities.

This research targeted only the agency-driven housing projects in resettlement sites, however it was not possible to extend the study to agency-driven reconstruction projects carried out in the original settlements, where similarly basic housing units were provided but with tenure security is not a limitation and may influence in the way how residents modify the provided reconstructed house.



## Chapter 1

### Introduction

*This chapter presents an overview of the entire dissertation. It illustrates the problem and the crucial issues related to it, objectives, research questions, methodology of the research, introduction of the study site, and how primary and secondary data were gathered. Additionally, in this chapter key issues are presented and discussed based on bibliography review. The issues presented draw a background for the understanding of the challenges of post-disaster recovery in urban areas, mainly focusing on the housing sector and the impact in local communities. This chapter also provides a brief introduction of each of the chapters of the dissertation.*

#### 1.1 Research background

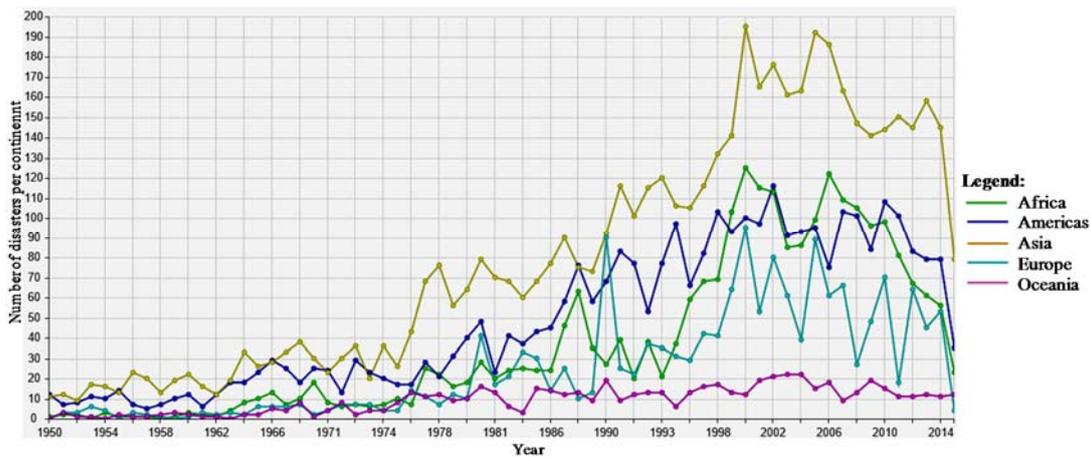
*“Communities will always face natural hazards. But hazards only become disasters when lives and livelihoods are swept away, mainly as a result of human activities. The vulnerability and what disaster analysts call ‘risk burdens’ of communities and countries are being increased through a myriad of everyday development decisions at individual, local, national and international levels”.* This statement was referred in the foreword of “Living with Risk” (UN/ISDR, 2004) the former United Nations’ Secretary General, Kofi Annan stressed that the tremendous consequences of disasters are not only the result of potential hazards, but they are consequence of human activity that increase the vulnerabilities to natural disasters. In fact, disasters besides unexpected destructive events are a complex combination of natural hazards and human interventions (Wisner, B., et al. 2004). They can be a mix of social, political and economic environments.

##### 1.1.1 Trends of natural disasters in the World

There is a worldwide trend of increasing number of natural disasters recorded in the last decades as it is shown in Figure 1.1. According to the World Bank (2010) within the last four decades, the increasing economic impact of natural disasters rose to more than 2.3 trillion dollars (see Figure 1.2) in total, the human losses resulting from natural disasters accounts more than 3.3 million (See Figure 1.3), and the affected persons account to more than 6.7 billion people (Figure 1.4), many of them were affected by disasters more than once.

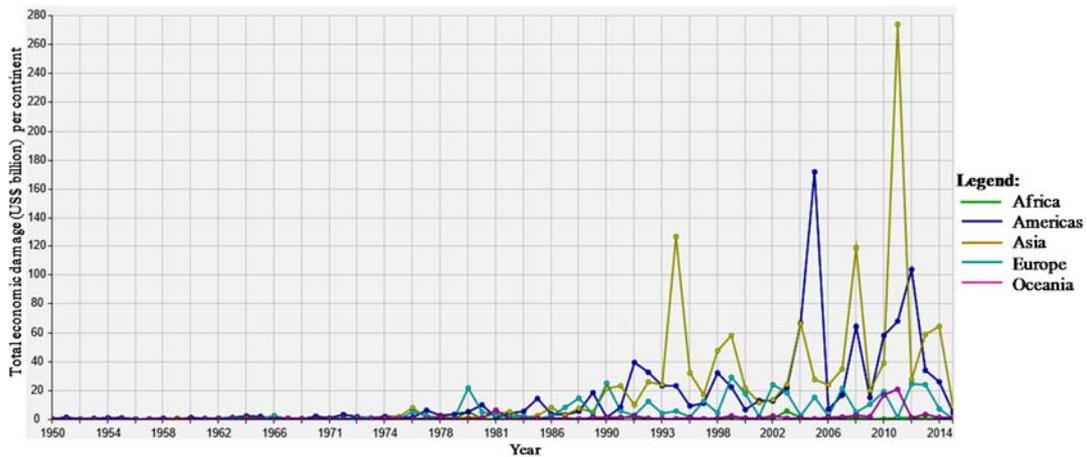
Figures 1.1, 1.2, 1.3 and 1.4, present a scenario where the most affected region by natural disasters is Asia, and where the economic damages and human losses are higher than in the rest of the globe. The most dominant hazard types affecting this region are hydro-meteorological, mostly tropical storms and floods, also geophysical disasters (earthquakes) that cause a huge impact in the region (Figure 1.5). The most frequent hazard in Africa is drought and in Europe extreme temperature changes and heat waves (Gencer, E. A., 2013).

The impact of natural disasters in the last decade shows a dramatic situation, which threatens the well-being and safety of individuals, communities and entire countries affected. Over 700 thousand people have been killed, over 1.4 million have been injured and approximately 23 million have been displaced as a result of disasters (UNISDR, 2015). In total, more than 1.5 billion people have been directly or indirectly affected by disasters, where women, children and people in vulnerable situations are most of the times the ones who suffer more the struggles of the disasters. The total economic loss was more than USD1.3 trillion. Moreover, between 2008 and 2012 alone 144 million people were displaced by disasters.



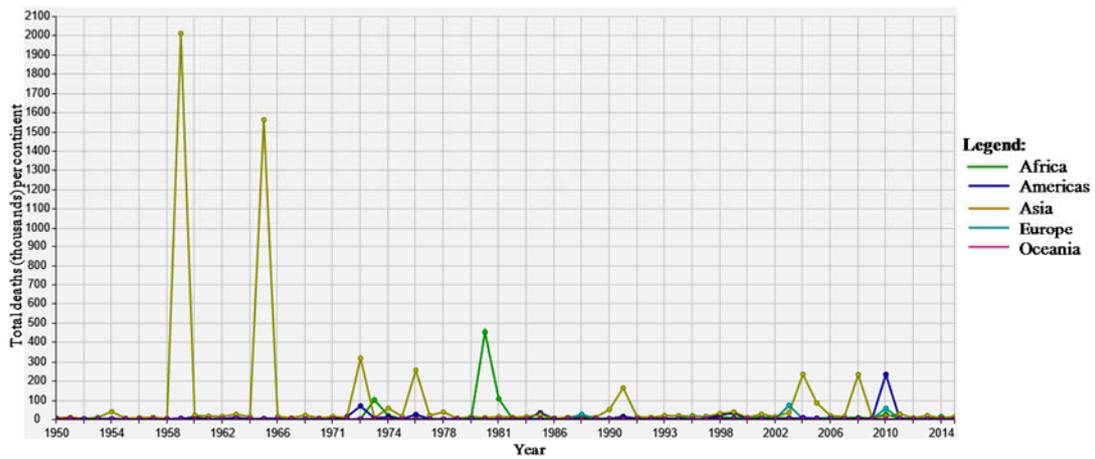
**Figure 1.1: Regional distribution of natural disasters, 1950–2015.**

Source: EM-DAT: The OFDA/CRED International Disaster Database. [www.emdat.be](http://www.emdat.be) - Université Catholique de Louvain, Center for Research on the Epidemiology of Disasters Brussels, Belgium (2015)



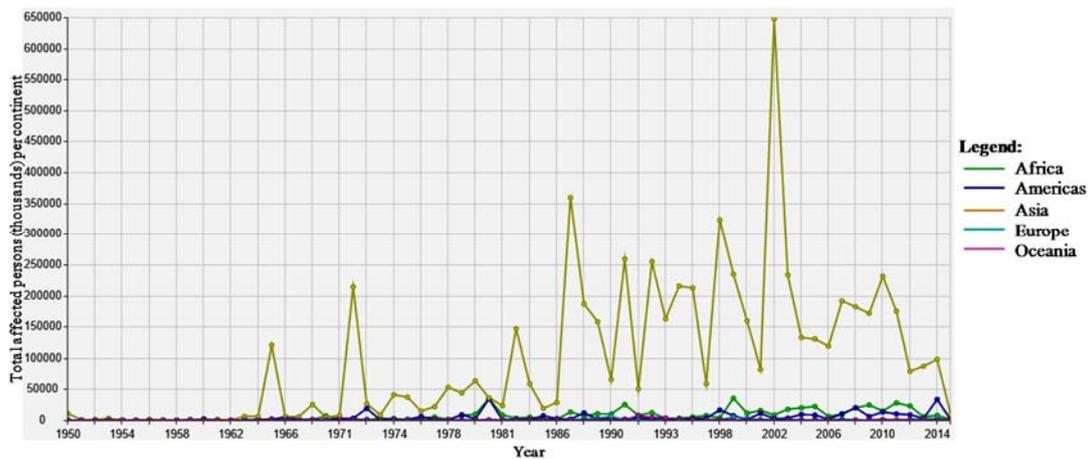
**Figure 1.2: Economic losses per continent as a consequence of natural disasters, 1950–2015.**

Source: EM-DAT: The OFDA/CRED International Disaster Database. [www.emdat.be](http://www.emdat.be) - Université Catholique de Louvain, Center for Research on the Epidemiology of Disasters Brussels, Belgium (2015)



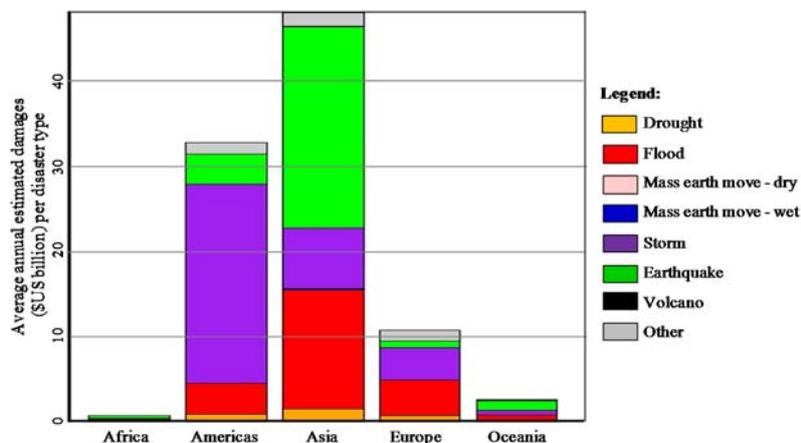
**Figure 1.3: Casualties caused by natural disasters per region, 1950–2015.**

Source: EM-DAT: The OFDA/CRED International Disaster Database. [www.emdat.be](http://www.emdat.be) - Université Catholique de Louvain, Center for Research on the Epidemiology of Disasters Brussels, Belgium (2015)



**Figure 1.4: Total affected persons by natural disasters per region, 1950–2015.**

Source: EM-DAT: The OFDA/CRED International Disaster Database. [www.emdat.be](http://www.emdat.be) - Université Catholique de Louvain, Center for Research on the Epidemiology of Disasters Brussels, Belgium (2015)



**Figure 1.5: Average annual damages (USD billion) caused by reported natural disasters (1990-2011)**

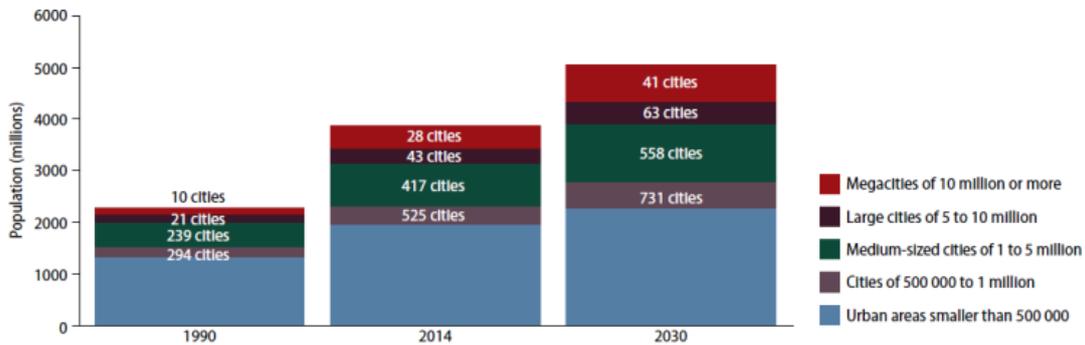
Source: EM-DAT: The OFDA/CRED International Disaster Database. [www.emdat.be](http://www.emdat.be) - Université Catholique de Louvain, Center for Research on the Epidemiology of Disasters Brussels, Belgium (2015)

In order to respond to the global increasing impacts of the natural disasters and minimize the treats that challenge the development of the countries, the international community has adopted the Hyogo Framework for Action in 2005. This global document unified criteria and strategies for global disaster risk reduction that each of the countries involved committed to follow and present results. Although there have been efforts to minimize the impact of natural disasters in the communities, the evidence indicate that that exposure of communities and assets in all countries has increased faster than vulnerability has decreased. This generated new risks and a steady rise in disaster-related losses, with a significant economic, social, health, cultural and environmental impact in the short, medium and long-term, especially at the local and community levels (UNISDR, 2015). The current global scenario presents that the human and economic cost are rising, especially in developing countries where the impact of the disasters are disproportionately higher and consequently are facing increasing levels of possible hidden costs and challenges in order to meet financial and other obligations. The number of people at risk has been growing by 70 to 80 million per year. More than 90 percent of population growth is in the developing world, among people with the smallest resources and the biggest burden of exposure to disasters (UNISDR, 2004).

### ***1.1.2 Urban exposure to natural hazards***

The global trends of losses caused by disasters have its reason in a complex issue, that societies became more vulnerable. In fact, according to UNISDR (2004) despite the record of natural disasters have increased, the frequency of dramatic natural events may be constant, what have contributed to the increasing of their intensity are the human activities. Therefore, the impact of disasters depends on development practices, environmental protection policies, the regulated or unregulated growth of cities, people concentration, distribution of wealth, and government structures.

The current global trend shows a reality of high and fast urbanization, where the concentration of people makes cities the focus for disaster risk reduction. The global high urbanization rates produced that in 2007 by first time global urban population exceeded global rural population (UN-DESA, 2014). Although the occurrence of disasters affects both rural and urban areas, the concentration of population and assets and the embedded conditions of socio-economic and spatial vulnerabilities generate higher disaster risks in cities. Additionally, the rapid and unplanned urban growth generate adverse economic situations that affect the way how people live, for instance, low-income groups are forced to inhabit in vulnerable areas that are regularly affected by natural hazards such as flood plains of rivers, slopes of volcanoes or earthquake prone zones (Wisner, B., et al. 2004). Although communities have survived coexisting with potential hazards, the generation of such situations in urban areas strains the limits of traditional human adaptive capabilities and the resilience of nature (Oliver-Smith, A. and Hoffman, S., 1999).

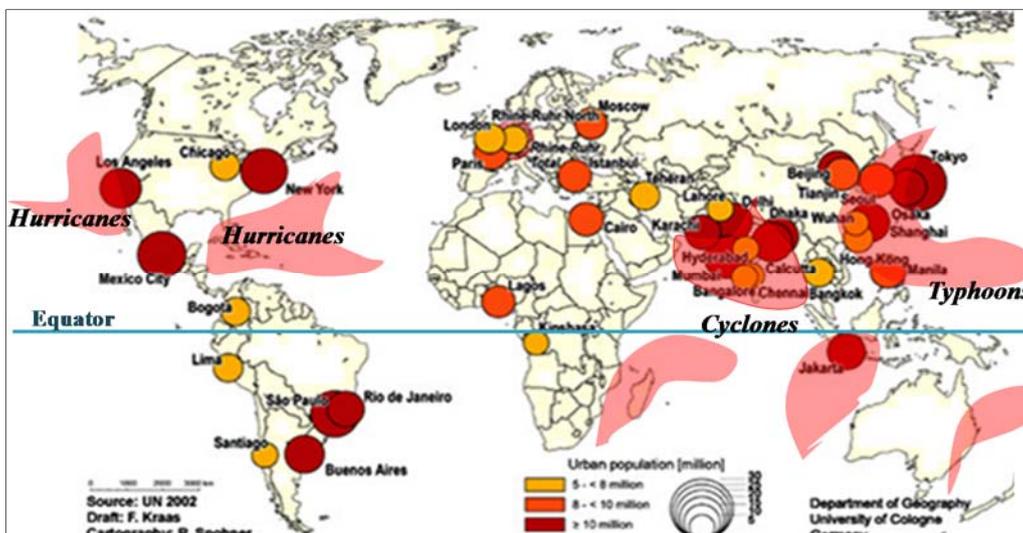


**Figure 1.6: Global urban population growth is occurring in cities of all sizes with emphasis in smaller than megacities**

*Source: UN-DESA, 2014*

In 2014, the UN estimated that 3.9 billion people that represent 54 percent of the world's population lived in urban areas (UN-DESA, 2014). Explosive urbanization is taking place in developing countries mainly in Africa and Asia; these regions are also experiencing the most internal displacement. Urbanization is mainly occurring in smaller cities and market centers (Figure 1.6), precisely where authorities are less prepared to plan the cities' growing, the provision of services and infrastructure, and the provision of housing (IDMC, 2014)

A clear example of the increasing of vulnerabilities as a consequence of human activities, and specifically the urbanization, are the higher concentration of people in cities in coastal areas. As it is presented in Figure 1.7, the most populated coastal megacities are locating in the developing world and in areas prone to tropical storms, which consequently put the communities in a permanent situation of vulnerability.



**Figure 1.7: Megacities and tropical storms distribution in the world.**

*Source: UN 2002, Megacities Taskforce <http://www.megacities.uni-koeln.de/documentation/>, <http://www.metoffice.gov.uk/weather/tropicalcyclone/facts>, Modified by Author.*

### 1.1.3 Impact of disasters on human settlements

Housing is often the sector severely impacted by both hydro-meteorological and geophysical disasters. Damage to housing sector includes both private and government and in most cases governments have to provide assistance for the damages associated with private sector housing damages (ADPC, 2011). On a micro

scale, disaster event disrupts daily life and displace families and results in a lack of access to basic services such as water and sanitation. In addition, families also have to face the destruction of their livelihoods and assets that make it even more difficult for them to recover from the loss. With limited resources and options, recovery processes of individual households depend on their own coping capacity and the external support.

In the analysis of how the housing sector is impacted by disasters in the Pacific Islands (Vrolijk, L., 1998) the UN recognized central issues of vulnerability that are related to the daily life of communities and the environment where they reside. Therefore, the considerations of human settlements are divided into three components: people, economic activities and the infrastructure and public services. The main issues for disaster risk of each of these components are identified in table 1.1.

Table 1 presents critical issues that if they are properly addressed would ideally reduce the exposure to natural hazards: If the houses are built appropriately to withstand natural hazards; if settlements are located in safe or relatively safe areas together with facilities and infrastructure; and if all housing, facilities, and infrastructure follow the established construction standards. The economic activities would be diverse and the working areas located in safe zones. The infrastructure would be based on networks with the low vulnerability that even if they are interrupted by disasters can still work or be restored in short time.

**Table 1.1: Central issues in the vulnerability of human settlements**

Vulnerability	Central Issues
<b>Community</b>	<ul style="list-style-type: none"> <li>• Where people live</li> <li>• How their houses are built</li> <li>• How their economic and social situation can be affected by a disaster</li> <li>• If they have access to a safe place during a disaster</li> </ul>
<b>Economy</b>	<ul style="list-style-type: none"> <li>• How can the economic system be disturbed by natural disasters</li> <li>• How does the population depend on these economic activities</li> <li>• Where are the major economic production facilities located</li> <li>• How do they depend on infrastructure and services</li> <li>• What is their construction quality</li> </ul>
<b>Infrastructure and Services</b>	<ul style="list-style-type: none"> <li>• In what way do the infrastructure and services contribute to the development of safe settlements</li> <li>• Where are public assembly sites (schools, hospitals, theatres, public markets etc.) located and what is their quality of construction.</li> <li>• How is the infrastructure system (water, electricity, access, Sanitation, telecommunication) laid out and what is the construction quality of this infrastructure</li> <li>• Where critical emergency facilities are located and are they accessible and safely built.</li> </ul>

Source: Vrolijk, L., 1998

Unfortunately, the real scenario is more complex and is defined by how the society evolved and, therefore, their environment, which influences how each of the critical issues presented in Table 1 has been developed. A real analysis of the local situation of the communities and their settlements that can lead to the understanding

of their vulnerabilities and the ways how to reduce them should include the understanding of how, where and why these communities build their houses and settle in specific areas.

#### ***1.1.4 Post disaster recovery and reconstruction***

Post-disaster housing reconstruction implies a complex process where different actors are involved, where the decisions are taken regarding the future of the directly affected communities. Housing recovery and reconstruction is planned and implemented following different approaches that were compiled by the World Bank (Jha, A. K., & Barenstein, J. D., 2010) in regard to the impact of residents and the level of participation and control they have over the reconstruction projects. For instance, it is argued that in situ reconstruction where residents are the ones who manage the construction of their own houses is the most appropriate approach, because it avoids problems related to the loss of livelihood and cultural values attached to the place people live. On the other hand, many approaches involve the provision of housing by an agency that can be an NGO or a government agency, where usually there is limited or none participation of the affected residents (Jha, A. K., & Barenstein, J. D., 2010). Among the agency provided houses approach there is resettlement that has been observed to be the most traumatic and less advisable approach from the communities' perspectives since there is a destruction of livelihoods, community ties and attachment to the former living place (Oliver-Smith, 1991). However, in cases where the disaster is the result of the site vulnerabilities, there are few possibilities other than resettlement to assure the safety of the residents.

#### ***1.1.5 Approaches for housing reconstruction***

Post-disaster reconstruction programmes undertaken by governments, NGOs, CBOs, volunteers and other stakeholders, have been classified by different agencies and researchers (Bakarat, 2003; Barenstein, 2006; Jha, A. K., & Barenstein, J. D., 2010) based on who is the responsible of the projects' management and the level of control and involvement of target communities in the design, building and general management of the housing construction. The World Bank (Jha, A. K., & Barenstein, J. D., 2010) has classified the reconstruction approaches in five types: a) Cash Approach (CA), b) Owner-Driven Reconstruction (ODR), c) Community-Driven Reconstruction (CDR), d) Agency-Driven Reconstruction in-Situ (ADRIS), and Agency-Driven Reconstruction in Relocation Site (ADRRS).

Broadly, the reconstruction approaches can be grouped in two: Owner-driven approach and Donor-driven Approach (Tauber, 2014), the differences lie in who manages the reconstruction. The Owner-driven approach considers that beneficiaries receive financial and technical assistance and they directly undertake the construction of the new houses or repair works of damaged housing. In contrary, the Donor-Driven or Agency-Driven approach implies that an external agency, that can be governmental, NGO, or others including the private sector, manages the planning and construction of the houses.

### ***1.1.6 Natural hazards in the Philippines and post-disaster housing reconstruction in the aftermath of Typhoon Washi***

This research is carried out in the Philippines, the country is considered one of the most exposed countries to disasters (Alliance Development Works, 2012) and was ranked third in the world risk index for 20115 (Alliance Development Works, 2015). It is a multi-hazard-prone country. The country is exposed to earthquakes, volcanic eruptions, droughts, floods, landslides, and regularly tropical storms. The occurrence of natural disasters in the Philippines frequently leaves displaced communities, due to the extensive damages in housing that challenges the government to fulfill the housing gap. For instance, the typhoon Washi, locally referred as Sendong, hit the northern region of the southern island of Mindanao in December 2011. Washi-affected various urban centers, one of the cities with more damages caused by the typhoon was Cagayan de Oro, where about 228,576 persons that represents almost 40% of the city population resulted displaced (OCD, 2012; IDMC, 2013). The subsequent steps were the resettlement of most vulnerable residents, which prior the disaster settled in highly vulnerable marginal settlements or squatters. In fact, 86% of the post-Washi housing recovery projects involved agency-driven resettlement.

The situation experienced in the aftermath of typhoon Washi represents a common situation for long-term housing assistance following disasters in the Philippines: First, the massive destruction and impact in the housing sector, mainly because the unsafe location of the pre-disaster settlements. Second, the government's efforts are centered on resettling affected communities, mainly residents of "informal settlements" which have established squatters prior the disaster, with sub-standard housing conditions.

Although there are some alternatives for post-disaster housing supply applied in the Philippines, like community loans for housing reconstruction, the preferred system is the construction of permanent houses in resettlement sites. The whole process is carried out through government-NGO partnerships for the planning, construction and even for post-relocation community assistance (Grünewald, F., and Boyer, B., 2013; Oxfam, 2014; Annawi D. et al., 2014; Carrasco, S., Ochiai, C., and Okazaki, K., 2015).

### **1.2 Statement of the problem**

In general, the recovery of the housing sector after disasters occurs in different stages. For early stages emergency/temporal shelters are provided to satisfy the immediate needs and the support comes from national and international sources. However, for the long-term housing reconstruction/recovery, great part of the support comes from the local and national context. Although the initial pressure to accommodate internally displaced people (IDPs) is lower, now it emerges the need to provide a stable housing solution, which ideally can allow these communities restore their livelihoods and gradually tend to their development. Unfortunately, the reality is more challenging, from the donors, there are pressures for complete their permanent houses projects in shorter time. The pressures from the authorities are mainly to develop the planning timely, and start the implementation even in parallel with the formulation of the needed studies or plans. As a consequence, the common result is that the priorities are reduced to presuppose residents' needs and rush to built housing units

measuring successes in a number of houses produced rather than the fulfillment of the needs of the communities and the understanding of the local conditions (Cuny, 1981).

In this context, there are few possibilities to properly integrate communities' inputs in the process, in many cases the idea of participative process is not the priority. Therefore, the real housing needs and local lifestyles are not considered for the design and implementation of the resettlement projects. The gap between the provided house that beneficiaries are obligated to accept do not necessary meet the main considerations from the residents, and in the post allocation stage they may feel it is necessary to improve or modify their houses. However, this can be challenging considering the lack of external support, but also the limitations of government bodies regarding the informality of these new structures.

### **1.3 Significance of this study**

In the Philippines the occurrence of tropical storms is recurrent; which means that the coping capacities and strategies for responding to the disasters are permanently challenged, and are likely to be changed and updated. For instance, the Internal Displacement Monitoring Centre (2013) reported that the areas that were severely affected by Typhoon Washi in December 2011 were affected again by typhoon Bopha in December 2012, causing only one casualty. Although in other areas the reported human losses were more than 1,000. The low impact on human lives in the previously affected areas was acknowledged to the pre-emptive evacuations as a preventive measure applied based on the experience and failures that occurred the previous year. In fact, the permanent hazard exposure in the country has forced the government to implement disaster prevention and response policies, the Philippines has been a global leader in enacting legislation related to disaster risk reduction.

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Researchers have theorized that a top-down approach and especially resettlement would produce negative outcomes, failure of the housing projects in terms of occupancy rates or abandonment of the houses (Oliver-Smith, A., 1991), destruction of livelihoods and community ties (Barenstein, J. D., 2006; Jha, A. K., & Barenstein, J. D., 2010), and alien or non-culturally appropriate houses . This would be evidenced in low satisfaction rates of resettles (Lizarralde, G. and Bouraoui, D., 2010; Barenstein, J. D., 2012) and further

change of their housing conditions, in other words, they would choose to move out or to modify the houses (Clark, W.A., and Onaka, J., 1983).

Housing modifications built by residents are the expression of the households' efforts to fulfill the mismatches in the provided house that is the result of low levels of residential satisfaction, unsatisfied residents' needs and lack of understanding of the local conditions. Additionally, this has a high impact on residents' living conditions and perspectives for future inhabitation and permanence in the provided houses. The understanding of how residents live and how the housing modifications are performed are crucial in order to improve the planning and construction of post-disaster housing. In contrast, it is necessary to understand the value of resident-initiated constructions that reduce residents' dependency from government or NGOs.

Therefore, the Philippines result in an environment with potentialities for this kind of studies, the recurrence of disastrous events, and consequently the need of permanent improvement of response and reconstruction policies and mechanisms. Typhoon Washi hit an area that is not frequently affected by tropical storms with an intensity that causes massive destruction. Thus, Washi was an unusual event that challenged the whole response and management structure. In addition, by the time this study is conducted, the residents have inhabited the provided houses in average one and a half years, and results ideal for the analysis of housing modification in the short term of occupancy. These issues were determinant for the selection of Cagayan de Oro and the Post Typhoon Washi reconstruction process for the analysis in this study.

#### **1.4 Research questions**

The study proposes following key questions that are aimed to be answered through the development of the research:

- Is it possible to have substantial positive outcomes from an entirely top-down post-disaster resettlement project?
- What are the reasons for the construction of housing modifications or extensions and how are they built?
- Are the housing conditions affected by modifications? Are the resident-initiated constructions safe?
- It is possible to involve other stakeholders in the process of housing modification?

#### **1.5 Aim of the study**

The aim of this research is to explore the outcomes of a top-down resettlement process in Cagayan de Oro, and to analyze the residents' capacities to adapt the provided houses to their needs and living conditions in order to provide a feedback for the improvement of the established procedure for post-disaster housing reconstruction in the Philippines.

#### **1.6 Objectives of the study**

The research objectives are as follows:

- To identify the pros and cons of the top-down resettlement project in Cagayan de Oro and the strategic relationships between stakeholders.
- To analyze how residents modify their houses, patterns of modification, and reasons for the construction of housing extensions.
- To explore the effects of resident-initiated modifications of the houses and to identify issues for the improvement of the post-disaster housing provision based on the analysis of the disaster recovery process in the aftermath of typhoon Washi in order to enable residents to adapt their houses to their needs and preferences.

## **1.7 Research scope**

The data collection was conducted between July and August 2014, 32 months after the typhoon Washi hit Cagayan de Oro, and 20 months after the first group of beneficiaries were allocated in the completed permanent houses in Calaanan site. This study is centered on the situation of the resettlement at the time of the field research which was still in progress and the housing modifications built by the residents in the short term. Therefore, the present study might be complemented by further analysis of housing modifications in the middle and long term in order to understand the impact on households of resettlement programs, which would also prove useful for the improvement of resettlement and social housing programs in the Philippines in the future.

## **1.8 Research location**

### ***1.8.1 Introduction of the study area***

The research is carried out in the city of Cagayan de Oro in the Philippines (Figure 1.8) which is one of the countries of the southeast Asia that is vulnerable to multi-hazards, and among them, annual typhoons are the most recurrent. Cagayan de Oro is a middle size city with 602,088 inhabitants and is located in the Southern region of Mindanao. Cagayan de Oro is the largest city in the region of Northern Mindanao (Region 10) and is the capital of the province of Misamis Oriental. Its total land area is 488.86 km<sup>2</sup> representing 13.9 percent of the entire Misamis Oriental province. It includes 25 kilometers of coastline and a harbor, Macajalar Bay. 44.7 percent of the surface of Cagayan de Oro is classified as agricultural land and 38.4 percent is classified as open spaces. The city is frequently categorized and referenced according to geographic factors: the 1st district (west area) consists of 24 barangays (barangay is the smallest administrative division in the Philippines and is the native Filipino term for a village, district or ward) which are mostly suburban, and the 2nd district (east area) is made up of 17 barangays, including city proper barangays numbering from 1-40.



**Figure 1.8: Location of the city of Cagayan de Oro**

Cagayan de Oro and the neighboring cities of Iligan, and Bukidnon are all situated in an area with complex river systems related to six major watersheds. The Cagayan de Oro River Basin is one of the biggest in Mindanao with eight major tributaries. It is drained by tributaries of a combined area of 136,046 hectares, making it one of the most expansive basins in Northern Mindanao. The geographic landscape of the Cagayan de Oro Basin which is almost circular with slopes and riverbanks are very steep, making it susceptible to flooding. Studies show that the water storage capacities of these major watersheds were reduced as a result of subsequent erosion and sedimentation (OCD, 2012).

On December 2011, an unexpectedly intense typhoon hit the region of Mindanao, where Cagayan de Oro was one of the most affected urban areas. As a result of the damage caused by the typhoon Washi (locally known as Sendong), the local government resettled residents of the most vulnerable areas.

## **1.9 Research Methodology**

To meet the objectives of the research set out in the previous section, this study was conducted following the principles of case study research for social science (Yin, R. 2009). The site selected was Calaanan in Cagayan de Oro and the case studies are four villages built by NGOs and others in coordination with the local government. The literature review includes the gathering and analysis of secondary data obtained prior and after the field activities, such as books, academic papers, reports from governmental and non-governmental agencies, and other publications. Primary data was obtained through: a) Semi-structured interviews with governmental officials and representatives of NGOs involved in resettlement, b) Household questionnaire survey, c) Housing observation survey and measurement, and d) graphic documentation of the housing and resettlement sites (see Figure 1.9).

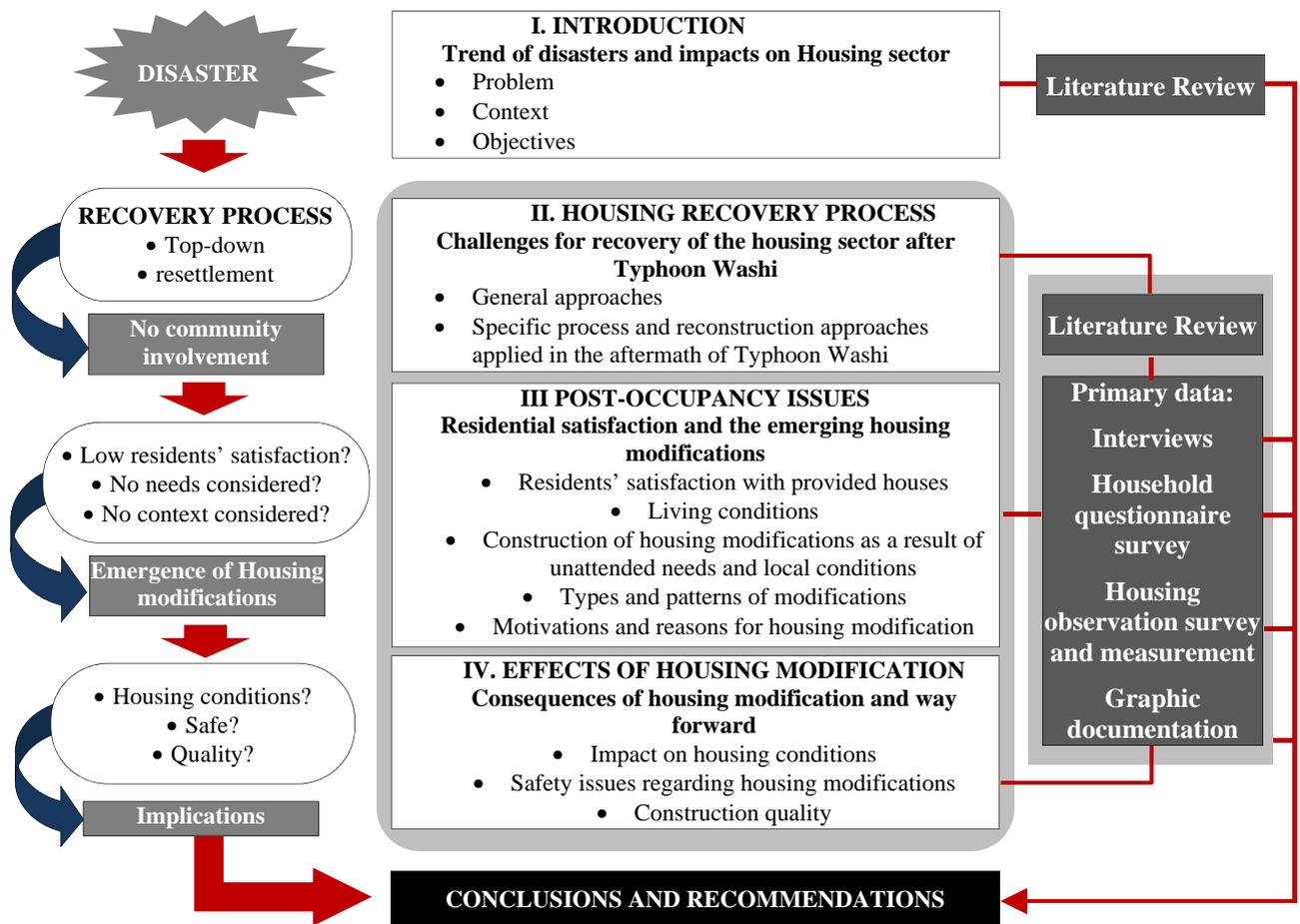


Figure 1.9 Research Framework of dissertation

The study utilizes qualitative and quantitative methods for data collection and analysis. The process included three main phases:

- *Stage 1: Introduction to the research topic and local context*
- *Stage 2: Networking*
- *Stage 3: Data collection*

### 1.9.1 Stage 1: Introduction to the research topic and local context

The first stage included the initial investigation and understanding of the problem and the context in the Philippines. Subsequently, justify the selection of the study site and cases to be analyzed and the selection of Cagayan de Oro and the post-disaster resettlement as the main case for analysis.

#### Previous research

The initial understanding of post disaster reconstruction was attained during the research for the master program that was focused on the early stages of recovery and NGOs involvement in the aftermath of the Great East Earthquake and Tsunami that hit the region of Tohoku in Japan on March 2011. This study provided a valuable experience for understanding the dynamics of coordination and the difficulties that local communities

face following a major natural disaster.

#### *Literature review*

An extensive desktop study is undertaken in order to summarize experiences of post-disaster housing reconstruction in various context, mainly in developing countries. The approaches taken and the outputs of the reconstruction projects in different countries but also lessons learned from previous experiences in the Philippines. In addition, studies related to housing modifications/transformations carried out by residents and concepts such as incremental housing in low-income communities are analyzed.

The research gathers secondary data from government and other agencies' reports, published books, scientific journals, organizational reports, manuals, guidelines, and various related websites.

#### *First Internship and direct observation*

The first approximation to the disaster issues in the Asia-Pacific region and specifically in the Philippines was done during the four months of internship in the disaster response department of the NGO Habitat for Humanity International, located in Manila. I also established contact with its local office Habitat for Humanity Philippines, which works extensively in social housing projects and post-disaster housing support and construction along the country in close partnership with the national government of the Philippines. The contact with the representatives of this NGO was crucial for the support during the field research in Cagayan de Oro.

### **1.9.2 Stage 2: Networking**

The Second stage included the start the construction of a useful network including local and national government officials, NGOs' representatives, CBOs' representatives, local community and other stakeholders involved in the process of housing recovery.

#### *Second internship*

As an strategy to understand the local reality of Cagayan de Oro and the activities of stakeholders involved on the long term recovery of the city it was considered two months internship in the Office of Civil Defense (OCD), Region 10, which works in Cagayan de Oro and neighboring areas. The Office of Civil Defense is directly working on disaster risk prevention activities but also supervising and coordinating together with the local government the progress of the reconstruction and resettlement in the aftermath of typhoon Washi.

#### *Networking*

Thanks to my participation in the activities of OCD it was possible to establish contact with officials of the local government, governmental agencies like the National Housing Authority and the Department of Social Welfare and Development, NGOs and local communities (Figure 1.10). This network was crucial for

the collection of primary data.



(a)



(b)



(c)



(d)

**Figure 1.10: (a) Meeting with the City Mayor of Cagayn de Oro, (b) attending the activities of the NGO Gawad Kalinga, (c) attending housing construction of the NGO Habitat for Humanity Philippines, (d) meeting with representatives of the regional office of the Philippine Red Cross**

### ***1.9.3 Stage 3: Data collection***

The third stage was the visit to resettlement sites in Cagayan de Oro and after the case studies were selected on-site data collection through interviews of government officials, and NGOs' representatives, household questionnaire surveys in resettlement sites, direct observation surveys and graphic documentation.

#### ***Semi-structured interviews***

In order to understand the interactions among stakeholders involved in the reconstruction process, primary data was collected through semi-structured interviews conducted during July and August 2014 (see Figure 1.11).



(a)



(b)



(c)



(d)



(e)



(f)

**Figure 1.11: Interviews to the representatives of (a) the Office of City Planning and Development (b) Office City Disaster Risk Reduction Management, (c) National housing Authority, (d) Department of Social Welfare and Development, (e) Misamis Oriental Filipino Chinese Chamber of Commerce, (f) Gawad Kalinga Office in Cagayan de Oro**

*Household questionnaire survey*

In order to obtain primary information about the beneficiaries of permanent houses in resettlement sites, a household questionnaire survey was conducted, through individual face-to-face interview to 254 randomly selected residents (Figure 1.12). The criteria for the calculation of the sample size are detailed in chapter 5.



**Figure 1.12: Activities in the resettlement sites (a) meeting with the community before the starting of the questionnaire survey (b) Questionnaire survey in Village 1, (c) Questionnaire survey in village 3, (d) local collaborator supporting with the questionnaire survey**

### *Observation surveys and measurement*

Housing observation survey included a technical survey to categorize the housing modifications. The houses selected for this survey are the same considered for household survey. The information gathered included the measurement of extensions, the materials, and considerations for seismic performance and resistance to wind loads.

### *Graphic Documentation*

Detailed photograph documentation was gathered of the households and the living conditions, housing situation and housing extensions, settlement and facilities.

## **1.10 Structure of the dissertation**

The dissertation is divided into four sections and eight chapters as presented in Figure 1.5. Each part and chapter is described as follows:

### **Part I: Introduction**

Part I contains chapters 1 and 2, and provides an overview of the dissertation and draws the actual situation and literature review of relevant topics analyzed in this study:

### ***Chapter 1:***

This chapter presents the background of this study; the research objectives, scope and limitations, problem statement, introduction of the study site and methodology are presented.

### ***Chapter 2:***

In chapter 2, general concepts are discussed related to the problems which emerged from the destruction of urban areas caused by disasters and the different approaches for reconstruction and the lessons learned from examples in different environments, mainly developing countries.

## **Part II: Disaster Exposure and Housing Recovery Mechanisms in the Philippines**

Part II includes chapters 3 and 4, where the hazard exposure and disaster management at the national and local levels are discussed.

### ***Chapter 3:***

This chapter provides an introduction to the exposure of multiple hazards in the Philippines, and the understanding of the frequency of disaster events in the country. Similarly, in this chapter the institutionalized structure for disaster risk reduction and post-disaster recovery in the Philippines are explained. There is special attention to the impact of disasters in the housing sector and the modalities for housing reconstruction and the approaches adopted.

### ***Chapter 4:***

This Chapter presents the process of reconstruction and long-term recovery in the city of Cagayan de Oro after the Typhoon Washi that hit the city in 2011. The main focus is the process of resettlement because it was determinant for the provision of the larger number of houses and involved a complex process that involved various stakeholders. In this chapter the relationships between stakeholders and the process of decision making are analyzed. Different housing recovery approaches adopted were also analyzed. The analysis resulted in the identification of pros and cons of the resettlement projects and how this can be applied for future recovery and reconstruction projects after a disaster in a permanently exposed country.

## **Part III: Post-Occupancy Issues**

Part 3 involves Chapters 5 and 6 and focuses on the mismatches between the agencies provided housing in Calaanan site in the city of Cagayan de Oro, and the priorities, needs and aspirations of the residents that result in housing modifications or extensions. In order to understand in detail the housing mismatches, it was carried out the analysis of the levels of satisfaction of the residents with their new living environment and their current living conditions.

### ***Chapter 5:***

Based on the premise that housing modifications emerge when there are residents' needs or aspirations

unsatisfied, Chapter 5 presents the opinions of the resettled communities about their level of satisfaction with their current housing conditions (house and neighborhood) in four villages in Calaanan site in Cagayan de Oro. The current and pre-disaster situations are compared in order to know if on the communities opinion there has been an improvement of their living conditions. In addition the current living conditions of the residents are analyzed in order to understand how the houses are occupied and what are the function of the extensions or other modifications.

#### ***Chapter 6:***

This chapter presents the types of housing modifications observed in the four villages analyzed, the initial motivations of the residents to build them, the actual use of the modifications, the location of the modifications inside the house, within the limits or outside of the provided lot, finally the materials used regarding their durability. The objective of this paper is to explore the different characteristics of housing extensions in the four villages, comparing them and initiate the definition of causes for housing modification.

#### ***Chapter 7***

This chapter presents a detail analysis of the reasons for the construction of housing modifications, and patterns of modifications in Mahogany Village at the Calaanan site, where the analysis of the provided houses and the housing extensions are done in detail. This chapter initially provides an overview of Mahogany village layout and the types of modifications done by residents, the residents' motivations to built extensions, type of motivations, their location, and current use. The indicators for the analysis of the reasons behind these modifications are demographic, economic, sociocultural, local environment, and climatic conditions.

### **Part IV: Effects of Housing Modifications and Recommendations**

Part 4, contains Chapters 8 and 9, that analyze the impacts of the construction of housing extensions in the level of safety of the residents and if as a consequence of these informally built structures there is a potential deterioration of the housing conditions.

#### ***Chapter 8:***

In this chapter the discussion is centered on the analysis of pros and cons of the construction of resident-initiated housing extensions; and the factors that may indicate the generation of unsafe housing conditions as a result of the informal modification of the original permanent houses provided in Calaanan site. The analysis included the understanding the progressive nature of extensions, the observation of actual seismic and wind resistant performances of the resident-initiated housing extensions. The other issue observed is the authorized extensions considering that are the only kind of housing modifications that can be supported by NGOs or other agencies. Additionally, this chapter analyzes the modifications in the settlement layout and how this may represent a risk for the safety of the residents.

#### ***Chapter 9:***

Chapter 9 summarizes the findings of the entire dissertation and provides recommendations for the improvement of the living conditions of the residents, a safe built environment for them and avoid the creation of new vulnerabilities.

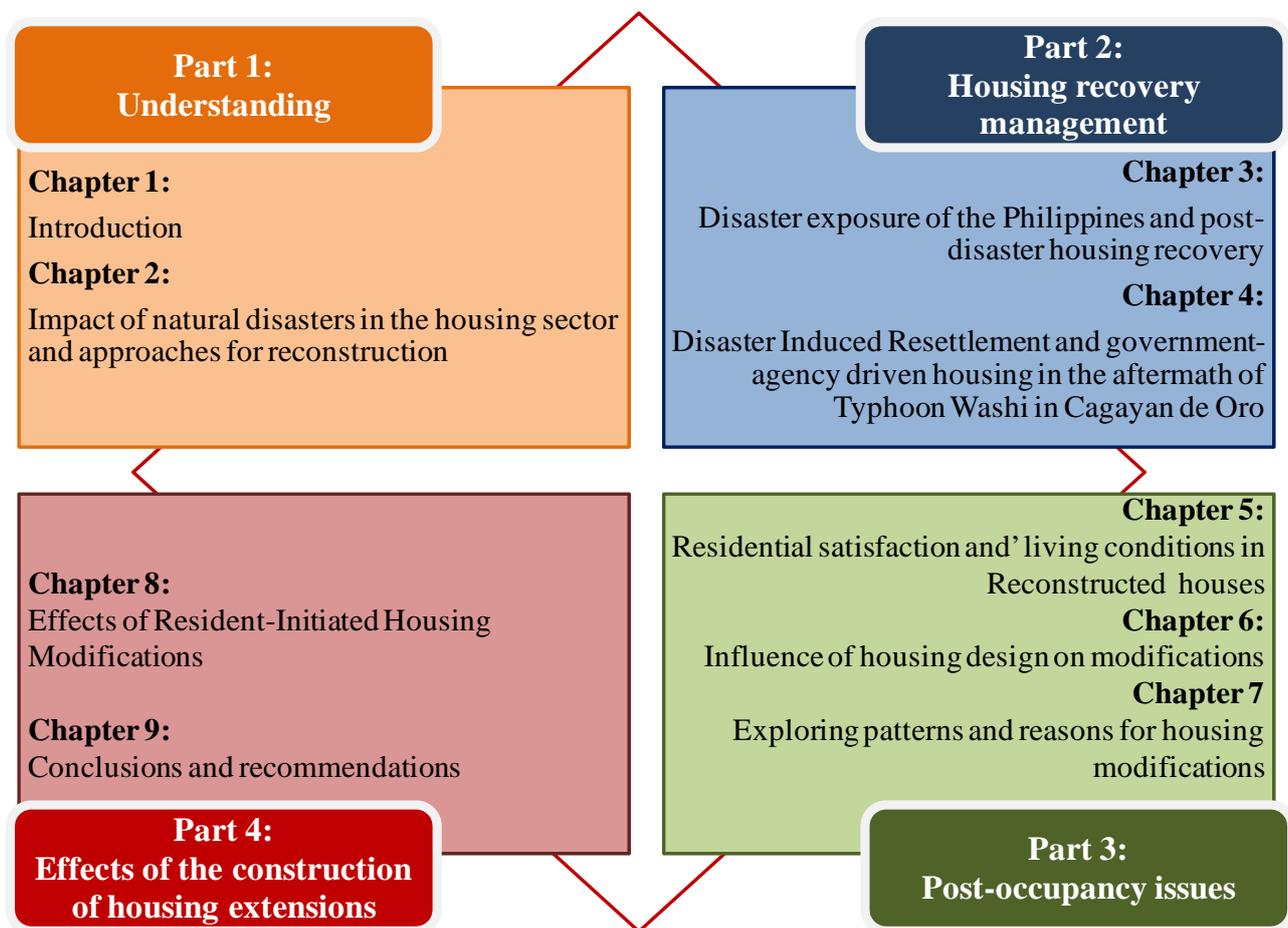


Figure 1.5: Structure of the dissertation

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## Chapter 2:

# Impact of natural disasters in the housing sector and approaches for reconstruction

*This chapter provides an overview of the risks in urban areas understanding the high densities in cities and consequently the impacts of a disaster for a larger number of people that are left homeless after a disaster. Additionally, this chapter draws an overview of the approaches for post-disaster housing reconstruction and the lessons learned from the adoption of certain approach in specific cases, mainly in developing countries.*

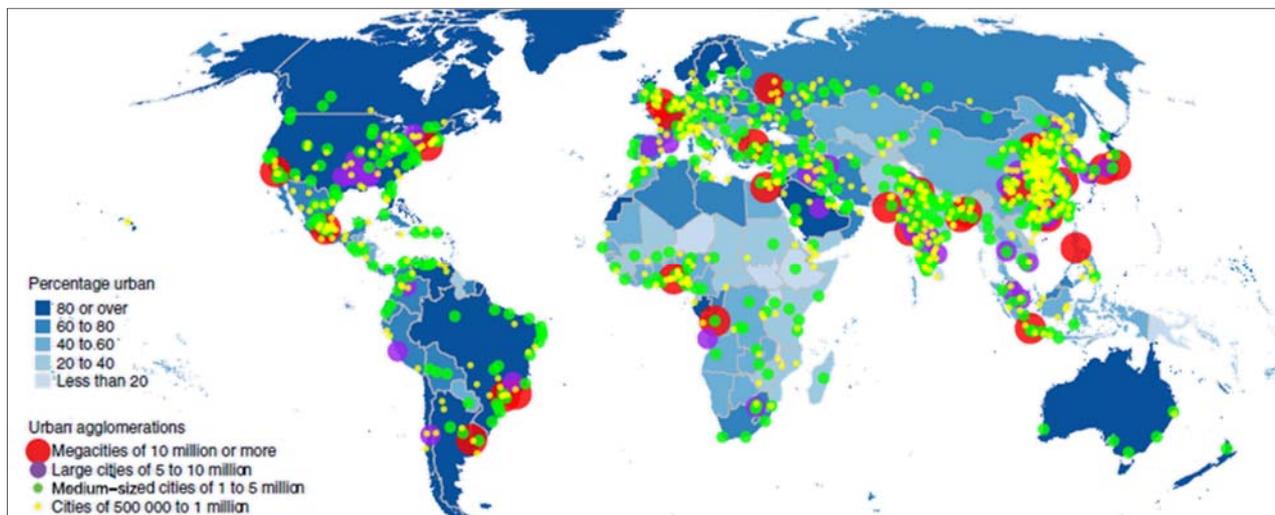
### 2.1 Disaster risks in urban areas

Globally, more people live in urban areas than in rural areas. In 2007, for the first time in history, the global urban population exceeded the global rural population, and the world population has remained predominantly urban thereafter. The planet has gone through a process of rapid urbanization over the past six decades. According to the Population division of the United Nations (UN-DESA, 2014), in 1950, more than two-thirds of people worldwide lived in rural settlements and less than one-third in urban settlements. In 2014, 54 percent of the world's population is urban (UN-DESA, 2014). The current trends show that urban population will continue growing, and by 2050, the world will be one-third rural and two-thirds urban, the opposite of the global rural-urban population distribution of the mid-twentieth century

UN-DESA (UN-DESA, 2014) classified urban areas according to their population. Thus, large cities with 5 to 10 million inhabitants account for a small, but growing proportion of the global urban population. While one in five urban dwellers worldwide lives in a medium-sized city with 1 million to 5 million inhabitants. In 2014 close to one-half of the world's urban population lives in settlements with fewer than 500,000 inhabitants. The fastest growing urban concentrations are medium-sized cities and cities with less than 1 million inhabitants located in Asia and Africa. The global distribution of the population in cities with at least 500,000 inhabitants is shown in Figures 2.1 and 2.2.

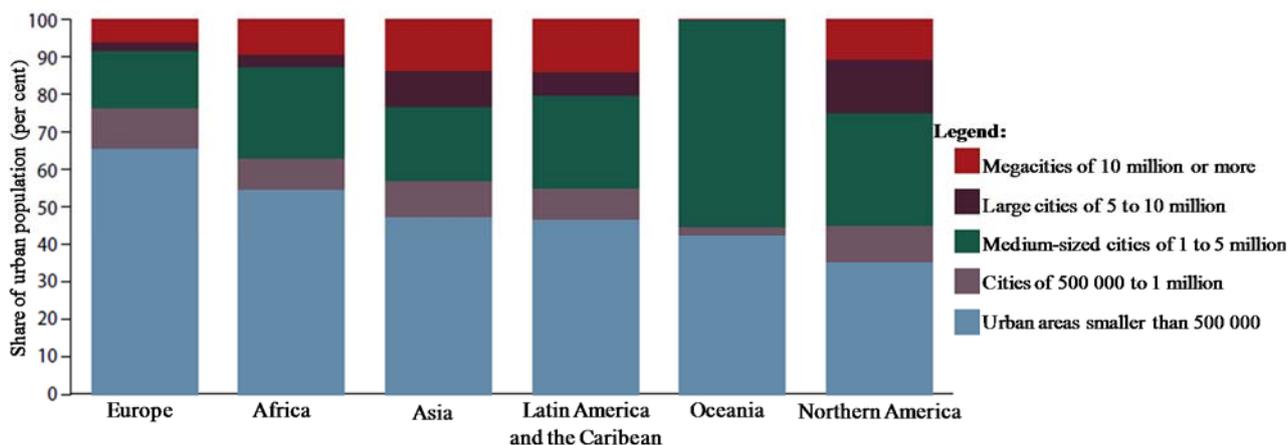
Disaster risks related to natural hazards is the probability that lives will be lost or damage resulted from an extreme natural phenomenon (Vrolijk, 1998). Vulnerabilities to natural disasters are increased by human-induced conditions, which in urban areas is related directly to the rapid and unplanned urbanization, and land degradation, globalization and socio-economic poverty, global warming, and climate change are among the global trends that affect the world at large and result in the severity, if not be the cause of natural disasters (Gencer, E. A., 2013). Specifically, the urban vulnerabilities lie on the interaction of physical, socio-cultural, economic and institutional issues. As Gencer (2013) argues the concentration of people and assets in urban areas raise the awareness about the conditions of buildings and infrastructure, the social and economic situation

of the communities, and the limited institutional capacity. These issues combined result in disasters in hazard-prone urban areas.



**Figure 2.1: Percentage urban and location of urban agglomerations**

*Source: UN-DESA, 2014*



**Figure 2.2: Population distribution by city size varies across major areas in 2014**

*Source: UN-DESA, 2014*

On the other hand, in urban areas, there is a strong relationship between vulnerability and urban poverty. However, it is vital to understand that poverty does not necessarily mean vulnerability. Bankoff (2003) observed that there are poor that are not vulnerable and not poor who are vulnerable. In theory, everyone can be threatened by natural hazards such as earthquakes, floods, drought, storms, tropical cyclones and hurricanes, wildfire, tsunami, volcanic eruptions and landslides. However, in the practice, the impacts are dramatically higher for the poorer communities. In fact, the poor that are vulnerable are the residents of densely populated marginal settlements, which can be located in the core of the cities or in peri-urban areas, and in poorly built housing on land most at risk.

The process of urbanization described above is closely related to the migration from rural areas to the cities driven by the impoverished rural economies. The lack of government capacities to plan the urban expansion, mainly in developing countries, and the lack of appropriate and affordable land, promoted the establishment of informal settlements. As a result, areas with precarious housing and living conditions rise inside the city and in the outskirts under the name of slums and squatters. Urban poor settlements take different shapes and sizes, and also have different names and characteristics. For instance, UN-HABITAT (2008) defines a **slum** as a neighborhood of housing that was once in good condition but has since deteriorated or been subdivided into a state of high crowding and rented out to low-income groups. A **squatter** settlement is an area of poor quality housing built on illegally occupied land. One-third kind of settlement is an irregular subdivision, in which the legal owner subdivides the land into sub-standard plots and sells or rents them out without following all relevant building codes and standards.

Therefore, these are the settlements that are most vulnerable to the impact of a potential natural disaster due to the combination of different factors such as unsafe location, overcrowding, lack of services and land security, and precarious construction quality of the houses (UN-Habitat, 2002). These pre-existing conditions defined the degradation of the settlements and consequently the higher exposure to disasters. Reconstruction approaches have to avoid the generation of these vulnerable conditions.

## **2.2 Impact of disasters on housing in Asia**

Housing is often the sector severely impacted by both hydro-meteorological and geophysical disasters (ADPC, 2011). The damages of major disasters between 2001 and 2010 and the impact on housing in Asia-Pacific region are presented in Table 2.1. Damage to housing sector includes both private and government and in most cases governments have to provide assistance for the damages associated with the private sector.

On a micro scale, disaster event disrupts day to day life and leaves the families without shelter and results in the lack of access to basic services such as water and sanitation. In addition, micro, small and medium-sized businesses located in those homes are similarly affected indirectly and the family could also be bereaved of the chance to be eligible for loans since one of the key assets or collateral is demolished, making it difficult for them to recover from the loss. Lessons from past events have shown vulnerable groups face various protection related problems aftermath of disaster events. With limited resources and options, recovery processes of individual households are contingent upon their coping capacity and the external support. Further, the community as a whole also suffers as the local economy is hard hit and the responsibility to support those made homeless by the natural disasters can place an extra burden on the dwindling economy.

**Table 2.1: Damage & Losses in the Housing Sector in Asia**

Year	Country	Type of Disaster	No of Housing Units		Housing sector damage and losses (USD in Millions)	Total damage and losses (USD in Millions.)	% of total loss
			Fully Damaged	Partially Damaged			
2001	India (Gujarat)	Earthquake	410,482	488,350	1100	2130	51.60
	India (Tamilnadu)		153,585	-	228.5	815	28.04
2004	Indonesia	Asian Tsunami	127,300	-	1437.1	4452	32.28
	Sri Lanka		99,480	44,290	306-341	970-1000	31.55-34.10
	Maldives		1,847	3,500	64.8	470.1	13.78
2005	Pakistan	Earthquake	203,579	196,574	1152.1	2876.0	40.06
2007	Bangladesh	Cyclone Sidr	564,967	957,110	839.0	1674.9	50.09
2008	Myanmar	Cyclone Nargis	450,000	350,000	623.6	4060	15.36
2009	Bhutan	Earthquake	446	4168	23.3	52	45.81
	Lao PDR	Typhoon Ketsana	3,178	-	8.6	58	14.83
	Cambodia		218	10,559	18.5	131.996	14.02
	Philippines	Typhoon Ondoy and Pepeng	220,000	-	730.3	4383	16.66
2010	Pakistan	Floods	913,307	694,878	1,588.0	10,056	15.79

*Source: ADPC, 2011*

On a macro scale, housing sector accounts for 10-50% of total disaster losses (Table 2.1). While high impact events (Intensive risk events) as below not only result in significant housing damage and economic loss they also account for the majority of the deaths. For countries that suffer disasters year after year, this can leave regular development programs in a constant state of flux as they are repeatedly raided for resources to help pay for unexpected reconstruction (ADPC, 2011).

The UN Global Assessment Report on Disaster Risk Reduction 2011 (UNISDR, 2011) provides an interesting insight into the damage and loss associated with natural disaster events based on available disaster data of selected countries. The report revealed that damages associated with small scale localized disaster events are predominantly due to hydro-meteorological hazards. The small-scale disasters affect the poorest families, and it accounts for significant disaster impact of 54% of total housing damages and 80% people affected while compared to high impact disaster events (UNISDR, 2011). This finding highlights the vulnerability of housing and built environment, not just to major disaster events but also small scale localized events which do not receive attention and much-needed support.

Above disaster damage and losses to housing sector show one side of the coin, on the flip side governments are increasingly concerned about the risks posed by extreme weather events and climate change. Housing and

other associated infrastructure have a longer lifetime (typically 20 to 40+ years) and it will be increasingly exposed to future risks posed by extreme events and climate change. While different framework and approaches are being evolved, it is important to focus climate change and associated risks as part of developmental issue and address underlying risk factors.

### **2.3 Post disaster housing reconstruction**

The United Nations (UN-OCHA and IFRC, 2015) states as a principle for reconstruction the opportunity for risk reduction and reform: *“A disaster offers opportunities to reduce the risk of future disasters by introducing improved land-use planning, building methods, and building regulations. These preventative measures should be based on hazard and vulnerability analyses, and should be extensively applied to all hazardous areas across the national territory”*.

After a disaster it is vital to consider elements at risk such as population, housing public utilities, industry, infrastructure and others, for planning and engineering practice, whether disaster prevention and mitigation are considered or not. Reconstruction planning must consider the inclusion of disaster prevention as the main approach for the projects, where land-use planning, construction quality of infrastructure and in particular housing are fundamental.

The main objective must be to rebuild houses and infrastructure that is less vulnerable to future disasters, what it is commonly referred as “build back better”. Pre-disaster vulnerabilities related to the poorly built houses can be reduced or eliminated since these issues are the main reason for the failures of the structures and the resulting human and economic losses.

For instance, in earthquake-prone areas, the collapse of buildings is the primary cause of casualties. Landslides are also reasons for structural collapse and death. Houses built on loose unconsolidated soils, soils prone to liquefaction, and unstable slopes are particularly at risk. The vulnerability of buildings under these conditions of hazard is increased where there is a lack of structural timber and lightweight building materials, for example in the arid zones of Asia and the Middle East (UN-OCHA and IFRC, 2015).

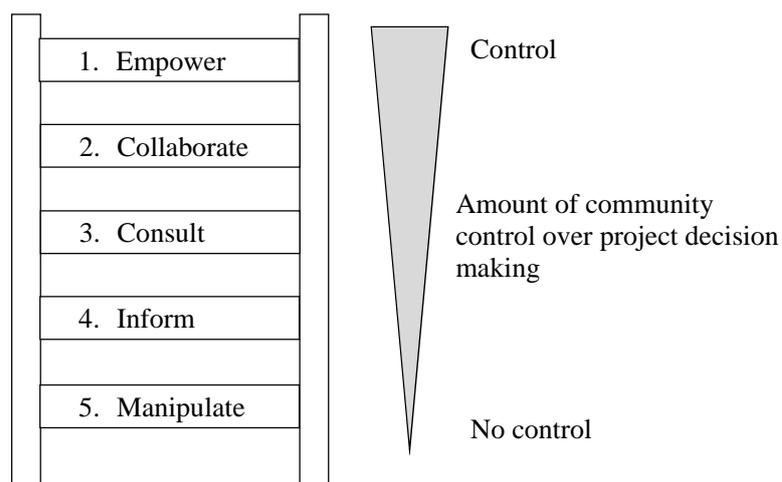
Although an appropriate building performance is important, mainly for low-income housing in which households cannot always afford the professional supervision. In addition, as Kreimer (1980) mentions that in different studies carried out in developing countries in Latin America, Africa, and Asia, residents prioritize the access to job and services and livelihood generation over the quality of the structure or the appearance of the settlement in terms of physical layout. Thus, there are other issues that must be considered for plan post disaster housing reconstruction such as land tenure, location, employment and services.

### **2.4 Approaches for housing reconstruction**

Post-disaster housing reconstruction projects can be planned and implemented following different approaches, which according to the World Bank (Jha, A. K., & Barenstein, J. D., 2010) vary mainly in terms of beneficiaries' level of control over the process of reconstruction. Understanding the levels of community involvement in the project can be determinant for the empowerment of the housing beneficiaries and allow them to feel identified with their houses, but also, minimize the traumatic effects of the disaster in affected communities. Thus, the participation of housing beneficiaries is reflected in the sense of ownership and personal responsibility for the house and the settlement as they are able to take decisions in the housing planning and construction (Davidson, et al. 2006, Oliver-Smith, 1991).

In Figure 2.2 it is presented a “ladder of community participation” that defines different approaches of community involvement in the decision-making in the housing projects. This ladder was adapted by Davidson, et al. (2006) based on Arnstein (1969) and Choguill (1996). In the top of the ladder “empower” communities refers to an active participation and high control over the project. The degrees of communities' involvement vary according to the loss of control over decision making. The lower levels are to inform of decisions taken by governments and other agencies and in the bottom of the ladder there is lacking of participation and communities are “manipulated” or forced to accept decisions taken by the planners.

The choice of the most suitable reconstruction approach to be employed has to be in accordance with a specific context, and the issues that have to be considered are: (1) reconstruction costs; (2) improvement in housing and community safety; (3) restoration of livelihoods; (4) political milieu; (5) cultural context; and (6) people's own goals for well-being, empowerment, and capacity (Jha, A. K., & Barenstein, J. D., 2010). Consultation with the community and evaluation of requirements and capacities is critical before deciding on any reconstruction approach.



**Figure 2.2: Ladder of community participation**

*Source. Davidson, et al. 2006, Choguill, 1996, Arnstein 1969*

The World Bank (Jha, A. K., & Barenstein, J. D., 2010) categorized five types of post-disaster housing reconstruction approaches. These approaches are not mutually exclusive and should be understood as fluid

categories that are often found in combination:

- *Cash approach*
- *Owner-driven reconstruction*
- *Community-driven reconstruction*
- *Agency-driven reconstruction in-situ*
- *Agency-Driven reconstruction in relocation site*

#### **2.4.1 The Cash Approach (CA)**

This approach implies the unconditional provision of financial support for repair and reconstruction of damaged houses. The local policies may include, or not, the formalization of untitled households, tenants, squatter residents and receive the financial assistance. CA is appropriate for disasters that have a relatively limited impact and where housing damage was not caused by shortcomings in local construction practices.

This approach usually does not consider any other assessment or assistance to the households and how they deal with the problems to repair their homes. On the other hand, residents have the freedom to take the decision of how to rebuild their own houses based on their own preferences and priorities, or even different uses rather than the original purpose of the assistance due to the lack of control.

#### **Experiences with this approach:**

##### *Subsidy for housing repair in Chile after the Earthquake in 2010*

Households whose houses were partially damaged and that were eligible for government subsidy to perform modest repairs used the funds to purchase materials from a local source. In addition, households could hire contractors for more complex repairs. Repair funds were disbursed in three increments (30%, 30%, and 40%) with inspections to ensure that subsidies were used for construction (Comerio, M. 2013).

#### **2.4.2 Owner-Driven Reconstruction (ODR)**

An ODR program includes the provision of financial assistance and a kind of technical assistance to households of severely damaged and destroyed houses. Beneficiaries may undertake the construction or repair work by themselves, by employing family labor, by employing a local contractor or local laborers, or by using some combination of these options.

The World Bank (Jha, A. K., & Barenstein, J. D., 2010) advocates this approach arguing that is the most empowering and dignified approach for households, and it should be used whenever the conditions are right for it. The approach is viable for both house and apartment owners, as well as for informal settlers, once their tenure is secured. In fact, the term “owner” in ODR refers as much to the ownership of the building process as to the ownership of the house.

ODR does not mean that owners build their homes by themselves, actually it implies to hire local contractors or laborers for at least part of the work. Thus, the key difference between this approach and agency driven approaches is that contractors and paid laborers are accountable to the homeowner rather than to an external agency that may not be able to provide the intensive supervision and control that homeowners often can. However, ODR requires good oversight and governance, for the accomplishment of construction standards. In some cases other agencies, governmental or nongovernmental, may be involved to ensure the quality of construction. Where engineered building technologies are being used, or multifamily housing is being rebuilt, using ODR is more challenging, but not impossible. The oversight from supporting agencies or government will need to be more technical, and experienced contractors must be hired. Success lies in establishing a support system for homeowners appropriate to the local context.

**Experiences with this approach:**

*Housing Reconstruction in Post-earthquake in Gujarat, India in 2001*

In the aftermath of the earthquake, the government of Gujarat constituted the Gujarat State Disaster Management Authority (GSDMA) which included in situ reconstruction and relocation. For the in situ repair and reconstruction, financial and technical assistance was provided, also subsidized construction materials to enable people to rebuild their homes themselves.

Financial assistance to homeowners was based on the type and size of the house and on the level of damage. For which the government carried out assessment surveys to define the amount of compensation in each case. The disbursement of the financial assistance was done in three parts. The first payment was the 40% for the preparatory works. The second part was 40% and the rest in the third stage. The disbursements of the second and third payments were done only after inspections from government engineers. The assistance included guidance to supervise construction and training programs implemented by engineers and masons and education campaigns on hazard-resistant construction.

The study carried out by Barenstein (2006), observed a high level of households' satisfaction over the houses. Additionally, the majority of the people were satisfied with the government's damage assessment survey, and the financial support received. Also, the project achieved equality in the provision of the assistance, especially regarding minorities and socially disadvantaged groups. On the other hand, there was some criticism about the government's compensation scheme. The beneficiaries received assistance based on what they had lost, rather than on what they needed.

The study from Barenstein also observed cultural and environmental sensitivity, because the people were familiar with the materials, used vernacular designs and spatial arrangements, which at the end allowed them to maintain the traditional character of the houses.



(a)

(b)

**Figure 2.3: Rebuilt houses in Gujarat (a) An owner-built house in Rapar Taluka (Kachch district); (b) An owner-built house in Bhuj (Kachch district)**

*Source: Barenstein, J. D. (2006)*

*On-site home reconstruction after the 2010 Chile Earthquake:*

For reconstruction, the Ministry of Housing and Urban Development was the responsible for the programs to repair or rebuild damaged houses. The subsidies were provided to 108,839 households for repair and 53,822 households for rebuilding the entire house (Comerio, M., 2013).

For reconstruction the ministry attempted to allow cash to each beneficiary, and subsequently, the household chooses a house model to be built. However, it resulted too time demanding. Therefore, the beneficiaries were gathered in groups and several pre-certified builders presented their offered models of houses. The houses were typically about 50 m<sup>2</sup>, either pre-fabricated or site built, either wooden-frame or reinforced masonry, all according to the minimum standards defined by the Ministry of Housing and the national construction code. Families made choices based on their own preferences and their priorities, for instance, pre-fabricated houses were chosen because the acquisition and construction were faster. Some families chose reinforced masonry because it reminded their pre-disaster house. Others chose wooden frame houses because they were afraid to live in masonry or adobe built houses.



(a)



(b)



**Figure 2.4: Varieties of rebuilt houses (a) Site-built wood house, (b) Site-built masonry house, (c) Prefabricated house. (d) Elevated house.**

*Source: Comerio, M., 2013*

The fact that households could choose the type of house produced genuine satisfaction with the government recovery policy (Comerio, M., 2013). However, beneficiaries expressed their dissatisfaction because the recovery programs did not include the socio economic issues of the affected communities.

### **2.4.3 Community-Driven Reconstruction (CDR)**

Community-Driven Reconstruction is also referred as “Participatory housing approach” (Barenstein, 2006). This approach implies different types and degrees of organized community involvement in the project cycle, which is often complemented by the assistance of an agency. The degree of community involvement in the projects depends on the approach adopted by each agency. The NGO or other agency can lead; suggest housing designs, building techniques, materials, and training. The agency may also employ skilled and unskilled workers from the community or train communities in appropriate construction practices. In cases where the community takes the leadership of the project, they can just receive support from facilitators. According to Jha et al.(2010), this approach may involve that the communities take one of more of the following roles:

- Organization and planning of the entire reconstruction process, including housing and infrastructure
- Decisions regarding housing design and building materials
- Production of building materials such as bricks
- Distribution of building materials or other forms of housing assistance (e.g., cash and vouchers)
- Hands-on reconstruction
- Oversight of builders

### **Experiences with this approach:**

#### *Community based post disaster reconstruction in Indonesia*

Considering the huge housing needs as a result of the scale of destruction in Aceh and Nias after the Indian Ocean Tsunami that hit various countries in December 2004, the government of Indonesia established the Rehabilitation and Reconstruction Agency for Regions and Community Life in Aceh and Nias (referred with

the acronym BBR in the local language) in order to manage the process of physical and socio economic recovery. There were different approaches adopted and government and non government agencies involved.



**Figure 2.5: (a) Participatory planning, Source: Prathiwi Widyatmi / Oxfam GB, in Silva J. (2010), (b) A village plan designed by residents, representatives and government officials, Source: BRR (2006) Village Planning Guidelines, Silva J. (2010)**

Silva J. (2010) analyzed the lessons from the projects of the DEC member NGOs. The DEC – Disasters Emergency Committee – is a consortium of 13 leading UK aid agencies. Most of DEC member agencies recognized that community-driven reconstruction was time-consuming and involved different stages. Planning and preparation took from 6 to 12 months (Figure 2.5). These participatory planning process enabled communities to design their new settlements and houses, through extensive activities with communities. For the provision of infrastructure and services, the coordination included other partners that included governmental agencies and humanitarian organizations. The participatory approach was extended also to the decision of the most appropriate housing design, from individual to cluster of houses.

The materials and construction systems were diverse. From concrete frame with masonry infill, reinforced blockwork, timber frame and even pre-fabricated systems according to the preferences of the communities and other factors, for instance, the urgency to complete the construction in the shorter term. The implementation methods varied from self- or community-build, contractor-build or direct implementation by the NGO. The most appropriate method depended on the skills and capacity of the affected population, local materials availability, the complexity of the housing design and type of construction, the timescale for construction and the availability of funding. In many cases, a single project included different methods of implementation (Silva, 2010).



**Figure 2.6: Diverse typologies of houses built in Aceh**

*Source: Silva J. (2010)*

Community-based reconstruction in Aceh represented a challenge; however the high levels of satisfaction with these projects and promoted the empowerment of local communities (Ophiyandri, 2011). Additionally, the quality of the houses, in general, met the established construction codes and considered disaster resistant principles.

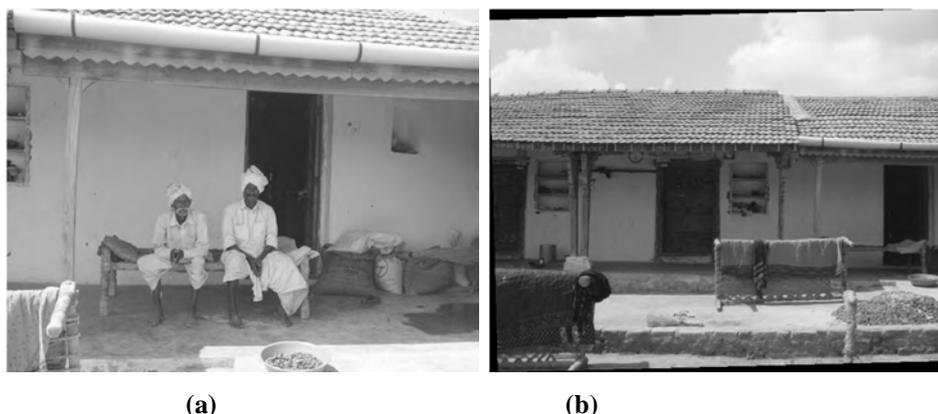
The positive outcomes from this approach has been acknowledged by the Government of Indonesia, and considering the successful projects in Aceh, is planning to implement projects for earthquake-resistant housing and community infrastructure in areas in Central and West Java and Yogyakarta Special Region affected by natural disasters (World Bank 2011). The project: “Community-based settlement rehabilitation and reconstruction project” was designed to achieve this objective through four sets of activities:

- Housing Reconstruction: sub-grants for the reconstruction of houses of the poorest households in villages most severely affected by disasters.
- Priority Investment: sub-grants for the reconstruction and rehabilitation of small-scale tertiary village infrastructure and other possible priority investments for recovery
- Community Education and Quality Assurance: Verify compliance with construction standards, provide capacity building for project management at the community level, and educate communities in emergency preparedness and mitigation of future disasters.
- Project Implementation Support

#### *Participatory housing approach in Gujarat, India*

The study conducted by Barenstein (2006) analyzes the reconstruction project carried out by a local NGO referred as “PHA”. PHA had previous experience providing low-cost housing for disadvantaged communities prior the earthquake in Gujarat. After the disaster PHA conducted an assessment identifying 30 villages for rebuild a total of 3,000 houses. PHS targeted poorer households on the basis that they could not rely only on government compensation to repair or rebuild their houses on their own. PHA opted for traditional local materials and techniques like stone walls with cement mortar and tiled roofs and built a expandable core house (Figure 2.7) consisting of a living space of 20m<sup>2</sup>. Plus sanitary facilities and residents were allowed to build

additional rooms according to their needs. This NGO also trained and employed local workers. Beneficiaries also were involved during the construction process.



**Figure 2.7: (a) A PHA house in Patan District, (b) An owner-built house (left) and a PHA house (right)**

*Source: Barenstein, J. D. (2006)*

The level of satisfaction among beneficiaries was high, and 91% of the house owners reported that their housing situation is better than it had been before the disaster. Many families added an additional room to the core house. The project also observed local cultural and environmental issues. Additionally, the PHA proved that it is possible to expect a labor contribution from poor communities including the participation of both men and women.

#### **2.4.4 Agency-Driven Reconstruction in-Situ (ADRS)**

This approach implies that governmental or nongovernmental agencies hire one or more contractors to design and build the houses. The design, materials, and techniques are expected to be imported from outside the community, especially in rural areas where the urban conventional construction is also considered an alien technology. The community may or may not be consulted on certain aspects of the project, such as house designs. House owners may be asked to take over some building tasks, and in some cases even participate in the construction process. Beneficiaries may also hire contractors within the framework of ODR, the principal contractor is accountable to the agency and may be contracted through formal tendering procedures. A special case of ADRS is when a public agency reconstructs government-owned housing, on public property.

Because ADRS takes place on the owners' own land, it gives the homeowner some degree of control over quality, and sometimes the opportunity to participate in specific tasks. During construction, owners may be able to make suggestions to or modify the design. ADRS eliminates the hurdle of land acquisition and generally allows the household to know where its house will be located. However, if housing designs are standardized or different from local designs, it may be difficult to fit the houses into pre-disaster settlement layouts or to modify them later. ADRS, therefore, often results in similar or even worse outcomes than those of ADRRS, especially in the case of large-scale single-family reconstruction.

## **Experiences with this approach:**

### *Contractor-driven reconstruction “In Situ” in Gujarat*

In Gujarat, contractor driven construction was applied by large national and international NGOs and private corporations through the government’s regulated public-private partnership program. The case analyzed by Barenstein (2006) refers to the NGO called CODIS. This NGO took over the full construction of 3,000 houses in 11 villages. CODIS provided houses with reinforced concrete frame structure, using concrete hollow blocks and flat RCC roofing. The construction was under a Delhi-based contractor which imported workers, and did not consider local participation in construction, but some households supervised the construction. CODIS built houses in three different sizes: 25m<sup>2</sup>, 34.5m<sup>2</sup>, and 37m<sup>2</sup>. For each house size, CODIS proposed three or four different designs, giving people the option to choose.

Barenstein’s study showed that the majority of beneficiaries were satisfied with the housing they received under CODIS program: 74% of the households consider their housing situation better than before the disaster, and 71.6% expressed satisfaction with their current houses. However, 36% of the residents expressed their dissatisfaction with the quality of materials used and 31% were unhappy with the quality of construction. Occupancy rates are particularly low in the neighborhoods belonging to one of the farming communities, and the house is used only for storage (Figure 2.8).



**Figure 2.8: (a) An incomplete CODIS house used for fodder storage  
(b) Incomplete and unoccupied CODIS houses**

*Source: Barenstein, J. D. (2006)*

### **2.4.5 Agency-Driven Reconstruction in Relocated Site (ADRRS)**

When using ADRRS, a governmental or nongovernmental agency contracts the construction of houses on a new site, generally with little or no involvement by the community or homeowners. The community, government, or agency supporting the reconstruction may purchase the land for the new settlement. Upon completion, the houses may be allotted through a lottery or using criteria defined by the community or the agency, or both. ADRRS, often justified as a risk-mitigation measure, may be advisable when communities are being relocated. And agencies may favor ADRRS for the ease of constructing on a clear site without

tenancy issues or other complications. ADRRS is used by public agencies to reconstruct government-owned housing in a relocated site, generally public land. However, for single-family homes, ADRRS can be problematic. It can lead to the construction of costly, inappropriate housing of poor quality and settlement arrangements that do not meet the socio-cultural and livelihood requirements of the people, causing severe economic consequences and low occupancy rates. The argument that ADRRS results in higher construction quality is rarely valid, because of poor supervision or the lack of qualified contractors. Moreover, finding an appropriate site can be a major challenge; failing to do so is, in fact, one of the principal reasons for dissatisfaction with this approach.

**Experiences with this approach:**

Although not all the case studies presented are Agency-driven, the common concern is the high impact of resettlement for the beneficiaries and the challenges that they have to face in order to restore their communities as well as livelihoods and look for further development:

*Agency-driven resettlement in Aceh*

The Rehabilitation and Reconstruction Agency for Regions and Community Life in Aceh and Nias (BBR) purchased 700 hectares of land in Labuy and Neuhun; of which 500 hectares were allocated for the relocation of households whose land had been destroyed by the tsunami and 200 hectares were allocated for renters and squatters. BRR prepared a resettlement plan for these areas and agreed to provide access roads, public facilities and livelihood assistance with housing being provided by several agencies. However, there were significant challenges with these sites including the distance from Banda Aceh and livelihood opportunities; shortage of potable water; land certification and lack of public transportation. Some agencies chose not to resettle beneficiaries to these areas as they were too far from people’s livelihoods. Others expressed concern that social cohesion would be a key issue as the resettled households were not entire communities but relocated households from all over Aceh (Oxfam International, 2007).



**Figure 2.9: Agency driven resettlement in Aceh**

*Source: Silva J. (2010)*

### *Relocation in the province of Çankırı, Turkey*

After the earthquake of June 6, 2000, reconstruction projects were conducted in villages of the province of Çankırı, the Ministry of Public Works and Settlement initiated the reconstruction projects in the area. The reconstruction approach adopted was to provide permanent post-disaster loans with a payback period of 20 years without interest for people who lost their homes. Although the beneficiaries were responsible for the hiring of contractors, the typical designs of the houses were prepared by a private firm for the area, and for the beneficiaries who did not like any of the options had the possibility to get their houses designed professionally. The supervision of the progress of the projects was under the responsibility of the government.



**Figure 2.10: (a) Elden Village (A new settlement 5 km. far from the existing one), (b) Yuva Village (A new settlement next to the existing one).**

*Source: Dikmen (2010)*

This system was applied in five villages in the region; the project included 1,221 houses, which in most of the cases were completed by 2003. The study from Dikmen (2010) considered the houses that were rebuilt in the original settlements and the houses that were built in seven new settlements. The results of this study presented a scenario where most of the houses built in resettlement sites were abandoned or seasonally occupied. Therefore, it is important to define the crucial issues that determined the beneficiaries' refusal of housing in new settlements that were found by Dikmen:

- Quick decision-making
- Lack of user participation in early decision-making process,
- Inadequate site-selection criteria,
- Lack of interdisciplinary works during site-selection,
- Not considering the life style of the users,
- Lack of guidance to the beneficiaries during the construction phase of the houses.

### *Successes and failures in post-tsunami resettlement housing program in Sri-Lanka*

Following the Indian Ocean Tsunami in 2004, large areas of Sri-Lanka were destroyed and communities resulted homeless. The government responded to the high housing demand and the need to allocate the victims

in safer areas with resettlement housing programmes in the affected areas. The study conducted by Perera, T. G. U. P., Weerasoori, I., & Karunaratne, H. M. L. P. (2013) focused on the factors that determined the success or failure of the resettlement program in the city of Hambantota, and specifically in the Siribopura resettlement site.

The Urban Development Authority (UDA) was the main responsible agency for the relocation of tsunami affected communities while several other government and non-government organizations gave their assistance accordingly. Houses were donated by several NGOs and CBOs, and resettlers have constructed their own houses based on their own layouts and designs.



**Figure 2.11: Diverse typologies of houses built in Hambantota**

*Source: Perera, T. G. U. P., Weerasoori, I., & Karunaratne, H. M. L. P. (2013)*

The analysis criteria of success or failure considered: a). Level of satisfaction of the households with regard to the physical, economical and social improvements they received after resettlement; and b) Situational Analysis on the resettlement site.

The findings of the study stress the importance to consider the further development of the communities rather than relocation itself. The consideration of socio-cultural aspects for a specific context and avoid center expectation on only the dwellings. Perera et al. (2013) also emphasize that “Reinstate a damaged community is not merely limited to reconstruction of serviced houses and provide them a job. Hence the need for a consistent conceptual approach to social impacts that should be the priority”.

## **2.5 Advantages and disadvantages of each reconstruction approach**

There are different pros and cons of each approach that must be considered in the planning stages, although approaches that cause fewer shocks in the affected communities are preferred, extreme approaches like relocation or resettlement are in some cases unavoidable. However, it does not mean that all the outputs are negative as it is presented in Table 2.2.

**Table 2.2; Advantages and disadvantages of each reconstruction approach**

<b>Reconstruction approach</b>	<b>Advantages</b>	<b>Disadvantages and risks</b>
<b>Cash approach</b>	<ul style="list-style-type: none"> <li>• Timely and cost- effective</li> <li>• Does not need complex delivery systems</li> <li>• Adapted to beneficiaries` needs</li> <li>• Reparation and recycle is possible</li> <li>• Best when local building capacity and financial support are adequate</li> <li>• Assistance can be used according to priorities</li> </ul>	<ul style="list-style-type: none"> <li>• Reproduce pre-disaster vulnerabilities.</li> <li>• No improvement of building skills.</li> <li>• No possibilities of new technologies</li> <li>• Possible problems to repair or reconstruct without assistance.</li> <li>• Financial assistance may be used for other needs than houses</li> <li>• Risk of inappropriate use of the funds.</li> <li>• May increase risk of corruption.</li> </ul>
<b>Owner - driven reconstruction</b>	<ul style="list-style-type: none"> <li>• Beneficiaries take an active role</li> <li>• Assistance is adapted to beneficiaries needs</li> <li>• Promote incremental housing process</li> <li>• Reparation and recycle is possible</li> <li>• Involves local industry</li> <li>• Helps preservation of local culture and community</li> <li>• Less subject to disruptions due to unstable political situations</li> <li>• Viable for dispersed and remote settlements</li> </ul>	<ul style="list-style-type: none"> <li>• Construction quality may be poor without good standards and assistance.</li> <li>• Risk of reproduction of pre-disaster vulnerabilities.</li> <li>• Possible incompatibilities between beneficiaries criteria and construction codes</li> <li>• Difficulties in case of relocation and poor communities without experience.</li> <li>• Vulnerable groups will find it difficult to manage reconstruction alone.</li> </ul>
<b>Community - driven reconstruction</b>	<ul style="list-style-type: none"> <li>• Enables the introduction of new technologies and materials.</li> <li>• Housing reconstruction can be linked to community development activities.</li> <li>• Can foster community cohesion for owners control over reconstruction</li> <li>• Access to construction materials assured</li> <li>• Can contribute to reactivation of the local economy.</li> </ul>	<ul style="list-style-type: none"> <li>• Overheads may be high due to agency involvement</li> <li>• Limited individual preferences can be attended due to imposed standards and designs.</li> <li>• Risk of corruption and non appropriate use of the resources.</li> <li>• Consultation may be limited to community leaders or local elites.</li> <li>• Real community participation can be avoided if it is considered as a time-consuming process.</li> <li>• Women`s perspectives may be ignored.</li> </ul>
<b>Agency - driven reconstruction in situ</b>	<ul style="list-style-type: none"> <li>• Communities are not displaced</li> <li>• People can be involved in reconstruction and monitoring</li> <li>• Enables introduction of new technologies</li> <li>• No land acquisition is required</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor settlement and housing plans cannot be compatible with existing sites.</li> <li>• Remaining built and natural environments may be considered obstacles and be removed.</li> <li>• Alien building technologies used can have negative environmental impacts.</li> <li>• Community involvement may be limited or only consider community leaders or elites.</li> <li>• Risk of poor construction quality due to lack of agency`s experience.</li> <li>• Risk of corruption and exploitation by contractors.</li> </ul>
<b>Agency - driven reconstruction in Relocated site</b>	<ul style="list-style-type: none"> <li>• Reduction of pre-disaster vulnerabilities</li> <li>• May be faster and cost-effective</li> <li>• May allow pre-disaster housing problems to be addressed</li> <li>• More appropriate for dense urban settlements</li> <li>• Can contribute to heritage conservation</li> <li>• Can address different categories of housing needs</li> </ul>	<ul style="list-style-type: none"> <li>• Difficulties and delays in finding appropriate land</li> <li>• Negative socio economic impacts and disruption of livelihoods</li> <li>• Poor site selection can cause negative environmental impacts and re-create pre disaster vulnerabilities.</li> <li>• Alien criteria for settlement layout, housing designs and construction technologies</li> <li>• Difficulties for a progressive construction and adaptations by beneficiaries</li> <li>• Lack of community participation and unequal distribution of houses.</li> </ul>

Source: Based on Jha et al, World Bank (2010), modified by author

## 2.6 Comparison of Reconstruction Approaches

Reconstruction approaches can be compared according to the degree of household control, the form of assistance, which are the stakeholders involved and how they interact:

**Table 2.3: Comparison of reconstruction approaches**

Reconstruction approach	Community participation	Type of support		Stakeholders involved	Stakeholders relationships
		Financial	Technical		
<b>Cash approach</b>	Very high	Cash only	None	-Government (agency) -Community (Beneficiaries)	
<b>Owner-driven reconstruction</b>	High	Conditional cash transfer to beneficiaries	Training of beneficiaries	-Government (agency) -Beneficiaries - Agency (desirable but rarely present)	
<b>Community-driven reconstruction</b>	Medium to high	Transfer to beneficiaries or community	Training of community and beneficiaries	-Government -Community organization -Beneficiaries -Agency (NGO, other)	
<b>Agency-driven reconstruction in situ</b>	Low to medium	Funds handled by agency	Limited or none	-Governmental or non-governmental agency -Contractor -Beneficiaries	
<b>Agency-driven reconstruction in Relocated site</b>	Low	Funds handled by agency	Limited or none	-Governmental or non-governmental agency -Contractor - Beneficiaries	

Legend

Type:

- Stronger relationship
- Weaker relationship

Frequency of coordination/communication:

- Frequent
- Sporadic

Source: Based on Jha et al, World Bank (2010), modified by author

## 2.7 Considerations for decision making

The reconstruction involves different stakeholders with specific roles, whose decisions take a direct effect on the process and the decisions of the other actors. The World Bank (Jha, A. K., & Barenstein, J. D., 2010) considers the following considerations for the stakeholders' decision making in the process of definition the most appropriate approach for reconstruction:

a. The **Government** should decide on the policy for housing and community reconstruction, based on the results of the damage and loss assessment, and in consultation with the affected community and the lead disaster agency. Important decisions include: the reconstruction approach or approaches to be employed; the financial contributions to be made by various parties, including households; mechanisms for coordination; and the administrative and project management procedures that all agencies will follow.

b **The lead disaster agency** should determine, in consultation with government financial officials, the level of assistance that will be provided for transitional sheltering, repairing, retrofitting, and reconstruction, and on the system for delivering funds. The government may want to impose a maximum assistance level for nongovernmental agency projects to reduce competition among agencies.

c. **Agencies involved in reconstruction** should agree with the government on performance benchmarks for all reconstruction approaches and on reporting procedures, and collaborate on establishing the baseline and the monitoring system.

d. **Affected communities** should decide which reconstruction approach or approaches are most suitable for them and collaborate with government in the selection process. They should also decide how they prefer to organize themselves during reconstruction and should have the right to select which agencies will assist them and to agree on the form of assistance. Depending on the community's political, social, and economic characteristics, the organization of the community and collective decision making may require outside facilitation and support.

e. Whatever the approach, **local governments** must direct those aspects of reconstruction related to land use and physical planning and the regulation of construction, land use and physical planning.

## 2.8 Key findings

The current global trend of high and rapid urbanization with a large concentration of people in cities is evidencing the vulnerabilities created by human interventions. The fact that there are more disasters recorded and the consequences and losses are higher is directly related to the number of people affected, number of casualties, economic losses, and destruction of housing and infrastructure. The disproportionately high impact on urban poor in comparison with wealthier has evidenced also that the causes are not directly related to the economic condition of the people. In fact, the difference lies in how the settlements are established. Poor communities have limited resources to access a formally established settlement, and in many cases settle in

highly vulnerable areas and marginal settlements with precarious housing conditions.

Disasters treat a community in different ways, i.e. health, economy, socio-cultural structures, environment, infrastructure, housing and others. In which the housing has an important role because it represents the immediate environment of a family, the nexus with the community in the settlement, and the starting point for development. After a disaster, it is crucial to ensure the safety of the people owing the appropriate housing conditions and avoid replicate pre-disaster vulnerabilities or create new ones.

The complexity of the process of long-term disaster recovery requires the establishment of coordination and collaboration bodies to channelize the support of affected communities by the disaster. It is necessary to consider the challenges that have to support the communities until their complete recovery.

It is necessary to consider the best approach that enables the participation of affected communities in the process of their recovery. Although in some cases the authorities prefer to have the control over the projects, due to lack of capacities, local communities cannot be completely ignored in the process of housing reconstruction.

Resettlement is the housing recovery approach that causes high impacts on people's living conditions and livelihoods. This approach is the least advised and represents a bigger challenge for affected communities. However, in cases that the field assessment indicated that it is the most appropriate approach due to the vulnerabilities of the sites, it is necessary to have especial attention to local conditions and lifestyles of housing beneficiaries.

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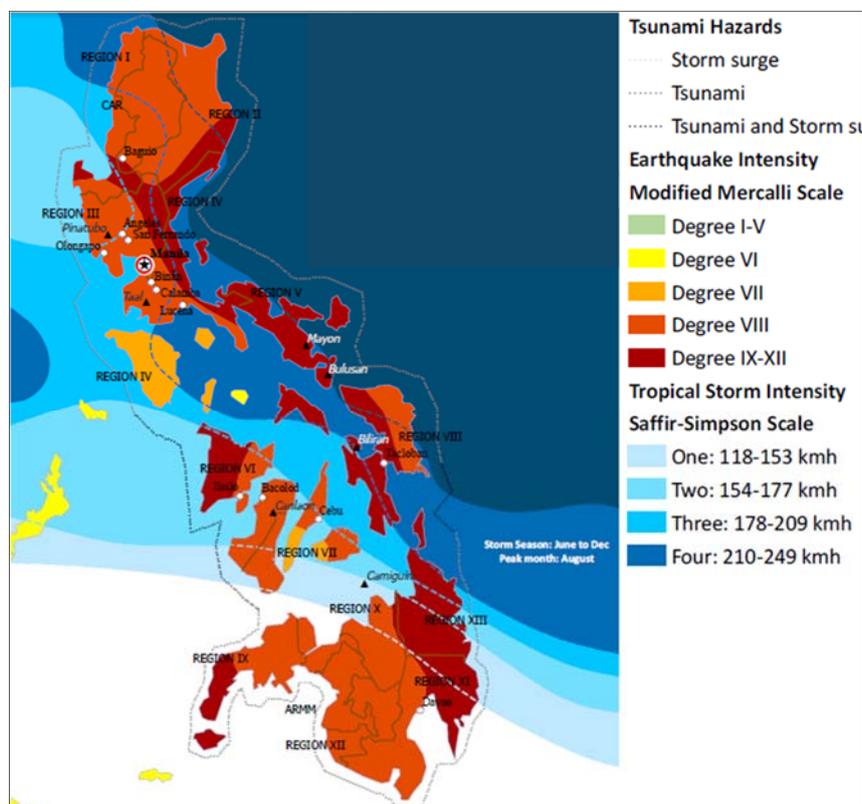
## Chapter 3:

### Disaster Exposure of the Philippines and Post-disaster Housing Recovery

*This chapter provides an introduction to the multi-hazard exposure of the Philippines, understanding the impact of recurrent disaster occurrence in the country. Additionally, the institutional structure for disaster risk reduction and post-disaster recovery are explained. There is special attention to the impact of disasters in the housing sector and the modalities for housing reconstruction and the approaches adopted according to the types defined in chapter 2.*

#### 3.1 Hazard exposure and recurrence of disasters in the Philippines

The Philippines is considered one of the most exposed countries to disasters, owing to its geographic location. It is a multi-hazard-prone country, astride the “Pacific Ring of Fire” and the “Typhoon Belt”; as a result, the Philippines has an unusually high multi-hazard exposure to natural disasters such as earthquakes, volcanic eruptions, tropical storms, and typhoons as it is shown in Figures 3.1 and 3.2. In fact, the Philippines has been ranked third in the Global Risk Index Report in 2012 (Alliance Development Works, 2012), taking into account the hazard exposure to climate related events combined with the sea rise level. Thus, potential multiple hazards, combined with highly urbanized areas and unregulated and precarious settlement patterns make the people in the Philippines vulnerable.



**Figure 3.1: Natural Hazard Risks of the Philippines**

Source: UN-OCHA (<http://www.unocha.org/roap>)



(a)



(b)

**Massive destruction caused by Typhoon Haiyan in 2013**

Source: <http://resources2.news.com.au/images/2013/11/24/1226767/025558-typhoon-haiyan.jpg>

**Communities affected by Mt. Pinatubo's eruption in 1991**

Source: [http://image.pbs.org/poster\\_images/assets/ess05\\_vid\\_lahar.jpg.resize.710x399.jpg](http://image.pbs.org/poster_images/assets/ess05_vid_lahar.jpg.resize.710x399.jpg)



(c)



(d)

**Destroyed urban areas by Bohol Earthquake in 2013**

Source: [http://www.ifrcmedia.org/assets/rss/slideshows/bohol-3/files/stacks\\_image\\_3555.jpg](http://www.ifrcmedia.org/assets/rss/slideshows/bohol-3/files/stacks_image_3555.jpg)

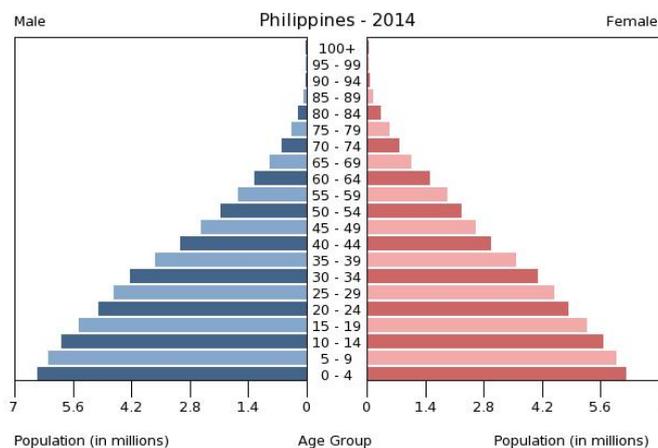
**Landslide in Southern Philippines in 2012**

Source: <http://newsinfo.inquirer.net/files/2012/01/pantukan-comval-landslide-298x224.jpg>

**Figure 3.2: Major disasters in the Philippines by type of hazard**

### 3.2 Demography

The Philippines ranks number 13 in the list of countries by population with an estimated of 100,998,376 (July 2015 est.) people. Currently Philippines's population is equivalent to 1.38% of the total world population, the country's density is 334 people per Km<sup>2</sup> (Worldometers, 2015). The urban population accounts almost 50% of the total population with 49,643,960 people (as presented in Table 3.1) The people in the Philippines are predominantly young (as shown in Figure 3.3) with a median age of 23.2 years, 22.8 years for men and 23.7 years for women (2015 est.) (CIA, 2015).



**Figure 3.3: Population pyramid of the Philippines**

Source CIA (2015)

**Table 3.1 Philippine demographics**

<b>Population</b>	100,998,376 (July 2015 est.)
Population growth rate:	1.61% (2015 est.) country comparison to the world: 74
<b>Urbanization</b>	
urban population:	44.4% of total population (2015)
rate of urbanization:	1.32% annual rate of change (2010-15 est.)
Major urban areas - population:	MANILA (capital) 12.946 million; Davao 1.63 million; Cebu City 951,000; Zamboanga 936,000 (2015)
<b>Drinking water source:</b>	<b>*improved:</b>
urban:	93.7% of population
rural:	90.3% of population
total:	91.8% of population
	<b>unimproved:</b>
urban:	6.3% of population
rural:	9.7% of population
total:	8.2% of population (2015 est.)
<b>Sanitation facility access:</b>	<b>**improved:</b>
urban:	77.9% of population
rural:	70.8% of population
total:	73.9% of population
	<b>unimproved:</b>
urban:	22.1% of population
rural:	29.2% of population
total:	26.1% of population (2015 est.)
<p><i>*An improved drinking-water source is defined as one that, by nature of its construction or through active intervention, is likely to be protected from outside contamination, in particular from contamination with fecal matter.</i></p> <p><i>**Improved sanitation facilities are likely to ensure hygienic separation of human excreta from human contact. They include flush/pour flush (to piped sewer system, septic tank, pit latrine), ventilated improved pit (VIP) latrine, pit latrine with slab, and composting toilet.</i></p>	

Source CIA (2015), WHO/UNICEF Joint Monitoring Programme (JMP)  
for Water Supply and Sanitation (<http://www.wssinfo.org/>).

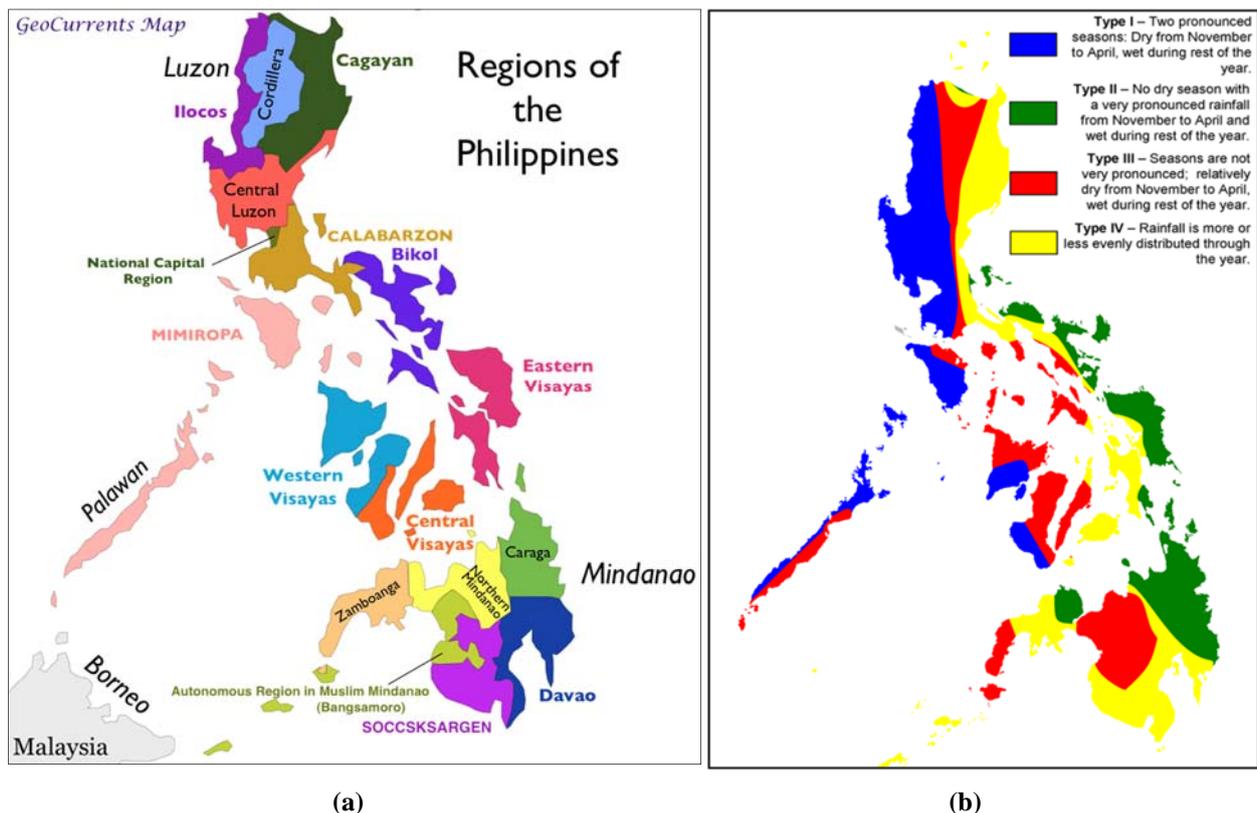
### 3.3 Geography and Climate:

The Philippines is an archipelagic nation located in Southeast Asia. Its length measures 1,850 kilometers, starting from the point near the southern tip of Taiwan and ending close to northern Borneo. Three prominent bodies of water surround the archipelago: the Philippine Sea and the Pacific Ocean on the east, the South China Sea on the west and north, and the Celebes Sea and the coastal waters of Borneo on the south. The Philippines constitutes an archipelago of 7,107 islands and has a total land area of approximately 299,764 square kilometers.

The country is divided into three major island groups which are subdivided into 17 regions (as specified in Table 3.2 and shown in Figure 3.4). Luzon is the largest island group with an area of 141,000 square kilometers, followed by Mindanao covering 102,000 square kilometers, and the Visayas with 57,000 square kilometers. The rest are small islets that emerge and disappear with ebbing and rising of tides.

**Table 3.2: Regions and provinces of the Philippines**

<b>Island Groups</b>	<b>Regions</b>	<b>Provinces</b>
Luzon	Region 1 - Ilocos	Ilocos Norte, Ilocos Sur, La Union, Pangasinan, Ilocos Norte, Ilocos Sur, La Union
	Region 2 - Cagayan Valley	Batanes, Cagayan, Isabela, Nueva Vizcaya, Quirino
	Region 3 - Central Luzon	Aurora, Bataan, Bulacan, Pampanga, Nueva Ecija, Tarlac, Zambales
	Region 4a - Calabarzon	Batangas, Cavite, Laguna, Quezon, Rizal
	Region 4-b - Mimaropa	Marinduque, Occidental Mindoro, Oriental Mindoro, Palawan, Romblon
	Region 5 - Bicol	Albay, Camarines Norte, Camarines Sur, Catanduanes, Masbate, Sorsogon
	CAR Region - Cordillera Administrative Region	Abra, Apayao, Benguet, Ifugao, Kalinga, Mt. Province
	NCR Region - National Capital Region	
Visayas	Region 6 - Western Visayas	Aklan, Antique, Capiz, Guimaras, Iloilo, Negros Occidental
	Region 7 - Central Visayas	Bohol, Cebu, Negros Oriental, Siquijor
	Region 8 - Eastern Visayas	Biliran, Eastern Samar, Leyte, Northern Samar, Southern Leyte, Western Samar (Samar)
Mindanao	Region 9 - Zamboanga Peninsula	Zamboanga del Norte, Zamboanga del Sur, Zamboanga Sibugay
	<b>Region 10 - Northern Mindanao</b>	Bukidnon, Camiguin, Lanao del Norte, <b>Misamis Occidental</b> , Misamis Oriental
	Region 11 - Davao	Compostela Valley, Davao del Norte, Davao del Sur, Davao Oriental
	Region 12 - SOCCSKSARGEN	Cotabato (North Cotabato), Sarangani, South Cotabato, Sultan Kudarat
	Region 13 - Caraga	Agusan del Norte, Agusan del Sur, Dinagat Islands, Surigao del Norte, Surigao del Sur
	ARMM Region - Autonomous Region in Muslim Mindanao	Basilan, Lanao del Sur, Maguindanao, Shariff Kabunsuan, Sulu, Capital – Jolo, Tawi-Tawi



**Figure 3.4: (a) Map of the Philippines, Source: Geocurrents, 2015**

<http://geocurrents.info/wp-content/uploads/2013/09/Philippines-Regions-Map.png>

**(b) Climatic map of the Philippines, Source: PAGASA, 2015a**

<https://kidlat.pagasa.dost.gov.ph/index.php/climate-of-the-philippines>

### Climate Types

According to the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA, 2015b), based on the distribution of rainfall, four climate types are recognized that define the climate in different areas of the country that are specified in Figure 3.4 (b). The climate types are described as follows:

Type 1- Dry season from is from December to May and wet season from June to November. During the months of June to September rain periods is at maximum. Areas that have this type of climate are exposed to southwest monsoon.

Type 2- No dry season occurs from December to January. Areas that have this type are exposed to North East Monsoon. Tropical storms are frequent in these areas.

Type 3- Seasons not very pronounced relatively dry. For 6 months, places experiencing this type of climate are located inland. Southwest monsoon greatly affects these areas.

Type 4- Rainfall is more or less evenly throughout the year. North East Luzon, Southern part of Luzon, Southern Mindanao, and few areas in Visayas experience this type of climate.

### *Temperature*

Based on the average of all weather stations in the Philippines, excluding Baguio, the mean annual temperature is 26.6 °C. The coolest months fall in January with a mean temperature of 25.5 °C while the warmest month occurs in May with a mean temperature of 28.3 °C. Latitude is an insignificant factor in the variation of temperature while altitude shows greater contrast in temperature. Thus, the mean annual temperature of Baguio with an elevation of 1,500 meters is 18.3 °C. This makes the temperature of Baguio comparable with those in the temperate climate and because of this, it is known as the summer capital of the Philippines. The difference between the mean annual temperature of the southernmost station in Zamboanga and that of the northernmost station in Laoag is insignificant. In other words, there is essentially no difference in the mean annual temperature of places in Luzon, Visayas or Mindanao measured at or near sea level.

### *Humidity*

Humidity refers to the moisture content of the atmosphere. Due to high temperature and the surrounding bodies of water, the Philippines has a high relative humidity. The average monthly relative humidity varies between 71 percent in March and 85 percent in September. The combination of warm temperature and high relative and absolute humidities give rise to high sensible temperature throughout the archipelago. It is especially uncomfortable during March to May, when temperature and humidity attain their maximum levels.

### *Rainfall*

Rainfall is the most important climatic element in the Philippines. Rainfall distribution throughout the country varies from one region to another, depending upon the direction of the moisture-bearing winds and the location of the mountain systems. The mean annual rainfall of the Philippines varies from 965 to 4,064 millimeters annually. Baguio City, eastern Samar, and eastern Surigao receive the greatest amount of rainfall while the southern portion of Cotabato receives the least amount of rain. At General Santos City in Cotabato, the average annual rainfall is only 978 millimeters.

### *The Seasons*

Using temperature and rainfall as bases, the climate of the country can be divided into two major seasons: (1) the rainy season, from June to November; and (2) the dry season, from December to May. The dry season may be subdivided further into (a) the cool dry season, from December to February; and (b) the hot dry season, from March to May.

## **3.4 Natural hazards**

Tropical cyclones and its sequential effects of rain and windstorms, as well as floods, are the most prevalent types of hydro-meteorological hazards in the country. Between 1997 and 2007, eighty-four (84) tropical cyclones entered the Philippine Area of Responsibility (PAR). These typhoons resulted in a total of 13,155 in human casualty and more than 51 million families have been affected. Economic losses due to typhoon damages in agriculture, infrastructures and private properties are estimated to reach PhP 158.242

billion. Some of the most devastating floods and landslides are triggered by these typhoons that happened also within this period. The El Nino Southern Oscillation which is a periodic disaster recorded high economic costs in just a single occurrence. In 2010, out of the almost PhP 25 million worth of damages to properties caused by natural disasters, tropical cyclones contributed to more than half. These affected more than 3 million people in that year alone (NDRRMC, 2011).

**Table 3.3: Top 10 natural disasters in the Philippines from 1900 to 2014 based on the number of casualties**

Rank	Type of disaster	Disaster	Date	Number Killed
1	Storm	Typhoon Haiyan (locally known as Yolanda)	11/8/2013	7,986
2	Earthquake (seismic activity)	1976 Moro Gulf Earthquake and Tsunami	8/16/1976	6,000
3	Storm	Typhoon Thelma (Uring)	11/5/1991	5,956
4	Earthquake (seismic activity)	1990 Luzon Earthquake	7/16/1990	2,412
5	Storm	Typhoon Bopha (Pablo)	12/4/2012	1,901
6	Storm	Tropical depression Winnie	11/29/2004	1,619
7	Storm	Typhoon Kate (Titang)	10/13/1970	1,551
<b>8</b>	<b>Storm</b>	<b>Typhoon Washi (Sendong)</b>	<b>12/15/2011</b>	<b>1,439</b>
9	Storm	Typhoon Ike (Nitang)	9/1/1984	1,399
10	Storm	Typhoon Durian (Reming)	11/30/2006	1,399

Source: "EM-DAT: The OFDA/CRED International Disaster Database [www.em-dat.net](http://www.em-dat.net) -

Université Catholique de Louvain - Brussels - Belgium"

Environmental factors such as denuded forests aggravate flood risks. The pace of deforestation since the 1930s accelerated in the 1950s and 1960s, before falling slightly in the 1980s. Even now, the effects of loose soil and reduced forest cover from past forestry activities are felt in frequent landslides and floods. Recent events show that the annual monsoon season in the country has brought severe flooding in most areas. In 2011, most of the disasters that claimed the lives of people and affected properties and livelihoods of the most vulnerable were brought about by increased rainfall which caused massive flash flooding in areas which don't normally experience such. Between January and September 2011, more than 50 incidents of flash flooding and flooding and more than 30 landslides occurred, mostly caused by increased rainfall and illegal logging. Typhoon Sendong alone caused the lives of more than 1,000 people and damaged properties amounting to billions of pesos.

In addition, the Philippines is situated along a highly seismic area lying along the Pacific Ring of Fire and is highly-prone to earthquakes. According to the Philippine Institute on Volcanology and Seismology (PHIVLOCS), the country experiences an average of five (5) earthquakes a day. Earthquake disasters are not as frequent as the typhoons and flooding that take place in the Philippines. Nevertheless, the impact generated on affected communities is usually massive and devastating. Earthquake-induced disasters were few in numbers and in terms of casualties. Within the 10-year period five (5) destructive earthquakes were recorded and human casualty included 15 deaths and 119 persons injured. Damage to the economy was estimated to

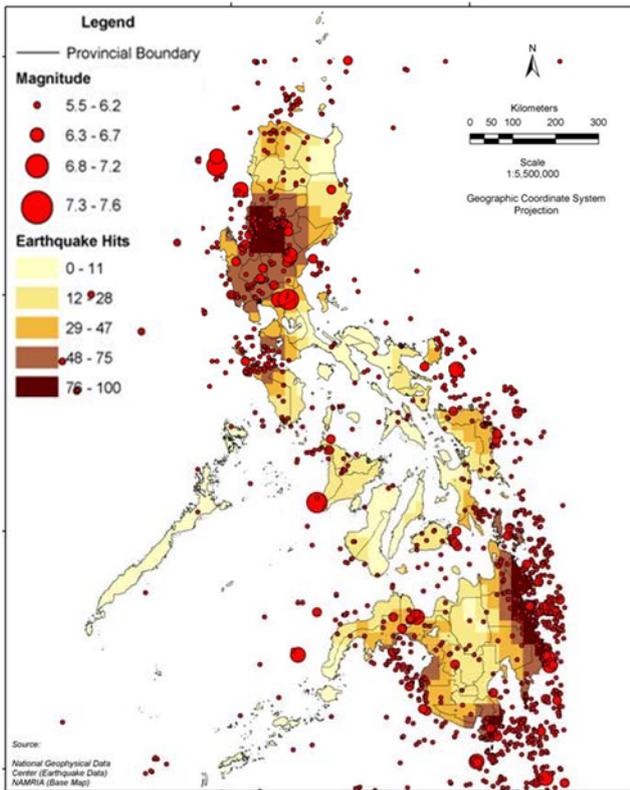
reach P0.207-B. The 1990 Luzon Earthquake, and the Moro Gulf Tsunami were the most notably devastating earthquake disasters in the Philippines. The country is also prone to volcanic eruptions being situated along the Pacific Ring of Fire where two major tectonic plates (Philippine Sea and Eurasian) meet. This explains the occurrence of earthquakes and tsunamis and the existence of around 300 volcanoes of which 22 are active.

Based on the data from the National Disaster Risk Reduction and Management Council (NDRRMC), between 1990 and 2006, annual direct damages caused by disasters amount to PhP 20 billion per year. This is roughly 0.5% of the Gross Domestic Product (GDP) on the average per year. In 2009 alone, tropical storm Ondoy and typhoon Pepeng caused substantial damages and losses equivalent to about 2.7% of the country's GDP.

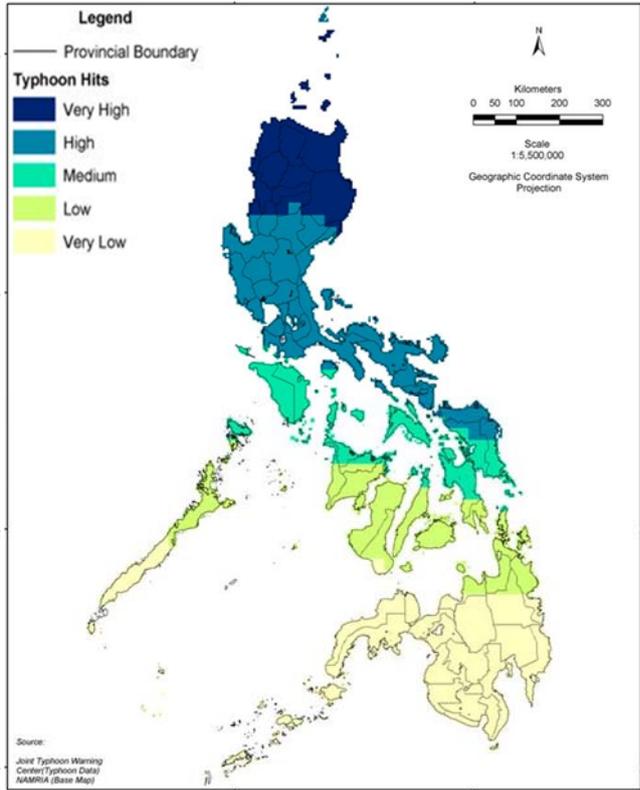
Hazards become disasters only if vulnerable people and resources are exposed to them. People who live in poverty and adverse socio-economic conditions are highly vulnerable to disasters, especially those who live in river pathways and along the most hazard-prone areas. This explains why some parts of the country are more prone to specific hazards than others; some parts are exposed to more hazards than others. In an analysis of natural disaster hotspots by the Hazard Management Unit of the World Bank in 2005, the Philippines is among the countries where large percentages of population reside in disaster prone areas. In the 2011 World Risk Report published by United Nations University and the Institute of Environment and Human Security, looking into the four components of risk (exposure, susceptibility, coping and adapt capacities), the Philippines is the third most disaster risk country worldwide.

Hazards by nature do not represent disaster risks, however the underlying vulnerabilities generate risks as a result of a variety of factors (RCC, 2011) as well as the frequency and intensity of the disasters. There are four key factors underlying disaster risk in the Philippines: vulnerable livelihoods, poor urban governance and weak political accountability, ecosystem degradation, and climate change (IDMC, 2013). Although all these factors are interrelated, poor urban governance and lack of accountability are the major factors for increasing the risk of displacement because they often result in ineffective or unenforced building codes and land use plans, further exposing vulnerable settlements to floods, landslides, and other hazards. Other issues contributing to the Philippines' high disaster risk include the scale of rapid and unplanned migration to already densely populated and low-lying urban areas, insufficient understanding of the impacts of climate change and other hazards, and lack of effective early warning systems for extreme weather events (IDMC, 2013).

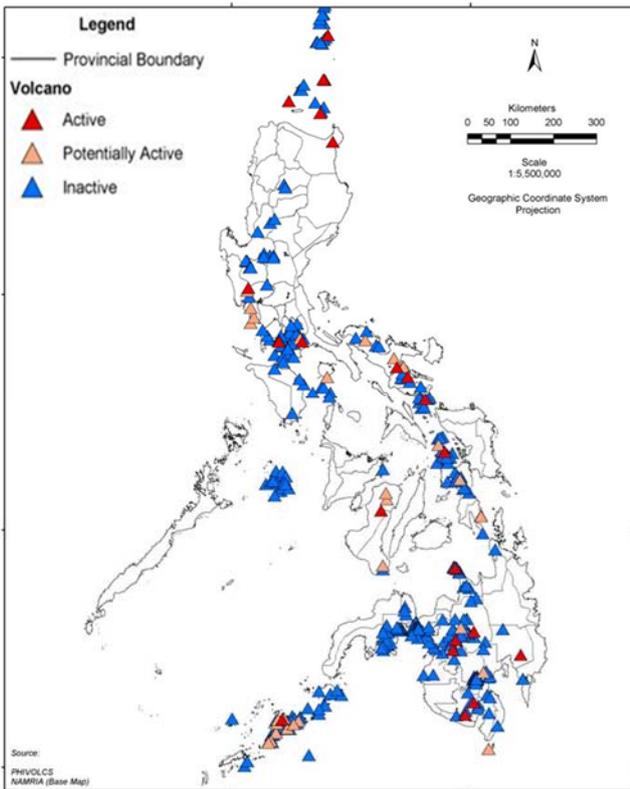
In this context of exposure to potential disasters, it can be assumed that the political and institutional structure of the country should prioritize systems and actions for disaster risk reduction and post-disaster reconstruction. However, the reality is that different types of gaps remain in the implementation of proactive legislation (IDMC, 2013) and institutional structures to prevent, mitigate, and respond to disasters and protection of internal displaced persons (IDPs).



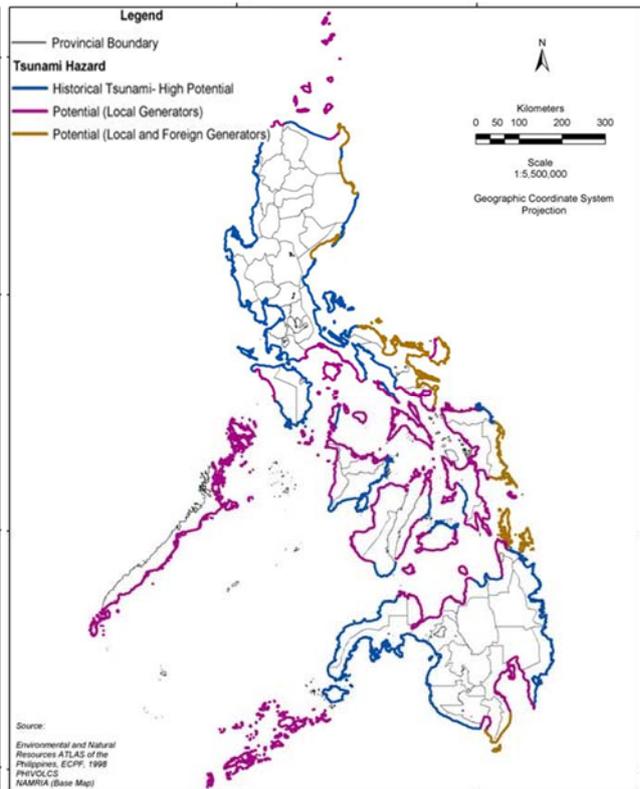
(a)



(b)



(c)



(d)

**Figure 3.5: (a) Earthquake-prone areas, (b) Typhoon incidence, (c) Distribution of Volcanoes, (d) Tsunami-prone areas**

Source: Manila Observatory, <http://vm.observatory.ph/hazard.html>

Some improvements have been implemented according to the Philippine Disaster Risk Reduction and

Management Act of 2010 (PDRRM-2010), as evidenced in the pre-emptive evacuations in preparation for TS Bopha (locally known as “Pablo”), which hit the Philippines on December 5, 2012, one year after Washi. The storm affected different areas of Mindanao and killed more than 1000 people but only one in Cagayan de Oro and none in other cities in the region. Despite these successful preventive measures, in general in the country, the actions are still reactive, continuing to be on a disaster-event basis as it was mentioned by Miclat and Annawi (2014) because in the established systems there are no clear mechanisms for include feedbacks from previous experiences. In addition, the most affected areas are the ones that have been identified as vulnerable or prone to disasters, with poor housing conditions and most of them are marginal settlements. Although, there were warnings there were no concrete actions to prevent the severe impacts of a potential disaster that in the end resulted on large areas devastated, thousands of families displaced and considerable fatalities.

These failures are extended to post-disaster scenarios where no sustainable actions are taken, specifically, post-disaster housing reconstruction strategies have not been considered holistically, as evidenced by the lack of follow up in the reconstruction process after TS Haiyan (locally known as Yolanda), which hit the central Philippines in November 2013, the established system to relocate residents of former vulnerable settlements, provide housing driven by the government and NGOs, and consequently unable community involvement in the decision making (OXFAMa, 2014).

### **3.5 Vulnerability of the population**

The poor are frequently considered the most vulnerable to disasters. According to the World Bank, at the household level, poverty is the single most important factor determining vulnerability, which in part reflects the precarious and vulnerable location of the settlements, poorly built housing, deterioration of living conditions in slum and squatter settlements, access to services and facilities and sources of livelihood, as it was observed in Chapter 2. In case of the Philippines the linkages between poverty and vulnerability to natural hazards are clearly evident (World Bank and NDCC, 2005)

Poverty and vulnerability to natural hazards are mutually reinforced due to the precarious social, cultural, economic and political environment of the poor and disadvantaged groups. On the other hand, disasters disrupt these fragile environments of poor people and threat them with a persistent poverty situation as they lose their livelihoods and belongings that force them to start from scratch and focus on survival rather than development.

The Philippines has a high incidence of poverty, standing at 26% in 2000 and poverty reduction is a central theme of development policy (World Bank and NDCC, 2005). The country had achieved considerable progress in reducing the level of poverty between 1990 and 1997, falling from 34% to 25% (World Bank, 2001). However, in 1998 it rose again to 28% and was still higher than the 1997 level in 2000. Poverty is largely a rural phenomenon in the Philippines. The rural poor accounted for about 77% of the poor in 1997 and the agriculture, fishing and forestry sector alone for two-thirds of the poor. However it does not look that the

situation has improved since the current statistics show that for 2015 the poverty incidence has increased from 24.6% in 2014 to 25.8% in 2015 (Philippines Statistics Authority, 2015).

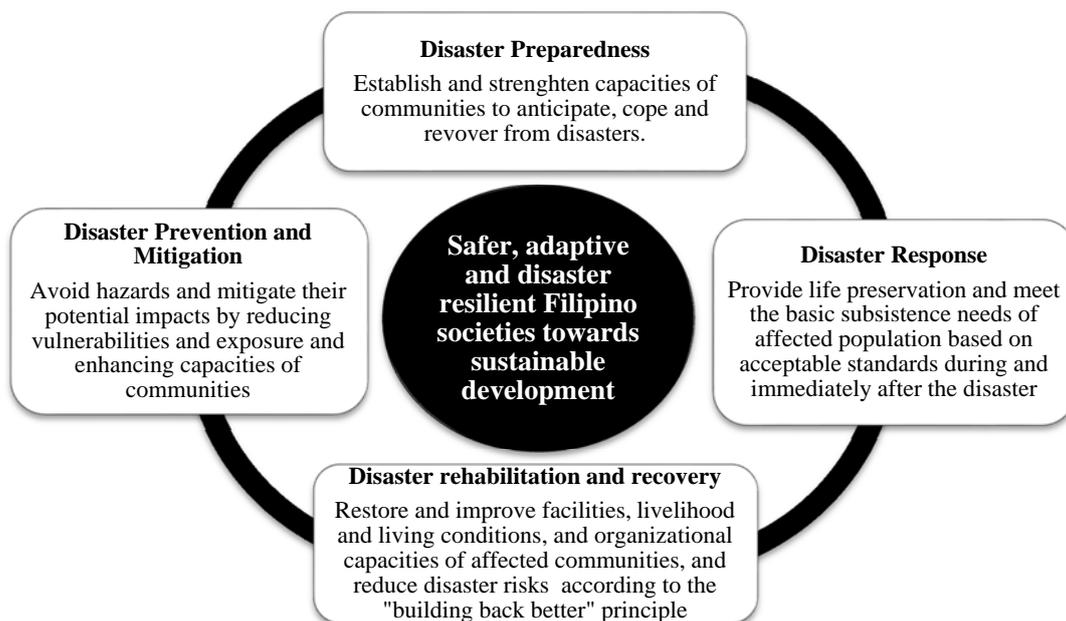
In the case of the Philippines, the linkages between poverty and vulnerability to natural hazards are connected to a variety of issues. For instance rapid urban growth and lack of tenure have forced many to live and work in high-risk areas. Families may have little choice but to return to such areas after the disaster even when resettlement options are available because of the importance of proximity to place of work. Disasters can be associated with spiraling debt, reflecting limited provision of rehabilitation assistance for repair of houses and restoration of livelihoods, poor access of lower income households to lending facilities and extremely low rates of saving. In the aftermath of a disaster, poor families may be forced to rely on borrowing from informal sector, forcing them into further poverty, and/or on remittances from relatives elsewhere in the country and overseas. Disasters can also contribute to longer-term states of poverty by delaying development of poorer areas. For instance, Balisacan et al (2002) in an initial poverty mapping exercise of the Philippines report that the results from the rapid appraisal demonstrate the importance of road conditions and distances to “centers of trade” as a determinant of poverty. Yet disasters destroy roads and many, particularly feeder roads, may not be repaired for several years after a disaster.

Despite both the high incidence of disasters in the Philippines and the government’s central objective to reduce poverty, however, efforts to reduce vulnerability to natural hazards are not systematically included as a central component of the government’s poverty reduction strategy. There is recognition of the need to support the poor post disaster as victims, as for instance, reflected in post-disaster relief activities implemented by DSWD (Department of Social Welfare and Development). Similarly, the government’s central poverty reduction engine, the National Anti Poverty Commission (NAPC), established in 1998, is composed of 14 Commissioners each representing the 14 basic sectors (farmers, workers, indigenous Filipinos, women, and so on), including the victims of disasters and calamity sector (VDC). There was some discussion at the time NAPC was created that vulnerability to natural hazards should be considered as a cross-cutting issue instead, in part because ‘victims’ eventually return to other sectors. However, there was concern that hazard vulnerability concerns could then end up being overlooked as each sector chose to focus on issues of most pressing concern to the group it represented and also that it would lose out in the allocation of budgetary resources.

### **3.6 Disaster coping mechanisms and coordination for long-term post-disaster recovery**

The National Disaster Risk Reduction and Management Plan NDRRMP (NDRRMC, 2011) provides guidelines for disaster risk reduction actions in order to contribute to the attainment of sustainable development through inclusive growth and build the adaptive capacities of communities. Through strengthening the capacity of the national government and the local government units (LGUs) together with partner stakeholders (NGOs, community based organizations, civil society, private sector), to build the disaster resilience of communities and to institutionalize arrangements and measures for reducing disaster risks, including projected climate risks

and enhancing disaster preparedness and response capabilities at all levels. The priorities of the plan are specified in Figure 3.6.



**Figure 3.6: DRRM Priority Areas and Long-Term Goals**  
*Source: National Disaster Risk Reduction and Management Plan*

### 3.7 Disaster response and recovery of the housing sector

#### 3.7.1 Disaster response

The Republic Act 10121 defines disaster response as:

*“The provision of emergency services and public assistance during or immediately after a disaster in order to save lives reduces health impacts, ensure public safety and meet the basic subsistence needs of the people affected. Disaster response is predominantly focused on immediate and short-term needs and is sometimes called disaster relief”.*

The National Disaster Risk Reduction Management Council (NDRRMC, 2011) defines “Early Recovery” as a “multidimensional process of recovery that begins in a humanitarian setting. It is guided by development principles that seek to build on humanitarian programmes and catalyze sustainable development opportunities. It aims to generate self-sustaining, nationally-owned, resilient processes for post-crisis recovery. It encompasses the restoration of basic services, livelihoods, governance, security and rule of law, environment and social dimensions, including reintegration of displaced populations”.

The priorities during this stage that are directly related to shelter assistance are: To evacuate affected communities and the provision of emergency or transitional shelters.

***a. Evacuated safely and on time affected communities***

The decision to evacuate an area must be done promptly. Timing is essential to an orderly, safe, and effective evacuation. Authorities must ensure that no person gets stranded; all those who want/need evacuation must be attended to. Though timing is essential, it is not only the factor that contributes to successful evacuation operations. The availability of logistics is also a key consideration; the scale disaster itself (e.g., inclement weather) is also important. Accordingly, there must be regular coordination with relevant agencies to ensure seamless activation of evacuation system/procedures.

***b. Temporary shelter and/or structural needs are adequately addressed***

Disasters leave many people homeless. Temporary shelters in some ways provide a measure of comfort safety for victims. The provision of adequate temporary shelters is of invaluable importance during disaster times. It is about a temporary “home” where people, their sources of livelihoods and important valuables find refuge in times of disasters. Temporary shelters are not just about structures, but other issues that are necessary to be considered both before, during and after a disaster happen.

**3.7.2 Rehabilitation and Recovery**

Under Section 3 of Republic Act 10121, rehabilitation and recovery are defined as: “Measures that ensure the ability of affecting communities and/or areas to restore their normal level of functioning by rebuilding livelihood and damaged infrastructure and increasing the communities’ organizational capacity”.

The NDRRMC (2011) defines “Post Disaster Recovery” as “the restoration and improvement where appropriate, of facilities, livelihood and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors, in accordance with the principles of build back better”.

The Rehabilitation and Recovery aspect of disaster risk reduction management (DRRM) cover areas like employment and livelihoods, infrastructure and lifeline facilities, housing and resettlement, among others. These are recovery efforts done when people are already outside of the evacuation centers. The priorities considered for this stage are:

***a. Damages, Losses and Needs Assessed***

An assessment or accounting of damages, losses and needs will be the basis for identifying programs, projects and activities for the disaster-affected areas.

***b. Economic activities restored and if possible, strengthened or expanded***

The ability of people affected by disasters to bounce back easily lie heavily on the restoration of their sources of income and livelihood opportunities. By identifying what the existing situation is, the government can respond with the appropriate programs that will enable the people to build back better after the disaster.

***c. DRRM and Climate Change Activities (CCA) elements are mainstreamed in human settlement***

This is about the development of disaster-resilient housing designs and introduction of improved and modernized building systems and programs. It also includes, among others, the identification of secure relocation sites for people displaced by natural and human-induced disaster of those living in hazardous areas.

***d. Disaster and climate change resilient infrastructure constructed/reconstructed***

Long term recovery ensures that the rehabilitation or reconstruction of infrastructures is disaster and climate-proof.

***e. An psychologically sound, safe and secured citizenry that is protected from the effects of disasters are able to restore to normal functioning after each disaster***

Disasters are devastating and usually leave a trail of human agonies including loss of human life, livestock, property, and livelihood loss, physical injuries and damages to development works. Along with relief, rehabilitation and care of physical health and injuries, psychosocial and mental health issues are also important and they need to be addressed. Emergencies also create a wide range of problems experienced at the individual, family, community and societal levels.

### **3.8 Leadership, Partnerships and stakeholders' involvement in Disaster Response and Recovery in the Philippines**

The National Disaster Risk Reduction Management Plan (NDRRMC, 2001) defines the leading roles of the government agencies in a framework of collaboration with implementing partner agencies or other groups (NGOs, CBOs, volunteers, private sector). The roles of the governmental agencies are:

***Vice-Chairpersons of the NDRRMC***

The overall lead or focal agency for each of the four priority areas are the vice-chairpersons of the National DRRM Council, namely:

- a) **V-Chairperson for Disaster Prevention and Mitigation:** Department of Science and Technology (DOST).
- b) **V-Chairperson for Disaster Preparedness:** Department of the Interior and Local Government (DILG).
- c) **V-Chairperson for Disaster Response:** Department of Social Welfare and Development (DSWD).
- d) **V-Chairperson for Rehabilitation and Recovery:** National Economic and Development Authority (NEDA).

The Leading agencies are responsible of:

- Takes the lead in initiating the implementation of the activities
- Coordinate and collaborate with the different implementing partners to ensure that the activities are operationalized.

- Monitor the progress of the activities
- Evaluate the implementation development and program efficiency
- Consolidate reports from the implementing partners and submit to the respective vice chairperson of the DRRM priority area

Implementing Partners' roles are:

- Perform the activities to achieve the specific outcomes
- Work with other implementing partners within the context of coordination, collaboration and partnership
- Submit report to the leading agencies

### **3.8.1 National Level**

At the national level, the four aspects for disaster risk reduction management are the guidelines for the actions to prevent and disaster response that are the basis to shift from reactive to proactive approach to face disasters. The leading agencies at the national level are:

#### ***National Disaster Risk Reduction and Management Council (NDRRMC)***

The NDRRMC has the overall responsibility of monitoring the development and enforcement by agencies and organizations of the various laws, guidelines, codes or technical standards. The NDRRMC is the coordinating body for disaster risk reduction management in the Philippines and is the highest policy-making body on the matter of disasters.

#### ***Office of Civil Defense***

The Office of Civil Defense has the main responsibility in ensuring the implementation and monitoring of the NDRRMP and the government agencies involved. The OCD is the agency responsible for ensuring that the physical framework, social, economic and environmental plans of communities, cities, municipalities and provinces are consistent with the NDRRMP. OCD needs to ensure that all disaster risk reduction programs, projects and activities requiring regional and international support shall be in accordance with duly established national policies and aligned with international agreements

### **3.8.2 Regional Disaster Risk Reduction and Management Councils (RDRRMCs)**

At the regional level, the RDRRMCs shall be responsible in ensuring that DRRM-sensitive regional development plans contribute to and are aligned with the NDRRMP.

### **3.8.3 Provincial, City, Municipal Disaster Risk Reduction and Management Councils (P/C/MDRRMCs or Local DRRMCs)**

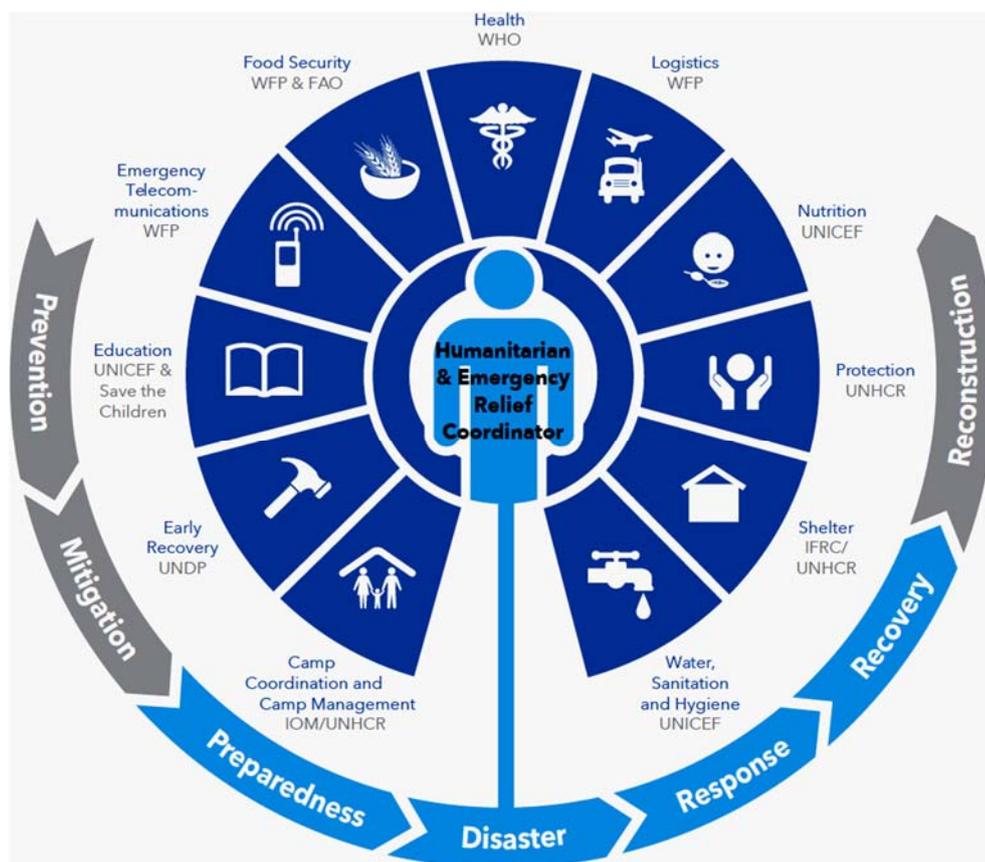
At the local government level, it is the primary duty of the Local DRRM Council to ensure that DRRM is mainstreamed into their respective local plans, programs and budgets as a strategy in sustainable development and poverty reduction.

### 3.8.4 Local Disaster Risk Reduction and Management Offices (LDRRMOs)

The Local DRRM Offices (LDRRMOs) at the provincial, city and municipal levels and the Barangay Development Councils shall design, program and coordinate disaster risk reduction activities consistent with the NDRRMP and develop the Local DRRM Plan of their respective local governments.

### 3.8.5 Cluster approach

Emergency situations require coordination among different stakeholders involved in relief and recovery activities in order to address the multiple needs of the affected communities. An appropriate coordination minimizes the mismatches and overlaps in humanitarian organizations' work. It focuses on needs-based, rather than capacity-driven, response. The cluster approach aims to ensure a coherent and complementary approach, identifying ways to work together for better collective results (UNOCHA, n. d.)



**Figure 3.7: Cluster Approach framework**

*Source: UNOCHA*

The current international humanitarian coordination system was set by General Assembly resolution 46/182 in December 1991. The Humanitarian Reform of 2005 introduced new elements to improve capacity, predictability, accountability, leadership, and partnership. The most visible aspect of the reform is the creation of the Cluster Approach. Clusters are groups of humanitarian organizations (UN and non-UN) working in the main sectors of humanitarian action, e.g. shelter and health (see Fig. 3.7). They are created when clear

humanitarian needs exist within a sector, when there are numerous actors within sectors and when national authorities need coordination support. Clusters provide a clear point of contact and are accountable for adequate and appropriate humanitarian assistance. Clusters create partnerships between international humanitarian actors, national and local authorities, and civil society. (UNOCHA, n. d.)

In the Philippines, NDRRMC has institutionalized the cluster approach as a coordination tool to ensure a more coherent and effective delivery of humanitarian assistance by mobilizing groups of agencies, organizations, and NGOs to respond in a strategic manner across key sectors or areas of activity. The coordination works from the national to the local levels, the coordination bodies, especially the co-chair are mainly undertaken by the agencies may vary. In Figure 3.8 it is presented the Organigramme of the cluster coordination mechanism for disaster response after Typhoon Washi.

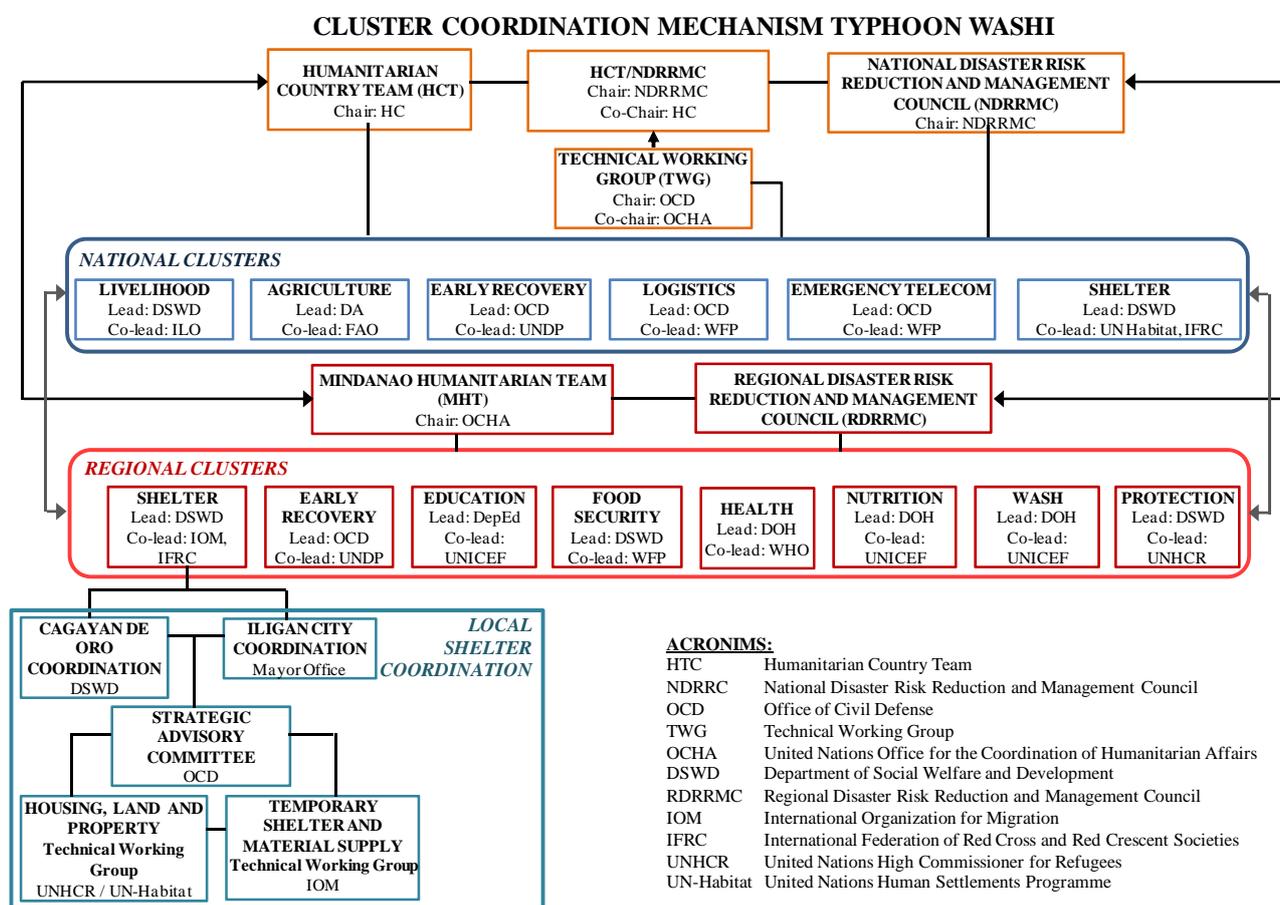


Figure 3.8 it is presented the Organigramme of the cluster coordination mechanism

Source: Author, based on UN-OCHA, 2013

### 3.9 Post-disaster housing situation in the Philippines

Over the last decade, the country has been hit by major disasters that rendered thousands of families homeless (Table 3.4). The most recent disaster, Typhoon Haiyan (locally known as Yolanda) that passed through the islands of Leyte and Samar on 8 November 2013, completely destroyed 550,928 houses and

partially damaged 589,404 more houses. The scale of the destruction of homes forced housing to the forefront of the national agenda.

According to Annawi (2014), post-disaster housing responses in the Philippines have failed to meet the high demand for housing. For instance, the programs for provision of housing assistance to families affected by Typhoon Durian (Reming) in 2006 where various agencies like the NHA and DSWD and private donors worked on housing projects, have not proved to be solve all the housing problems because by January 2013 there was still a housing gap of 4,238 houses that needed to be built. Another example is the housing gap in Cagayan de Oro that was hit by Typhoon Washi, which after building 7,952 houses there is still a gap of 3,273 houses as of July 2014.

**Table 3.4: Disaster Events and Impact on Housing**

Year	Areas Affected	Disaster Event	Houses Totally Damaged	Houses Partially Damaged
2006	Albay	Mudflows	21,477	91,865
		Typhoon	114,394	103,380
2008	Iloilo City	Flood	1,4488	4,919
2009	Metro Manila	Tropical Storm	30,082	154,922
		Ketsana (Ondoy)	(nationwide)	(nationwide)
2011	Cagayan de Oro	Flashflood	7,317	12,635
	Davao Oriental	Typhoon	21,975	8,270
2012	Compostela Valley	Debris flow	38,653	56,401
		Landslides		
2013	Bohol	Ground shaking	14,480	57,405
		Subsidence related to sinkholes		
2013	Eastern Samar	Typhoon	550,928	589,404
	Leyte Samar	Storm surge	(nationwide)	(nationwide)
		Flood		

*Source: Annawi et al. (2014), World Bank-Manila Office*

### 3.9.1 Government responses

The review of case studies summarized by the World Bank (Annawi, 2014), although the recurrent occurrence of disasters in the Philippines has not been considered a systematic approach for post-disaster housing response. Both national and local governments have not yet established a clear strategy for coordination and clear definition of roles among the national government agencies involved in post-disaster housing responses, although the NDRRMP specifies roles, it seems that there are still many gaps in the practice in order to achieve an efficient and integrated response to undertake large-scale solutions, allocation of

resources.

In response to Typhoon Durian (Reming), the national government set up the Bicol-Calamity Assistance for Rehabilitation Efforts (Bicol-CARE). For the housing reconstruction response, the Bicol-CARE Commission assigned NHA to take charge of land acquisition and site development (particularly, earthworks and site clearing, the construction of the main and secondary roads; provision of a water system and electrification). NHA's tasks included the conduct of surveys, site development planning, lot subdivision and individual land titling.

The construction of housing units was sponsored by different organizations: the NGOs Gawad Kalinga, Amore and Christian Aid (with Habitat for Humanity Philippines as their builder). Each donor had its own housing design, with the corresponding budget for a housing unit, and arrangement of labor. There was no review of the housing designs of the donors. Almost all housing donors required members of beneficiary families to work on site for a minimum of 500 hours, through what they call "sweat-equity", in order to be awarded housing units. As agreed by the Bicol-CARE Commission, DSWD is going to cover the shortfalls in donor-funded housing assistance. As of January 2013, DSWD funded the construction of 24% (2,870 units) of the total lots generated in the relocation sites (11,873) or 44% of the total number of units constructed (6,491).

### **3.9.2 Governmental housing reconstruction programs**

The post-disaster housing reconstruction modalities observed includes:

- a. Housing projects established under the Core/Modified Shelter Assistance Program (CSAP/MSAP) of the Department of Social Work and Development (DSWD);
- b. Resettlement program of the National Housing Authority (NHA);
- c. Community Mortgage Program (CMP) of the Social Housing Finance Corporation (SHFC).

This review covers the use of core shelters or permanent houses and does not review transitional shelters or bunk houses.

#### **a. Department of Social Welfare and Development – Core/Modified Shelter Assistance Program**

As a form of shelter assistance, DSWD's budget of PhP 70,000 for either CSAP or MSAP is intended to purchase materials to build the shelter units, whereas the costs of land and labor are the responsibility of LGUs or beneficiaries. The LGUs are thus key partners of the DSWD, providing land and site development, technical manpower—such as foremen, construction equipment, and tools—and organizing livelihood opportunities, such as food-for-work programs. The engineer from DSWD-Central Office monitors the status of the projects in terms of physical accomplishment and provides on-site feedback and input if necessary.

**Table 3.5: Summary of houses funded through DSWD from 2008 to 2014**

Year	No. of houses funded	Amount allocated (in PhP)	Status of Implementation		
			Completed	Ongoing	Not Started
2008	9,307	644,749,980	8,336	814	157
2009	9,250	542,120,000	7,922	836	504
2010	3,029	190,220,000	2,297	498	233
2011	15,373	1,073,300,000	7,029	3,299	5,045
2012	8,927	711,170,000	4,027	1,508	3,392
2013	33,506	2,368,820,000	3,168	1,185	29,153
2014	6,629	464,030,000	0	55	6,574
Total	86,021	5,994,409,980	32,779	8,195	45,058

\* 1 USD = 44.5 PhP (Philippine Pesos,) as of December 2014.

Source: DSWD, Disaster Risk Reduction and Response Operations Office, 2014

The status of reconstruction (2008–2014) funded through the DSWD accounts to 86,021 housing units (shown in Table 3.5). Of the total number of houses funded, only 38% have been completed, about 10% are under construction while the remaining 52% have not yet been started. The reasons for the delay are the lack of funding from the local government units (LGUs) that are the counterpart which has to supplement the DSWD budget. Other reasons are the delays in the site development works, and lack of time, on the part of beneficiaries, to devote to the construction of houses. The budgets for these units have already been released by DSWD through checks in the name of the identified beneficiaries and have been downloaded to either the neighbors associations or LGUs.

**b. National Housing Authority (NHA) – Resettlement Program**

NHA is mandated to produce shelters for the lowest 30% of income earners through its five housing development programs: (i) resettlement, (ii) slum upgrading, (iii) sites and services, (iv) core housing, and (v) medium-rise housing (Ballesteros, M. and Egana, J. V., 2012).

*Resettlement Assistance Program for Local Government Units:* NHA assists in LGUs’ development of resettlement sites under its Resettlement Assistance Program for LGUs. This is implemented as a joint undertaking between the LGU and NHA. The LGUs’ primary contribution is land, whereas the NHA provides funds to cover the cost of land development. The LGUs recover project costs from beneficiaries and use the proceeds exclusively for project maintenance or to acquire and/or develop new resettlement sites.

The NHA resettlement program initially targeted informal settlers affected by the government’s development projects. However, it was extended to families that lost their homes due to natural disasters (Ballesteros, M. and Egana, J. V., 2012). Housing reconstruction projects included NHA resettlement projects in the aftermath of Typhoon Durian (2006) and Typhoon Ketsana (2009). Additionally, this approach was also

adopted in Cagayan de Oro, Iligan, Misamis Oriental, and Bukidnon in the aftermath of Typhoon Washi (2012).

The NHA is currently working towards a housing reconstruction program for families affected by Typhoon Haiyan. On President Aquino's instruction that post-Typhoon Haiyan houses must be resilient, the Housing Design Technologies Office of NHA developed a disaster resilient house design that was reviewed and approved by the Department of Public Works and Highways. The cost of a 22 m<sup>2</sup> row house designed for a wind load of 250 khp is approximately PhP 220,000 (approximately USD 4,600) which is almost twice the cost of the current cost of a row house (Regala, B., 2014).

Housing reconstruction approaches. NHA's resettlement program is implemented using the ADDRIS approach (Jha, A. K., & Barenstein, J. D., 2010), whether in-city or off-city relocation:

- NHA-administered resettlement program caters to families to be displaced from sites targeted for government infrastructure projects and those occupying danger areas such as waterways, esteros and railroad tracks. NHA either (i) acquires and develops raw land to generate service lots or core housing units or (ii) acquires completed housing projects from private developers following NHA's specifications that the beneficiaries are going to re-pay to NHA in monthly amortizations.
- Resettlement assistance program for LGUs is an NHA-LGU joint venture in which the LGU provides the land while the NHA provides funds for land development. LGUs recover project cost from beneficiaries and utilize proceeds exclusively for project maintenance or to acquire and/or develop new resettlement sites. Following an ADDRIS approach, NHA's resettlement projects are developed by contractors accredited by NHA following NHA's standard social housing designs. The housing units are then offered to the families targeted for relocation. This approach offers little opportunity for the families to participate in the selection of sites to be developed into resettlement sites and construction of houses. It is when the houses are already constructed that families are offered to choose among multiple relocation areas.

NHA's resettlement program includes livelihood assistance in the form of: (i) a budget for livelihood infrastructure (i.e. for construction of livelihood facilities usually consisting of livelihood center, tricycle, jeepney or transport shed and/or market center), and (ii) budget of PhP 3,000 per beneficiary household for livelihood programs (Annawi et al, 2014). The latter is included in NHA's administration cost, with NHA serving as "facilitator, resource integrator, and planner." In short: NHA connects the resettled communities to skills training, job opportunities, scholarship programs, income-generating projects, or credit/loan assistance of concerned agencies. In the past, lack of livelihood opportunities and basic services have led beneficiaries to abandon their units and return to the city. Accordingly, sustainability and effectiveness of resettlement are issues that must be addressed with respect to each individual project (Kelly, T., 2013).

*c. Social Housing Finance Corporation (SHFC) – Community Mortgage Program (CMP)*

The SHFC is engaged in low-cost housing through its CMP, a mortgage financing program that enables informal settler families (ISFs), assisted by accredited mobilizers (civil society partners or LGUs), to purchase the land they are occupying (onsite) or an alternative site of their choice, provided that costs remain within the loan budget and that the beneficiaries can afford it. The maximum amount that can be loaned is PhP 165,000; this amount may be broken down into PhP 90,000 for lot acquisition, PhP 15,000 for site development, and PhP 60,000 for housing construction. A CMP loan is re-payable over a maximum period of 25 years at an interest rate of 6% per year (Please consider 1 USD = 44.5 PhP as of December 2014).

SHFC's CMP applies the community-driven reconstruction approach according to the definition detailed by the World Bank (Jha, A. K., & Barenstein, J. D., 2010). CMP is implemented with the assistance of mobilizers (accredited community-based civil society organizations or LGUs), who prepare the disaster affected families to apply for CMP loan. CMP mobilizers organize these families, assist them in preparing all documentary requirements and in accessing support from the LGUs and other partners. With the help of mobilizers, community associations take the lead in negotiating with the owners over the price of their occupied lands or selecting possible relocation sites. While CMP can be offered as an option to disaster-affected families, a question is raised whether or not families that lost their livelihoods during a disaster are in a position to repay mortgage loans (Kelly, T., 2013).

The experiences of Homeless Peoples Federation Philippines in various areas in the country show that encouraging disaster affected families to save for the collective self-financing of their incremental relocation/housing initiatives can be an effective means of empowering them to participate in the post-disaster reconstruction (ESSC, 2010).

The Social Housing Finance Corporation (SHFC) – Community Mortgage Program (CMP) between 2005 and 2014, SHFC loaned out a total of PhP 5,908,583,677 (approximately USD 125.2 million) for lot acquisition. There were no loans taken out for house construction prior to 2005. This reflects the CMP's focus on the formalizing land tenure of affected families. Currently, there is no available data regarding only post-disaster housing response (Annawi et al., 2014).

### **3.9.3 Challenges in post-disaster housing reconstruction**

Questions and challenges emerge after the immediate weeks or months following a disaster event, such as when must disaster response shift from evacuation and temporary shelter to permanent housing solutions, or whether or not people are to be allowed to re-build where a flash flood, mudflow, landslide or storm surge wiped out their houses.

The challenge of addressing the scale of the housing demand in the country left by past disaster events and the increasing number of people living in high-risk areas calls for more strategic responses toward “building

back better and safer” (Annawi et al., 2014). Some initiatives and elements of this are emerging although the implementation is critical. Lessons are now being drawn from recent disaster events, such as the need for the assessment of relocation sites by the Mines and Geosciences Bureau and the effort to delineate no-build zones as areas not suitable for housing due to their high vulnerability, and which needs to be clearly defined.

Resettlement is a measure that was widely adopted in for post-disaster reconstruction and recovery in the country. Therefore, there are concerns that are necessary to consider:

- There is limited participation of the population targeted for resettlement.
- Availability of basic services and utilities in the new site and readiness of the receiving LGUs to serve the added population. The relocation of people does not necessarily involve transfer of resources and receiving LGUs do not receive additional funding to provide for the needs of the added population. There is a need for coordination between those managing the relocation of people and the LGUs receiving the relocates. Part of the planning for relocation or large populations must address the provision of these basic services to ensure people’s quality of life.
- Availability of livelihood opportunities or accessibility to existing livelihoods. The resettlement of poor urban families to new settlements where there is a lack social facilities and economic opportunities can promote the deterioration of living conditions and re-create slum and squatter areas where they came from or create large concentrations of poor families.

### **3.10 Housing needs and affordability in pre-disaster times in the Philippines**

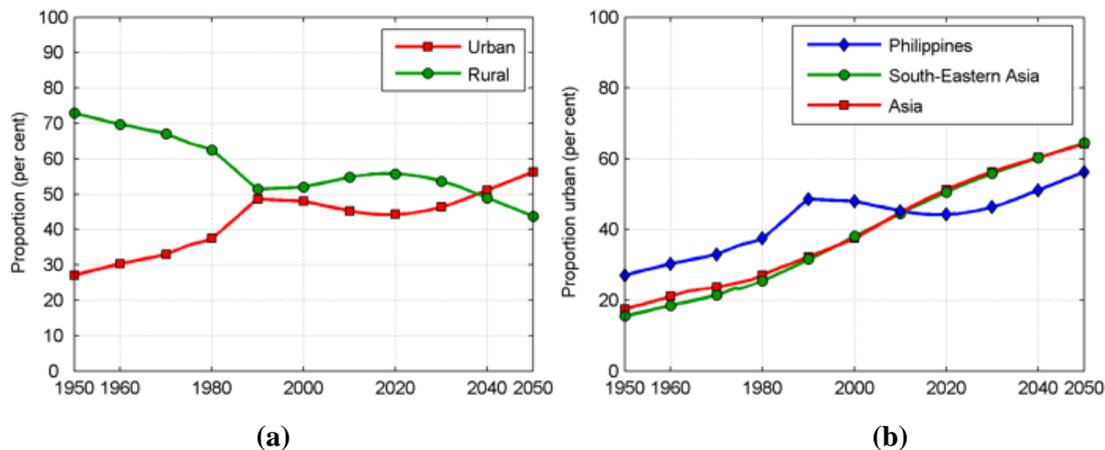
Globally the access of housing is a growing challenge to cities and countries. A rising number of residents, that are not limited to poor, pay disproportionate share of income for housing or live in inadequate housing that is lacking of livelihood opportunities, and access to services like health and education (Woetzel, J. et a., 2014). The United Nations Universal Declaration of Human Rights (UN General Assembly, 1948) in the article 25 explicitly includes decent housing as a basic human right:

*“Everyone has the right to a standard of living adequate for the health and wellbeing of himself and of his family, including food, clothing, housing and medical care and necessary social services...”*

Although access to adequate housing is a universally recognized human right, the gap in decent affordable housing extends virtually around the globe, exacting a large social and economic toll on both developing and advanced economies, affecting both poor and middle-income citizens (Woetzel, J. et a., 2014).

In the Philippines, the urban population growth outpaces the housing supply (see Figure 3.9). The Philippine housing market reveals a tremendous gap between the demand and supply of housing since

affordable shelter and land markets have not kept pace with rapid urban growth. Because of the housing shortage, the majority of households are unable to pay for the cost of housing and land. The minimum housing cost per unit is 3.8 times the yearly wages of an unskilled laborer and 3.1 times the annual income of an employee earning a median income per month Ballesteros, M., (2002).



**Figure 3.9. (a) Proportions of urban and rural population in the current country or area in per cent of the total population, 1950 to 2050. (b) Proportions of urban population in the current country as compared to the major area and region in which this country is located. The proportion is expressed in per cent of the population between 1950 and 2050.**

Source: United Nations, Department of Economic and Social Affairs, Population Division (2014): *World Urbanization Prospects: The 2014 Revision*. <http://esa.un.org/unpd/wup/Country-Profiles/>

Housing demand is shown to be largely associated with income. For this reason, housing affordability has often been measured in terms of the proportion of income that a household must or is willing to spend on housing. However, the demand estimates also show that there are underlying factors such as lifecycle, price of housing and financing availability that impact on housing affordability. Table 3.6 presents the range of annual family income per household that has been used in the study of the University of Asia and the Pacific UA&P (2015) and the Table 3.7 presents the minimum family income that allows households to have access to housing according to the type of housing unit, from socialized to the higher cost housing.

**Table 3.6 Annual income per household in the Philippines**

Annual income per household	Number of household	Percentage
Bellow 78,000	4,251,817	23.04%
78,001 - 130,000	4,640,804	25.15%
130,001 - 405,000	7,592,152	41.15%
405,001 - 1,100,000	1,776,243	9.63%
1,100,001 - 2,200,000	160,872	0.87%
More than 2,200,000	29,653	0.16%
<b>Total households</b>	<b>18,451,541</b>	<b>100.00%</b>

Source: 2009 Family Income and Expenditure Survey

<https://psa.gov.ph/content/2009-fies-additional-tables>

**Table 3.7 Matching housing cost with capacity to pay**

Type of house	Annual amortization	Required income	Required annual income
	PhP	PhP	PhP
Socialized Housing	23,468.02	78,226.72	At least 78,000
Economic Housing	38,041.55	126,805.17	At least 130,000
Low Cost Housing	121,493.27	404,977.55	At least 405,000
Mid Cost Housing	324,595.20	1,081,984.01	At least 1,100,000
High End Housing	649,190.41	2,163,968.02	At least 2,200,000

\*1 USD = 44.5 PhP (Philippine Pesos,) as of December 2014

Source: University of the Asia and the Pacific (2015)

The UA&P has analyzed the housing demand and the capacities for housing supply between 2001 to 2011, and the deficit in the poorer economic groups in the Philippines rose to 3,087,520 housing units (Table 3.8) that represent the backlog for the calculation of the projection of housing demand by 2030.

**Table 3.8 Housing demand and supply profile 2001-2011**

Market Segment	Housing demand (Households)	Housing supply	Surplus/ (Deficit)
Socialized Housing	1,143,048	479,765	(663,283)
Economic Housing	2,503,990	541,913	(1,962,077)
Low Cost Housing	704,406	242,246	(462,160)
Mid Cost Housing	72,592	322,995	250,403
High End Housing	18,235	242,246	224,011

Source: University of the Asia and the Pacific (2015)

Table 3.9 presents the analyzed new housing need between 2012 and 2030 (UA&P, 2015) that results in a total new need average of 345,941 housing units per year for the lowest income groups.

**Table 3.9 New housing need 2012- 2030**

Market Segment	Price Range PhP (approx. USD)	Units Needed	% Total Need
Can't Afford/ Needs Subsidy	Below 400,000 (below 8,300)	1,449,854	23.28%
Socialized Housing	Below 400,000 (below 8,300)	1,582,497	25.41
Economic Housing	400,000-1.25million (8,300 – 26,200)	2,588,897	41.58
Low Cost Housing	1.25m-3m (26,200 - 62,800)	605,692	9.73
Mid Cost Housing	3m-6m (62,800 – 125,000)	No Need	0
High End Housing	More than 6m (More than 125,000)	No Need	0
<b>TOTAL NEED</b>		<b>6,226,940</b>	<b>100</b>

1 USD = 44.5 PhP (Philippine Pesos,) as of December 2014.

Source: University of the Asia and the Pacific (2015)

The calculation of the total housing needs by 2030 results from the sum of 832,046 households who can't afford, 3,087,520 that represents the housing backlog 2001-2011, and the new housing needs (6,226,540 housing units). At the present, according to Habitat for Humanity Philippines (UA&P, 2015) yearly new housing stock averages less than 200,000, while the needed each year are more than 300,000 housing units. Therefore the final housing needs that have to be covered by 2030 is equal to 6,546,106 housing units (Table 3.10).

**Table 3.10 Estimated backlog by 2030**

<b>Particulars</b>	<b>Units Per Year</b>	<b>Number of Years</b>	<b>Total Units</b>
Current Housing Backlog			3,919,566
New Housing Need 2012-2030	345,941	18	6,226,540
Housing Production Capacity	200,000	18	(3,600,000)
<b>Backlog by 2030</b>			<b>6,546,106</b>

*Source: University of the Asia and the Pacific (2015)*

The capacities for housing supply specified in Table 3.10 do not consider the sudden housing needs resulting from natural disasters that between 2006 to 2013 accounts 813,794 houses destroyed that have to be replaced in situ or in resettlement sites (as it is specified in Table 3.4 in the previous section). Therefore in average the housing needs added due to disasters accounts 101,724 houses, which increase the pressure for searching sustainable solutions for housing supply because this exceeds the established government mechanisms for housing support.

### **3.10.1 Informal settlers and the cost of formality**

According to the Asian Development Bank (2008), in the Philippines more than 40% of urban families have to live in makeshift dwellings in informal settlements. While official data indicate that only about 20% of the 7.5 million urban households fall below the poverty income line (PhP 13,915 –approximately USD 290-per capita per year as of 2001), the poverty income line alone does not capture the dire situation of informal settlers. Many of the urban poor living in informal settlements suffer from lack of access to a safe water supply and sanitation, proper solid waste disposal, poor-quality housing, insecure tenure, and high risks to public health. Moreover, complicated legal processes prevent them from obtaining legal title (ADB 2008).

Informal settlers - individuals/households living under any of the following conditions (Magtulis, M. A., and Ramos, E. V., 2013):

- a. Lot without consent of the property owner (informal settler);
- b. Danger areas (along riverbanks, railways, under the bridge, etc);
- c. Areas for government infrastructure projects;
- d. Protected/forest areas (except for indigenous peoples);

- e. Areas for Priority Development (APDs),
- f. Other government/public lands or facilities not intended for human habitation

De Soto (2000) analyzed the cost of formalization in different developing countries. In the Philippines, if a person has built a dwelling in a settlement on either state-owned or privately-own urban land, in order to purchase it legally and then formalize the property it is necessary to form a neighbors' association to allow them to be qualified for a state housing finance program (Community Mortgage Program – CMP, as it was explained in the previous section). The entire process of formalization could need 168 steps, involving 53 public and private agencies and taking 13 to 25 years, if the government housing finance has enough funds. Additionally, if the land that is part of the property to formalize is categorized as agricultural, the process is extended 45 additional bureaucratic procedures in 13 agencies that at the end adds two to three more years to the process.

The obstacles evidenced above produced a situation where the settlers find it extremely difficult to stay legal or to become legal. Therefore, migrants that initially had limitations to access for housing now they are practically obligated to break the law and they opt to be out of the system (De Soto, 2000). Once the newcomers to the city quit the system, they become “extralegal”, in which residents are obligated to live and work outside the official law, and they use their own informally binding arrangements to protect and mobilize their assets.

### **3.11 Key findings**

The high level of exposure to multiple hazards in the Philippines questions the current reactive trend of the actions, which emphasize the post-disaster response more that preventive measures to avoid the impacts of disasters. The high economic and social costs as a result of recurrent disasters evidence the lack of an integrated approach to manage disaster risk prevention activities with the community and specially, the reduction of pre-disaster vulnerabilities lying on the inappropriate location of settlements.

There is a clearly established system for post-disaster recovery that involve multiple governmental agencies, and each of them has established a particular system to collaborate with NGOs, volunteers and other actors from the private sector. Additionally, as a result of the leadership role of governmental agencies, as it is specified in the DRRMP, there is no consideration for community participation. Therefore, the tendency is to favor top-down approaches for reconstruction, such as resettlement, and the approaches that imply high residents' control, such as community-driven reconstruction through SHFC's CMP, do not have a higher impact that is evidenced in the low number of houses built through this system in comparison with the approaches.

The approaches and the stakeholders, which include government agencies and NGOs, are similar to the provision of housing in both “normal” and post-disaster situations. The way how social housing projects were carried out with financial support through the NHA and an NGO as a housing builder have been been

considered for both housing upgrading and resettlement. However, one of the main differences is the role of the target communities. For social housing in pre-disaster time, the projects include the mandatory participation of beneficiaries in the construction of their own houses for a minimum number of hours of unpaid work. Housing beneficiaries also have to make monthly financial contributions as a partial payment for the provided house. In the process of planning and construction, there are other possibilities to include beneficiaries' opinions and concerns. However, for post-disaster projects, the stakeholders may be similar, but due to the time constraints and the pressure to allocate displaced residents in reconstructed houses, all the considerations for community involvement are simply not applied.

The process for housing provision, as it was explained in this chapter, in pre and post-disaster contexts are similar because the stakeholders and the institutional framework are basically the same. In fact, much of the experiences of social housing in normal times have been applied to organize the reconstruction of houses after disasters, even resettlement. The institutional and operational systems work effectively since the roles of the stakeholders are clearly defined in most of the cases; the national and local partners (NGOs and private sector) work with government agencies in social housing projects and in post-disaster reconstruction. Therefore, the operation mode is understood by both governmental and the non-governmental counterpart. However, the system is clearly following a linear approach where there is no consideration for evaluations of successes and failures observed by residents of the provided houses that are evident in the post-occupancy stage. Thus, there is still no place in the established system for the inclusion of the feedback from housing beneficiaries which is urgent to be included in order to enable the improvement of the process of housing provision.

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## **Chapter 4:**

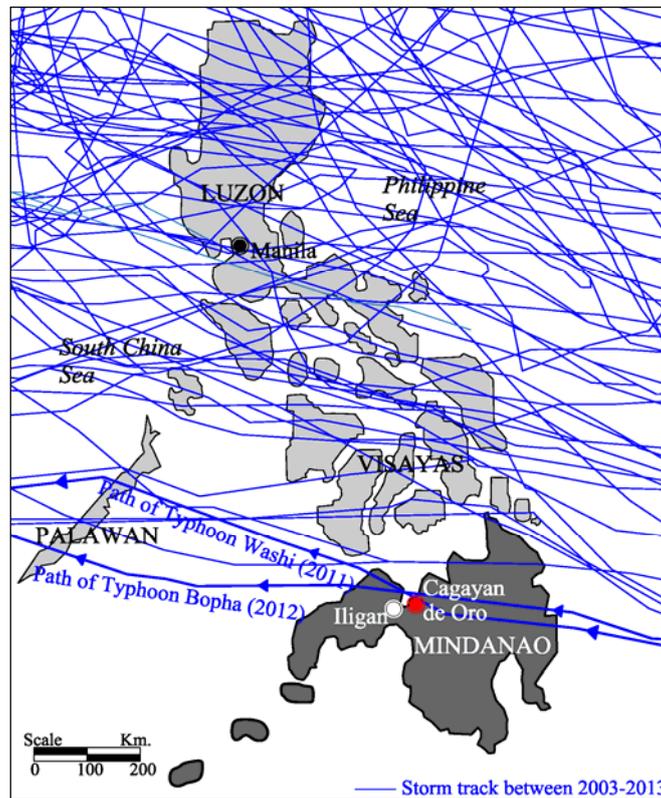
### **Disaster Induced Resettlement and Government-Agency Driven Housing in the aftermath of Typhoon Washi in Cagayan de Oro**

*This Chapter presents the process of reconstruction and long-term recovery in the city of Cagayan de Oro after the Typhoon Washi that hit the city in 2011. The main focus is the process of resettlement because it was determinant for the provision of the larger number of houses and involved a complex process that involved various stakeholders. In this chapter the relationships between stakeholders and the process of decision making are analyzed. Different housing recovery approaches adopted were also analyzed. The analysis resulted on the identification of pros and cons of the resettlement projects and how this can be applied for future recovery and reconstruction projects after a disaster in a permanently exposed country.*

#### **4.1 Impact of the Typhoon Washi in Cagayan de Oro**

Typhoon Washi, locally referred to as “Sendong,” made landfall in Mindanao between the 16th and 17th of December 2011. This tropical storm crossed Misamis Oriental and Cagayan de Oro in Northern Mindanao. In 2011, Washi was the 19th tropical cyclone to enter the Philippine area of responsibility and was the second tropical storm to affect Mindanao. Typhoon Washi maintained maximum sustained winds of 75 kph with gusts up to 90 kph, pouring an amount of rainfall that was usual for tropical storms that hit the Philippines generally, but unusual for those that hit Northern Mindanao. A one-day rainfall of 180.9 mm was recorded, which was higher than the monthly average of 117 mm during December in the period from 1977 to 2005 (i.e., 28 years). On December 17, 2011, water levels in major rivers drastically increased. The water level of the Cagayan de Oro River reached 9.86 meters and discharged 2,500,000 liters/second, 62 times more than the usual discharge when the water level is normal at 2 meters (OCD Region X, 2012).

Although an average of 15 to 20 tropical storms affect the Philippines every year (CIA, 2015; World Bank and NDCC, 2005), from them five to six struck the country each year. From the historical record of typhoons that hit the country, these events are not usual in Mindanao (see Figure 4.1). According to the Joint Typhoon Warning Center (JTWC), from 1945 to 2012, only 35 tropical storms were reported to have passed through the island. Actually, from 1947 to 2008, only one typhoon every ten years, on average, crossed Mindanao. Washi caused severe flooding, particularly in the cities of Cagayan de Oro and Iligan, which were drastically affected.



**Figure 4.1: Typhoon exposure of the Philippines and the path of Typhoon Washi**

*Source: Author, based on data from the National Statistical Coordination Board of the Philippines*

The most affected was Region 10 (Northern Mindanao), where there were 1,295 fatalities, 2,006 injured and 802 reported as missing, 69,715 families displaced, and 39,888 damaged or destroyed houses. Cagayan de Oro, Iligan, and the rest of the affected areas are located close to complex river systems related to six major watersheds. About 41 barangays (a barangay is the smallest administrative division in the Philippines, equivalent to a district, village, or ward) of a total of 80 were inundated in Cagayan de Oro. The floods swept away houses, commercial establishments, and infrastructure (Figures 4.2 and 4.3). The high number of casualties in both Cagayan de Oro and Iligan cities was attributed to their high-density population, together with the informal settlements established along the riverbanks and floodplains, which were identified as hazard-prone areas.



**Figure 4.2: Houses swept away in areas alongside Cagayan River, Cagayan de Oro**

*Source: R. Fernandez*



**Figure 4.3: (a) Settlements flooded and (b) housing damaged or destroyed by Typhoon Washi**

*Source: R. Fernandez*

## **4.2 Impact of Washi in the housing sector**

The totally damaged houses in the region accounted for PhP 1,539,851 (approximately USD 32.8 million), while the partially Damaged houses cost PhP 384,962,785 (approximately USD 8.2 million). In Cagayan de Oro City, around 18,436 houses (47% of the total housing damaged by Washi) were either completely or partially destroyed, causing an estimated damage of PhP 901,644,000 (approximately USD 20,130,475). The damaged homes were located in flood-prone barangays near the affected river systems, and in the urban locations, the most vulnerable areas—those near the Cagayan River bank—were later designated as “no-build” or buffer zones (see Figure 4.6).

### **4.2.1 Informal and formal housing**

The disaster left thousands of families displaced and those rendered homeless by the flood had to live in congested evacuation centers, tent camps, and temporary shelters with limited basic services like water, electricity sanitation facilities, and others.

Although the damages affected both formally constructed buildings and informal precarious constructions, there is a clear distinction of the characteristics to compare the situation of the residents of both types of buildings. Formal housing, compared with the informal housing, is constructed following the building codes and planning standards enforced by local government and national housing agencies and has security of tenure as it follows formal procedures of legal ownership.

The Office of Civil Defense (OCD, 2012) reported that displaced families and individuals belonging to the formal housing sector mostly opted to stay in lodging houses, inns, hotels, and socialized housing projects constructed by private firms or live in the homes of relatives.

In contrary, approximately 85% (more than 15,000 in Cagayan de Oro only) of the households affected by Typhoon Washi belong to the informal housing sector (OCDA, 2012). These settlements occupied government-owned land and/or were located in disaster-prone areas, thus putting the inhabitants at risk. In particular, the urban poor tend to settle in hazardous areas like waste swamp areas, on river banks, or off-shore in and around the cities because they cannot afford to live elsewhere (Jha, A. K., & Barenstein, J. D., 2010).

Cagayan de Oro historically has received migrants from different regions of the country where people settled informally. This influx, combined with rapid and unplanned urban growth (its population almost quadrupled from 1975 to 2010; Ulack, R. 1976, OCDA, 2012) resulted in the establishment of marginal settlements or squatters close to important commercial areas or public markets where most of the residents were employed, thereby avoiding additional expenses in transportation (Ulack, R. 1978).

In addition to the traumatic disruption of the residents' lifestyle and challenges for their survival after the disaster, because the areas are highly vulnerable, there is no alternative but to resettle the communities to safer places in order to protect them from the effect of future disasters (Jha, A. K., & Barenstein, J. D., 2010). Hence, the post-Washi housing recovery in Cagayan de Oro implied that squatter settlers would need to be resettled.

The approach adopted for the recovery of 86% of the housing after Washi in Cagayan de Oro is what the World Bank calls "Agency-Driven Reconstruction in Relocated Site" (ADRRS). Therefore, this massive resettlement implies a complex process wherein each of the different stakeholders has a role, approaches, and responsibilities (Bosher, L., 2011). In addition, the success of this process depends to a large extent on the interrelationships of the actors (Davidson, C., 2010; Amaratunga, D, and Haigh, R, 2011), as well as the independent decisions by each actor, which, in turn, affect other actors' decisions (Chamlee-Wright E. and Storr, W., 2009).

In general, the stakeholders involved in post-disaster recovery concentrate their efforts on their implemented or funded projects because of pressure for quick results, lack of capacities or time, or the need to report accomplishments punctually to governmental agencies or donors. However, in order to analyze the effectiveness of the process, it is necessary to understand comprehensively the different stages leading the long-term recovery and reconstruction. Therefore, this research aims to analyze the coordination mechanisms, criteria for decision making, and complex interactions among the different stakeholders involved in the long-term housing recovery (permanent housing) in Cagayan de Oro in the aftermath of Typhoon Washi/Sendong in terms of resettling informal squatter residents.

### **4.3 Methodology:**

The target of the analysis is the decision making process for long-term disaster recovery, focusing on provision of permanent housing in resettled sites, although the full process for housing recovery includes early or short-term shelter assistance such as emergency and transitional housing, which is briefly described.

In order to understand the interactions among stakeholders involved in the reconstruction process, primary data was collected during July and August 2014 through 15 conducted officials of the national and local government institutions, implementing agencies and donor/contractors presented in Table 4.2.

**Table 4.2: Profiles of Interviewees**

No.	Code	Organization/Institution	Date
1	LGU 1	Office of City Planning and Development, Cagayan de Oro	09 July
2	LGU 2	Office Shelter and Housing Multi-Sectoral Task Force, Cagayan de Oro	10 July
3	LGU 3	Office of Building Official, Cagayan de Oro	04 August
4	LGU 4	Estate Management Division, Cagayan de Oro	05 August
5	LGU 5	Office City Disaster Risk Reduction Management Office	10 July
6	GOV 1	Department of Social Welfare and Development DSWD – REGION 10 - CDO	06 August
7	GOV 2	National Housing Authority (NHA) - REGION 10 – CDO	21 July
8	GOV 3	Office of Civil Defense (OCD) - REGION 10 – CDO	06 August
9	IA 1	Misamis Oriental Filipino Chinese Chamber of Commerce - FCCC	09 July
10	IA 2	Gawad Kalinga Cagayan de Oro Office	10 and 16 July
11	IA 3	Habitat for Humanity Philippines, Cagayan de Oro Office	16 and 31 July
12	IA 4	Oro Habitat for Humanity	21 August
13	IA 5	Red Cross Philippines, Cagayan de Oro	15 July
14	IA 6	Xavier University	22 July
15	IA 7	Xavier University	22 July

*LGU: Interview with officials of Local Government Unit – Cagayan de Oro*

*GOV: Interview with officials of National Governmental Offices for Region 10 in Cagayan de Oro*

*IA: Interview with representatives/managers of implementing agencies (NGOs, civil organizations, others)*

#### **4.4 Post-disaster Housing Reconstruction in Cagayan de Oro**

In this chapter, the resettlement process is analyzed with reference to the design-construction-operation process (DCOP) stage (Bosher, L. et al 2007; Ginige, K., 2011), based on the “Plan of Work” (RIBA, 2001, RIBA 2013), the “Construction Process Protocol” (Cooper et al., 2005), and the “Process Flow of Housing Reconstruction” in Sri Lanka after the 2004 Indian Ocean Tsunami (TAFREN, 2005, Nakazato and Murao, 2007).

In Table 4.1 it is presented the process in stages. Because of the complexity of the process, which is not necessarily linear, the content of the stages may vary, overlap, or provide feedback for modifying the project. Additionally, there are the main questions for examining the process and the implications in the resettlement process (as were proposed by Davidson, C., 2010).

**Table 4.1: Resettlement Stages and Related Issues**

Stages		Issues to be considered	Evaluation of the resettlement process
<b>1. Preliminary</b>	Strategic Definition	Identify the need of housing, initial measures and legal framework, and regulations, alternatives for post-disaster reconstruction	<b>Who?</b> Identify the potential and actual participating actors in the process based in their abilities to contribute
	Preparation and Brief		
<b>2. Planning and Design</b>	Conceptual / Development and Technical Design	Preparation, planning, design, coordination and definition of roles of stakeholders, and the approach for reconstruction.	<b>What?</b> Recognize needed tasks in the process and possible roles to be assigned or overtook by stakeholders
	Construction		
<b>3. Construction</b>	Monitoring/ Supervision	Mobilization of resources and practical actions and decisions taken by stakeholders as well as monitoring of the progress of the projects.	<b>Why?</b> Define common approaches and objectives to be fulfilled in collaboration with stakeholders
	Handover and Close Out		
<b>4. Use</b>	In Use	Once the projects are completed, the affected communities are allocated, and they receive support for community development.	<b>When?</b> Recognize the time appropriateness of the decisions taken and the moves or actions taken.

#### 4.4.1 Preliminary

In this stage, three main aspects will be analyzed: the initial measures adopted in the aftermath of Typhoon Washi, initial shelter assistance, and transitional shelters.

##### a) *The initial measures*

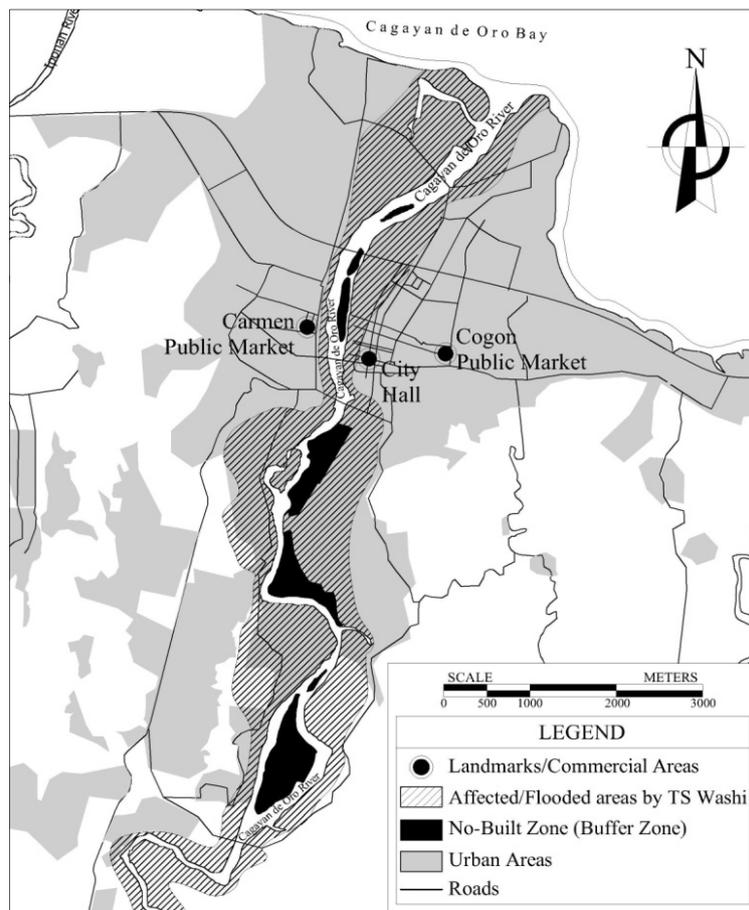
The initial measures or actions taken by the local government unit (hereafter LGU) in coordination with the Department of Social Welfare and Development (hereafter DSWD) included evacuation of the affected communities to public evacuation centers, tent cities, or planned camps supported by the national government, international and national NGOs, and other non-profit organizations, which built these camps on the outskirts of the city (Figure 4.4). Other residents sought shelter with their friends, families, or relatives in unaffected areas, and those who could afford it looked for a private accommodation to rent. Some residents opted to shelter in “spontaneous camps” in parks or other open lands using improvised materials to make their tents (Hirano, 2012).



**Figure 4.4: (a) Covered courts used as evacuation centers. Source: Hirano (2012). (b) Tents Red Cross installed by the Red Cross adjacent to the proposed site for permanent relocation**

*Source: NHA.*

Because of the large number of displaced persons (228,576), there were 42 operating evacuation centers where 13,321 families (65,046 persons) sought shelter, with 24,750 families (163,530 persons) outside evacuation centers (OCDA, 2012).



**Figure 4.5: Cagayan de Oro City, affected areas, and no-build zone**

Another vital action was the determination of “no-build zones” or buffer areas (Figure 4.5) by the LGU, which were declared unsuitable for any urban use (mainly housing). This decision was made in observance of

Presidential Decree 1067 (Philippine Water Code), which establishes strict observance of a three-meter easement by the rivers. These illegal settlements or squatters became the target for a massive resettlement because of the urgent need to relocate the affected communities residing in highly vulnerable areas; then, the subsequent disaster became the trigger for resettlement.

Once the “no-build” zones were demarcated, the value of the land, a precious commodity in urban areas, fluctuated according to supply and demand. Table 4.2 (Hirano, 2012) presents the influence of Typhoon Washi on the value of land in Cagayan de Oro.

**Table 4.2: Land Value Fluctuation Owing to Typhoon Washi**

Location	Pre Washi	Post Washi
<b>No-build zone</b>	1,500 PhP/m <sup>2</sup> . (USD 34)	No value, settlers not allowed to return
<b>High-risk zone</b>	4000-5000 PhP/m <sup>2</sup> . (USD 90 – 112)	Lost value, cannot sell
<b>Medium-risk zone</b>	4000-5000 PhP/m <sup>2</sup> . (USD 90 – 112)	Lost value, cannot sell
<b>Outside danger zone</b>	2000-2500 PhP/m <sup>2</sup> . (USD 45 – 66)	Increased in value by 1000 PhP/m <sup>2</sup> (USD 23).

*Source: Catholic Relief Services (Hirano, 2012)*

Subsequently, in early January the national and city governments announced an ambitious program to build or rebuild 8,599 houses only in Cagayan de Oro, aiming for completion one year after Typhoon Washi (Hirano, 2012), at an estimated cost of PhP 4,389.36 million (approximately USD 98 million) (OCD<sup>a</sup>, 2012). Although the LGU purchased the available land for social housing and/or post-disaster recovery, the goal set for permanent housing has not been accomplished, even 2 years after the disaster.

On December 21, 2011, the Philippines Vice President Jejomar C. Binay, chair of the Housing and Urban Development Coordinating Council (HUDCC), announced that the local government of Cagayan de Oro had allocated 34 ha of a 64-ha lot in Calaanan town for development as the first relocation site for families affected by the Washi floods. The local government had purchased the lot in 1996 as a part of its contribution to the resettlement assistance program for LGUs. Additionally, the vice president announced an estimated cost of PhP 412.5 million (approximately USD 9,196,299) for developing the land as well as housing construction that would benefit some 2,265 families.

#### ***b) Initial shelter assistance***

Three to four weeks after Washi, some residents began to return to their original homes and started reparation work supported by different NGOs like Habitat for Humanity Philippines (HFHP), Oro Habitat (OH), Balay Mindanao-BMFI, International Organization of Migration (IOM), Philippine Red Cross (PRC), HRC, and KEDRN. These organizations distributed repair kits, coordinated by the shelter cluster, with a total cost, for Cagayan de Oro only, of PhP 19,502,000 (USD 435,436) or a total cost of PhP 49,621,000 (USD 1,107,922) (OCD<sup>a</sup>, 2012), including all the affected areas.

- **Transitional shelter**

Government plans were centered on permanent housing solutions; however, the situation in the crowded evacuation centers and camps did not meet the basic Sphere standards for shelter (Hirano, 2012, Sphere 2010, Subhashis, 2012). Thus, Catholic Relief Services (CRS), together with IOM, identified the needs and gaps in the humanitarian response. Understanding the time required for the completion of permanent housing, both CRS and IOM started transitory housing programs in Cagayan de Oro.

The LGU officials were reluctant to invest in non-permanent solutions, which they considered as unplanned expenses. People began occupying transitional shelters 3 months after the disaster. Occupation could have happened faster; however, the local government was not willing to support transitional shelters and allocate land for these temporary settlements because, since the beginning, it was clear that the government’s priority was to allocate resources, capacities, and land to permanent housing.

Despite the reluctant attitude of the LGU, land acquisition or allocation for transitional shelters was accomplished through agreements with the LGU (for temporary use of LGU-owned land intended for permanent housing), private owners, and the Church that owned the land. For CRS specifically, certain conditions were imposed for using the land for transitional settlements (Table 4.3). The final cost of all transitional shelters in Cagayan de Oro was PhP 89,536,050 (approximately USD 1,999,877) and a total amount in all affected areas of PhP 112,708,785 (approximately USD 2,516,587) (OCDA, 2012).

**Table 4.3: Transitional Shelter Sites and Conditions for Occupancy**

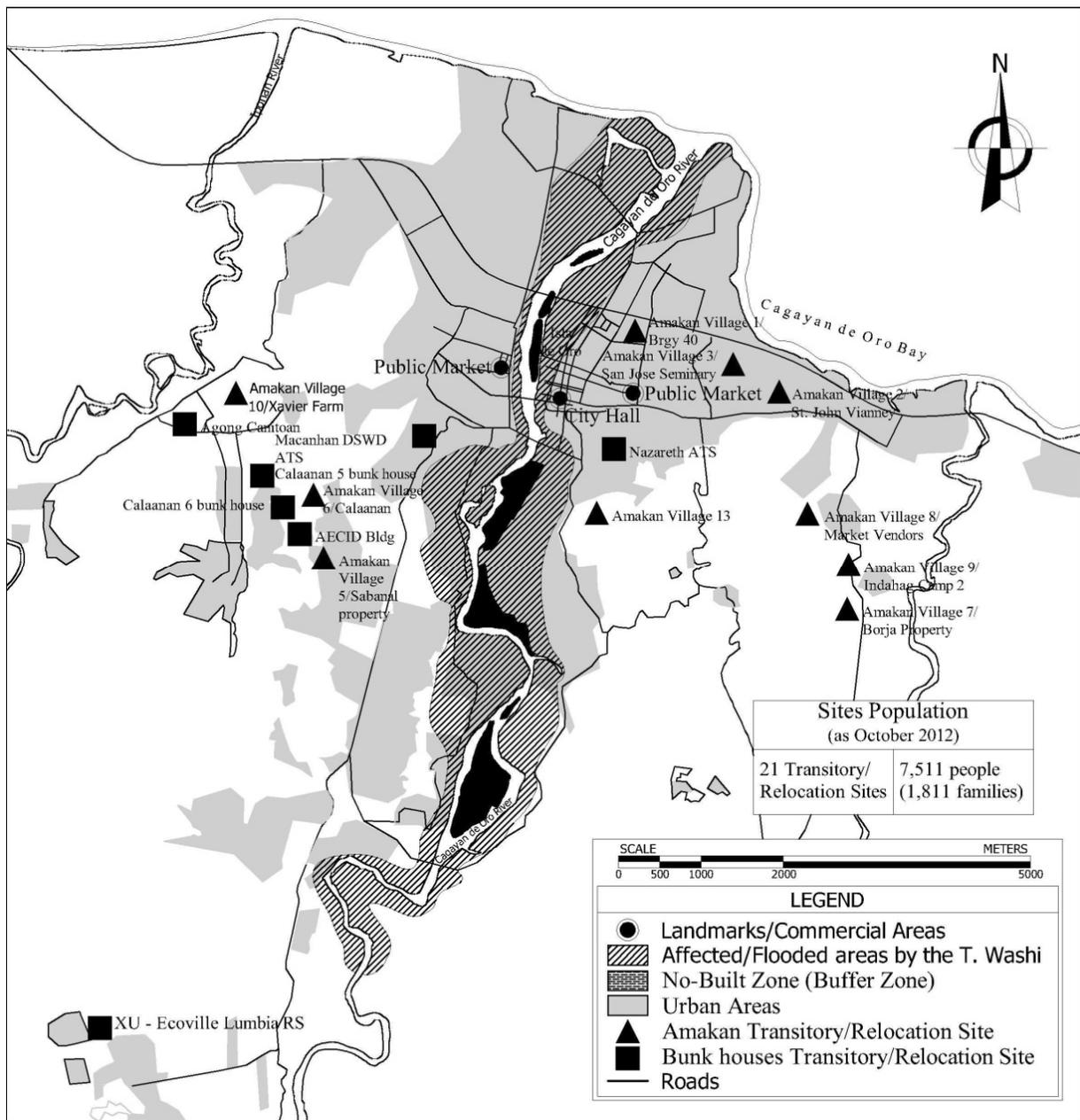
Owner	Type of Agreement	Conditions	Endorsed by
<b>City of Cagayan de Oro (LGU)</b>	Verbal agreement for temporary use	Prioritize the construction of permanent housing, that can result on an early closure of transitional settlements	City mayor
<b>Private</b>	Memorandum of agreement between the Archdiocese of Cagayan de Oro and land owner	Commitment to close the site and not allow illegally permanent settlement of beneficiaries	Land owner
<b>Church</b>	Verbal agreement after request from Archbishop	None	Archbishop

*Source: Catholic Relief Services (Hirano, 2012)*

One of the main factors governing the provision (or not) of transitional shelters is the time that the affected people would stay in evacuation centers or tent camps until construction of permanent housing would be completed. From this perspective, it sounds appropriate to provide a temporary alternative with essential basic shelter needs as the victims worked to restore their communities. However, this assumption is more theoretical than realistic, because there is no warranty that the transitional shelters will meet people’s needs. In fact, depending on the context, transitional shelters can even hinder long-term recovery because when the displaced

communities are allocated in transitional settlements, they cannot fully start a new life, being aware that they will be moved to a permanent settlement sooner or later. Additionally, transitional shelters can delay the construction of permanent housing because they relieve the urgency for immediate allocation of the affected people, who must stay there longer than expected, uncertain about their future.

In Cagayan de Oro, the transitional settlements were located in different urban and peri-urban areas (Figure 4.6). Some transitional settlements were considered for the construction of permanent housing, such as the Calaanan site and Xavier Ecoville; however, the rest of the victims allocated to temporary shelters had to face a subsequent relocation and consequently the stress that this process implies.



**Figure 4.6: Transitory/relocation sites in Cagayan de Oro**

*Source: Author, based on Hirano (2012)*

There are two types of transitional shelter: the IOM-built “bunkhouses” (Figure 4.7) and the CRS-built “amakan houses” (Figure 4.8); both use available timber and local materials. The amakan houses adopted a locally sensitive approach, inspired by the traditional Filipino house, which is called “bahay kubo” (Figure 4.9).



**Figure 4.7 (a) and (b): “Bunkhouses,” transitional housing built by IOM.**

Source: Author



**Figure 4.8 (a) and (b): “Amakan houses,” transitional housing built by the Catholic Relief Services.**

Source: Catholic Relief Services, Philippines



**Figure 4.9: (a) Traditional Filipino house, the “bahay kubo.” Source: Folk Architecture (Perez et al., 1989).**

**(b) Traditional house built near resettlement sites in Cagayan de Oro. Source: Author**

For camp management, the DSWD created the post of camp manager, which was meant to be the connection among the NGOs, DSWD, and the IDPs (internally displaced people). The camp managers were responsible for ensuring the smooth running of the camp, addressing problems when they appeared, collecting and disseminating information, and tracking the population's needs and problems.

#### **4.4.2 Planning and Design**

##### **4.4.2.1 Interagency coordination mechanism**

Various coordination bodies were established in order to organize the recovery efforts, communication, and collaboration among different stakeholders in each stage of the post-disaster response, and specifically for immediate and long-term housing recovery.

##### **a. The Philippines' "permanent clusters"**

The National Disaster Coordination Council (NDCC) is the main government coordination body for post-disaster response at the national and regional levels; it is responsible for providing overall guidance in response to a disaster and liaising with the international humanitarian community. In 2007, NDCC decided to institutionalize the cluster mechanism in the Philippines' disaster management system. This had been set in 1991 by UN and non-UN humanitarian organizations, after which it was internationally used to coordinate and deliver humanitarian assistance after disasters. The cluster approach is currently used in 30 countries. Through the adoption of the cluster approach in the Philippines, the eleven clusters that were designated are led by government departments in collaboration with international humanitarian agencies. Among the clusters initially established was the Emergency Shelter, which was led by DSWD and the International Federation of the Red Cross and Red Crescent (IFRC)/UN Habitat.

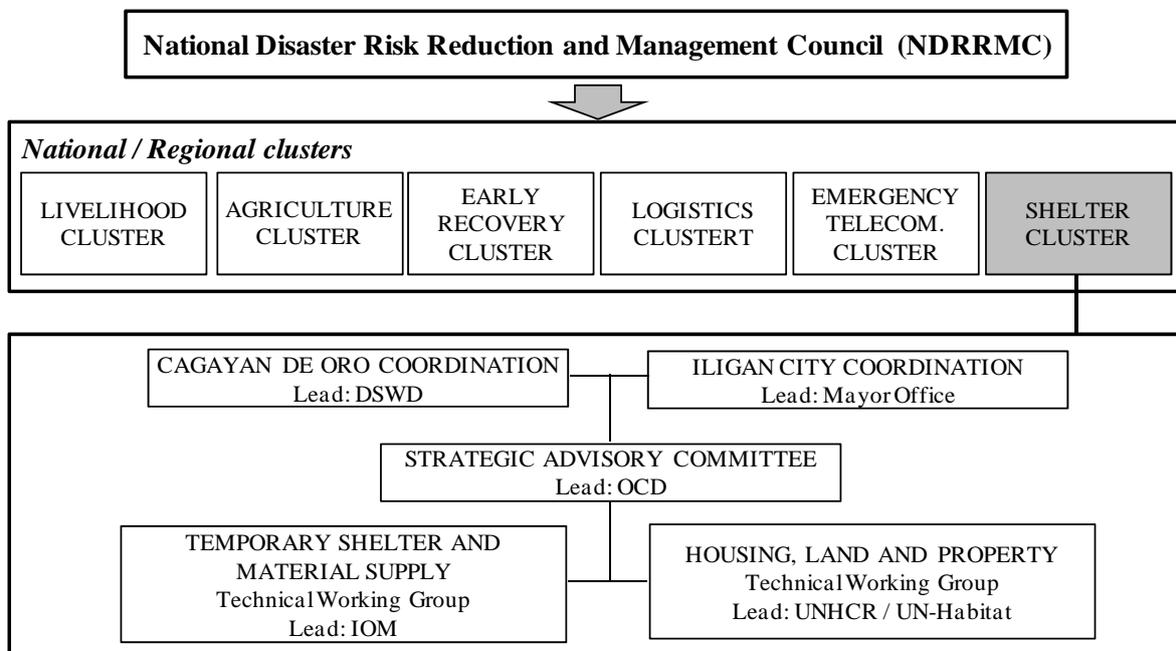
In 2011, the National Disaster Risk Reduction and Management Council (NDRRMC) and Humanitarian Country Team (HCT) created the "Technical Working Group" in order to improve coordination in response to the needs of people affected by disasters. The group was formed by government agencies and members of the HCT, including UN agencies, OXFAM, and IFRC. This group contributes to the decision-making process in terms of the cluster set-up in the Philippines and to the coordination of assistance in response to a particular disaster (Vega 2012).

The first coordination bodies activated were the post-disaster response clusters. Each cluster is essentially a "sectoral group" (e.g., health, shelter, water and sanitation, food security) that has been established in order to fill the gaps and to ensure adequate preparedness and response. These clusters supported different aspects of the early recovery, whereas the shelter cluster was responsible specifically for coordinating the early shelter assistance.

**b. Strategic Advisory Committee (SAC)**

From the beginning of the relief operation, the government of the Philippines provided emergency assistance to those affected by the storm and supported coordination efforts through various agencies at the local, regional, and national levels. The government agency responsible for the coordination of assistance during the emergency phase is the Department of Social Welfare and Development (DSWD). DSWD is also in charge of addressing the needs of informally settled families during the recovery phase, while the NHA is responsible for the long-term needs of formally settled families.

In terms of shelter, both DSWD and the Office of Civil Defense (OCD) in Region 10 have played a key role in assuming leadership and ensuring appropriate coordination with the international humanitarian community. DSWD is the shelter cluster’s designated government counterpart, and its roles include liaising with the government emergency agencies and chairing the cluster’s meetings in Cagayan de Oro. OCD is in charge of leading the cluster’s SAG (see Figure 4.10).



Acronyms:

DSWD: Department of Social Welfare and Development

IOM: International Organization for Migration

OCD: Office of Civil Defense

UNHCR: United Nations High Commissioner for Refugees

UN-Habitat: United Nations Human Settlements

Programme

**Figure 4.10: Coordination bodies for early housing assistance**

Source: Author, Modified from Philippine Red Cross

**c. Local Inter-Agency Committee for Permanent Housing (LIAC)**

In order to organize the decisions and actions for leading the recovery of the built environment, mainly permanent housing, the LGU of Cagayan de Oro established the Local Inter-Agency Committee for Permanent Housing (hereafter LIAC), of which the city mayor was the chairman. The LIAC became the venue for stakeholders in coordinating and agreeing upon approaches to post-disaster housing (DSWD, 2012). NHA-

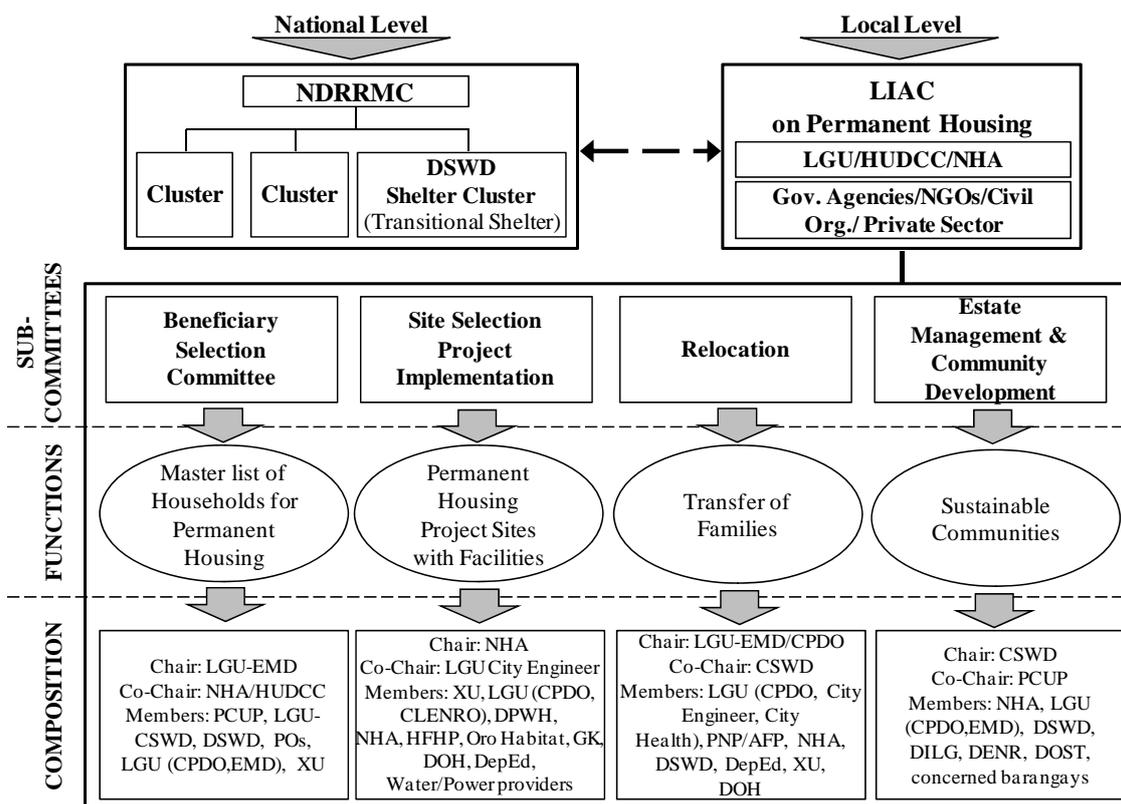
Region 10 served as the secretariat for LIAC.

The main responsibilities for LIAC (Annawi, D., 2014) are as follows:

- To enable all housing project stakeholders to participate in the planning and implementation of a permanent housing program with basic facilities and community services
- To integrate and maximize available resources from all participating entities, adopting a common term of reference for site planning and development that would include a menu of housing options and assistance.
- To formulate the implementing rules and code of policies for beneficiary selection
- To create working sub-committees on social preparation, beneficiary selection, arbitration, and awards
- To approve the master list of qualified beneficiaries
- The resolution of issues elevated by the sub-committees
- To define and agree on the structure for coordination, authority levels, and delivery of services
- To ensure adherence to the provisions of the 1992 Urban Development and Housing Act (RA 7279) on the relocation and resettlement of families
- To monitor and evaluate the implementation of plans, programs, and projects as well as the operations of the sub-committees and to submit regular reports to LGU, HUDCC, and NHA.

The different stakeholders involved in reconstruction and recovery after Typhoon Washi participated in the LIAC efforts toward relocation and construction of permanent housing. In order to organize the actions taken in the process, four sub-committees were established, and the organizations and agencies were allocated in each of them according to their capacities and expertise. The functions, structure, and participating actors in LIAC are shown in Figure 4.11.

The LIAC was the coordinator and decision maker for resettlement and permanent housing construction, as well as the mediator between local and national government offices, and between the humanitarian and private sectors. The LGU of Cagayan de Oro has now taken over the coordination and the different offices involved. Later in August 2012, after a change in the local administration, further coordination and decision making was given over to the “Shelter and Housing Multi-Sectoral Task Force,” which was created specifically to undertake the LIAC functions. LIAC is still active, but the meetings are held less frequently than before.



- Acronyms:
- CLENRO:* City Local Environment and Natural Resources Office  
*CPDO:* LGU City Planning and Development Office  
*CSWD:* LGU City Social Welfare and Development Office  
*DENR:* Department of Environment and Natural Resources  
*DepEd:* Department of Education  
*DILG:* Department of the Interior and Local Government  
*DOH:* Department of Health  
*DOST:* Philippines Department of Science and Technology  
*DSWD:* Department of Social Welfare and Development  
*EMD:* LGU Estate Management Division Office  
*GK:* Gawad Kalinga
- HFHP:* Habitat for Humanity Philippines  
*HUDCC:* Housing and Urban Development Coordinating Council  
*IOM:* International Organization for Migration  
*LGU:* Local Government Unit  
*LIAC:* Local Inter Agency Committee  
*NDRRMC:* National Disaster Risk Reduction and Management Council  
*NHA:* National Housing Authority  
*OCD:* Office of Civil Defense  
*PCUP:* Presidential Commission for the Urban Poor  
*PNP:* Philippine National Police  
*XU:* Xavier University

**Figure 4.11: Functions and stakeholders participating in LIAC sub-committees**

Source: Author, based on NHA LIAC documents

### 4.2.3 Definition of reconstruction approaches

The NHA reported the alternatives for housing assistance agreed upon in LIAC meetings for formal and informal settlers as presented in Table 4.4:

**Table 4.4: Housing Assistance Alternatives for Affected Households in Cagayan de Oro**

Housing status	Housing alternatives	Agencies
<b>Informal settler families (ISFs)</b>	Within 20m danger areas Resettlement program with housing components and facilities	NHA/LGU & others involved
<b>Formal settler families</b>	Beyond 20m danger areas Housing material assistance Site upgrading (subject to geo-hazard clearance)	NHA/LGU & others involved NHA/LGU/DENR
<b>Formal settler families</b>	Titled properties Housing loan Housing material assistance Site upgrading (subject to geo-hazard clearance)	HDMF/NHA/LGU and others NHA/LGU & others involved NHA/LGU & others involved

Source: NHA

The World Bank (Jha, A. K., & Barenstein, J. D., 2010) defines five types of post-disaster housing reconstruction approaches, which were explained in detail in Chapter 2:

- *Cash approach (CA)*: Financial assistance without technical support for repairs and reconstruction of damaged houses.
- *Owner-driven reconstruction (ODR)*: Conditional financial assistance, together with regulations and technical support for reconstruction of houses, which is given directly to households.
- *Community-driven reconstruction (CDR)*: Financial and/or material assistance channeled through community organizations and promoting their involvement in decision making and in managing reconstruction.
- *Agency-driven reconstruction in-situ (ADRIS)*: Refers to an approach in which a governmental or non-governmental agency hires a construction company to replace damaged houses in their pre-disaster location.
- *Agency-Driven reconstruction in relocation site (ADRRS)*: Refers to an approach in which a governmental or nongovernmental agency hires a construction company to build new houses in a new site.

From these five approaches three are compatible with the modalities adopted for the recovery of Cagayan de Oro:

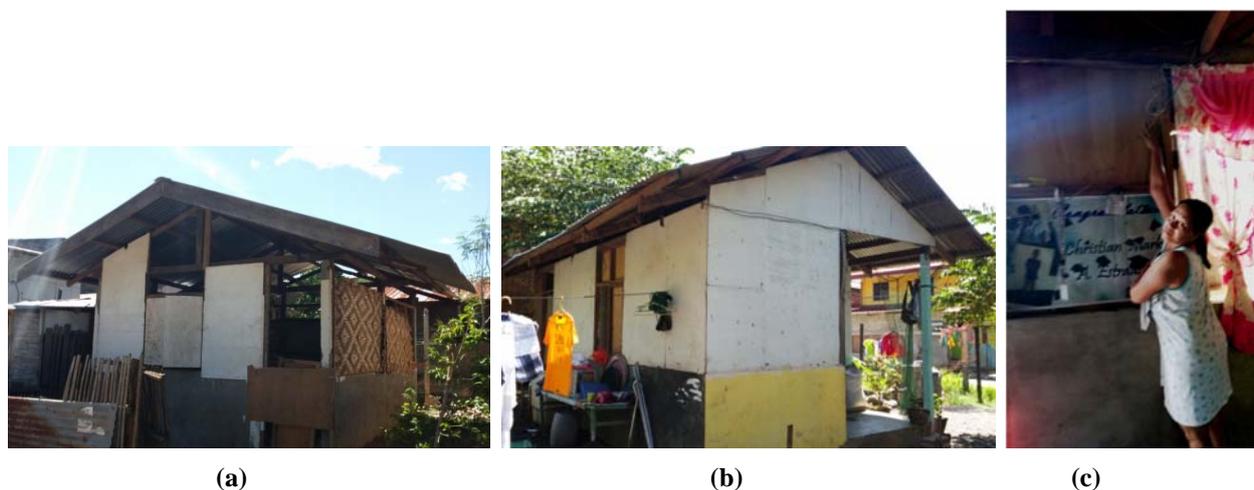
**a. *Community-driven reconstruction (CDR)*:**

Financial assistance is channeled through “neighborhood associations for shelter assistance” or NASA or LGUs that ideally are active in decision making and in reconstruction management. This type of housing reconstruction/resettlement is carried out through the CMP of the Social Housing Finance Corporation (SHFC). The focus of CMP is helping ISF communities to acquire land tenure security over the private lands they have been occupying. In other words, the affected communities are encouraged to organize and formally acquire the land and to ask for loans for the construction of houses.

In response to Typhoon Washi, SHFC set up and piloted an “express lane” facility in Cagayan de Oro to fast track the processing of CMP loan applications from disaster affected families. Despite the shortened process, it took about two years for an application to be approved (Annawi, D. et al., 2014), owing to the multiple requirements. For this reason, only 2% of the housing needs after Washi have been covered through this system so far (Table 4.5).

***b. Agency-Driven reconstruction in-situ (ADRIS);***

In Cagayan de Oro, the Philippine Red Cross (PRC) and IOM did onsite reconstruction for the destroyed or severely damaged houses of residents in affected areas. The main criterion for being awarded this assistance was for the residents to have legal ownership of the land. In central Cagayan de Oro, besides the no-build zones, the areas vulnerable to flooding were also demarcated; hence, those residents who have formal ownership or title of this land could not be relocated. So far the number of houses built following this modality represents 11% of the total planned (Table 6).



**Figure 4.12: (a) Typical house built by PRC. (b) Damaged house repaired with improvised materials. (c) Level of water during Typhoon Bopha in Dec. 2012**

*Source: Author*

The PRC provided housing with mixed materials (concrete and timber), as shown in the Figure 4.12. Such can be severely affected by future typhoons or storms because the vulnerabilities rising from the inappropriate location remain. This was evident when TS Bopha hit Cagayan de Oro on December 2012 (one year after Washi), and many of these houses were flooded and damaged.

***c. Agency-driven reconstruction in relocation site:***

This modality implies that for the resettlement of Washi survivors whose former homes were located in no-build zones or high risk areas, the priority is to allocate them to safer areas. This has been the main focus for housing provision after Washi, where 86% of the needed houses have been built in relocation sites (Table 6). This approach has resulted in a faster process than the other approaches (the first group of beneficiaries was transferred 4 months after the disaster). The approach also involves different stakeholders from land providers, donors or funders, governmental agencies and NGOs, and implementing agencies or constructors.

**Table 4.5: Post-Typhoon Washi Housing Reconstruction Approach**

Approach	Housing Planned	
	No.	%
Community-driven reconstruction	258 units	2%
Agency-driven reconstruction in-situ	1,268 units	11%
Agency-driven reconstruction in relocation site	9,699 units	86%
Totals	11,225 units	100%

Source: DSWD, NHA, LGU

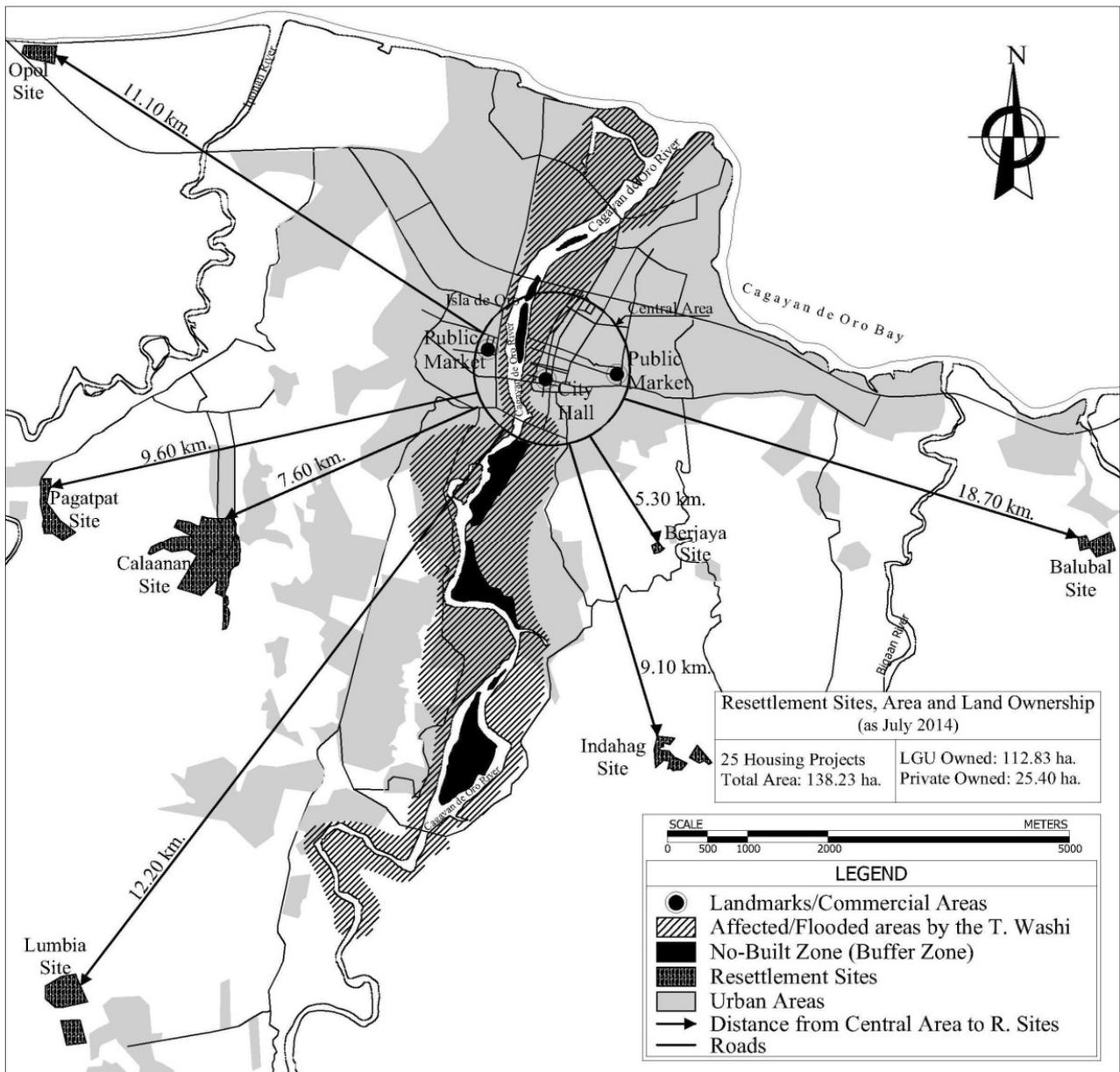
#### **4.4.2.2 Land identification and site planning**

Prior to the disaster, the city had a draft of a relocation plan and had purchased lands for housing informal settlers in a form of “land banking” with the support of NHA (specified in The Urban Development and Housing Act [UDHA] of 1992), through which LGUs are encouraged to purchase land to be used for social housing and emergency. After the disaster, the priority was to shelter the victims, and these sites were proposed as resettlement sites.

The LGU, in coordination with the members of LIAC, then considered the availability of possible resettlement sites. Having public land available was a great advantage in responding to the need for relocating people in Cagayan de Oro. Additionally, private institutions (such as Xavier University and the Archdiocese of Cagayan de Oro) that provided land for emergency shelters or tent camps expressed their willingness to donate land for permanent housing. However, it is necessary to mention that this land is in unfavorable locations, away from the main commercial centers (e.g., the Cogon and Carmen public markets) and city facilities in the city center (Figure 4.13); this aspect, therefore, is a challenge to restoring the livelihood and development of the displaced communities.

Once it had been determined to use the available land for resettlement, the first site designated was the Calaanan resettlement site in the southwest part of the city, approximately 7.5 km from the center. The resettlement process at this site serves as the reference for analyzing the following stages. The Department of Environment and Natural Resources was responsible for the land classification and designation of safe areas for the construction of housing. Other sites were simultaneously designated for resettlement, and the land development works started under the responsibility of the LGU and DPWH.

The development of the plans and design of the sites was the responsibility of the LGU; however, for some sites, it was done in coordination with the National Housing Authority (hereafter NHA), especially those wherein the houses were funded by the NHA. In planning for sites on privately owned land, decisions were made in coordination with the implementing agency (constructor) and the LGU.



**Figure 4.13: Resettlement sites in Cagayan de Oro**

Source: Author, based on master plan from LGU

#### 4.4.2.3 Funding of the Resettlement projects

The funds for resettlement were provided by different agencies (governmental, NGOs, and private corporations) according to the agreement between LGUs, implementing agencies, and donors (the details are specified in Table 4.6).

For the sites wherein the housing funds were provided by NHA and DSWD, the total cost per housing unit is approximately PhP 110,000.00 (approximately USD 2,500); 64% (PhP 70,000.00) were provided by DSWD, being considered as a donation for beneficiaries; and the remaining 36% (PhP 40,000.00) was provided by NHA. It is not clearly defined if this is a donation or if the beneficiaries will have to pay it back; NHA officials are still considering this question.

**Table 4.6: Housing Reconstruction/Resettlement Funding**

	<b>Items</b>	<b>Unit</b>	<b>Cost</b>	<b>Responsible Agency</b>
<b>A. LGU-Owned land</b>	1. Raw land cost	Per m <sup>2</sup>	None	LGU
	2. Land development. cost (50 m <sup>2</sup> per house)	Per house (unit)	Php 47,000.00 (Developed @ Php 600 per m <sup>2</sup> x Gross Project Area)	NHA
<b>B. NHA resettlement</b>	1. Developed lot (50 m <sup>2</sup> )	Per lot	Php 100,000.00	NHA/developer
	2. Housing unit cost (21 m <sup>2</sup> ; Duplex)	Per house (unit)	Php 110,000.00 Php 40,000.00 (if it is funded with DSWD)	NHA/DSWD/LGU/ developer
	3. Water	Per house (unit)	Php 4,000.00	NHA/developer
	4. Power	Per house (unit)	Php 6,000.00	NHA/developer
	5. Community facilities (optional)	Per house (unit)	Php 20,000.00	Concerned agency
<b>C. DSWD</b>	1. Housing unit cost	Per house (unit)	PhP 70,000.00	LGU/NHA/LGU/ developer
<b>D. Implementing Agencies (NGOs, others)</b>	1. Housing unit cost	Per house (unit)	Approx. PhP 110,000.00	NGOs, imp., agencies, private sector
	2. Community facilities	Unit	Not specified	

1 USD = 44.5 PhP as of December 2014.

Source: NHA, DSWD, LGU

#### 4.4.2.4 Implementing agencies' screening and land allocation

The LGU, through LIAC meetings, designated the sites and the land, and assigned an implementing agency or partner (housing builder) according to their capacities and the number of houses that can be built with their available budget. The builder agencies were then required to submit the needed documents to obtain the building permits, based on the minimum requirements for social housing specified in both the National Building Code of the Philippines and the Minimum Design Standards and Requirements for Economic and Socialized Housing Projects (BATAS PAMBANSA BLG.220).

#### 4.4.2.5 Housing design and construction permits

In LIAC meetings, the LGU and other government agencies (such as the NHA and DSWD) provided guidelines for the implementing agencies to follow in order to avoid substantial differences between housing built by various agencies that could cause problems for the beneficiaries (see Table 4.7).

**Table 4.7: Standards for Housing Design Parameters**

Parameters	Standards	Regulated by
Budget	PhP 110,000.00 (approx. USD 2,456.00)	LIAC
Lot size	Approximately 50.00 m <sup>2</sup> .	LIAC, Standards for
Floor area	Approximately 21.00 m <sup>2</sup> .	Economic and Social Housing HLURB (2008)
Housing design	Variable depending on funding agency (DSWD and/or NHA)	Variable
Housing materials	Variable	
Water supply	<ul style="list-style-type: none"> <li>• Mandatory connection to appropriate public water system.</li> <li>• If public water supply system is not available, the developer shall provide for an independent water supply system within the subdivision project.</li> </ul>	National Building Code DPWH (2005)
	<ul style="list-style-type: none"> <li>• Minimum quantity required shall be 150 liters per capita per day.</li> </ul>	Standards for Economic and Social Housing
Electrical power supply	<ul style="list-style-type: none"> <li>• Mandatory individual household connection to primary and alternate sources of power if service is available in the locality.</li> </ul>	HLURB (2008)
Drainage system	<ul style="list-style-type: none"> <li>• The drainage system for economic and socialized housing projects shall be made of concrete lined canal with adequate capacity and with load bearing cover.</li> </ul>	Philippine Electrical Code
Sewage disposal system	<ul style="list-style-type: none"> <li>• Individual septic tank conforming to the standards and design of the Sanitation Code of the Philippines.</li> </ul>	National Plumbing Code

Owing to the differences in housing design criteria between NGOs and other implementing agencies, the criteria adopted by major agencies working in Cagayan de Oro are as follows:

- Habitat for Humanity Philippines (hereafter HFHP) adopted housing typologies because of its close relationships with different government agencies, such as “quadruplex,” or row houses, in which the priority was the construction of as many houses as possible. This NGO mostly followed established designs by DSWD and NHA, modifying them in coordination with these agencies.
- For the design of the houses built by the NGO Gawad Kalinga (hereafter GK), decisions about housing typology were referred to the standards for NHA and DSWD houses; however, GK finally adopted its own design for row houses.
- For the local NGO Oro Habitat (hereafter OH), the design was provided by HFH because, in this case, OH acted as a contractor for HFH, which also supervised the quality and progress of the construction of the houses.
- The only criterion used for houses provided by the Filipino-Chinese Chamber of Commerce (hereafter FCCC) was minimum floor area. The design itself was provided by the supplier in China, which sent qualified personnel for assembling the houses and training skilled local workers.

The selection of the materials, in most cases, accommodated conventional masonry with galvanized sheets for the roofing. The exceptions were the houses from the FCCC, which decided to provide pre-fabricated houses because of their practicality and the organization's limited capacity to supervise the project.

#### **4.4.2.6 Beneficiaries' screening and selection**

Along with preparation for construction, beneficiaries were selected for houses in resettlement sites. The DSWD worked in coordination with the LGU (EMD) to define a list of qualified beneficiaries to be granted permanent housing.

DSWD followed its guidelines for beneficiary selection in reviewing the list of affected families and individuals. Camp managers were assigned to interview families on the list to verify their situation and discuss relocation options. The list was then turned over to the City Estate Management Division (EMD) for further validation. EMD eventually absorbed the camp managers into its staff pool, enabling the effective carryover of database management and continuation of community support in resettlement sites.

Priority beneficiaries were those with totally damaged houses who were living in temporary shelters and tent camps. People in the evacuation centers were provided a choice of resettlement sites, and beneficiaries also said that it was possible to request a change in site.

#### **4.4.3 Construction**

##### **4.4.3.1 Land development and construction of infrastructure**

The LGU was responsible for preparation of the land and, in coordination with the Department of Public Works and Highways (DPWH), worked on restoring infrastructure (roads, public water, and drainage lines).

##### **4.4.3.2 Housing construction**

The construction of the houses was managed directly by each implementing agency. HFHP worked through their contractors or partners (which could be local construction companies or NGOs, such as OH). GK managed the construction directly, at the same time attempting to promote beneficiaries' participation during the construction. This was not possible, however, because of time constraints. OH built houses under the permanent supervision of HFHP; however, the proposed number of houses is not completed yet because of deficiencies in the quality of the land. FCCC directly contacted the supplier of the pre-fabricated housing in China, and this company sent personnel who could work together with local workers on the assembling of the housing units; consequently, the construction time was shorter than usual. Table 4.8 shows the progress of permanent housing construction in Cagayan de Oro as of July 5, 2014.

**Table 4.8: Summary of Permanent Housing Progress in Cagayan de Oro**

Approach	Constructor	Land Owner	Funding	Housing Typology	Houses Planned	Houses Finished	Occupied
Agency-driven reconstruction in relocation site (ADRRS)	Habitat for Humanity, Philippines	LGU, private, Xavier University, Archdiocese CDO, religious org.	DSWD, NHA, Lutheran World Relief, private corporations, JICA, relig. org.	Quadruplex/duplex/row house/single detached	6,848 units	4,630 units	3,478 units
	Gawad Kalinga	LGU, private	Private corporations	Row house/single detached	1,418 units	824 units	824 units
	Oro Habitat	LGU	Private corporations	Row house	276 units	240 units	240 units
	Filipino-Chinese Chamber of Commerce	LGU	FCCC	Row house (pre-fabricated)	600 units	600 units	285 units
	LGU	LGU	LGU	Row house	114 units	74 units	74 units
	Various religious org.	Archdiocese CDO, other relig. org.	Various religious org., other donors	Single detached	403 units	226 units	197 units
	Rotary-CDO	LGU	Rotary-CDO	Quadruplex/duplex	40 units	20 units	18 units
Community-driven reconstruction (CDR)	SHFC/DSWD	CMP	DSWD	Single detached	178 units	0 units	Being prepared
	DSWD	Various	NASA-DSWD	Single detached	80 units	70 units	37 units
Agency-driven reconstruction in-situ (ADRS)	Red Cross	IDPs	Red Cross	Single detached	1,204 units	1,204 units	1,204 units
	IOM	IDPs	IOM	Single detached	64 units	64 units	64 units
<b>TOTALS</b>	<b>Land area 90.48 has. + in process to purchase + IDPs owned land</b>		<b>No. of houses needed 8,559 units</b>		<b>11,225 units</b>	<b>7,952 units</b>	<b>6,421 units</b>

*Source: Based on DSWD, NHA, LGU*

### 4.3.3 Provision of facilities

Housing construction was begun simultaneously with work on the infrastructure, but in many cases, the houses were completed before the infrastructure; thus, residents were without basic services (like drainage and water supply). For later projects, the approach will be to provide the infrastructure first and start constructing

the houses later.

In terms of individual facilities, the National Building Code of the Philippines requires septic tanks as part of sanitation, which each implementing agency has to provide. Other services, like water and electricity, should be arranged through individual applications to the respective companies by the residents after they are allocated in the houses. Many of the first sites have communal faucets for their water supply with no less than 10 households using each one for free. Later, the NGOs that built the houses and the LGU have supported the residents' applications for individual connections, for which they have to pay individually. However, this newer arrangement has been a factor for delays in the process, because the whole community needs to be organized and accept the conditions of the water district that provides the service, owing to the limited financial resources of the residents. Electric connections have been provided individually to each household; however, the Cagayan Electric Power and Light Company (CEPALCO) has not finished all the public connections because of the remote location of the settlements.

Community facilities and services—such as communal or barangay centers, health centers, schools, multi-purpose covered courts, police stations, and others—were provided after the houses were completed and the residents allocated. The responsibility for providing these facilities varies from the corresponding government agency to the private sector or NGOs.

#### ***4.3.4 Project monitoring and supervision***

Monitoring and technical supervision of the projects was done by each NGO, constructor, or any other implementing agency. The LGU monitored the progress of inspections and the number of houses completed because of the urgency in allocating the affected communities. Additionally, other agencies such the NHA or DSWD inspected the projects they funded in coordination with the implementing agency or NGO (specifically HFHP and GK).

Both the regular inspections and the monitoring committee inspections (in which different LGUs, governmental agencies, and NGOs participate) focused on the physical progress of the housing construction; in other words, the main concern was the number of houses completed rather than the quality of the construction.

#### ***4.4.4 Use***

##### ***4.4.4.1 Beneficiaries' allocation***

After the completion of permanent housing, the LGU allocated groups of beneficiaries to the new sites according to the progress of completed houses. The residents were granted permission to live in the built permanent housing through usufruct, whereby the beneficiaries have the right of residence, but the government has the ownership of the lot and the house (in cases of privately owned land, the owners of the land own the house).

The first batch of houses was completed 4 months after the disaster and was assigned to beneficiaries, who transferred in April 2012 when they were presented with a Certificate of Occupancy. Those who received the certificates were also asked to sign a waiver for giving up rights to their original settlement along the river. After those with totally damaged houses, second priority beneficiaries are those with partially damaged houses who are located within danger zones, along with renters and sharers.

#### 4.4.4.2 Post-occupancy support

Once the communities were resettled in the new sites, different community support activities have been implemented. One of the main concerns is the creation of livelihood opportunities. The promoters of these activities are the LGU, the DSWD, and the NGOs who built the houses.

#### 4.4.4.3 Maintenance

Once the residents have moved into the houses, they are responsible for maintaining them. Implementing agencies (NGOs) considered some flexibility in the design of the houses, mainly the construction of a mezzanine to be used as sleeping or storage space, or the roofing of service areas at the back of the core houses. However, such houses were considered as built by residents or in collaboration with other NGOs or civil organizations.

#### 4.4.4.4 Change of use/adaptation/modification

Finally, the residents began to build extensions of the houses based on their needs (Figure 4.14), although in the agreement signed prior to their transfer to the houses, it is specified that the construction of these extensions is not allowed, except for lofts.



**Figure 4.14 (a) and (b): Informal extensions built by residents in resettlement sites.**

*Source: Author*

As part of community support in resettlement sites, some NGOs provided mezzanines or lofts that can be used as bedrooms or storage space. In settlements where there is no access to potable water, NGOs provided water collection tanks, each of which is shared by two housing units (Figure 4.15).



**Figure 4.15: (a) Mezzanine built by the NGO KEDRN. (b) Rainwater collection tanks in resettlement sites provided by other NGOs.**

*Source: Author*

## **4.5 Outcomes and challenges**

During the resettlement process in Cagayan de Oro, various issues that emerged provided both positive and negative feedback for the management and progression of resettlement and changes in the urban configuration.

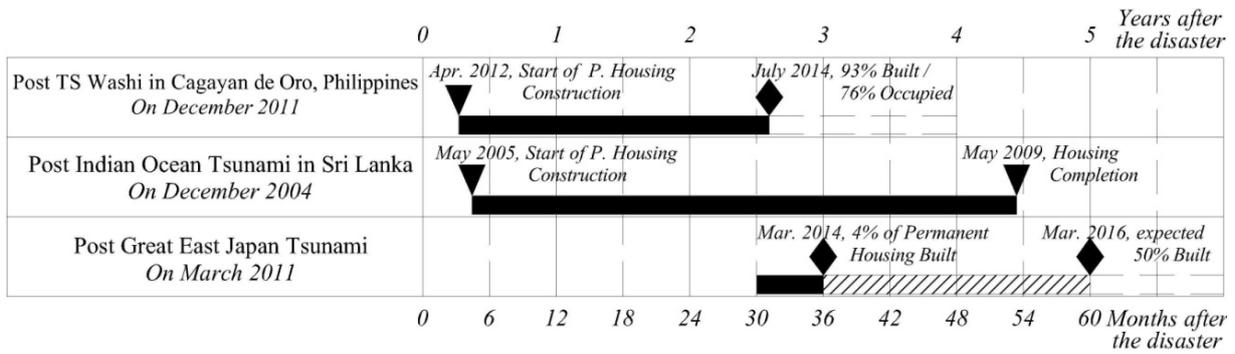
### **4.5.1 *Disaster as a trigger for resettlement***

The squatter areas established in Cagayan de Oro were located in highly vulnerable areas, whose residents always suffered from floods, evidencing a lack of pre-disaster measures to assure the safety of these communities. National agencies and local researchers had warned of the possible effects of a typhoon with the intensity of Washi, but the LGU failed to act. Thus, resettlement was disaster induced and was thereby unavoidable.

It is still necessary to plan for future resettlement and protection projects for vulnerable areas outside the no-build zones because the residents formally occupy the land and are not the first priority for resettlement projects.

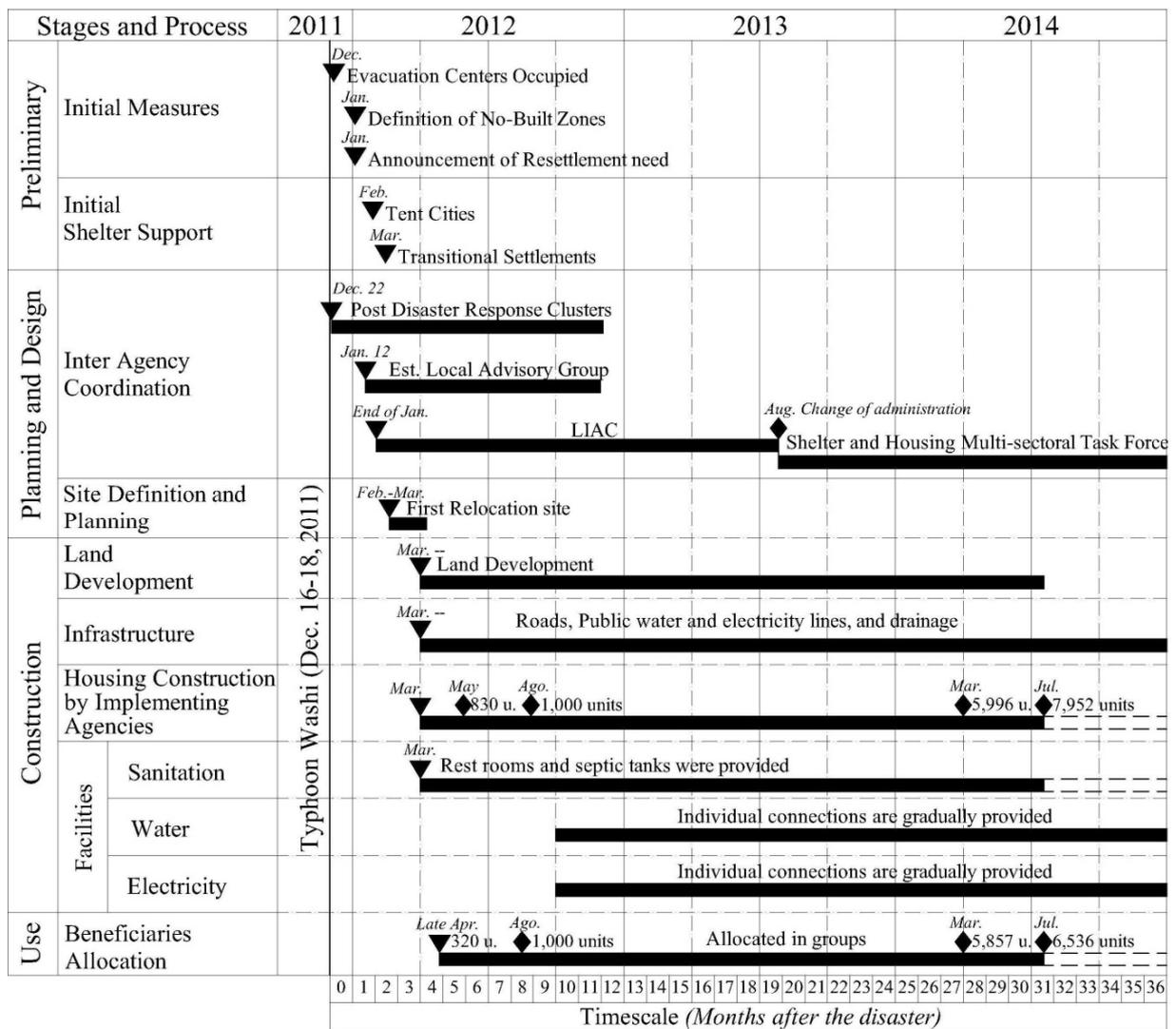
### **4.5.2 *Timeliness***

The first batch of beneficiaries was transferred to permanent houses on April 28, 2012, 4 months after the Typhoon Washi, during the visit of President Aquino. This occurrence was unusually fast for post-disaster resettlement. For instance, according to the reconstruction and recovery plans for resettlement from the Great East Japan Tsunami that hit the Tohoku Region in March 2011, construction of permanent housing was specified to begin 2 years after the disaster (Reconstruction Agency, 2014). In Sri Lanka also, after the Indian Ocean Tsunami, the construction of the first group of permanent housing started 5 months after the disaster (Choi C. Y. and Honda R., 2014; see Figure 4.16).



**Figure 4.16: Comparison of post-disaster resettlement projects in Cagayan de Oro, Sri Lanka, and Japan**

Analyzing the timeline of the reconstruction and resettlement after Washi (Figure 4.17), the immediate measures after the disaster done in a timely fashion, the priority being to provide permanent housing; however, an overlapping of stages occurred that in normal times, without the pressure and stress caused by a disaster, would be considered a priority. For instance, basic services and infrastructure should be finished before residents move into the permanent housing.



**Figure 4.17: Timeline of post-Washi housing resettlement process**

### 4.5.3 Land Availability

One of the challenges in the resettlement of communities affected by disaster is to find land for the new settlements. Thus, it was remarkable that previous local administrations in Cagayan de Oro had purchased land through a land banking system. As a result, the availability of land allowed for a quick start to the construction of permanent houses in resettlement sites 6 months after the disaster and the allocation of the first groups of residents after a year. The situation was different in the city of Iligan, also severely affected by Washi, where the LGU faced a lack of suitable land available for the new settlements.

However, because of the pressure for quick results, some steps were omitted, such as appropriate land classification in terms of safety and suitability for housing. As one example, houses located in landslide-prone areas were severely damaged during the rainy seasons in some relocation sites. This forced a second relocation of the families allocated to these houses.

### 4.5.4 Land Suitability

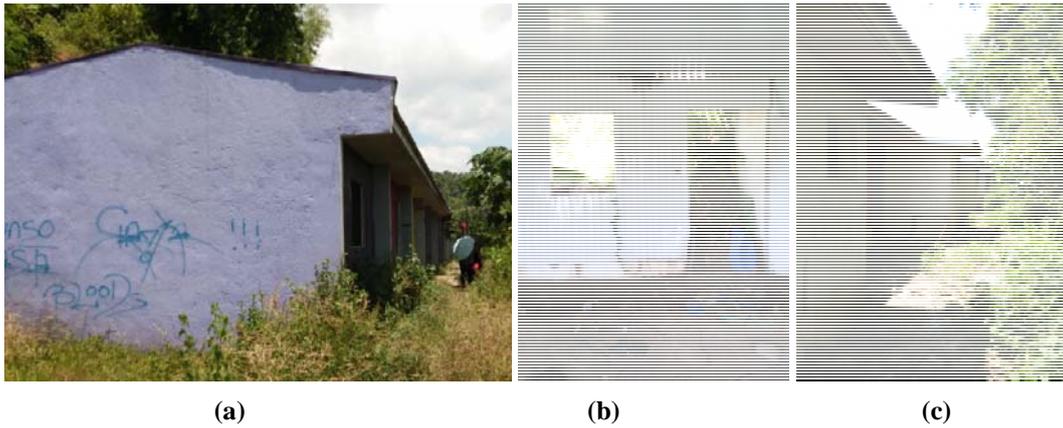
Geo-hazard assessment, especially for relocation sites developed earlier, has been mostly viewed as a compliance step and not as a critical aspect of ensuring that relocated residents were not unnecessarily exposed to hazards. This step is often skipped or shortcuts taken, especially if the site is owned by local government, and because of time constraints and limited staff within the Mines and Geosciences Bureau (MGB). MGB in Region 10 has only two geo-hazard specialists currently working on 44 pending geo-hazard assessment applications. The MGB policy for geo-hazard assessment needs stricter implementation, and MGB needs greater support to do this.

The pressure to develop sites and built housing in the shorter term promoted quick construction of houses without confirmation of the appropriateness and safety of the land. For instance, houses that were built in landslide-prone areas (hills) at the Calaanan site were severely damaged during the heavy rains and typhoon seasons: 15 structures built by the Filipino-Chinese Chamber of Commerce (Figure 4.18) and 22 built by the LGU (Figure 4.19) are considered not livable. Consequently, the residents had to be transferred again to temporary housing and later to an available housing unit at the same or different site.



**Figure 4.18 (a) and (b): Fifteen abandoned houses built by FCCC in a landslide-prone area**

*Source: Author*



**Figure 4.19 (a), (b), and (c): Abandoned houses (22) built by LGU and affected by landslide at the Calaanan relocation site, Barangay Canitoan.**

*Source: Author*

#### **4.5.5 Lack of Technical Supervision during Construction**

LGU officials have recognized that because of limited staff in the Office of Building Officials, regular supervision of the construction quality of houses in relocation sites was not possible, although this office is responsible for issuing building permits and supervising the construction. In addition, the different inspections from DSWD, NHA, and LGU were centered only on the progress of construction and number of housing units finished. Consequently, various technical deficiencies may be found in permanent resettlement sites, like cracks in the walls and the risk of bank wall collapse, even with reinforcement of the soil slope.

Another issue reported by Ateneo de Manila University (Micalat, S., and Annawi, D., 2014) included houses' losing their roofs during Typhoon Bopha (which hit Cagayan de Oro in December 2012) only one month after the beneficiaries transferred to the permanent houses. An inspection conducted by the United Architects of the Philippines (UAP) revealed that the rivets, trusses, and purlins were not strong enough to withstand the strong winds during the storm. Repair work was ultimately done by the NGO that built these houses.

#### **4.5.6 Improvements in the Process**

Some changes were made in the approach during the process, based on feedback from the first resettlement sites. For instance, initially the priority in the design of the settlement was to maximize the use of the land for the construction of housing, resulting in higher density settlements wherein residents' comfort and needs were compromised because of limited space. This approach was changed in later projects: in coordination with the LGU, single detached houses are now built instead of quadruplex or row houses.

In the first sites, infrastructure and houses were constructed simultaneously, causing diverse problems, as previously noted, once the beneficiaries were allocated because of the lack of water and electricity. The approach for later projects has been to provide the infrastructure and services first and then start the construction of houses; in this way, beneficiaries have basic services as soon as they are allocated.

#### 4.5.7 Stakeholders' Participation and Leadership

Selecting resettlement as the main approach for housing recovery was promoted by the top-down approach. Such decisions were made in the multi-stakeholder meetings of the LIAC and regulated by the national laws and codes, the established guidelines and procedures of the government agencies involved, and the internal procedures of NGOs and other implementing agencies. This approach encourages the capacity building of each stakeholder, collaboration among them, and the leadership of the local government (Figure 4.20).

However, as is usual and expected in any post-disaster recovery process, the local government provides most of the leadership during the different stages of reconstruction, and the regional offices of national governmental agencies, like DSWD and NHA, closely support the LGU from their fields of expertise. In the case of Cagayan de Oro, other stakeholders' inputs were given in coordination, but in some cases, they were directly or indirectly influenced by the government officers' decisions. Thus, the locals actually had few opportunities to make their voices heard.

PROCESS PHASES		STAKEHOLDERS												
		National Government					LGU - LIAC	Implementing Agencies				Private Sector	Beneficiaries	
		OCD	DSWD	NHA	DPWH	DEPED	DENR	LGU - LIAC	FCCC	HFHP	GK	OH	Private Sector	Beneficiaries
Preliminary	Declaration of No-Built Zones							●						
	Availability of Resettlement Land							●						▲
Design and Planning	Construction Standards and Regulations		▲	▲	▲			▲						
	Inter Agency Coordination	●	▲	▲	▲				▲	▲	▲	▲	▲	
	Designation Resettlement Sites						▲	●						
	Site and Development Plan			▲				▲						▲
	Designation Implementing Agencies		▲	▲				●						
	Land Allocation							●						
	Beneficiaries' Selection		▲					●						
	Construction Permits							●	▲	▲	▲	▲		
	Housing Design		▲	▲				▲	▲	×	▲	×		
	Construction	Land Development							●					
Infrastructure Construction					●			●						
Housing Construction								●	▲	▲	▲	▲		
Facilities' Supply								▲	●	●	●	●	▲	▲
Sanitation								▲	●	●	●	●	▲	▲
Water								▲	●	●	●	●	▲	▲
Electricity								▲	●	●	●	●	▲	▲
Community Facilities						●			●	●	●	▲		
Technical Supervision								●	●	●	●	●	▲	
Progress Inspection			●	●				●	●	●	●	●	▲	
Use	Handover and Close Out							▲	▲	▲	▲			
	Beneficiaries' Allocation							●						
	Post-Occupancy Support		●					●		▲	●			
	Housing Maintenance												●	
	Change of use/adaptation/modification												▲	●

Type of Participation: ● Direct/Lead ▲ Indirect or in Coordination × Limited or Influenced

Acronyms:  
 OCD Office Of Civil Defense DSWD Department of Social Welfare and Development  
 NHA National Housing Authority DPWH Department of Public Works and Highways  
 DEPED Department of Education DENR Department of Environment and Natural Resources  
 LGU Local Government Unit FCCC Filipino Chinese Chamber of Commerce  
 HFHP Habitat for Humanity Philippines GK Gawad Kalinga  
 OH Oro Habitat for Humanity

Figure 4.20: Stakeholders' participation in the resettlement process

Source: Author, based on interviews with government and NGO informants

As a result, involvement from affected communities was limited, and there were many restrictions on adopting locally appropriate solutions for the design and construction of permanent housing. Moreover, the potential for community empowerment and the sustainable development of resettled families was denied. Thus, the “sense of dependency” from external support (such as LGU, government agencies like DSWD, NGOs, and volunteers) increased because during the resettlement, no priority was given to the creation of livelihood opportunities, which should be an integral part of relocation planning.

#### **4.5.8 Security of Land and Housing Tenure**

The households in resettlement sites were awarded a “Certificate of Occupancy” that allows them to reside in the provided housing through the system called “usufruct.” Although the beneficiaries cannot be evicted during the term of the contract (usually from 25 to 50 years), beneficiaries do not assume formal ownership, and even the existing contract can be cancelled if there is a severe violation of the occupancy conditions. Through this system, the land and housing are officially property of the LGU or the private institution that is the owner of the land, and so far no legal framework exists for transferring these properties to the beneficiaries. Without security of land and housing tenure, resettled families remain vulnerable to future evictions and displacement, a situation which hinders the development of the communities because of the continuation of dependency on external aid.

#### **4.6 Key findings**

The large flow of migrants, the rapid growth of the city, the establishment of informal settlements or squatter areas in the proximities of rivers’ banks, determined the vulnerabilities that threaten the local residents. In addition to the lack of an integral disaster management measures that must be integrated not only to post-disaster response, but prevention, mitigation and by the adoption of pro-active measures. This contributed to the massive destruction of the city after the disaster.

This question the efficiency of the “event-basis” approach for disaster response and the reactive actions, for instance it is only after Typhoon Washi that a Disaster Risk Reduction Management office (DRRM) was created in the LGU. Another issue is the lack of clear guidelines for housing reconstruction or resettlement. Therefore it hinders any self-criticism and feedback from previous experiences for the improvement of the resettlement management based on the current experiences in Cagayan de Oro.

There were different housing reconstruction approaches adopted for post Typhoon Washi recovery. The focus is the Agency-Driven Reconstruction in Relocation Site, top-down process, where the local government directly influenced the decisions taken during different stages and took the leadership in the inter-agency. This promoted the improvement in the capacities of different offices involved and the implementation of disaster preparedness activities through the Disaster Risk Reduction Management office.

Additionally, since it was evident that the advantage to have public land for emergency use which enabled timeliness in the construction and allocation of permanent housing. Subsequently, the current administration is working on purchasing land to continue with the land banking initiatives.

Local governments should clarify the policies to ensure the land and housing security to households in resettled sites, arrange the formal transfer of the property rights to residents and promote the sustainable development of these new communities.

Resettlement is adopted in more recent disaster recovery processes in the Philippines, i.e. the reconstruction projects after the typhoon Haiyan that hit the central region of the country in 2013. Thus, the lessons learned from the management of the resettlement in Cagayan de Oro can be useful to improve future decision making and management of post-disaster reconstruction.

This chapter presented the institutional structure and the process of decision making and coordination of the government lead housing reconstruction program in Cagayan de Oro. The households perspectives and actions taken after their allocation in resettlement sites are detailed in the following chapters.

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## Chapter 5:

### Residential Satisfaction and Living Conditions in Reconstructed Houses

*Based on the premise that housing modifications appear when there are residents' needs or aspirations unsatisfied, Chapter five presents the opinions of the resettled communities about their level of satisfaction with their current housing conditions (house and neighborhood) in four villages in Calaanan site in Cagayan de Oro. The current and pre-disaster situation are compared in order to know if on the communities opinion there has been an improvement of their living conditions. In addition the current living conditions of the residents are analyzed in order to understand how they occupy the houses and how are the interactions with the extensions or other modifications built.*

#### 5.1 Pre-disaster housing conditions

Cagayan de Oro is an intermediate-sized city (with a population less than one million people) that has historically attracted rural migrants and has experienced rapid urban growth (the population increased from 128,000 in 1970 to 602,088 in 2010). These issues promoted illegal squatter and slum settlements on public land or those whose ownership is in dispute between the local government and a second party (Ulack, R. 1976).

The squatters in the central urban areas were established on the bank of the Cagayan River (Figure 5.1) and near public markets that constitute the residents' places of employment (Ulack, R. 1978). As defined by UN Habitat (2008), the quality of the housing was poor, constructed with locally available materials and with limited access to facilities and such services as water, drainage, and electricity.



**Figure 5.1: (a) Low income housing located in high risk areas along the  
(b) Cagayan de Oro River, Cagayan de Oro**

*Source: Author*

Before Typhoon Washi hit Cagayan de Oro, there had been different warnings about the vulnerability of

these squatters and other residential areas along the Cagayan de Oro River, including formally established settlements. For instance, a 2010 study by the Xavier University Engineering Resource Center had already identified that two barangays or districts in central areas of Cagayan de Oro were at risk for floods. These districts were among those hit by Typhoon Washi (Lo, D.S. & Oreta, W.C., 2010). Another geo-hazard assessment conducted by the Mines and Geosciences Bureau (MGB) in July 2009 also indicated that these areas are regularly affected by floods because of being adjacent to the Cagayan de Oro River.

Survivors who were interviewed admitted that they knew the risks; however, they remained unfazed because they were accustomed to regular floods. They also said that they had never experienced a typhoon of the intensity of Washi. Many of the residents indicated as well that even if they had known a typhoon of this magnitude would occur, they had nowhere else to go, owing to landlessness (OCD Region X, 2012).

**Table 5.1. General situation of pre-disaster housing**

	Village 1: % (No.)	Village 2: % (No.)	Village 3: % (No.)	Village 4: % (No.)
<b>Tenure status</b>				
Own house	56% (33)	70% (47)	75% (48)	86% (55)
Rent	27% (16)	21% (14)	13% (8)	9% (6)
Shared house	17% (10)	9% (6)	13% (8)	5% (3)
<b>Access to basic facilities</b>				
Water	83% (49)	66% (44)	77% (49)	77% (49)
Drainage	53% (31)	52% (35)	48% (31)	45% (29)
Electricity	80% (47)	69% (46)	83% (53)	80% (51)
<b>Outer Wall Materials</b>				
Wood and makeshift	24% (14)	36% (24)	48% (31)	53% (34)
Wood and traditional materials	59% (35)	46% (31)	13% (8)	20% (13)
Wood and concrete	17% (10)	15% (10)	36% (23)	20% (13)
Concrete	0% (0)	3% (2)	3% (2)	6% (4)
<b>Roofing Materials</b>				
Wood and makeshift	29% (17)	40% (27)	56% (36)	66% (42)
Wood and traditional materials	5% (3)	24% (16)	14% (9)	3% (2)
Wood/galvanized iron	58% (34)	33% (22)	28% (18)	19% (12)
Galv. iron and concrete	8% (5)	3% (2)	2% (1)	13% (8)
<b>Level of damage of former house caused by Typhoon Washi</b>				
Totally destroyed	88% (52)	93% (62)	98% (63)	89% (57)
Major damage	10% (6)	4% (3)	0% (0)	3% (2)
Partial damage	2% (1)	3% (2)	2% (1)	8% (5)
No damage	0% (0)	0% (0)	0% (0)	0% (0)

Previous housing experiences may influence current housing satisfaction (Snarr and Brown, 1980) considering the long-term social integration in pre-disaster environments (Oliver-Smith, 1991). Table 5.1 shows the materials used in people's former houses; it shows the prevalence of non-permanent materials. Local traditional materials like bamboo and palm leaves were popular. For roofing, the use of makeshift materials

such as plastic sheets and tarpaulins was common. The majority of residents had access to water and electricity. However, that does not mean they had individual connections. In fact, electricity was illegally obtained through informal connections from neighbors. Water not for drinking was obtained from the river and wastes were directly discharged into the river.

Housing tenure is a sensitive issue for the understanding of housing satisfaction (Lizarralde and Bouraoui, 2010). Pre-disaster houses were built on publicly owned land and consequently there were no tenure rights. In these former settlements, hazardous location, poor housing, and the quality of construction present a picture of a precarious and highly vulnerable environment.

Resettled communities have limited housing alternatives even if they are not satisfied with their current houses. This became evident when all the residents stated that they have not left the house provided for them and have not returned to former settlements. However, these responses may have been influenced by the conditions of occupancy, which provide for the suspension of rights if residents leave their current house.

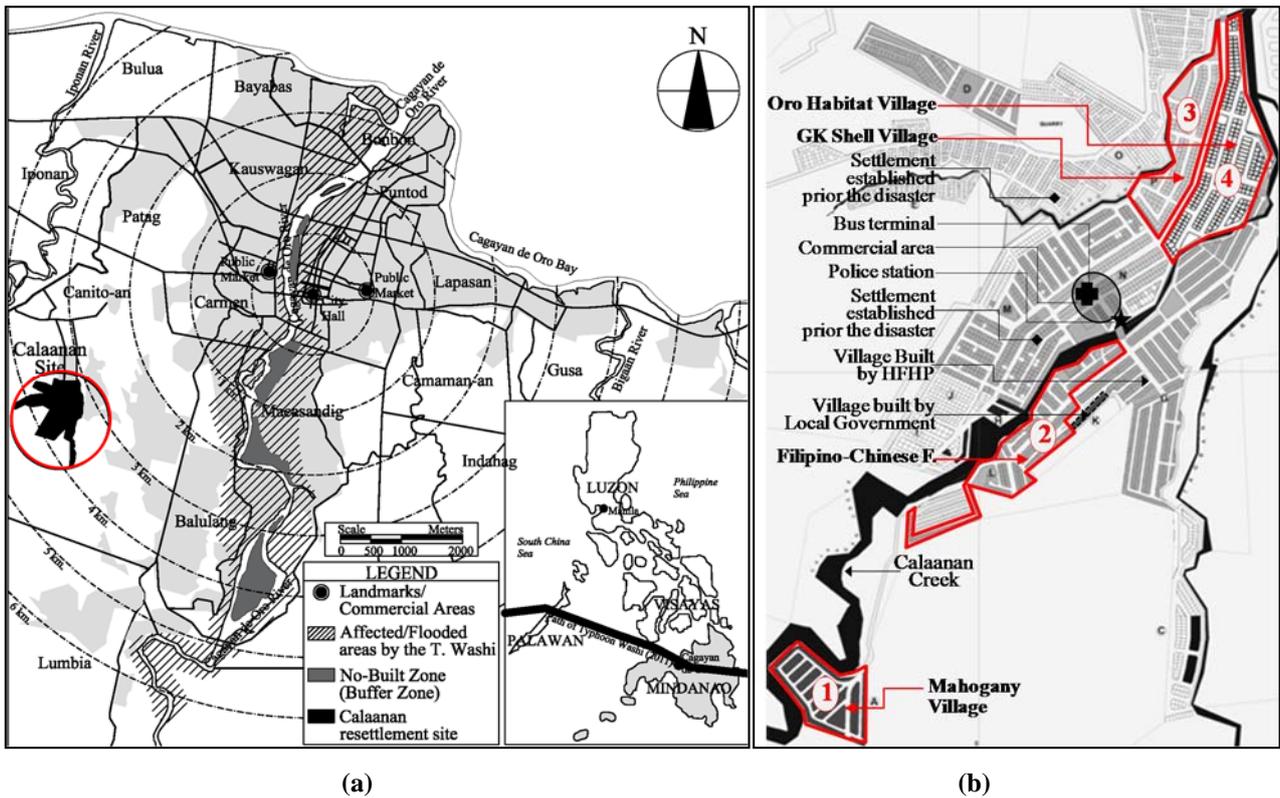
## **5.2 Disaster-induced resettlement in Cagayan de Oro**

Tropical storms regularly hit the Philippines and frequently affect the city of Cagayan de Oro. Although tropical storms are familiar to the local residents, the frequency and intensity are lower than the regularly expected in the north and center of the country. Thus, when the tropical storm Washi (locally known as Sendong) hit the region caused an unpredicted impact, especially in urban areas. The high impact in the housing sector led to the resettlement of squatter residents settled in the river banks, which were the most vulnerable. In order to prevent the residents to return to the former settlements, the government defined the No-Built Zones which specify the prohibition to establish settlements in the land that was categorized as highly vulnerable.

### **5.2.1 Study site: Calaanan**

Calaanan site is the largest resettlement site in Cagayan de Oro, with a total area of 26.7 ha. 2,299 houses built and 2,176 beneficiaries allocated (as of July 2014) (DSWD, 2014). Calaanan is located in the peri-urban area of Cagayan de Oro, approximately 7.5 km southeast from the city center (see Figure 5.2, Left). This is one of the first settlements where implementing agencies built permanent basic housing units for victims of Washi in Cagayan de Oro.

The land is property of the local government of Cagayan de Oro, and before Washi its use was planned for social housing programs. Therefore, by the time the permanent housing for resettled communities were built, there were already settlements built and occupied by low-income people, also existed some infrastructure, such as access roads, transportation routes (local buses), community facilities such as Barangay center, which include governmental offices, with administrative, and community spaces but also health facilities, schools and commercial areas (see Figure 5.2, Right).



**Figure 5.2. Affected areas by Washi in Cagayan de Oro, location of Calaanan site and path of Typhoon Washi (a), Location of the four selected villages on the Calaanan site (b)**

### 5.2.2 Settlement layout and designs of Agency-built permanent houses

The local government of Cagayan de Oro is the legal owner of the land, which was the main coordinator for the design of the settlement layout, land development, provision of infrastructure and services, and the planning and construction of permanent houses. The basic infrastructure and services were provided in accordance with the National Building Code of the Philippines and the Minimum Design Standards and Requirements for Economic and Socialized Housing Projects, regulations that specify for the provision of access roads, supply of water and electricity, and appropriate drainage in new settlements. The designs of the houses consider basic units, without internal partitions, that were commonly used in social programs in the country (Manalang et al., 2002). There are specific characteristics in each village which constitute the initial circumstances of inhabitation and the changes that driven the construction of housing extensions that are described in the next section.

## 5.3 Agency provided permanent housing

### 5.3.1 Housing design and construction

Resettlement sites in Calaanan site are divided into villages according to the builder or donor, which influences the housing design and project management (Table 5.2):

**Table 5.2: Synopsis of the permanent housing projects for each village analyzed**

		Village 1	Village 2	Village 3	Village 4
Agency profile and management	Implementing agency	Habitat for Humanity Philippines (HFHP)	Filipino-Chinese Chamber of Commerce (FCCC)	Gawad Kalinga (GK)	Oro Habitat for Humanity (OH)
	Type	National NGO	Private group	National NGO	Local NGO
	General approach	Social and post-disaster housing	Community support	Community development	Social housing, HFHP contractor
	Coordination	Local Government	Local Government	Local Government	Local Government
	Funding	Gov. / private	Private	Gov. / private	Through HFHP
	Housing design and construction	Typology	Quadruplex	Row houses	Row houses
Service areas		Not provided	Not provided	Kitchen / others	Kitchen / others
Planned Extension		Yes (Loft)	Not considered	Yes (Loft)	Yes (Loft)
No. of houses		160	300	271	240
Floor area		21.00 m <sup>2</sup>	21.16 m <sup>2</sup>	24.00 m <sup>2</sup>	21.95 m <sup>2</sup>
Lot area		39.55 m <sup>2</sup>	27.00 m <sup>2</sup>	36.00 m <sup>2</sup>	29.60 m <sup>2</sup>
Cost per house		PhP 110,000	PhP 70,000	PhP 110,000	PhP 90,000
PhP (USD)		(USD 2,500)	(USD 1,550)	(USD 2,500)	(USD 2,000)
Materials		Conventional*	Prefabricated**	Conventional*	Conventional*
Further support**	Government	Basic support	Basic support	Basic support	Basic support
*	House builder	Indirect	None	Direct	Indirect

\*Conventional: RC structure, concrete block masonry for walls, metal roof structure and steel sheets.

\*\*Prefabricated: Steel-frame structure, plastic wall panels, metallic roof truss and corrugated steel sheets.

\*\*\*Community support after their allocation to permanent housing is provided equally by the local government and other agencies from national government through social assistance programs that include distribution of food or sporadic working opportunities. The house builders (NGOs) have a different approach: Direct community support such as community development projects. For indirect support, NGOs coordinate community support with other NGOs.

### ***Village 1: Mahogany***

Mahogany Village is the most isolated community within the Calaan site (see Figure 2). Habitat for Humanity Philippines (HFHP), which is the implementing agency for this village, built 160 housing units. The access road connects Mahogany with the rest of the site, however, due to its location, there is no public transportation.

Mahogany's location was also a disadvantage in terms of the provision of potable water through public connections, and so HFHP and the local government built a communal well and communal faucets. Additionally, an NGO provided a rainwater collection system for every two housing units, comprising collection guttering and storage tanks. Sanitation was ensured through the installation of one septic tank for every two housing units as part of the overall housing design. However, power supply is not in place for all

the households, as each family is required to apply to the local power company for an individual meter. The results of the survey recorded that 80% (47 of 59 those surveyed) of households had individual electricity connections.

Communal facilities were observed to have been partially provided. One of the houses is used as a development center or office for community assistance from the local government. There is a covered court built with non-permanent materials that is used as a meeting space, and there is a playground and sports field, which is located adjacent to the settlement but on privately owned land.

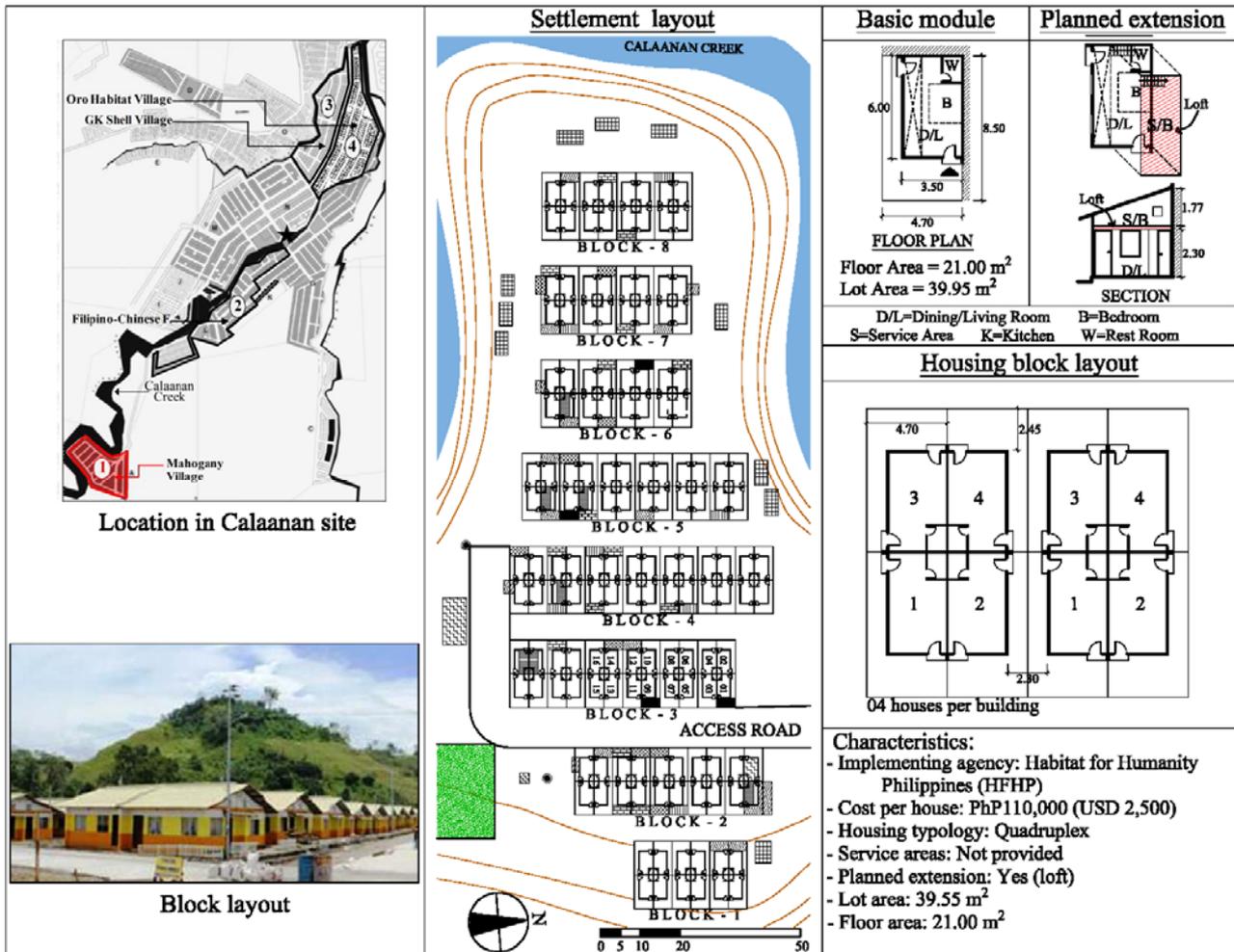


Figure 5.3. Mahogany Village, settlement layout and housing design

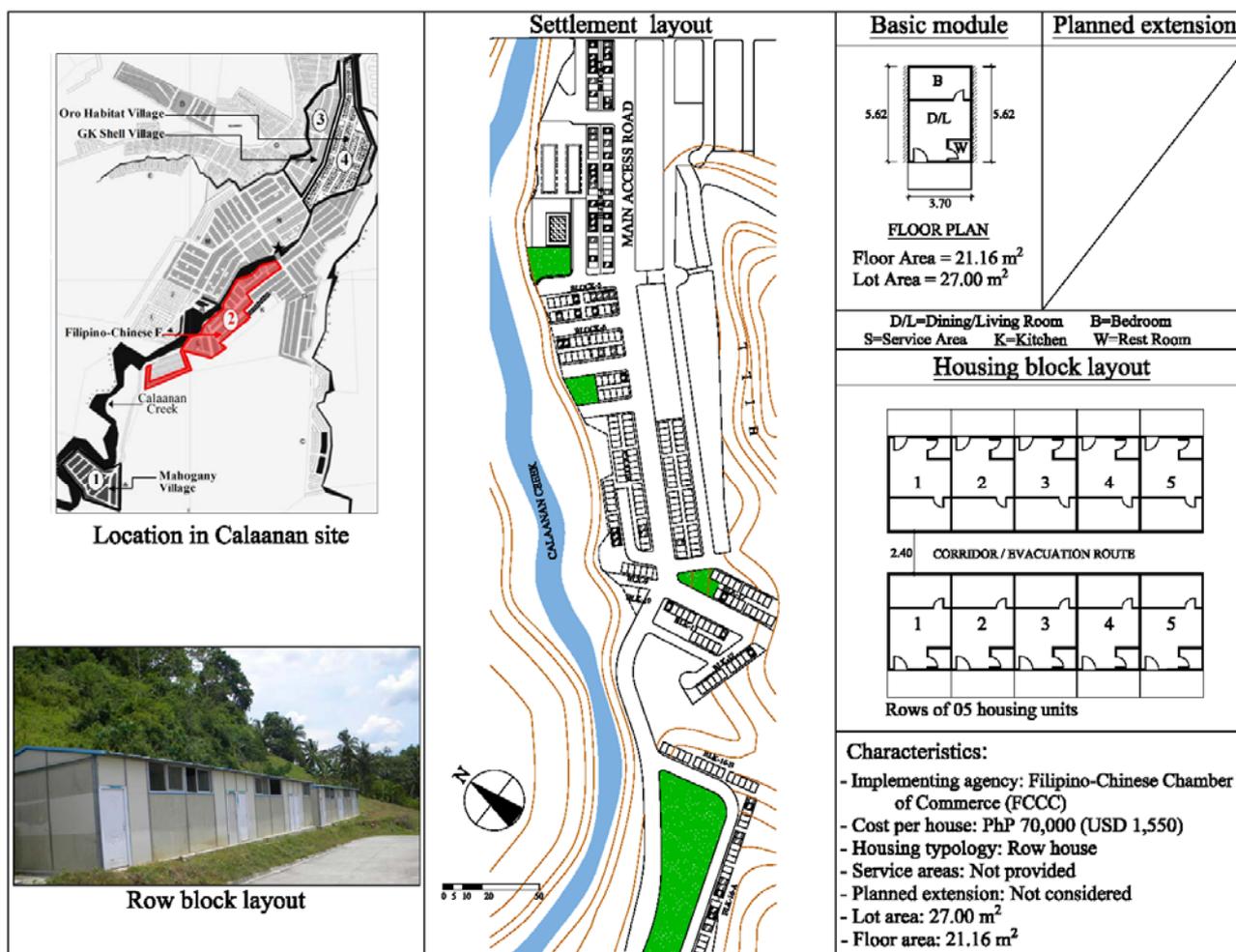
The “quadruplex” design of the housing features four units per building (see Figure 5.3). This design was adopted through coordination with national and local governmental officials and with regard to standardized designs developed by the National Housing Authority and the Department of Social Welfare and Development. It was selected because it optimizes the usage of the limited available land for relocation, promoting high density in the settlement.

The average area utilized for each housing unit is 21 m<sup>2</sup>, with the units built using conventional permanent materials, such as concrete hollow block, metal truss or roof supporting structure, and galvanized iron sheets.

The design is simple, comprising an open main space, in which residents can add internal partitions, and a restroom installed in one corner.

**Village 2: Filipino-Chinese Friendship**

Filipino-Chinese Friendship (FCF) village is located in one of most densely populated areas in Calaanan (see Figure 1, Right) and among the villages analyzed is the largest with 300 housing units built by the Filipino-Chinese Chamber of Commerce. FCF village is located along a main access road that connects to Mahogany village, and it is one of the most dynamic areas in the settlement with various local shops and other small businesses.



**Figure 5.4. Filipino-Chinese Friendship Village, settlement layout and housing design**

Basic services like water has been provided through communal faucets located in public spaces. In the housing blocks located in hilly areas, residents have to carry water in containers for their daily use. Sanitation was ensured through the installation of one septic tank for every two housing units as part of the overall housing design. Power supply is provided only to the residents who have individual meters that accounts for 90% of the residents surveyed (60 of 67). Communal facilities were provided by an NGO which built a group of multi-purpose spaces with permanent materials and a sport field.

The “row house” design features blocks of five houses per building (see Figure 5.4). This design was adopted through coordination between the Filipino-Chinese Chamber of Commerce and the supplier according to the minimum requirements set by the local government. The area of each house is 21.16m<sup>2</sup> and the lot area is 27 m<sup>2</sup>. There is a space of approximately 5.84m<sup>2</sup> in front of the house for a front yard and is used by the residents to build extensions. There is no consideration for internal modifications of the house; also the internal partitions are not expected to be modified.

The houses were built with unconventional pre-fabricated materials that consist on a steel-frame structure, plastic wall panels, and metallic roof truss and corrugated steel sheets. There is an alley in the rear of the houses between two blocks; the use of these spaces is not defined because the design did not consider a posterior entrance to the houses.

### ***Village 3: GK Shell***

Permanent houses in GK Shell village were built by the NGO Gawad Kalinga, which focuses on community development and the construction of social and post-disaster housing. This village has 271 houses. This village is located in the entrance of Calaanan site and along the main road in the settlement, close to the bus terminal and the existing commercial areas.

Services like water supply is provided through individual connections to each house in the whole village. The arrangements for individual water connections were completed thanks to the coordination between residents with the support of Gawad Kalinga. Sanitation, similarly to other villages, is provided through septic tanks for a partial treatment of the wastes. However, in many houses it was observed that the service areas in the rear of the houses were flooded due to the overflow of the tanks. Power supply is provided to 97% of the residents (62 of 64 households surveyed) all through individual connections. Communal facilities were provided by the builder NGO that built a covered multipurpose court with permanent materials. Also there is a playground for the use of the residents.

The “row house” design features blocks with a variable number of houses per building (see Figure 5.5). This typology was adopted following the established designs of the National Housing Authority, and prioritizing the maximization the use of the available land. The area of each house is 24m<sup>2</sup> and the lot area is 36 m<sup>2</sup>. The design considers the construction of a loft to be built by the residents according to their needs. There is a frontal yard and an alley in the rear of each row of houses for secondary access which groups the kitchens and service areas of the houses. The houses were built with conventional materials RC structure, concrete block masonry for walls, metal roof structure and steel sheets.

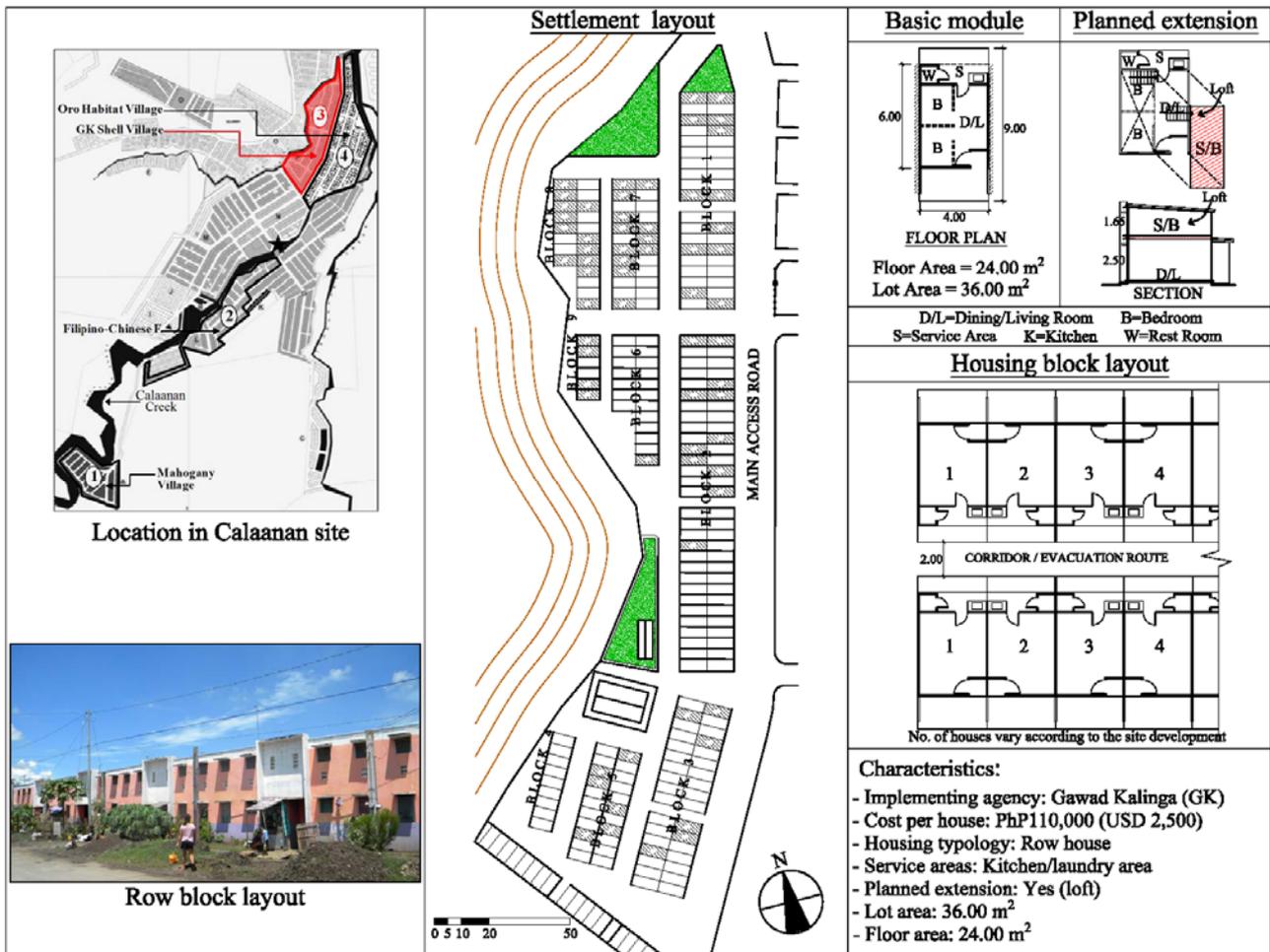


Figure 5.5. GK Shell Village, settlement layout and housing design

#### Village 4: Oro Habitat

The local NGO Oro Habitat for Humanity built 240 houses in coordination with HFHP. The location similarly to village 3 is privileged, along the main road in the settlement and close to commercial areas and bus terminal. Potable water is provided through communal taps for 41% of the households, the rest have individual meters and connections. Sanitation is provided through septic tanks shared every two houses. Power supply is only available for 30% of the households surveyed (19 out of 64). There is a multipurpose space built with permanent materials by HFHP.

The design of the houses in “rows” is the result of the coordination with the National Housing Authority and Habitat for Humanity Philippines, the last one was the coordinator to obtain funds from public or private donors. There is a posterior alley of the housing rows for a secondary access; however this is narrower than in village 3 as shown in Figure 5.6. The area of each house is 21.95m<sup>2</sup> and the lot area is 29.6m<sup>2</sup>. There are service areas (kitchen and laundry) provided in the rear of each house. The design anticipates the construction of lofts to accommodate the needs of the residents, in this village a NGO built these internal modifications prioritizing the large families and single parent households. The houses were built with conventional materials RC structure, concrete block masonry for walls, metal roof structure and steel sheets.

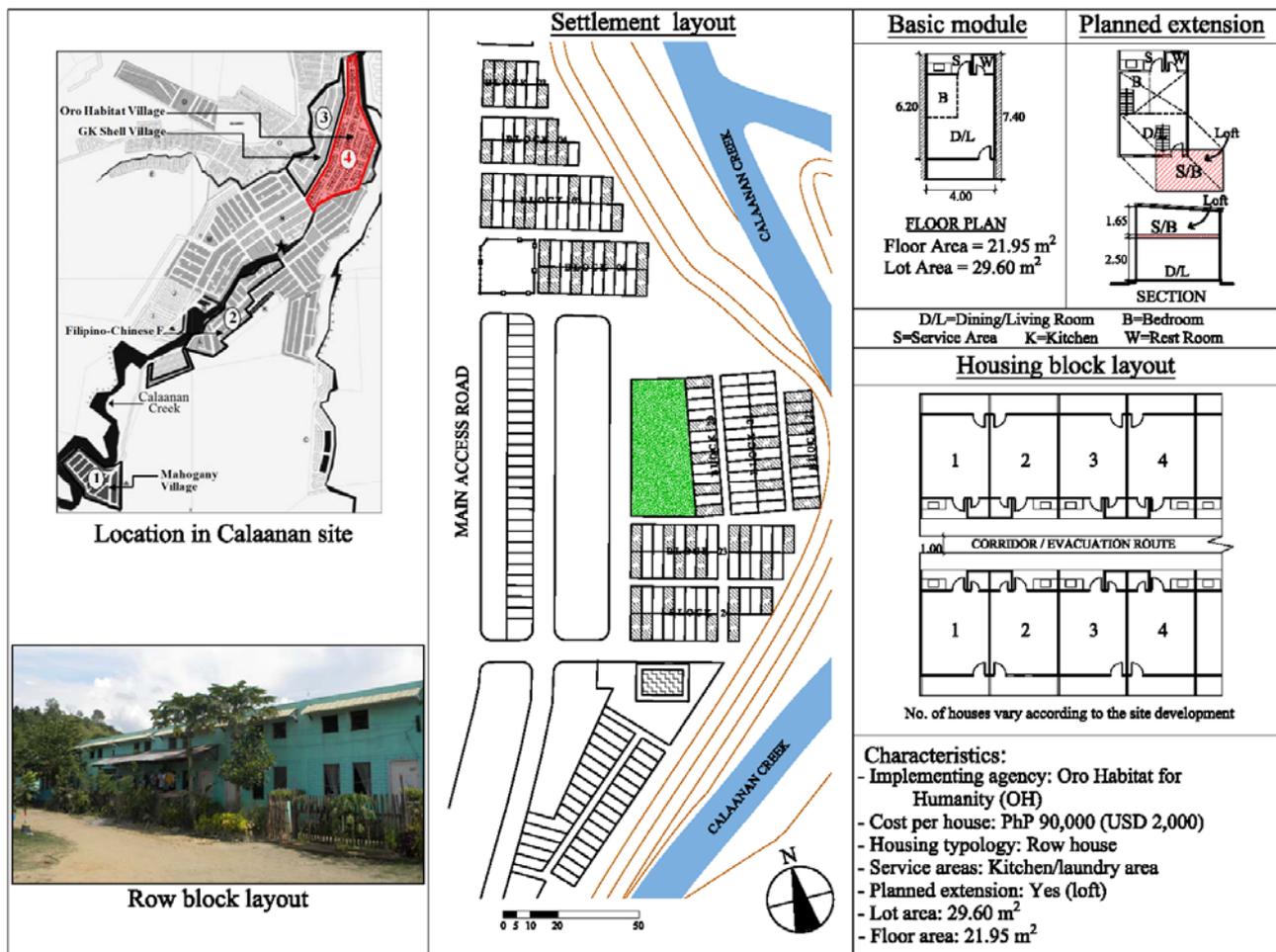


Figure 5.6. Oro Habitat Village, settlement layout and housing design

### 5.3.2 Methodology for Data Collection

The primary data for analysis of residents perspectives about their houses and living conditions were based on a household questionnaire conducted face-to-face with each of the 254 randomly selected housing beneficiaries. The sections of the questionnaire included:

- Demographics and household profile.
- Pre-disaster housing conditions.
- Housing modifications built after allocation of beneficiaries.
- Residents' satisfaction about housing conditions and comparison about their pre and post-resettlement socio-economic situation.

#### a Sampling determination:

The criteria for definition of the sample size considers a small population (Morris, 2004) referring to the households currently living in the relocated site of Calaanan, considering the communities organized according to the agency that built the houses.

The parameters for definition of the Sample Size are:  $\pm 10\%$  Precision Level and Confidence Level Is 90%, they have been defined regarding the feasibility to conduct household questionnaires in the site and the level of reliability.

To determine the sample size for small populations (Pitman, 1992) the formula used is the normal approximation to the hypergeometric distribution.

$$\text{Hypergeometric} \quad n = \frac{N z^2 pq}{(E^2 (N-1) + z^2 pq)} \quad (1)$$

Where:

n is the required sample size

N is the population size

p and q are the population proportions, if they are unknown each of these values are set to 0.5.

z is the value that specifies the level of confidence you want in your confidence interval for the data analysis. Typical levels of confidence for surveys are 90%, in which case “z” is set to 1.645.

E sets the accuracy of your sample proportions with an accuracy of plus or minus 10%. Then E is set to 0.10.

*b Sampling size for household questionnaire survey:*

For the determination of the sample size applying equation (1) in the four villages, the value of N is equal to the number of households in each village, therefore applying the formula the sample size for each village is as follows:

For village 1: N=160, sample size n=48 households.

For village 2: N=300, sample size n=56 households.

For village 3: N=271, sample size n=55 households

For village 4: N=240, sample size n=53 households

At the time of the coordination meetings with the residents of the target villages prior of the questionnaire survey, it was observed a positive attitude from them. Therefore, it was possible to conduct a slightly higher number of face-to-face questionnaires in order to assure more accurate data. The details about the required and actual number of questionnaires completed per community are shown in the following table:

**Table 5.3: Sample size for household questionnaire survey**

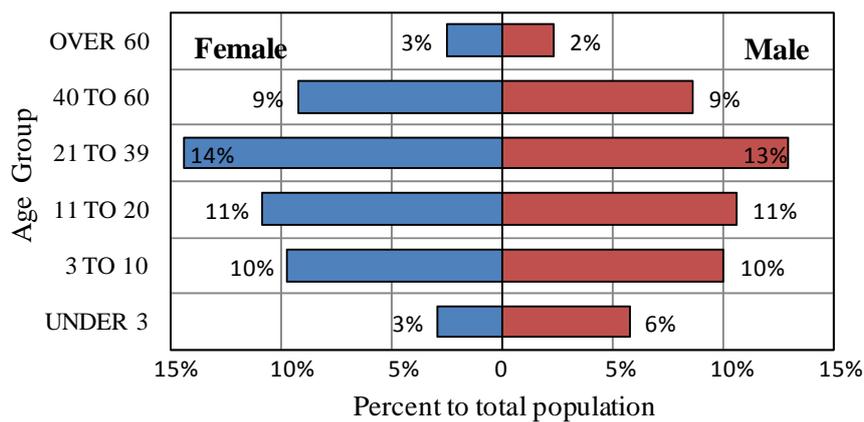
Community	Number of households per village	Sample size for Household Questionnaire	Actual number of households surveyed
Village1: Habitat for Humanity - Mahogany	160	48	59
Village 2: Filipino-Chinese Friendship	300	56	67
Village 3: GK Shell	271	55	64
Village 4: Oro Habitat	240	53	64
<b>Total number of surveyed households</b>			<b>254</b>

#### 5.4 Residents' profile and livelihood

The age and gender distribution of the population in the villages surveyed are presented in Table 5.4 and Figure 5.7. The data reveal that there is a balance between male and female and a young population where 69% of the residents are between 3 to 39 years old.

**Table 5.4: Ages and number family members**

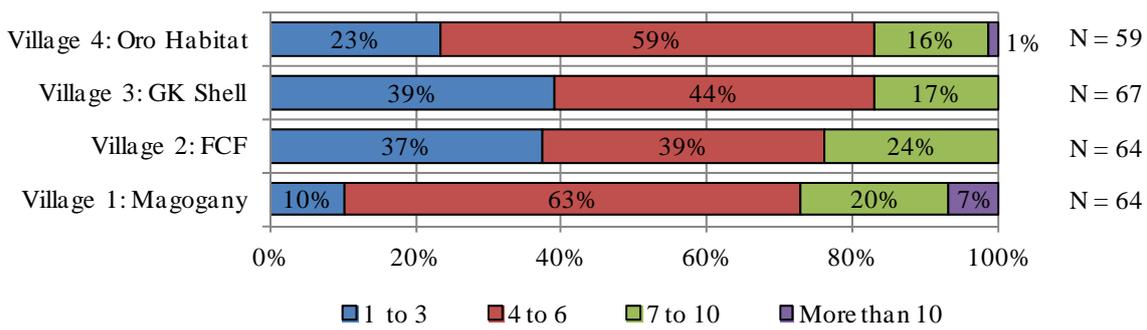
Ages	Female	Male
Under 3	3% (36)	6% (71)
3 to 10	10% (120)	10% (124)
11 to 20	11% (134)	11% (131)
21 to 39	14% (178)	13% (160)
40 to 60	9% (114)	9% (107)
Over 60	3% (31)	2% (29)



**Figure 5.7. Distribution of population by age and gender**

The information related to the family size that refers number of members per family is presented in Figure 5.8. In average 51% of the families are medium size (4 to 6 members), while 28% are small size families (1 to 3 members), 28% has 7 to 10 family members and only 2% of the families have more than 10members. Additionally it was found that 92% (235) of the families are nuclear, which means that are conformed only by parents and their children. In contrast only 8% (20) are extended families that live with grandparents and/or

other relatives such as cousins, aunts or uncles.

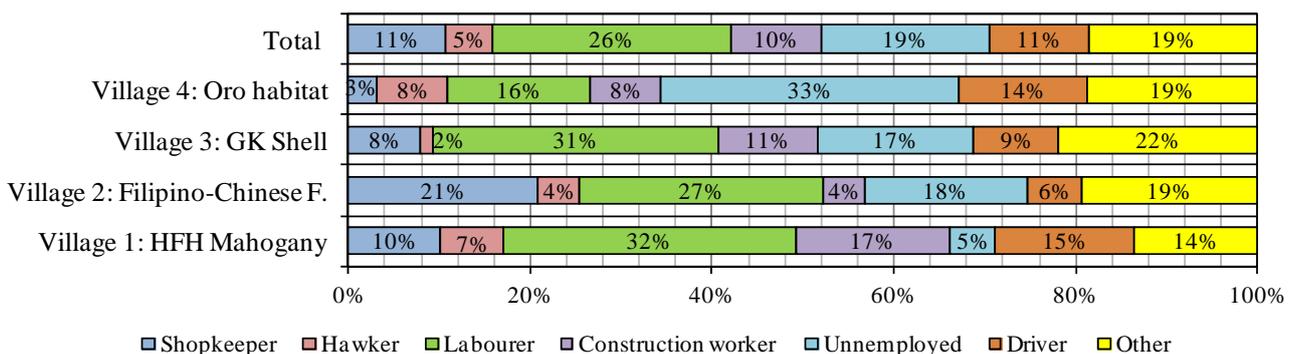


**Figure 5.8. Family size by villages**

The restoration of livelihoods that were severely affected not only by the disaster but mainly by the process of resettlement results to be one of the biggest challenges for the local residents. The pre disaster economic activities were closely linked to the location of the settlements close to the two major public markets in the city located in the central area. In resettlement sites, residents have to look for alternative activities that represent their current occupations.

The results from the survey reveal that even though the residents' livelihoods were destroyed, in average 19% answered that currently they are unemployed or non-permanent jobs. Most of the residents are unskilled workers, which is evident with the 26% of them that are currently laborer; 11% motorbike or "pedicab" drivers, that are two of the main local transportation means, as it is shown in Figure 5.10. Another important occupation is shopkeeper in the houses where residents have built small grocery stores or other kind of small businesses like barbershops or others. The use of their houses as a tool for income source was observed in 11% of the residents. The motivation was to obtain income that thanks to an informal micro-financing system (by moneylenders) that allowed residents the construction of shops and the supply of products.

There are residents that still work in the central area of the city, commuting every day from Calaanan site to the public markets selling diverse products; this sector represents 5% of the local households that in Figure 5.9 is presented as hawkers. Finally, there is a 19% which occupation is diverse, there are office workers, electricians, masons or carpenters, dressmakers and others.



**Figure 5.9. Distribution of current occupation of resettled families**



**Figure 5.10. Occupation of local residents: Local grocery shop built in front of the house (a), and drivers of local transportation means like “pedicab” driver(b) and motorbike drivers (c)**

### 5.5 Residential satisfaction after resettlement

Different researchers argue that residential satisfaction reflects the failure or success of resettlement projects (Oliver-Smith, 1991), and represents a predictor of residents’ attitude toward moving or modifying their houses (Clark and Onaka, 1983; Manalang et al., 2003; Seek, 1983). This approach acknowledges the gaps between the needs and behaviors of residents and current residential situation (Adriaanse, 2007). Consequently, understanding residents’ satisfaction and evaluating how the buildings perform may be the basis for improving the design criteria and planning of future projects (Preiser, 1995), considering that agency-built housing is the main approach in the Philippines.

The analysis of residents’ satisfaction with permanent housing implies an understanding of the physical environment, socioeconomic situation (Barenstein J.D., 2012; Lizarralde and Bouraoui, 2010; Perera et al., 2012), and experiences (Francescato et al. 1989) inherent to their habitual routines (Ahrentzen, 1992) and living conditions. For the analysis of residential satisfaction, residents responded to two groups of questions:

The first group contains eight indicators for the analysis of current residential satisfaction (Clark and Onaka, 1983; Lizarralde and Bouraoui, 2010; Perera et al., 2012):

- 1) Location of the settlement,
- 2) Size of the lot,
- 3) Size of the house,
- 4) Strength of the house,
- 5) Quality of construction,
- 6) Thermal comfort,
- 7) Acoustic comfort, and
- 8) Functionality.

The second group analyzes comparatively residents' perceived pre- and post-disaster housing and socioeconomic situation. Thus, seven indicators were considered (Barenstein J.D., 2012; Snarr and Brown, 1980):

- 1) Housing,
- 2) Neighborhood environment,
- 3) Community life,
- 4) Security,
- 5) Economic situation,
- 6) Health, and
- 7) Education.

There are two issues not considered in the questionnaire: provision of facilities and tenure status. The reason for that is that common facilities were provided, and the individual water and electricity connections depend on individual residents' arrangements. The second issue is tenancy rights, which turn out to be complex, since local government retains legal ownership of the land and housing. Residents have been awarded the right to inhabit the house for a period of 25 years, which may be extended, but not guaranteed.

### 5.5.1 Data processing

The data obtained from resident questionnaire survey was processed according to equation (2) in order to obtain the satisfaction scores "x" per village and indicator:

$$x = \frac{R_1(i) + R_2(i) + R_3(i)}{R - r} \quad (2)$$

$R_1$  = Residents who responded *satisfied* or *better*       $R_2$  = Residents who responded *indifferent* or *same*  
 $R_3$  = Residents who responded *dissatisfied* or *worse*       $r$  = Residents who responded "Don't know"  
 $R$  = Total number of respondents

For the analysis or comparison of the data obtained in the four villages per indicator, the answers obtained were assigned a scoring index "i", detailed as follows in Table 5.5:

**Table 5.5. Scoring assigned to residents' answers**

Group 1: Residents' satisfaction with present housing situation	Group 2: Residents' perception of their pre- and post-disaster housing and socioeconomic situation
Satisfied = +1	Better = +1
Indifferent = 0	Same = 0
Dissatisfied = -1	Worse = -1
"don't know" = No Score	"don't know" = No Score

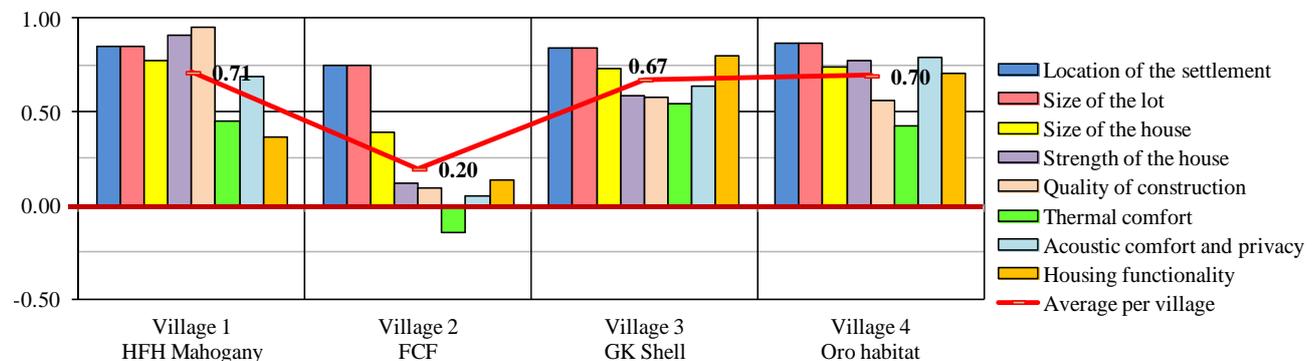
### 5.5.2 Satisfaction with present housing situation

Table 5.6 shows the scoring for each village. The scores were calculated to compare housing satisfaction per village and indicators. Regarding overall residential satisfaction, villages 1 and 4 present the higher scores, higher than village 3, and village 2 presents low satisfaction. Comparing the mean of different indicators, residents expressed high satisfaction in settlement planning issues such as settlement location, due to the proximity to the city center (compared with other sites). Satisfaction about lot and house sizes is high in the four villages. However, satisfaction with house size in village 2 is lower although the house is bigger than in village 1.

**Table 5.6. Residents' satisfaction with present housing situation**

Indicators	Village 1	Village 2	Village 3	Village 4	Average per indicator
Location of the settlement	0.85	0.75	0.84	0.87	<b>0.83</b>
Size of the lot	0.85	0.75	0.84	0.87	<b>0.83</b>
Size of the house	0.78	0.39	0.73	0.74	<b>0.66</b>
Strength of the house	0.91	0.12	0.59	0.77	<b>0.60</b>
Quality of construction	0.95	0.09	0.58	0.56	<b>0.55</b>
Thermal comfort	0.45	-0.15	0.54	0.43	<b>0.32</b>
Acoustic comfort and privacy	0.69	0.05	0.64	0.79	<b>0.54</b>
Housing functionality	0.37	0.14	0.80	0.71	<b>0.50</b>
<b>Average per village</b>	<b>0.71</b>	<b>0.20</b>	<b>0.67</b>	<b>0.70</b>	

Satisfaction scores: Satisfied (+1), Indifferent (0), Dissatisfied (-1)



Residents' perceptions of housing strength and construction quality are higher in village 1, medium in villages 3 and 4, and very low in village 2. The reasons may be related to the materials used in the houses in village 2 and the uncertainty about their lifespan. Thermal comfort has a medium satisfaction score in villages 1, 3 and 4; it is higher in village 3, due to the design that eases ventilation, while in village 2 residential satisfaction is clearly low due to the lack of proper ventilation and the thermal insulation of building materials. Acoustic comfort or acoustic insulation levels are related to the privacy of the residents; in villages 1, 3 and 4 the levels of satisfaction are high, and in village 2 they are very low, in the same way as they are for thermal comfort.

Housing functionality refers to the suitability of spatial distribution, which facilitates or limits daily activities. In villages 3 and 4, satisfaction is high, but in villages 1 and 2 satisfaction is low, which points to an incompatibility between design and lifestyles.

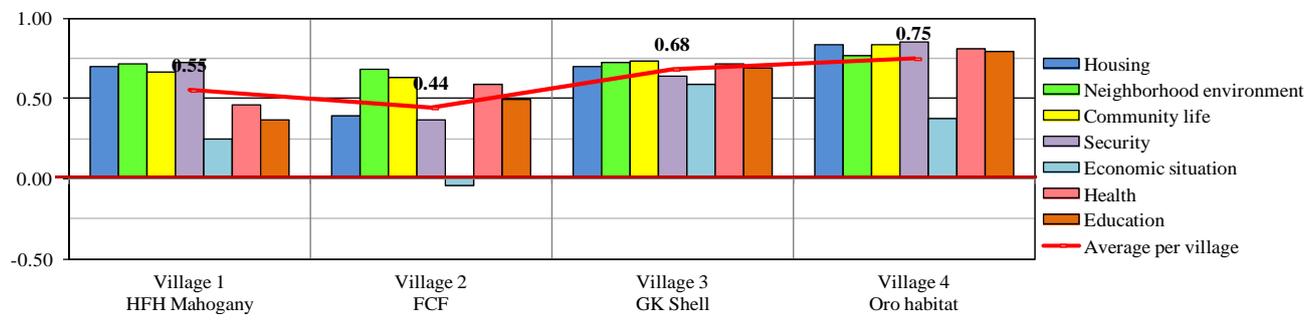
### 5.5.3 Comparison of pre- and post-resettlement housing and socioeconomic situation

Table 5.7 contains the results of households' perception and comparison of their current and pre-disaster situation expressed in the indicators and scores in the four villages.

**Table 5.7: Residents' perception of their pre- and post-disaster housing and socioeconomic situation**

Indicators	Village 1	Village 2	Village 3	Village 4	Average per indicator
Housing	0.69	0.39	0.70	0.83	<b>0.66</b>
Neighborhood environment	0.71	0.68	0.73	0.77	<b>0.72</b>
Community life	0.67	0.63	0.73	0.83	<b>0.71</b>
Security	0.72	0.37	0.64	0.85	<b>0.64</b>
Economic situation	0.25	-0.04	0.59	0.37	<b>0.29</b>
Health	0.46	0.59	0.72	0.81	<b>0.64</b>
Education	0.37	0.49	0.69	0.79	<b>0.58</b>
<b>Average per village</b>	<b>0.55</b>	<b>0.44</b>	<b>0.68</b>	<b>0.75</b>	

Satisfaction scores: Better (+1), Same (0), Worse (-1)



Among the villages analyzed, the score in village 2 is the lowest, followed by village 1, and the highest scorers are villages 3 and 4. Residents' perception of neighborhood environment and community life is positive, which indicates a better present situation. The materials in their former houses were mainly precarious and therefore perception of their current house is clearly higher, although in village 2 it is lower, due to non-conventional housing materials. Security is positively perceived, except in village 2 where the perception is negative.

The lack of livelihood opportunities in the new settlements explains why residents' current economic situation is negatively perceived in the four villages, which in average shows the lowest score among all the indicators analyzed. The scores relating to access to health and education facilities are higher in villages 3 and

4, because they are located next to principal roads and existing public transportation routes. On the other hand, villages 1 and 2 are located further away, where public transportation is not available.

## **5.6 Housing Modifications**

The phenomenon of “spontaneous transformation” or resident-initiated modifications (Khan, T. H., 2013; Makachia, P.A., 2005) refers to the alterations of the houses, carried out by their inhabitants with the objective to adapt their environment and meet their needs and behaviors. This is result of what is called “housing stress”, which appears when the “level of tolerance” is exceeded, creating a mismatch between the actual and the preferred housing (Carmon, N., 2002). In order to fill this mismatch, residents build alterations or additions to the original housing units due to diverse reasons originated from the current living conditions.

For the purpose of this research, internal partitions are not considered as housing modifications, the target for this study are the structures or elements that add useful floor area to the basic housing provided, this includes internal or external extensions of the houses.

### **5.6.1 Characteristics of housing modifications**

In this section, the focus is not only on the reasons for modifications, but also on how they were built and who built them. Table 5.8 presents the percentages of houses modified, where villages 1, 2 and 4 have a similar incidence of modification. However, in village 3 the percentage of unmodified houses is higher, which may be related to the continuous community work carried out by the NGO which built the houses. The construction of extensions is forbidden in the occupancy contract signed by residents. Thus, residents are discouraged from building extensions in front of the houses, although the NGO’s attitude is flexible with the modifications in the rear, being mainly kitchen enclosures, due to the residents’ need to protect their belongings.

Planned modifications or lofts were considered in the housing design for villages 1, 3 and 4. In village 2, it can be seen that all the extensions are unplanned, and in village 3, a higher percentage of households (42%) built both. In village 3, lofts are the only modifications allowed by the occupancy conditions, and therefore NGOs supported their construction. Residents of villages 1 and 4 received support from NGOs, which selected the largest and most vulnerable families. On the other hand, in village 1, 29% and in village 4, 11% of the planned extensions were funded by residents. In village 3, all the lofts were built and funded by residents, which demonstrates less dependency on external support. The construction of lofts was mainly done through self-build, whereas in villages 1, 3 and 4, the percentage of residents who hired skilled workers for their construction is higher, and in village 4, all were built by a carpenter or mason.

Unplanned modifications cannot be considered permanent, because legally they can be removed. Thus, housing extensions are classified under “durable and precarious” regarding building materials. The highest percentage of durable extensions was built in village 3, and they are mainly kitchen enclosures. In other villages, the tendency is precarious extensions, due to the lack of NGO or government control over the construction of

extensions. Local government officials stated that residents tend to build extensions on weekends, when their staff is not on the site. Although these residents are notified to stop building or to remove these constructions, so far these measures have not been effective.

**Table 5.8. Modifications in permanent houses**

		<b>Village 1:</b>	<b>Village 2:</b>	<b>Village 3:</b>	<b>Village 4:</b>
		<b>% (No.)</b>	<b>% (No.)</b>	<b>% (No.)</b>	<b>% (No.)</b>
<b>Housing modification and classification</b>	<b>Housing modifications</b>				
	Modified	69% (41)	54% (36)	38% (24)	63% (40)
	Non-modified	31% (18)	46% (31)	63% (40)	38% (24)
	Total	100% (59)	100% (67)	100% (64)	100% (64)
	<b>Type of modification</b>				
	Planned	5% (2)	0% (0)	13% (3)	13% (1)
	Unplanned	83% (34)	100% (36)	46% (11)	78% (31)
	Both	12% (5)	0% (0)	42% (10)	20% (8)
	<b>Funding</b>				
	Household	29% (2)	0% (0)	100% (13)	11% (1)
<b>Planned modifications</b>	House builder NGO	0% (0)	0% (0)	0% (0)	0% (0)
	Different NGO	71% (5)	0% (0)	0% (0)	89% (8)
	<b>Builder</b>				
	Self-build	14% (1)	0% (0)	46% (6)	0% (0)
	Carpenter/mason	14% (1)	0% (0)	54% (7)	11% (1)
	NGO	72% (5)	0% (0)	0% (0)	89% (8)
<b>Characteristics of unplanned housing modifications</b>	<b>Type of materials</b>				
	Durable	24% (10)	36% (13)	58% (14)	23% (9)
	Precarious	66% (27)	61% (22)	21% (5)	60% (24)
	Both	10% (4)	3% (1)	21% (5)	18% (7)
	<b>Builder</b>				
	Self-build	82% (32)	86% (31)	71% (15)	87% (34)
	NGO	0% (0)	0% (0)	0% (0)	0% (0)

## 5.7 Living conditions

The “experimental dimension” of inhabitation refers to how residents experience the dwelling and how their daily activities are developed (Ahrentzen, 1992) that in the time creates attachment to the house where living patterns are expressed. Moreover, it is crucial the understanding of home beyond the physical concept of housing. This aspect is analyzed by Dovey (1985) who argues that the dehumanized process of creation of houses without the understanding of the concept of “being at home” and the ones who inhabit the houses, leads to the creation of homeless.

In order to analyze the actual living conditions of the resettled families in the provided houses there were selected some of the families and the way how they inhabit their new homes are described. In the analysis it is examined if the process of inhabitation lead to or not in the adaptation of residents' built environment in order to fit their required living spaces and environment that allows them to develop their daily activities and preferences.

### **5.6.1 Living conditions in Village 1**

In house 1, (Figure 5.11) the residents develop most of their activities inside the house, except for cooking. Thus residents built an improvised kitchen outside of the house where also there is a space for firewood that they collect from the neighboring areas. Beside the kitchen residents have built precarious low fences to define the limits of their property, which expands beyond the property line assigned and includes part of the public space (roads). The type of family is extended, with one of the grandparents living together with the already large family with together with both parents and children are 12 members. The family was selected due to their low income and size to be beneficiaries of a NGO built loft to accommodate the family that is used for both sleeping space and storage.

The situation found in house 2 (see Figure 5.11) was completely different. The family type is nuclear family with a total of 4 members. The main economic activity is based on the small shop that they have built in front of the house. Residents also have built a loft without external support, which is used as bedroom. The interior of the house is well equipped with the needed furniture and organized living spaces.

In house 3 (Figure 5.12) the family type is extended, with both grandparents living with the family, which in total has 9 members. Their economic situation is stable with the occupation of the family head as a carpenter/mason (as it is understood by local people) with a higher average family income. The residents have built a two story extension in front, which is the only one of this type in the settlement. The first floor is used as resting area, because as it was expressed by the residents, inside the house it is extremely hot. It was observed that part of this space is also used for storage of firewood. Inside of the provided house, the use of the space is combined as bedroom and living room. Additionally, residents have built a loft that is used as sleeping space.

House 4 (Figure 5.12) is an example of an unmodified house. Although the family has 8 members, residents have kept the house without major changes. Residents also mentioned that they have a high family income (that for this study is more than PhP 200 per day). However, the observation of living conditions evidence a precarious situation where there is not defined sleeping spaces.

In house 5 (see Figure 5.13) the family type is nuclear and middle size (6 members). There are no changes in the interior of the house, which the space is mostly used as bedroom. The family built a covered space in front of the house to protect them from the sunrays during the daytime because more of the daily activities, like cooking, laundry and resting, are performed in this space. There is a small firewood kitchen or locally

called “dirty kitchen”. Additionally, the residents built a fence to define the limits of their property and a garden.

House 6 which is presented in Figure 5.13 is a clear example of the need to expand the living area of the house in order to accommodate the family members. This large family (12 members) has the basic stuff inside the house which is used as a dormitory, and the rest of the activities are performed in a sub house built outside the assigned lot. The sub house was built with non-permanent materials (with a short lifespan and that can be removed easily) like wood, bamboo, rattan mats and corrugated steel sheets for roofing. The sub house has a kitchen area, a corner for laundry and a sleeping space that is used mainly for the kids during the day.

In village 1, the construction of lofts responds to the need for sleeping areas to accommodate residents. Within the spaces for daily activities, the priorities are service and rest areas, which have not been considered in the housing design. Spaces for cooking or laundry are needed, and therefore residents fill this gap by building extensions inside or outside the lot, as in house 6, where a sub-house was built.

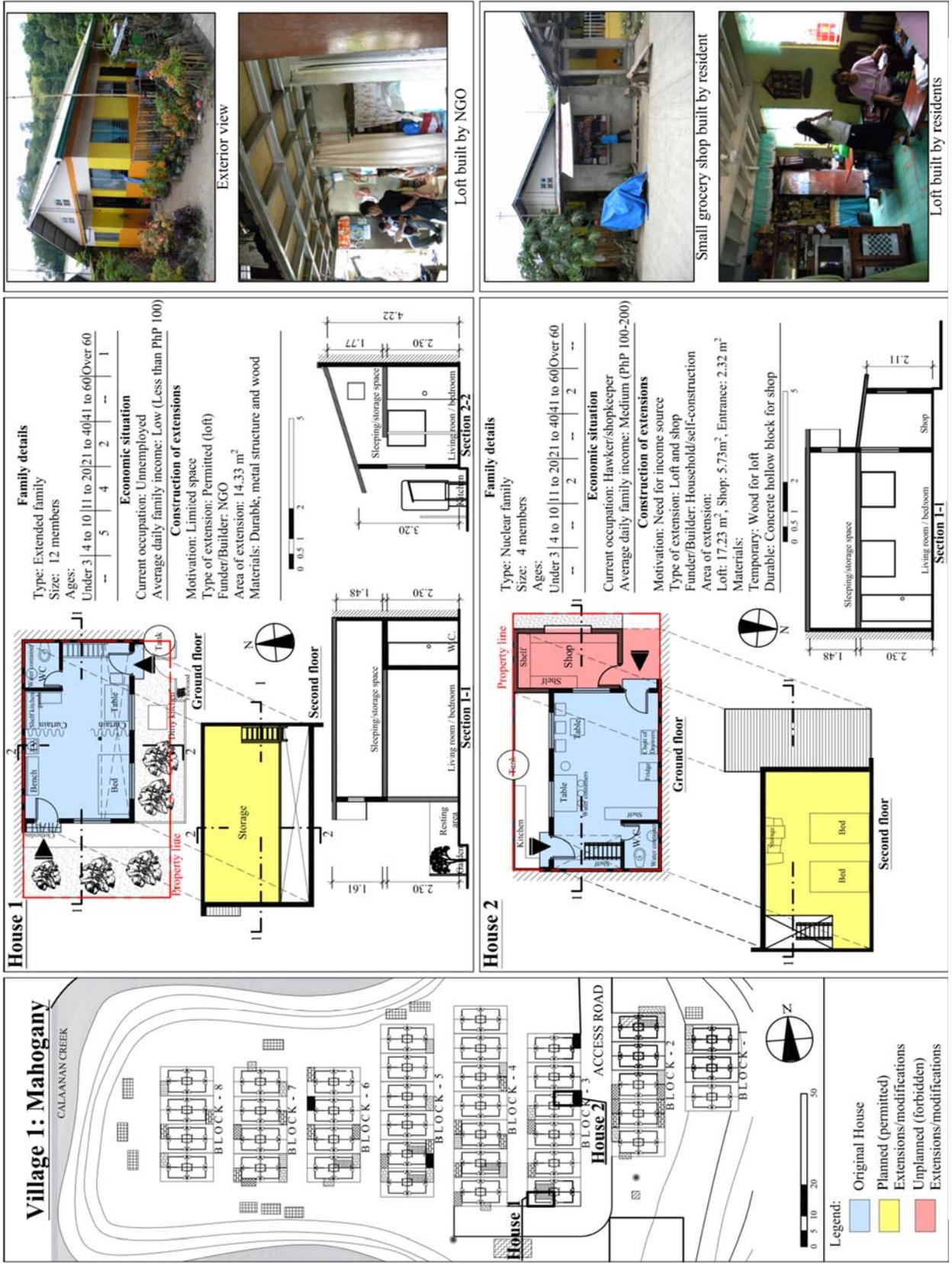


Figure 5.11 Living conditions of residents in Village 1, Houses 1 and 2



Figure 5.12 Living conditions of residents in Village 1, Houses 3 and 4



### **5.6.2 Living conditions in Village 2**

In house 1 (see Figure 5.14, the family is small (2 members) but has opened two small businesses (small grocery store and a barbershop) that are the main source of income. This is the only family that have changed the original design of the house changing the location of the restroom closer to the bedroom in order to have a wider living room that connects the private spaces with the shops built with durable materials (concrete hollow blocks).

The extension built in house 2 (Figure 5.14) is the response to the limited space for developing the residents daily activities but also the uncomfortable temperatures inside the original house. The family built a covered space in front of the house, which has concrete walls only on the extremes of the property with plans in the long term to upgrade the extension with durable materials. The space is used for cooking, storage firewood, laundry and resting.

In house 3 (Figure 5.14) the family size is average (5 members), with a high level of daily family income (more than PhP 200). The original house has not been modified but extensions were built in front and in the rear of the house. The frontal extension was built partially with durable materials (concrete block for low walls) and completed with wood and covered with corrugated steel sheets. This space is used for a local business that is the main income source of the family (grocery store and internet café). The extension built in the rear is built with makeshift and recycled materials (wood poles and tarpaulin sheets), the space use is for cooking, storage and as living room.

House 4 (see Figure 5.15) has been substantially modified by the residents. This is the only house where residents have built a two story extension with durable materials (RC structure and concrete hollow blocks) by a hired local mason. The head of the family is an office worker which for the local average has a high income (more than PhP 200 per day). Although according to the residents the main motivation was the uncomfortable high temperatures inside the house, the spaces built have different uses like studio, bedroom and storage.

The variety of housing extensions and their use in village 2 is influenced by the low control from the local government, which is unable to restrict the building of extensions. Houses 1 and 3 present local businesses as the main use of extensions, which are combined with service areas and are located in the rear of the house. Residents expressed how inconvenient is the lack of a secondary access in the back of the house that could connect the extensions built in the rear with the original house.

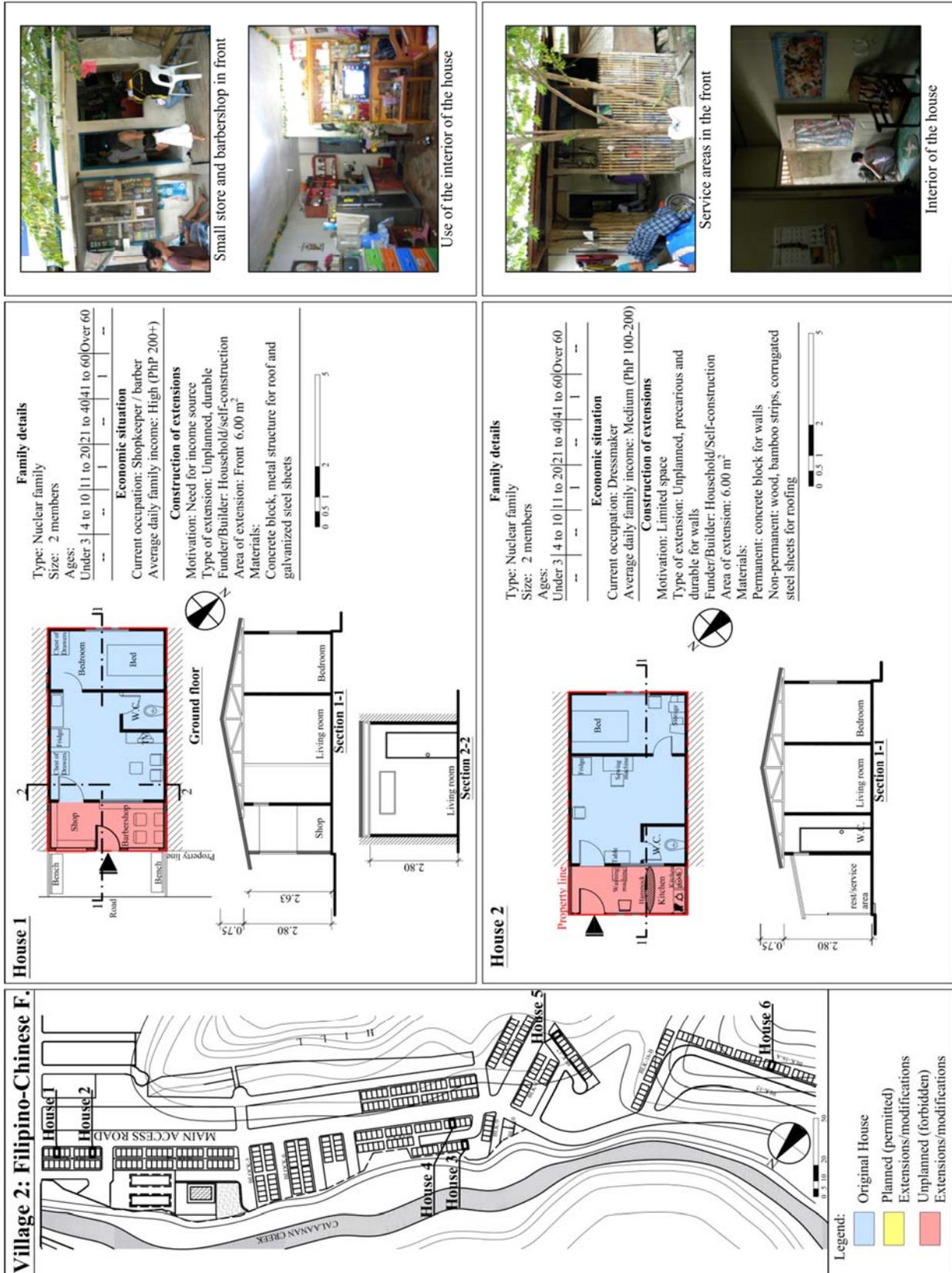


Figure 5.14 Living conditions of residents in Village 2, Houses 1 and 2

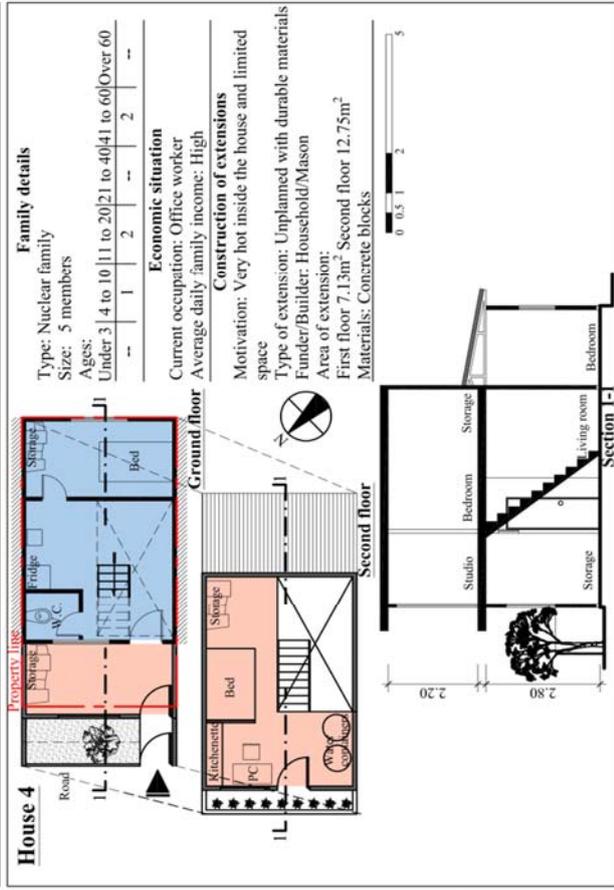
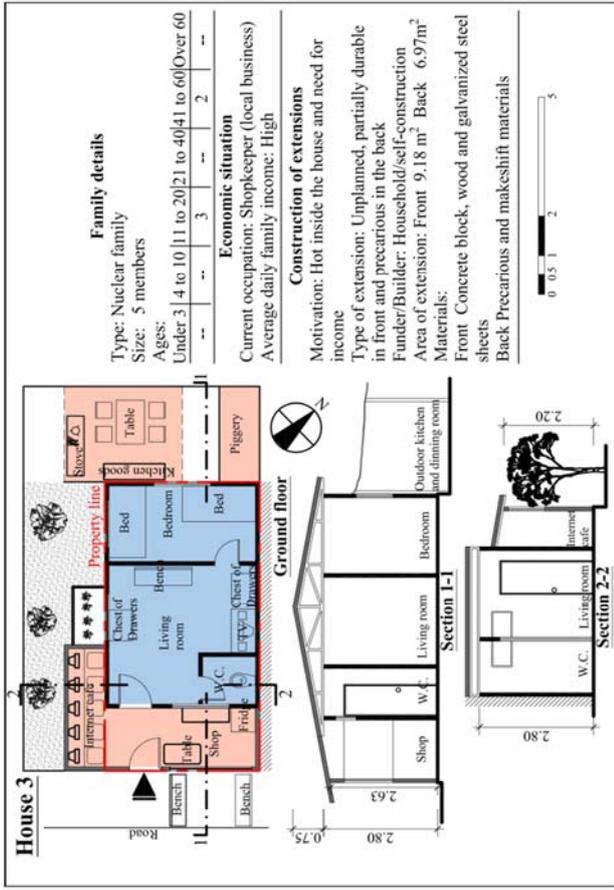
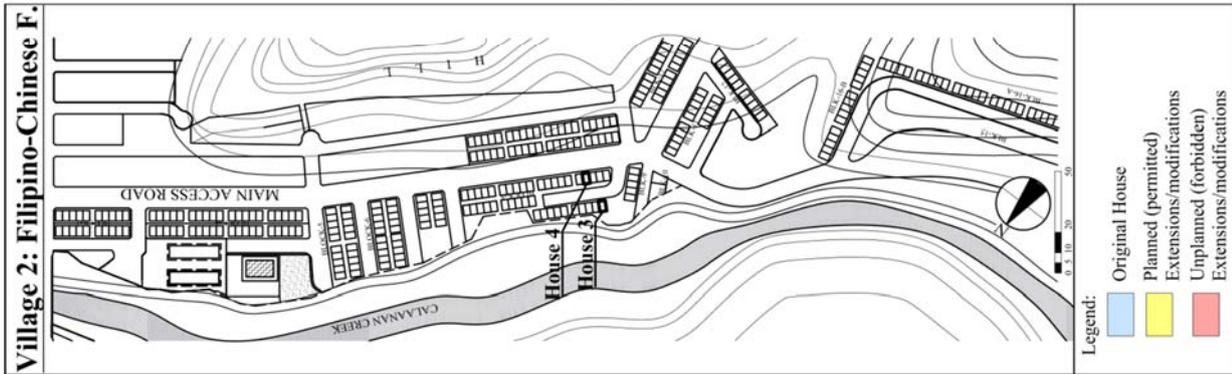


Figure 5.15 Living conditions of residents in Village 2, Houses 3 and 4

### **5.6.3 Living conditions in Village 3**

In house 1 (Figure 5.16) residents built a loft that is used as sleeping space and extended the kitchen in the rear of the house enclosing it in order to protect their belongings. Although the family head is working in the city, there is a small store built in the entrance of the house that is a complementary income source for the family which has an average daily income of more than PhP 200 (approx. USD 4.30)

The family in house 2 (Figure 5.16) is small with 3 members, a high income which built a loft that is used as sleeping space (bedroom) and a kitchen enclosure built with durable materials (concrete blocks) Both of the extensions were built by a local mason hired by the family.

House 3 (Figure 5.17) presents internal partitions in order to divide the space inside the house in two bedrooms and a dining room. There is a precarious extension built in the rear of the house where makeshift materials were used to enclose the service areas. Although the family income is high there are no extensions built with durable materials.

In house 4 (see Figure 5.17) the family is investing on the construction of a loft that is in progress according to their available resources. The current use of the loft is storage. Residents have covered the service area in the rear of the house and make a garden in the side of the house.

In village 3, all the lofts were built by the residents without support from NGO that built the houses. Lofts or mezzanines are used as bedrooms and storage spaces, and some of them are under construction. The lack of external support for the construction of extensions promotes the active participation of residents in funding and building lofts and demonstrates the residents' capacities and motivation to improve their living conditions.



Figure 5.16 Living conditions of residents in Village 3, Houses 1 and 2



Figure 5.17 Living conditions of residents in Village 3, Houses 3 and 4

#### ***5.6.4 Living conditions in Village 4***

In house 1 (Figure 5.18) the family is nuclear and has 9 members with a high daily family income. Residents have built a loft to accommodate the family members which is used as bedroom and for storage. There is also a frontal extension used as rest space and a extension in the rear where the service area was covered and enclosed.

The residents of house2 (Figure 5.18) have a completely different profile. The family is a couple without kids which main activity is painting, therefore the main use of the interior of the house is as a art studio, and residents extended in the rear of the house with durable materials to accommodate a bedroom and a kitchen separately. In addition, residents have built an enclosure in front of the house to define the limits of their property.

The family residing in house 3 (see Figure 5.19) have been selected by one NGO that built the loft mainly because of it is a large family (11 members). Residents use this space for sleeping and storage. In addition the family has extended the roof of the kitchen in the rear of the house with precarious materials.

In house 4 (Figure 5.19) the family type is nuclear and medium size with 5 members. The daily family income is high and their main income source is the grocery store they built in front of the original house. This extension is partially built with durable materials (low wall built with concrete blocks) and completed with wood and roofed with corrugated steel sheets. In the interior of the house residents have built non-permanent partitions with plywood and separated the bedrooms and living room. There is no major intervention in the service area in the rear of the house.

In village 4, residents built extensions in front and rear of the houses, even occupying the corridor designed for secondary access to the houses. The use of the extensions is also diverse, from local grocery stores to intermediate spaces for rest and enclosures of kitchen and service areas in the rear.



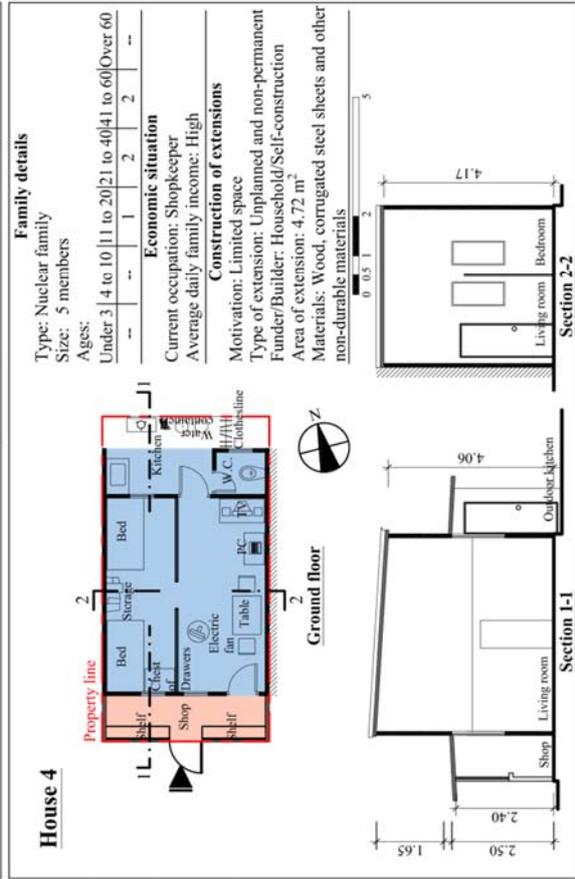
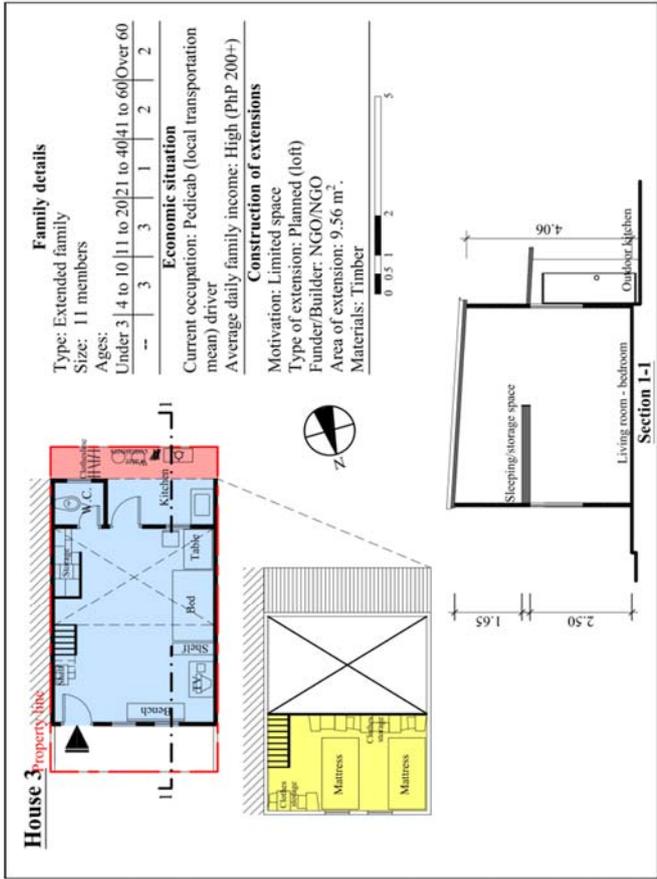


Figure 5.19 Living conditions of residents in Village 4, Houses 3 and 4

## 5.8 Key findings

From the analysis of residential satisfaction and living conditions, there are various issues that emerged for the improvement of future resettlement projects:

The informal nature of pre-disaster settlements evidenced poor construction quality and limited access to facilities. Consequently, the positive perceptions of resettled communities are not surprising: in the new settlements, they have access to basic services and facilities, and although local government keeps the formal ownership of the houses, occupancy rights were awarded to residents, so there is no threat of eviction.

Residents' satisfaction with their current houses is generally positive, although there are some differences between the four villages. Negative perceptions are related to appropriateness to the locality such as thermal comfort and construction quality.

Despite the lack of control over housing planning and construction resulting from the entirely top-down resettlement, it is evident that communities are not passive recipients of help. Despite the residents' negative perception of their economic situation; they are able to build complementary structures progressively in order to ease their daily activities, with or without external support, thus displaying a proactive attitude.

Additionally, the differences in the approach for post-occupancy community support from government but especially from NGOs in the four villages analyzed, illustrated how easily residents' attitudes are influenced. For instance, in village 3, the supporting NGO discouraged residents from building extensions in front of the housing provided in order to promote compliance with local regulations and occupancy terms. On the other hand, in village 2, due to the lack of control, different types of extensions proliferated with limited concern about residents' safety.

The analysis of living conditions highlighted the lack of essential spaces for daily activities, such as kitchen, service and rest areas. Consideration had not been given in planning to the characteristics of a tropical country, where residents tend to develop their activities in outdoor or intermediate spaces due to high temperatures inside the houses.

The main difficulty expressed by the residents is the reconstruction of livelihood opportunities, which should be one of the main priorities of community support activities carried out by local government and other agencies. The assistance-based support from these agencies only causes dependency and hinders the development of these communities; which is explained by the negative perception of residents' current economic situation and the difficulties to find livelihood opportunities.

The construction of housing extensions, despite their illegality, clearly demonstrates a need for residents

to work actively as they conceive of them as housing improvements. Thus, it is necessary to review housing designs and consider them as “core houses” as regards the possibility of residents improving them. This demonstrates the need to change the approach in order to allow housing modifications, and consequently promote assistance by NGOs in order to improve the construction quality and safety of these complementary structures. This is especially true, considering that this study showed that NGOs can have a positive influence on the attitude of residents by motivating or discouraging certain types of extension.

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## Chapter 6:

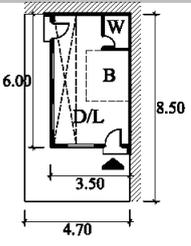
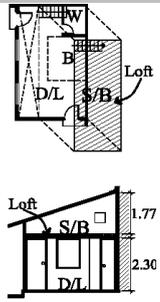
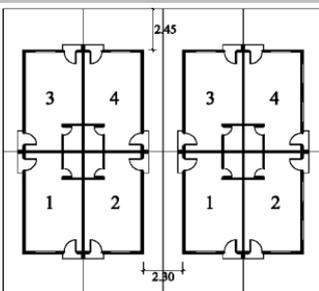
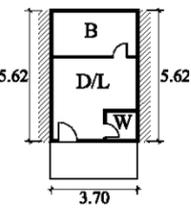
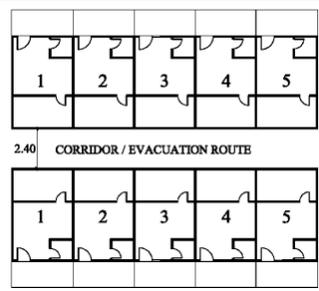
### Influence of Housing Designs on Modifications Built by Residents

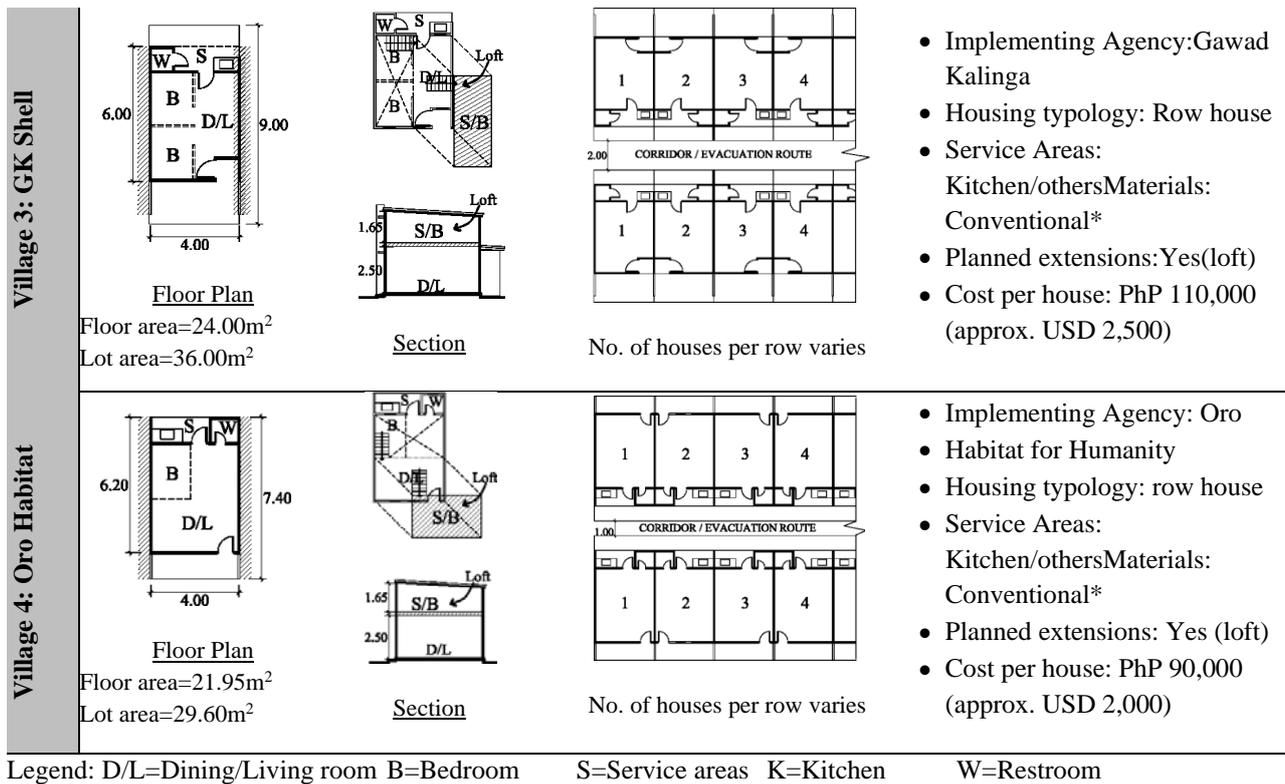
This chapter presents the types of housing modifications observed in the four villages analyzed, the initial motivations of the residents to build them, the actual use of the modifications, the location of the modifications inside the house, within the limits or outside of the provided lot, finally the materials used regarding their durability. The objective of this paper is to explore the different characteristics of housing extensions in the four villages, comparing them and initiate the definition of causes for housing modification.

#### 6.1 Designs of Agency-built permanent houses

The design of the houses allows for basic units without internal partitions of the kind that were commonly used in social programs in the country (Manalang, R. T. et al. 2002). There are specific characteristics in each village that constitute the initial circumstances of inhabitation that are described in Table 6.1.

**Table 6.1: Housing designs and characteristics**

	Basic module	Planned extensions	Housing block layout	Characteristics:
Village 1: Mahogany	 <p>Floor Plan Floor area=21.00m<sup>2</sup> Lot area=39.95m<sup>2</sup></p>	 <p>Section</p>	 <p>4 houses per building</p>	<ul style="list-style-type: none"> <li>• Implementing Agency: Habitat for Humanity Philippines</li> <li>• Housing typology: Quadruplex</li> <li>• Service Areas: Not provided</li> <li>• Materials: Conventional*</li> <li>• Planned extensions: Yes (loft)</li> <li>• Cost per house: PhP 110,000 (approx. USD 2,500)</li> </ul>
Village 2: Filipino-Chinese Friendship	 <p>Floor Plan Floor area=21.16m<sup>2</sup> Lot area=27.00m<sup>2</sup></p>		 <p>Rows of 5 housing units</p>	<ul style="list-style-type: none"> <li>• Implementing Agency: Filipino-Chinese Chamber of Commerce</li> <li>• Housing typology: Row house</li> <li>• Service Areas: Not provided</li> <li>• Materials: Pre-fabricated**</li> <li>• Planned extensions: None</li> <li>• Cost per house: PhP 70,000 (approx. USD 1,550)</li> </ul>



Legend: D/L=Dining/Living room B=Bedroom S=Service areas K=Kitchen W=Restroom

\*Conventional: RC structures, concrete block masonry for walls, metal roof structure and steel sheets.

\*\*Prefabricated: Steel-frame structure, plastic wall panels, metallic roof truss and corrugated steel sheets.

## 6.2 Housing modifications

The phenomenon of spontaneous transformation or resident-initiated modifications (Khan, T.H., 2013; Makachia, P. A., 2005) refers to the alterations of the houses, carried out by their inhabitants with the objective to adapt their environment and meet their needs and behaviors. This is result of what is called “housing stress”, which appears when the “level of tolerance” is exceeded, creating a mismatch between the actual and the preferred housing (Seek, N., 1983). In order to fill this mismatch, residents build alterations or additions to the original housing units due to diverse reasons originated from the current living conditions.

For the purpose of this research, internal partitions are not considered as housing modifications, the target for this study are the structures or elements that add useful floor area to the basic housing provided, this includes internal or external extensions of the houses. In the survey it was observed that in average 56% of the residents modified their houses, as shown in Table 6.2 In villages 1, 2 and 4 there is major percentages of modified houses. Although the housing designs are similar in villages 3 and 4, unmodified houses in village 3 represent 63%.

**Table 6.2: Housing modifications**

	Village 1	Village 2	Village 3	Village 4	Mean
	% (No)	% (No)	% (No)	% (No)	
Modified	69%(41)	54%(36)	38%(24)	63%(40)	56%
Non-modified	31%(18)	46%(31)	63%(40)	38%(24)	44%
Total	100%(59)	100%(67)	100%(64)	100%(64)	

### 6.3 Residents' motivations for modifications

Once the households who modified their houses were identified, they were asked about the motivations to transform their houses or in other words, from the residents' perspective, what were the initial reasons for the construction of extensions, the results are presented in Table 6.3. The responses from residents reveal the needs or other driven factors that influenced the construction of extensions:

**Table 6.3: Motivations for housing modification**

	Village 1 % (No)	Village 2 % (No)	Village 3 % (No)	Village 4 % (No)	Mean
Limited Space	54% (22)	69% (25)	63% (15)	85% (34)	68%
Uncomfortably hot inside	41% (17)	36% (13)	0% (0)	18% (7)	24%
Need income source	20% (8)	6% (2)	8% (2)	8% (3)	11%
Security	0% (0)	0% (0)	29% (7)	0% (0)	7%

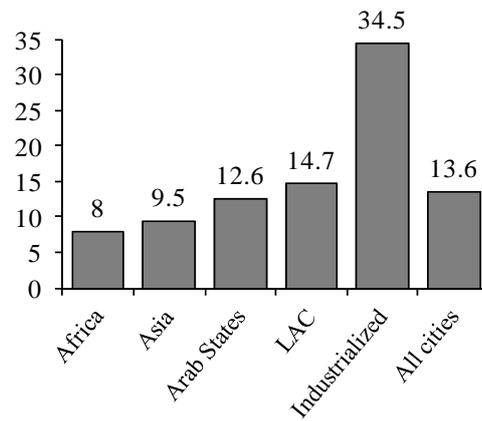
#### 6.3.1 Limited Space

The limited space inside the provided house represents the main motivation in the four villages, which means that in average 68% of the residents require larger areas to accommodate the family members and/or to develop their daily activities. The initial premise is that the floor area of the house is limited regarding the family size per household. In Table 6.4 it is shown the number of members per family in the total of households surveyed in the four villages. As it is presented in Table 6.4, in average 51% of the households have 4 to 6 members, this indicates that the average floor area per person in village 1 is 4.2 m<sup>2</sup>, in village 2 is 4.23 m<sup>2</sup>, in village 3 is 4.8 m<sup>2</sup>, and in village 4 is 4.39 m<sup>2</sup>.

**Table 6.4: Number of family members and ages per household**

No. of family members	Village 1 % (No)	Village 2 % (No)	Village 3 % (No)	Village 4 % (No)	In 4 villages
1 to 3	10% (6)	37% (25)	39% (25)	23% (15)	28% (71)
4 to 6	63% (37)	39% (26)	44% (28)	59% (38)	51% (129)
7 to 10	20% (12)	24% (16)	17% (11)	16% (10)	19% (49)
More than 10	7% (4)	0% (0)	0% (0)	2% (1)	2% (5)
Total	100% (59)	100% (67)	100% (64)	100% (64)	100% (254)

In the 2001 Report of the State of the World Cities (UN Habitat, 2001), it was stated that the floor area per person is a key indicator of housing quality and measures the adequacy of living space in dwellings. Regarding this criterion there is a comparison of average housing floor area per household in urban areas presented in Figure 6.1.



LAC = Latin America and the Caribbean

**Figure 6.1: Floor area per person in cities**

Source: UN Habitat, 2001

Comparing the floor area per person in Asia (9.5 m<sup>2</sup>) and the average in the four villages analyzed, it is revealed that the houses in Calaanan site consider only half of the floor area per person (4.2 to 4.8 m<sup>2</sup>) in the region. The need of spaces not considered in the house design such as kitchens, service areas and others, is also a motivation for the construction of extensions. The specific motivation for these spaces is better explaining when their current use was observed.

### 6.3.2 High temperatures in the interior of the houses

Another important factor for housing modification is the uncomfortably high temperatures inside the houses which is the second most important driven factor for housing modification. This is a determinant issue in villages 1, 2, and 4. The use of conventional materials and standardized housing designs from builder NGOs, governmental agencies like the National Housing Authority or the Department of Social Welfare and Development, promoted the construction of houses based on urban contexts and without considering the limitations of low-income people to have access to electrical systems to reduce the internal temperature of the houses, such as air conditioning or even electric fans. As a consequence, the provided houses are lack of thermal insulation, low (in village 2) or lack of ceiling where the galvanized steel sheets used for roofing produced the accumulation of heat inside the house, and improper ventilation to allow air circulation due to the lack of upper windows specially in village 1.

In village 3 to have shaded spaces outside of the houses is not the residents' priority. The reason is that they are prohibited by the builder NGO which discourages the construction of extensions in front of the houses, in fulfillment of the occupancy conditions that prohibit these kinds of constructions. However, the NGO allows modifications in the rear of the houses because they are "less obvious". This is one of examples of NGO influence in the residents' management.

### 6.3.3 Need for income source

The need of income sources is related to the feasibility to find livelihood opportunities (for an average of

11% of the residents in the four villages), especially in a new environment and in a short or middle term after the resettlement. However, it is not clear from the point of view of housing design the reason why a higher percentage of residents of village 1 consider this need as a priority in comparison with other villages.

The possibility to have small scale loans (unregulated) from local moneylenders motivated residents to open small businesses, mainly small grocery shops or locally known “sari-sari” stores, motorbike repairing and vulcanizing, dressmaker and others. None of the surveyed households expressed a motivation to build housing extensions in order to obtain extra incomes from renting out these spaces, in part because to rent out part of the house means a serious misconduct and violation of occupancy terms. Therefore, this was not found in the survey and neither reported by the local government staff working in the settlement.

The explanation for a higher incidence of households motivated to modify their houses due to the income need in village 1 is related to its location in Calaanan site. Village 1 is physically isolated from the most densely populated areas in the site (see Figure 1) and farther from the local facilities and commercial areas in the site, the distance to the main access roads and consequently limited accessibility from and to the city center where the major commercial areas are located and which were the main working site of the resettled residents before the disaster.

#### 6.3.4 Security

The residents’ need to protect their belongings through the construction of enclosures is a priority in village 3. The housing block layout in this village considers 2 meters for a corridor in the rear of the houses which have a secondary entrance. The layout is similar in village 2 and 4. The basic differences are that in village 2, the housing design does not consider a secondary entrance. Therefore the house is apparently less vulnerable to thieves. In village 4, the corridor for the secondary entrance is narrower, from 1 to 1.2 meters; also there are many residents that built extensions in the rear completely covering these spaces.

#### 6.4 Current use of house modifications

In contrast with the residents’ motivation to modify their houses, Table 6.5 presents the information related to the actual use of the housing extensions collected through direct observation in the site.

**Table 6.5: Actual use of extensions**

Motivation	Use	Village 1	Village 2	Village 3	Village 4	Mean	
		% (No)	% (No)	% (No)	% (No)		
Need for space	Service areas	Kitchen	20% (25)	69% (25)	79% (19)	78% (31)	62%
		Laundry	5% (2)	3% (1)	0% (0)	0% (0)	2%
	Multi-purpose	Loft	17% (7)	0% (0)	54% (13)	23% (9)	24%
		Sub house	15% (6)	19% (7)	4% (1)	5% (2)	11%
Uncomfortably hot inside	Rest area	54% (22)	39% (14)	4% (1)	33% (13)	33%	
Need income source	Shop/business	32% (13)	33% (12)	8% (2)	23% (9)	24%	

### 6.4.1 Limited Space

The need to increase the limited space is expressed in the construction of spaces not provided in the original house, such as kitchen or laundry areas which are fundamental for daily activities in 64% of the houses. The need to increase the area of the house is also related to the construction of spaces to accommodate the family members, specifically sleeping spaces which represent 33% of the households who built lofts or sub-houses. In the field it was observed that sleeping spaces are generally combined with other uses, such as storage (in case of lofts) and are also part of structures independent from the provided house such as the sub houses built outside the provided lot, of course informally. Sub houses generally combine sleeping areas, rest spaces, kitchen, and other service spaces.

In villages 2, 3, and 4 the use of most of the extensions are kitchens, in villages 1 and 2, these spaces were not provided, therefore residents needed to build an outdoor kitchen or attach the space to the provided house. The design of houses in villages 3 and 4 considers spaces for kitchen and service, such as laundry, and the constructions in these areas imply to enclose them building a wall and roofing these spaces (Figure 6.2). Exclusive laundry spaces are few, 5% in village 1 and 3% in village 2, the reason is that these are secondary activities which are performed in rest areas.



**Figure 6.2: (a) Enclosed kitchens in village 3, (b) rest space used also as rest space for socializing in village 4**

### 6.4.2 High temperatures in the interior of the houses

Rest areas were built responding to the need to have intermediate shaded spaces between the interior and exterior of the house for the 11% of the residents. The reason is the high temperatures inside the house. The uses of these spaces are commonly combined with laundry or storage, but these spaces also promote the interaction between the residents of the house and neighbors (Figure 3). The data shown in Table 4 is consisted with Table 5, the major percentage of rest areas was built in villages 1, 2, and 4, and precisely these villages expressed that due to the lack of proper ventilation.

As it was explained before, residents in village 3 thought that they were limited to use only the remained lot area in the rear of the houses. Although they may feel the interior temperatures uncomfortable, their

priorities are to build spaces that allow them to perform their daily activities such as cooking or to protect their belongings enclosing these spaces.

### 6.4.3 Need for income source

The need to have an immediate income source has promoted the construction of local small stores which spread rapidly in the four villages (24% in average), especially in villages 1, 2, and 4. It does not mean that there are no small stores in village 3. The difference is that residents did not build extensions for shops; instead they accommodated the entrance of the house to create a space for stores (see Figure 6.3). However, this does not add area to the house, for this reason it is not considered in Table 6.5.



Figure 6.3: (a) Shops built as extension in village 4, and (b) shop accommodated in the entrance of the house

### 6.5 Types and location of housing modifications

Lofts or mezzanines are the only extensions that are built inside the house, the design of the houses in villages 1, 3, and 4 allow the construction of these structures, because this issue was considered during the planning stage, with high ceiling, only in village 2 because the ceiling is lower it is impossible to build these extensions.

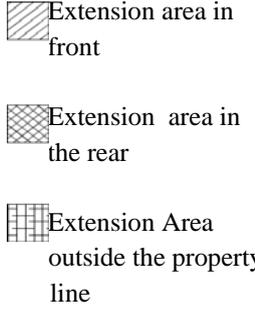
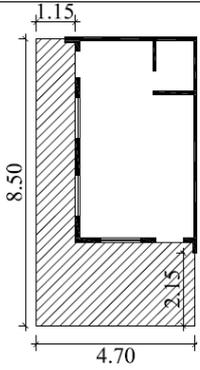
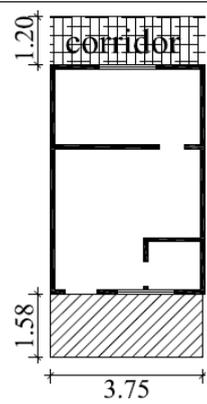
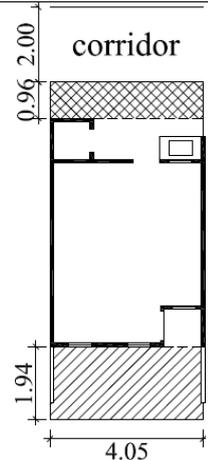
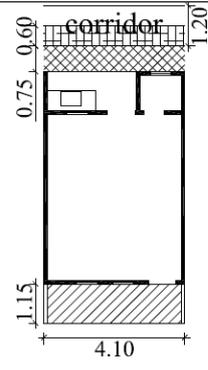
Besides lofts or mezzanines other extensions or housing modifications are unplanned, and since the local government forbids any construction outside the house, these unplanned modifications are also considered illegal. However, to satisfy the needs of the residents are their main priority, as it is presented in Table 6.6, the incidence of unplanned extensions built is clearly higher than the planned ones in the four villages.

Table 6.6: Type of modification

	Village 1 % (No)	Village 2 % (No)	Village 3 % (No)	Village 4 % (No)
Planned only	5%(2)	0%(0)	13%(3)	3%(1)
Unplanned only	83%(34)	100%(36)	46%(11)	78%(31)
Both (planned + unplanned)	12%(5)	0%(0)	42%(10)	20%(8)

To analyze the location of the extensions built by residents is a key factor for the understanding which housing design promoted certain extension. Table 6.7 presents the data related to the location of extensions.

**Table 6.7: Location of extensions**

	Village 1 % (No)	Village 2 % (No)	Village 3 % (No)	Village 4 % (No)
Front/side	88% (36)	97% (35)	0% (0)	58% (23)
Rear	0% (0)	3% (1)	79% (19)	75% (30)
Inside the house	12% (5)	0% (0)	54% (13)	23% (9)
Outside the lot	12% (5)	8% (3)	0% (0)	3% (1)
Legend:				
				
	-Floor Area =21.00 m <sup>2</sup>	-Floor Area =21.16 m <sup>2</sup>	-Floor Area= 24.00 m <sup>2</sup>	-Floor Area=21.00 m <sup>2</sup>
	-Lot Area = 39.95 m <sup>2</sup>	-Lot Area = 27.00 m <sup>2</sup>	-Lot Area = 36.00 m <sup>2</sup>	-Lot Area = 39.95 m <sup>2</sup>
	-Area extension (front/side) =18.42m <sup>2</sup>	-Area extension (front)=5.92m <sup>2</sup>	-Area extension (front)=7.62m <sup>2</sup> (rear)=3.90m <sup>2</sup>	-Area extension (front)=4.48m <sup>2</sup> (rear) =3.08m <sup>2</sup>
		-Area extension outside the property line (rear- corridor)=4.52m <sup>2</sup>		-Area extension outside the property line (rear- corridor) =4.48m <sup>2</sup>

In village 1, 88% of the extensions were built in front and/or side of the house where the available area for extensions inside the lot is 18.42 m<sup>2</sup>. In village 2, 97% built in the 5.92 m<sup>2</sup> available in front. Village 4 also present a high percentage (54%) of extensions built in the 4.48 m<sup>2</sup> available in the front of the house. On the other hand, in village 3, there are no extensions built in front, because of the influence of the builder NGO over the residents' decisions for housing modification.

Extensions built in the rear are more frequent in villages 3 (79%) and 4 (75%), mainly kitchen enclosures. The design of the houses in village 1 makes it impossible to build rear extensions. In village 2, only 3% of the extensions are built in the rear, because there is no secondary access to connect any possible extension with the main building.



(a) (b)  
**Figure 6.4: (a) Sub houses in village 1 and (b) village 2**

Constructions built outside of the lot are called in this study sub houses because in these constructions different activities are performed, but also are independent from the permanent housing building (Figure 6.4). This type of extension is more frequent in village 1 (12%) and in village 2 (8%). Only 3% in village 4, and none of the residents built sub houses in village 3.

### 6.6 Technical characteristics of extensions

In this section the technical characteristics of the extensions, mainly by residents are presented in order to understand the quality of construction and the expected lifetime of these constructions.

Unplanned modifications cannot be considered permanent, because legally they can be removed. Therefore in this study housing extensions are classified in durable and precarious regarding the construction materials used. Additionally there are residents who combined both types (Table 6.8). The major percentage of durable extensions built is presented in village 3 (79%), which are mainly kitchen enclosures. In the rest of the villages the tendency are the precarious extensions, this can be explained by the lack of initiatives to discourage the construction of extensions. According to the local government officials, residents tend to build those extensions on weekends, when the local staff is not in the site. Later these constructions were reported and residents received notifications to stop their construction or to remove them. However, so far these measures have not been effective.

Table 6.8 contains information about the type of foundations of the extensions, it is clearly shown that in all the villages there is few attention for the stability of this part of the structures. In few durable extensions concrete steel bars were used for foundations that provide more stability and safety to these constructions.

**Table 6.8: Materials of housing extensions**

	<b>Village 1</b>	<b>Village 2</b>	<b>Village 3</b>	<b>Village 4</b>
	<b>% (No)</b>	<b>% (No)</b>	<b>% (No)</b>	<b>% (No)</b>
<b>Type of materials</b>				
Durable	34%(14)	39%(14)	79%(19)	41%(16)
Precarious	76%(31)	64%(23)	42%(10)	78%(31)
Both	10%(4)	3%(1)	21%(5)	18%(7)
<b>Foundations</b>				
Concrete and steel bars	8% (3)	3% (1)	0% (0)	8% (3)
Concrete and stones	0% (0)	0% (0)	0% (0)	0% (0)
Unknown/no foundation	92% (36)	97% (35)	100% (21)	92% (36)
<b>Columns and beams</b>				
Concrete and steel bars	13% (5)	3% (1)	0% (0)	13% (5)
Wood	72% (28)	53% (19)	48% (10)	67% (26)
Mixed wood/concrete	0% (0)	0% (0)	0% (0)	0% (0)
No structural elements	15% (6)	44% (16)	52% (11)	21% (8)
<b>Outer walls</b>				
Concrete block	26% (10)	28% (10)	43% (9)	23% (9)
Wood	8% (3)	3% (1)	5% (1)	13% (5)
Mixed wood/concrete	0% (0)	22% (8)	5% (1)	8% (3)
Traditional materials	54% (21)	36% (13)	38% (8)	28% (11)
Makeshift/improvised	5% (2)	6% (2)	10% (2)	21% (8)
No walls	8% (3)	6% (2)	0% (0)	8% (3)
<b>Roofs</b>				
Galvanized iron/wood rafters	92% (36)	78% (28)	81% (17)	87% (34)
Galvanized iron/concrete	0% (0)	3% (1)	0% (0)	3% (1)
Traditional materials	0% (0)	3% (1)	5% (1)	0% (0)
Makeshift/improvised	8% (3)	17% (6)	14% (3)	10% (4)

Structural elements like columns and beams are vital in order to keep the strength and stability of the constructions and protect walls from falling. In table 8, it is shown that most of the extensions' columns and beams are wooden. However most of the extensions do not have structural elements.

The materials used for outer walls of extensions are diverse, from the conventional for durable constructions. In village 3, 43% of the extensions were built with concrete blocks. Traditional materials that are locally available (bamboo, nipa leaves, coconut lumber, others), in village 1 most of the extensions were built with these materials (Figure 6.5). Makeshift or improvised materials are also used in the four villages for precarious extensions, but the incidence is lower.



(a)

(b)

**Figure 6.5: Precarious extensions in village 2, using nipa leaves, wood and bamboo (a), and combined bamboo for walls and corrugated galvanized iron sheets for roofing (b).**

The materials for roofs are presented in Table 6.8, for durable or precarious constructions with some consideration for a longer lifespan are roofed with corrugated iron sheets on wood rafters, which are the most commonly used in the four villages. Local traditional materials are also popular; obviously the lifespan is shorter and mostly used for precarious extensions.

### **6.7 Main issues that determined housing modifications**

The construction of housing extensions has spread rapidly in the four villages, even in village 3 despite the restrictions set by the builder NGO. The modification of the houses is unavoidable. Although from the authorities perspective is a negative outcome, for the residents, it means the possibility to improve their houses. Consequently, they feel identified with their homes and secured to be able to adapt and maximize the space (Manalang, R. T., et al., 2002). There are three main issues that are identified as crucial for the understanding of the influence of housing design in the construction of extensions:

#### **6.7.1 Housing mismatches**

Expressed in the limited understanding of residents' needs, lifestyles and the local conditions by the planner and builder of the houses: The family size is variable (from 1 to more than 10 members) as well as the needed space to accommodate them. The basic daily activities of the residents were not considered, like the lack of cooking and service spaces. The way how residents traditionally collect and use firewood from surroundings for cooking in the called "dirty kitchens". The challenges that residents have to face to restore their livelihoods or initiate an income generating activities in their homes, which motivated the construction of spaces for local businesses. The limited consideration of thermal comfort inside the house as a result of the lack of proper ventilation or higher ceilings which are suitable for tropical locations. In addition to the preference for using conventional building materials instead of the traditionally used which allow fresher internal spaces. These issues promoted the need for intermediate shaded spaces where residents prefer to stay during the daytime, socialize and perform their daily activities.

### **6.7.2 Location of extensions**

Three physical issues such as housing design, the position of the house in the lot and the settlement layout have influenced where and how the extensions were built. As individual houses, the area inside the lot which is not occupied by the house is where residents start to enclose due to the need to protect their belongings, like in villages 3 and 4. Subsequently, residents gradually build complementary spaces, like shaded areas, lofts, stores and even sub-houses. As a housing block, the layout also promotes different kind of extensions, for instance the residents of the houses located in the extremes end of the rows or the blocks in the borders of the settlements built sub houses informally occupying land outside of the given housing lot.

### **6.7.3 Materials of extensions**

Depending on the materials used and the considered lifespan of the extensions durable and precarious constructions were observed. Although in the present most of housing modifications can be classified as precarious where local traditional and makeshift materials are easily available in the environment or due to the cost are affordable for residents. However housing needs and the way residents satisfy these needs are not static. The residents' living conditions change together with their socio economic situation, the characteristics of housing extensions may also change. In the time as long as residents' perceive the stability in their environment and observe more safety in housing tenure, they may invest on long lasting constructions.

## **6.8 Key Findings**

This study presents the different types of housing extensions and their main characteristics which are the response of specific residents' motivations based on their needs not considered in the NGO-government built permanent housing and provide the opportunity for residents' control over their built environment.

The understanding of local conditions and residents' needs must be considered in the housing planning, either to include in the housing provided or consider their future construction by residents. It is clear that in this kind of resettlement projects, there is a lack of acknowledge of specific residents' housing needs because the priority was to build a large number of houses and the NGOs and government were under pressure to complete the housing construction and allocation of resettled residents.

Additionally, it is unlikely even with extensive community participation activities, to cover the different and specific needs of the residents. Therefore, it is necessary to consider a change in the approach for post-disaster housing reconstruction from top-down to community inclusive management approach for future events. Furthermore, for already built houses it is important a flexible attitude of the local government over housing modifications, and in coordination with other stakeholders (such as NGOs and other government agencies) provide technical assistance in order to avoid poor construction practices. It is possible to take advantage of the high level of influence of NGOs in local communities (as it was proved in village 3), which can lead to a positive change for the compliance of construction standards.

The location of extensions is influenced by the housing design, its position in the provided lot and in the settlement. Therefore it is necessary that implementing agencies and government agencies involved recognize these issues in order to redesign the houses for future projects considering a proper use of the spaces but also provide flexibility for resident-initiated housing modifications inside or outside the house, but also avoid the informal use of land beyond the provided lot.

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## Chapter 7:

### Exploring Patterns and Reasons of Housing Modifications

This chapter explores the reasons for, and patterns of, housing modifications in Mahogany Village at the Calaanan site, where the analysis of the provided houses and the housing extensions are done in detail. This chapter initially provides an overview of Mahogany village layout and the types of modifications done by residents, the residents' motivations to built extensions, type of motivations, their location, and current use. Subsequently, it was conducted the analysis of the reasons behind these modifications, incorporating consideration of demographic, economic, sociocultural, local environment, and climatic conditions.

#### 7.1 Study site: Mahogany Village

In this chapter, the analysis will be focused on village 1 (Mahogany village), which is the most isolated community within the Calaanan site (Figure 7.1). The local government, which owns the land, coordinated the design of the settlement layout, land development, provision of infrastructure and services, and the planning and construction of permanent houses, of which a total of 160 were built.

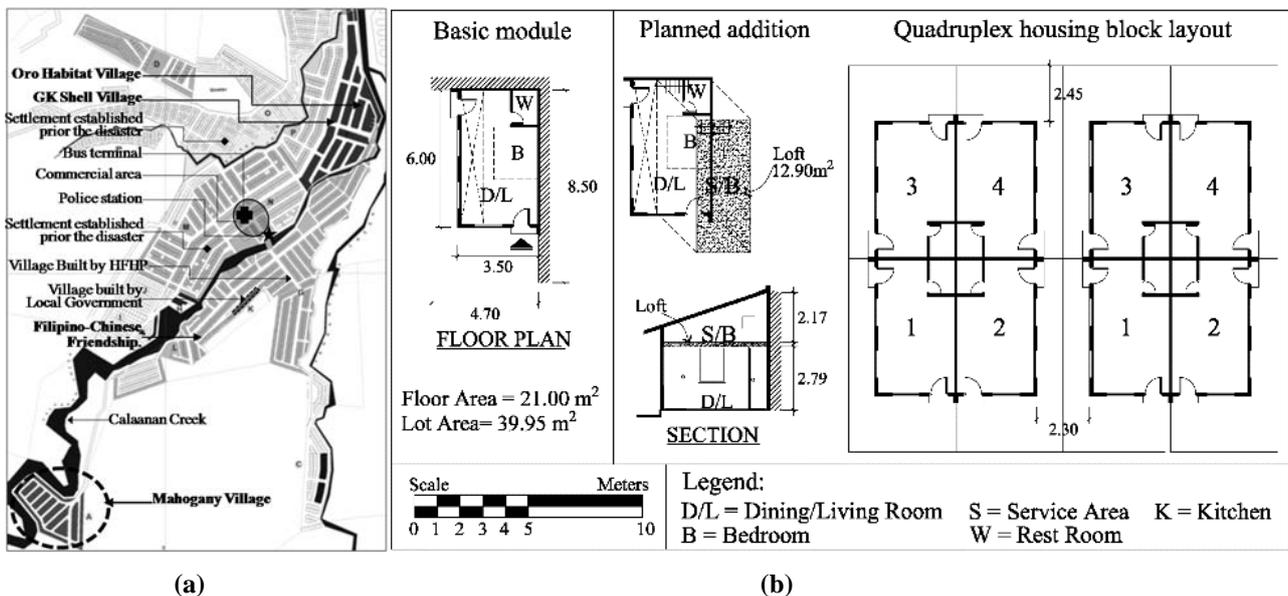


Figure 7.1. (a) Local Context and Location of Mahogany Village.

(b) Quadruplex Housing Units in Mahogany Village

For the construction of the housing units, HFHP was assigned as the project's implementing partner or contractor, and financed the construction in Mahogany through donations from private corporations (for other villages, HFHP has received funds from the National Housing Authority or the Department of Social Welfare and Development). The houses in Mahogany were built by a subcontractor—the NGO All Hands Volunteers—and progress was supervised by HFHP.

The “quadruplex” design of the housing features four units per building (see Figure 3). This design was adopted through coordination with national and local governmental officials and with regard to standardized designs developed by the National Housing Authority and the Department of Social Welfare and Development. It was selected because it optimizes the usage of the limited available land for relocation, promoting high density in the settlement. However, this type of use of limited space can cause feelings of discomfort and a lack of privacy among residents.

The average area utilized for each housing unit is 21 m<sup>2</sup>, with the units built using conventional permanent materials, such as concrete hollow block, metal truss or roof supporting structure, and galvanized iron sheets. The design is simple, comprising an open main space, in which residents can add internal partitions, and a restroom installed in one corner (see Figure 7.1). This minimalist housing design has long been used in social housing programs in the Philippines (Manalang et al., 2002), the beneficiaries of which are the marginal low-income families (represented by the lowest 30 percentile income group, with an average annual income in Philippine pesos of Php 62,000 or approximately USD 1,400; National Statistical Coordination Board).

During Mahogany’s housing design and planning stage, the implementing organizations (NGOs) provided options for extensions in order to address a potential need for additional space; these options were limited, though, to the construction of mezzanines or lofts for bedroom areas, adding an extra 12.90 m<sup>2</sup> to the overall housing floor area (Figure 7.1).

## **7.2 Post-occupancy adaptation**

The concept of “housing performance” is based on the premise that houses are designed and built to satisfy occupants’ activities and goals (Preiser, 1989). However, the level of an inhabitant’s satisfaction with their house is unlikely to remain high permanently. “Housing stress” appears when the “level of tolerance” is exceeded, creating a gap between the actual and the preferred housing (Seek, 1983). In fact, at any point in time, householders’ needs or expectations can change simply through the process of inhabitation (Khan, 2013; Seek, 1983), and they may therefore decide to move to another house or modify their current one.

The phenomenon of “spontaneous transformation” or modification, as defined by Khan (2013), refers to alterations of houses carried out by their inhabitants with the objective of adapting them to accomplish desired environmental and living conditions. In Mahogany, data collected through the survey indicated that 69% of residents modified their houses (41/59 surveyed households), with these modifications initiated either by them or with support from an NGO (see Table 7.1). That such modifications are initiated by householders confirms the need to adapt the original built environment to their personal requirements and behaviors. Furthermore, during the field survey, many of the non-modifier households (Figure 7.2 (d)) expressed their intention to build extensions, initially using improvised materials that, in time, could be replaced by more durable structures.

“Usufruct” is the system that was used to grant occupancy rights to the households: householders received an occupancy certificate after signing an agreement with the local government. This provided the right to reside

in the houses for a defined term of between 25 to 50 years (Oxfam, 2014), but it did not provide any property right to the household. Thus, the security of tenure was not guaranteed, including that of the additions or modifications built by the residents.

### **7.3 Patterns of housing modification**

Through the field study it was found two types of modifications featured: modifications that are planned or authorized and those that are unplanned or unauthorized. This differentiation is based on the conditions specified in the occupancy certificate granted to residents through usufruct. Unplanned constructions are considered informal and a violation of the occupancy conditions, so extensions are liable to be removed regardless of the type of construction materials used. Thus, all non-allowed modifications are considered to be non-permanent.

Based on the construction materials used, two types of modifications were defined: “durable,” with permanent or semi-permanent characteristics, and “precarious,” representing temporary or transitional constructions that might be gradually upgraded into durable constructions. The materials typically used for the outer walls of durable extensions were concrete hollow blocks (Figure 7.2(f)); these are widely used in the country for conventional constructions. For precarious modifications (Figures. 7.2(b), 7.2(c), 7.2(e)) and second floors (Figure 7.2(g)), the surveyed residents used light or local materials (coconut lumber, nipa leaves, plywood) and makeshift materials (plastic sheets or tarpaulins).

The classification criteria used to define the level of modifications focused on internal additions and the external construction of new spaces. “Internal modifications” refers to the construction of lofts or mezzanines (see Figure 7.2(i)); internal partitions (walls) were not considered in the study because they do not incorporate additional floor area. The majority of the externally modified spaces were built on one story; however, some households had also begun to build two stories (Figure 7.2(g)).

The available area for extensions inside each lot is reduced to 16.87 m<sup>2</sup> because of the rainwater storage tank shared between every two houses. Consequently, some residents had started to build extensions adjacently to their houses but already out of the lot (Figures 7.2(a) and 7.2 (b)), and others built sub-houses separated from the house and the lot. This can be seen in the layout and type of extensions shown in Figure 7.2.

As discussed in the next section, the residents’ use of housing extensions was motivated by a number of reasons, such as a need to accommodate family members; a requirement for service areas for cooking, laundry, or storage; or as a means of an income source (Figure 7.2 (c)), owing to the destruction of livelihoods following the disaster and subsequent resettlements.

**Table 7.1: Patterns of Housing Modification.**

Type	Materials	Level	Location	Uses	Space
Planned (allowed) (2)	Precarious (2) Durable (5)	Internal (7) modifications	Inside the house (7)	Service areas (7)	Storage (7)
Combined planned and unplanned (5)	Precarious (30)	Horizontal (31)	Inside the lot (25)	Service areas (15) + <i>combined with other uses</i> (5)	Kitchen (1) Resting space/laundry (10) Kitchen–resting space (4) Shop–resting space (3) *Kitchen–sub-house (1) *Shop–resting space–sub-house (1)
				Small shops/business (6) + <i>combined with other uses</i> (4)	Shop/business (6) *Shop–resting space (3) *Shop–resting space–sub house (1)
Unplanned (not allowed) (34)	Combined precarious and durable (1)	Horizontal (8)	Combined inside/outside the lot (1) Outside the lot (5)	Bedroom areas (4) + <i>combined with other uses</i> (2)	Sub-house (4) *Kitchen–sub-house (1) *Shop–resting space–sub-house (1)
				Service areas (4) + <i>combined with other uses</i> (1)	Resting space/laundry (3) Kitchen–resting space (1) *Shop–resting space (1)
	Durable (8)	Horizontal (8)	Inside the lot (8)	Small shops/business (3) + <i>combined with other uses</i> (1)	Shop/business (3) *Shop–resting space (1)
		Vertical (1)	Inside the lot (1)	Service areas (1)	Resting space (1)

Notes: A total of 41/59 households transformed their houses; subtotal number of households presented in parentheses; \* = households that built multiple extensions with more than one use.

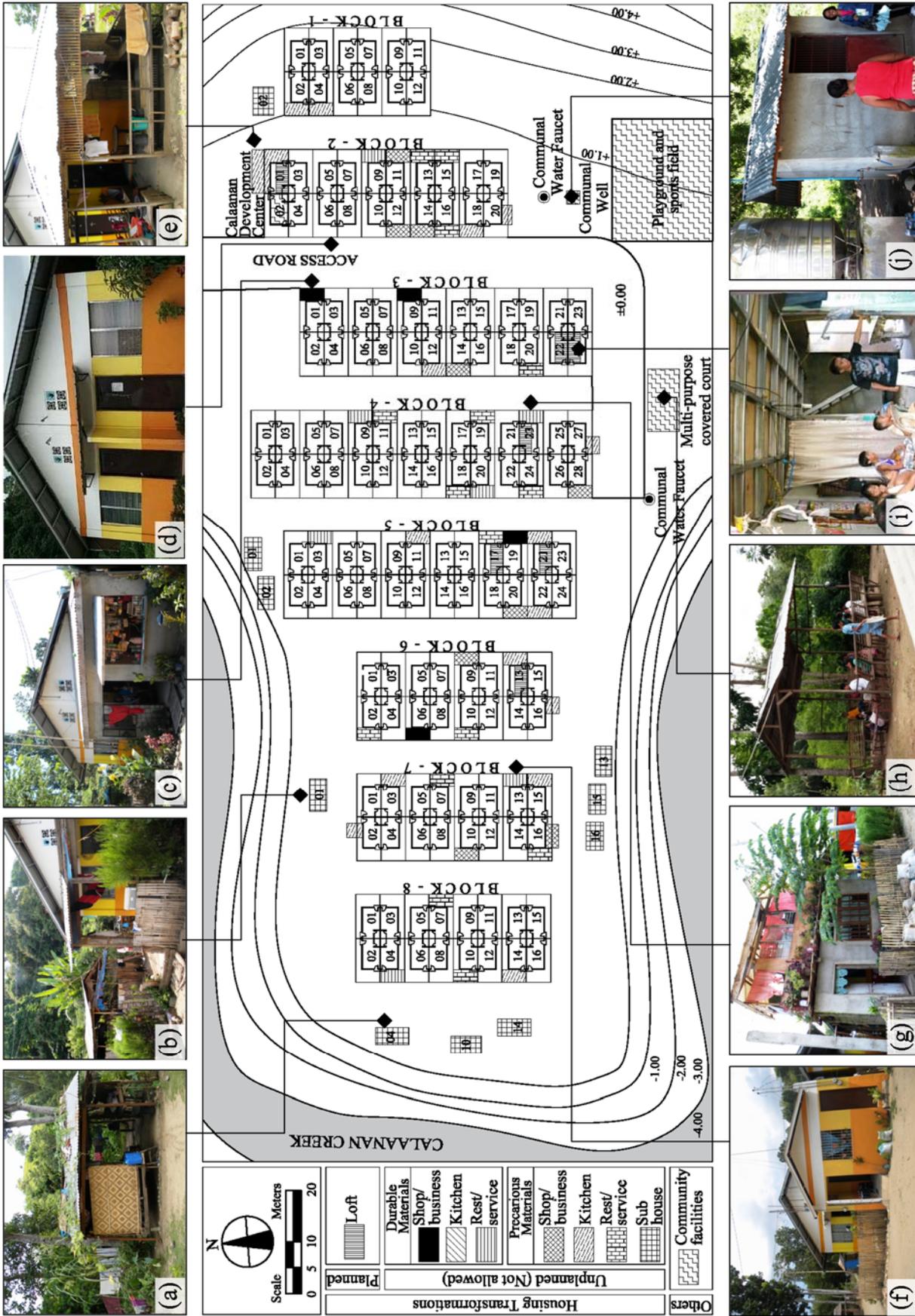


Figure 7.2: Mahogany Village—Settlement Layout and Types of Housing Modifications

## 7.4 Reasons for modification

Khan (2013) stated that housing modifications are the result of internal and/or external factors, and can be driven by multiple reasons that may overlap or combine. In this study, such factors were adapted to the situation found in the site. Thus, internal factors were found to be the result of one or more needs of the residents, as well as social and cultural patterns. Additionally, in Mahogany, external factors were defined by the local conditions. The present analysis of internal and external factors driving housing modifications encompassed demographic, economic, and social and cultural issues, and local environment and climatic conditions (see Table 7.2).

**Table 7.2: Reasons for Housing Modification.**

Factors	Determinants	Indicators	Motivation
Internal	Demographic issues	Density	Need for space
	Economic issues	Residents' occupations	Income source
	Social/cultural issues	Local lifestyle	Daily activities
External	Local environment/ climatic conditions	Climatic conditions	Adapting to local conditions

*Source: Based on Khan (2013), modified by author*

Housing modifications are thought to be the expression of residents' impetuses to satisfy certain needs and behaviors. In the study's survey, residents were asked about their motivations to construct modifications; the results are presented in Table 7.3.

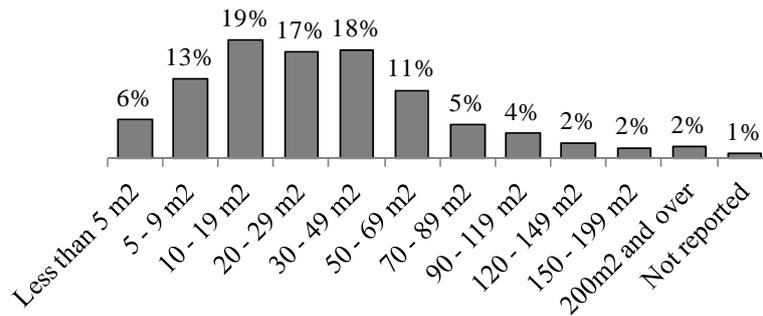
**Table 7.3. Residents' Motivations for Housing Modification.**

Motivation	% (No)
Limited space/need for privacy	39% (16)
Uncomfortably hot inside	26.8% (11)
Limited space + hot inside	14.6% (6)
Need for income source	19.5% (8)
<b>Total</b>	<b>100% (41)</b>

Limited space within which to accommodate family members or perform various daily activities inside the home was the main motivation residents reported for transforming their houses. The second was a need to address the uncomfortable heat of the houses' interior spaces. Together, the houses' restricted, airless spaces and high temperatures were a significant combined reason for alterations, too. The need for an income source was another motivation present at the site, but was less pressing.

### 7.4.1 Demographic issues

Floor area per person is a key indicator of housing quality and measures the adequacy of living space in dwellings (UNCHS, 2001).



**Figure 7.3: Occupied Housing Units by Floor Area**

*Source: Philippine Statistics Authority, 2010*

In the Philippines, there is a tendency toward high density and even more limited floor area per person than the average for the region (see UN Habitat, 2001). The housing data presented in Figure 7.3 reveal that 38% of the families in the country live in houses measuring less than 20 m<sup>2</sup>.

Therefore, the permanent housing units each comprising 21 m<sup>2</sup> built in Mahogany were considered to be a decent and appropriate solution, at least in the context of the Philippines more broadly. They were similar to dwellings built for social housing and post-disaster housing elsewhere in the country, and, despite limited space, may even have represented an improvement of housing quality for many of the marginal, low-income families. However, these houses were not exempted from modification.

Considering the pressures on larger families living in close quarters, the study's analysis should present a connection between family size and the incidence of modifications. However, as Table 7.4 shows, the major percentages of modifier households were medium-sized families, followed by small families.

**Table 7.4: Family Size–Housing Modifications**

Persons (No.)	% (No.)	Modified % (No.)	Non-modified % (No.)
1 to 3	10% (6)	66.7% (4)	33.3% (2)
4 to 6	63% (37)	78.4% (29)	21.6% (8)
7 to 10	20% (12)	50% (6)	50% (6)
> 10	7% (4)	50% (2)	50% (2)

Likewise, the construction of sub-houses and lofts might be thought to be connected with a need to alleviate crowding in a house, building sleeping spaces and adding privacy for extended families (more than one family unit). Yet, the results reported in Table 7.5 show that, of seven lofts built, five were supported by an NGO and only two were built by residents. In addition, just one loft was built by an extended family, and three by larger-sized families. Most of the lofts built belong to medium-sized and nuclear families.

**Table 7.5: Demographically Related Extensions.**

Extension	No.	Family size			Type of family		
		1–3	4–6	7–10	10+	Nuclear	Extended
Lofts	7	14.3% (1 <sup>*</sup> )	42.9% (2 <sup>*</sup> +1 <sup>†</sup> )	28.5% (1 <sup>*</sup> +1 <sup>†</sup> )	14.3% (1 <sup>†</sup> )	85.7% (1 <sup>*</sup> +5 <sup>†</sup> )	14.3% (1 <sup>*</sup> )
Sub-houses	6	—	83.3% (5 <sup>*</sup> )	—	16.7% (1 <sup>*</sup> )	100% (6 <sup>*</sup> )	—

Notes: <sup>\*</sup> = dweller-initiated modifications (funded and built); <sup>†</sup> = NGO-supported modifications (funds and construction).

Lofts were originally intended for use as dormitory spaces. However, due to the houses' uncomfortably high temperatures, residents typically used them for storage. Therefore, the construction of lofts is not necessarily related to a pressure to accommodate family members. On the other hand, only two out of five sub-houses were built by large families (with 11 and 12 members, respectively) and the other three were built by medium-sized families (four members). However, the use of the sub-houses is flexible, and can combine sleeping areas, a kitchen, and storage.

The demographic indicators show a tendency for housing modifications in both small and large families. There appears to be no direct relationship between family size and the construction of extensions; moreover, the incidence of modifications is higher in small- and medium-sized families.

#### 7.4.2 Economic issues

Beneficiaries' financial situations may point toward their likelihood to build extensions and the materials that might be used. Table 7.6 shows data analyzed according to daily family income. Unexpectedly in this context, the incidence of extensions built is higher in poorer families.

**Table 7.6: Average Family Daily Income–Housing Modifications.**

DFI	Transf.	Non-transf.	Materials of modifications.		
			Precarious	Durable	Both
0–100	100% (7)	0% (0)	85.7% (6 <sup>*</sup> )	14.3% (1 <sup>*</sup> )	—
101–200	62.5% (10)	37.5% (6)	70% (7 <sup>*</sup> )	30% (2 <sup>*</sup> +1 <sup>†</sup> )	—
200+	66.7% (24)	33.3% (12)	75% (18 <sup>*</sup> )	20.8% (1 <sup>*</sup> +4 <sup>†</sup> )	4.2% (1 <sup>*</sup> )

Notes: DFI = daily family income in Philippine pesos; <sup>\*</sup> = dweller-initiated modifications (funded and built); <sup>†</sup> = NGOs supported modifications (funds and construction).

Precarious modifications initiated by these households were predominant. The questionnaire survey results also revealed that the middle-income families tended to build durable extensions. In the higher-income group, most of the durable extensions (lofts) were built by an NGO.

Householders' occupations are another indicator that may influence housing modifications. Table 7.7 shows the study's findings in terms of the head of the family's current occupation and the extension type.

**Table 7.7. Current Household Occupation–Modifications.**

<b>Occupation</b>	<b>% (No.)</b>	<b>Modified % (No)</b>	<b>Non modified % (No)</b>
Laborer	32% (19)	57.9% (11)	42.1% (8)
Unemployed	5% (3)	100% (3)	0% (0)
Driver	15% (9)	55.6% (5)	44.4% (4)
Shopkeeper	10% (6)	100% (6)	0% (0)
Construction	17% (10)	70% (7)	30% (3)
Hawker	7% (4)	75% (3)	25% (1)
Other	14% (8)	45% (6)	25% (2)

*Notes: \* = dweller-initiated modifications (funded and built);*

*† = NGO-supported modifications (funds and construction).*

Non-skilled residents, such as laborers and hawkers, experience instability in their jobs, because of the distance to their places of work in the city and public markets. Nonetheless, they are willing to build extensions. Residents who built their house extensions for use as small grocery stores and other businesses felt significant pressure to obtain an income source.

Overall, this analysis of economic issues revealed that residents do not feel limited by work instability or lower incomes. A similar inference was made regarding the construction of durable extensions, which are built by higher- and lower-income families.

### **7.4.3 Social and cultural issues**

Communities' social and cultural patterns may also play a role in residents' decisions to build extensions. In this study, the uses for such extensions help to define the reasons for their being built, as these daily activities often reflect a society's customs and habits. It was expected that residents' activities would be performed inside of their homes, as extensions were not allowed. Instead, the priority was to expand the living spaces outside of the housing units, regardless of the conditions of occupancy.

Table 7.8 demonstrates the sample residents' tendency to build service areas for cooking, storage, and resting spaces that are combined with laundry.

**Table 7.8. Use of the Extensions.**

<b>Type of spaces</b>	<b>% (No.)</b>
Bedroom areas	9.8% (4)
Combined bedroom and service areas	2.4% (1)
Service areas	53.6% (22)
Combined service areas–shops	9.8% (4)
Small shops/business	22% (9)
Combined bedroom–service areas–shops	2.4% (1)

This finding can be explained on account of the absence of service areas inside the houses, but also because of the traditional and popular kitchen types in poorer Filipino communities, which are typically located outdoors and use a “dirty kitchen” or stove in which firewood is used for fuel. There is also an economic advantage to this, because the wood can be obtained for free from the trees in the surrounding area. Other service spaces, such as laundry areas, are combined with resting spaces, which are used for childcare, socializing, and resting during the daytime.

#### **7.4.4 Local environment and climatic conditions**

Adaptation to the local conditions and environment is a common concern in the provision of post-disaster housing and resettlement (Jha, A. K., & Barenstein, J. D., 2010; Oliver-Smith, 1991). In relation to the local climatic conditions, such as high temperatures and humidity, the use of conventional materials in the permanent houses and a lack of proper ventilation lead to uncomfortably hot internal spaces. As a result, the residents needed intermediate shaded spaces for daily activities such as socializing or resting, and, hence, built such spaces using local traditional materials. A similar situation was seen in the sub-houses, regarding sleeping and resting spaces.

Likewise, there was a change in the final use of lofts from planned sleeping spaces to storage, because these spaces were extremely hot, day and night. This, in turn, demonstrates a limited consideration of local conditions in the housing design and planning stage.

### **7.5 Key findings**

This chapter explored the patterns of housing modifications and the reasons for their construction, which change in accordance with the beneficiaries’ adaptation to this new environment through the process of inhabitation. This process generated a variety of self-built structures, which were limited by the available lot area. However, the needs and preferences of residents underpin the tendency for and motivation to extend their living space.

The construction of extensions is unavoidable, as it is the result of the process of inhabitation and is essential for dwellers’ adaptation. Therefore, such extensions should be taken into account at the planning stage and flexibility in the housing design should be increased accordingly. This would support the proactive attitude observed within residents’ inclination to transform their houses regardless of their economic situation.

Consideration of local conditions—identifying patterns in beneficiaries’ daily activities and family structure characteristics, livelihood opportunities, and an understanding of the local climate—is critical for the provision of suitable housing and the construction of locally sensitive solutions.

In summary in this chapter it was found that there is no single reason behind the construction of housing extensions. Moreover the reasons and motivations are frequently overlapped and are permanently changing.

In addition, it was clearly shown that residents do not feel limited by their economic situation, family size or the regulations. In fact, families are willing to invest in the improvement of their homes although the transfer of formal ownership is still uncertain for them.

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## Chapter 8:

### Effects of Resident-initiated Housing Modifications

*In this chapter the discussion is centered on the analysis of pros and cons of the construction of resident-initiated housing extensions and defines the factors that may indicate the generation of unsafe housing conditions as a result of the informal modification of the original permanent houses provided in Calaanan site. The analysis included the understanding the progressive nature of extensions, the observation of actual seismic and wind resistant performances of the resident-initiated housing extensions. The next issue observed were the authorized extensions were observed considering that are the only kind of housing modifications that can be supported by NGOs or other agencies. Additionally, this chapter analyzes the modifications in the settlement layout and how this may represent a risk for the safety of the residents.*

#### **8.1 Risks of the construction of housing extensions**

##### **8.1.1 Government and NGOs attitudes towards the construction of housing extensions**

In Cagayan de Oro, the local authorities' argument against the construction of extensions is the fear to replicate the precarious pre-disaster housing conditions, regarding that most of the resettled households were squatter residents. Additionally, it is also considered the issue that formal ownership of the land and houses cannot be transferred to the residents under the national definition of usufruct. In fact, residents have limited control over their housing units, and any alterations of the houses are subject to the approval of the building administrators (UNESCAP and UN-Habitat, 2012).

The position of national agencies like the National Housing Authority and the Department of Social Welfare and Development, and NGOs is to follow the occupancy terms that residents must respect. Therefore there is no support for the construction of housing extensions. The only approved changes in the houses are the construction of lofts and the construction of non-permanent internal partitions. In fact, some NGOs supported the funding and construction of lofts in some houses.

##### **8.1.2 Indicators of deterioration of housing conditions**

The construction of extensions is a form of self-help housing which different studies (Turner, J. F. C., 1972; Turner, J. F. C., 1976; Tipple, G. A., 1996; Tipple, G. A. and Ameen, S. M., 1999; Greene M., and Rojas, E., 2008) recognize as a valuable form of resident-driven housing construction, mainly in developing countries and in low-income communities. However, governments tend to assume that a flexible attitude towards the construction of housing extensions will lead to the decaying of the current housing conditions (Tipple, G. A. and Ameen, S. M., 1999).

UN-Habitat refers to “Five Deprivations” that indicate the deterioration of a neighborhood that was once in good condition but has since generated conditions that resulted in unhealthy and unsafe environments (UN-Habitat, UN Statistics Division and Cities Alliance, 2002). These indicators define poor housing conditions of residents lacking one or more of the following aspects:

- (1) Access to improved water,
- (2) Access to improved sanitation facilities,
- (3) Security of tenure,
- (4) Sufficient living area, and
- (5) Structural quality/durability of dwellings.

***(1), (2) Access to water and sanitation***

A proper access of water and sanitation are the basic conditions for the resettlement projects in Cagayan de Oro, although there are differences in the type and quality. Sanitation in all villages was ensured through the provision of septic tanks.

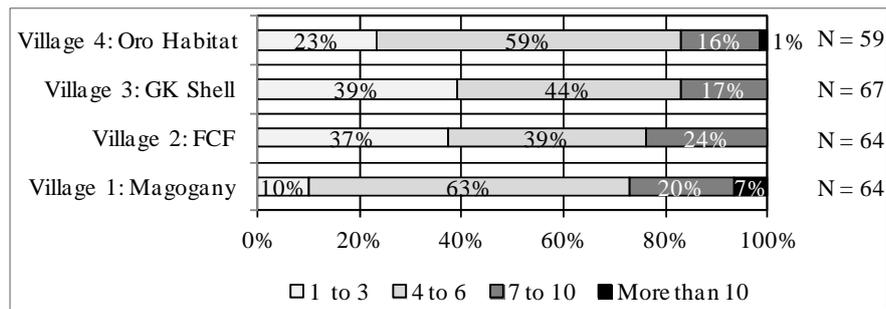
***(3) Tenure security***

Housing beneficiaries were granted the right to use the land and the permanent houses through usufruct for a term of 25 to 50 years. Through this tenure arrangement, beneficiaries receive nearly all rights of ownership, except the right to have a legal title and to alienate, transfer or dispose of property according to the Civil Code of the Philippines or Republic Act 386, Articles 562-612. Usufruct has been a viable approach to providing in-city tenure to poor people (UNESCAP, UN-Habitat, 2012). Therefore, residents are safe against future evictions, but have limited rights over their houses.

***(4) Sufficient living area***

The international standards for humanitarian response indicates a minimum floor area of 3.5m<sup>2</sup> per person (The Sphere Project, 2011) and the average household size in the Philippines is 4.6 (Philippine Statistics Authority, 2012). Therefore an appropriate housing floor area should be at least 16m<sup>2</sup> per housing unit. In addition, the Philippines regulations indicate a minimum lot area for economic housing is 36m<sup>2</sup> and for social housing is 32m<sup>2</sup> (Housing and Land Use Regulatory Board, 2008) and a minimum floor area requirement for a single dwelling of 22m<sup>2</sup> for economic housing and 18m<sup>2</sup> for socialized housing.

From the household survey in the four villages in Calaanan site, it was found that the average household size is 4 to 6 (see Figure 8.1), and the individual housing area in the four villages ranges from 21 to 24 m<sup>2</sup>. Therefore there is no evidence of overcrowding for most of the households, although there are some big and extended families. Moreover, the construction of extensions adds floor area to the provided housing reducing the density in the house.



**Figure 8.1: Household size in Calaanan site**

**(5) Structural quality/durability of dwellings**

The permanent houses provided in resettlement sites were formally built in compliance with the related regulations and under supervision of the local government and other agencies. Therefore, it is assumed an appropriate construction quality. However, diversity in the builders and quality of construction of extensions puts into question their quality and durability. Therefore it is necessary to evaluate the safety of these constructions which is developed in the next section.

**8.2 Effects of Housing modifications**

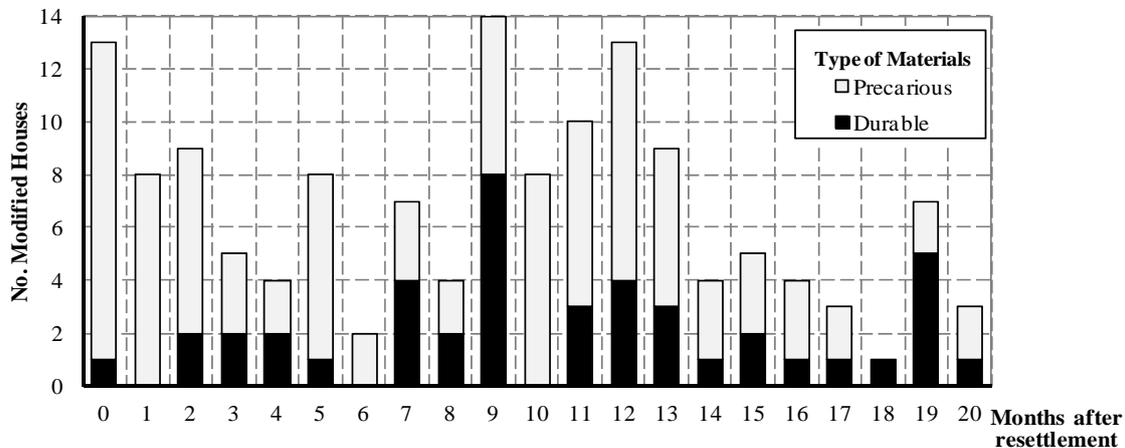
The changes in the housing that may lead to the deterioration of the local environment and the low quality of the housing extensions are the main aspects to be analyzed considering the following issues: (1) The progressive nature of housing modifications, (2) safety of construction of housing extensions, (3) analysis of assisted housing modifications, and (4) consequences in the settlement layout.

**8.2.1 Progressive housing modifications**

The evidence from different studies (MacDonald, J., 1987) indicates that immediate after taking possession of the house provided, beneficiaries expand it using precarious, makeshift materials or locally available materials (nipa leaves, bamboo or coconut lumber) in their surroundings that are easy to install. According to the study conducted by Greene M., and Rojas, E. (2008), during the initial phase of housing modification or expansion, families expand the house with little consideration for quality in order to solve their immediate needs. This allows residents to accumulate savings, materials, tools and technical skills or hire skilled labor and gradually upgrade the precarious constructions to durable structures (Greene M., and Rojas, E., 2008).

Although resettled communities do not have the formal ownership of the houses, the construction of housing extensions means a huge effort from their side and an important investment on what they consider their home, especially in durable extensions which can be considered permanent despite the condition of informal. The construction of housing extensions evidence residents’ commitment and permanence (Aysan, Y. 1987; Oliver-Smith, A., 2014) which was observed in Calaanan where residents started to built almost immediately after they occupied the houses.

In Figure 8.2 it is shown the progress of the construction of housing extensions in the four villages analyzed in Calaanan site. Although the construction of precarious extensions is still high even in the later months, residents are regularly building durable or more permanent extensions as their permanence in the current house is longer.



**Figure 8.2: Progress of housing modification after residents' allocation in permanent houses**

The data obtained in the field confirm that precarious extensions represent 76% in Village 1, 64% in Village 2, 42% in Village 3, and 78% in Village 4. The household survey presents these results after 20 months the first groups of residents were allocated. Consequently this indicates the extensions situation in a short term, when the modification of the settlement and housing is in progress of consolidation. Therefore, the analysis of the quality of durable or permanent extensions is the priority to evaluate the safety of housing conditions in the site since their lifespan is expected to be longer.

### 8.2.2 Safety of housing extensions

Later stages of the process of housing modification involve the improvement of the quality of the houses after the initial expansions have been built. The construction becomes more complex and requires higher technical skills that self-builders do not have. The quality of construction in durable extensions is determined by the materials used and the technical skills of the builder and professional supervision. Greene M. and Rojas, E. (2008) observed in various studies that most incremental builders have limited abilities that lead to poor housing construction, not only in design but also in the use of materials.

The lack of knowledge and incorporation of appropriate disaster resistant features during the design and construction of buildings is one of the crucial factors that contribute to vulnerability of constructions (ADPC, 2011). Permanent houses were built following the construction codes and standards. However, for housing extensions there is no supervision and the construction quality is questionable because they are based on traditional and conventional construction practices that do not include technical considerations for the safety and an adequate performance against potential hazards.

In order to define if there are vulnerabilities originated in the improper construction practices in housing extensions and consequently confirm the creation of unsafe housing conditions, two aspects were assessed in qualitative way in the field: The performance of extensions against earthquakes and strong winds. For this analysis only the durable extensions were considered understanding the longer lifespan of these constructions: Village 1=9, village 2=14, village 3=11, and village 4=12.

### 8.2.2.1 Seismic resistant considerations

In order to evaluate the seismic performance of the extensions, seven indicators were considered and were observed in the field. These indicators were elaborated following the “Self-Check questionnaire for Earthquake Safety of Concrete Hollow Block (CHB) Houses in the Philippines” (Imai, H., et al. 2015). There were some modifications to the original questionnaire considering the specific conditions of the housing extensions, and the description of the criteria for each indicator are presented in Table 1.

**Table 8.1: Indicators for evaluation of seismic performance of extensions**

Indicator	Criteria
<b>1. Builder/planner of the extensions</b>	The assumption is that building construction standards are followed if authorized people took charge of the construction. The highest construction quality is expected if planning/supervision is done by an engineer/architect, and the lowest is expected for self-construction.
<b>2. Materials of foundations</b>	Reinforced concrete wall foundation resists shaking, slipping, and tilting better than stone foundation [28].
<b>3. Materials of walls</b>	There are three types of materials considered for walls based on their strength and performance: Concrete block, mixed wood and concrete, and makeshift/ improvised materials.
<b>4. Standard CHB (6inch) used in walls</b>	The use of standard 6 inches CHB for external walls produces more stable and stronger structures. The code prescribes the use of at least 6 inches (150 mm) thick CHB.
<b>5. Materials of columns and beams</b>	Confinement of CHB wall ensures stability of the structure and avoids it to follow in case of earthquakes.
<b>6. Attachment to the main building</b>	It is important to consider the type of attachment of the housing extensions to the main house, the following three types were observed: Rebar, nails, none or unknown.
<b>7. Reinforce walls with steel bars and correct spacing in walls</b>	Steel bars embedded in CHB walls, concrete columns, floors, and foundation resist the impact of seismic forces. The use of the standard 10 mm diameter steel bars, spaced at 40 cm from side to side, properly connected, and tied to steel bars laid every three layers of CHB (∅60 cm) prevents the collapse of walls during earthquakes [28].

The results of the field observations are presented in Table 8.2.

**Table 8.2: Results of field observations of seismic performance of extensions**

Parameters	Village 1	Village 2	Village 3	Village 4
	% (No)	% (No)	% (No)	% (No)
<b>1. Builder/planner of the extensions</b>				
Architect/engineer/NGO	0%(0)	0%(0)	0%(0)	0%(0)
Mason/ Carpenter	56%(5)	36%(5)	45%(5)	33%(4)
Self-construction	44%(4)	64%(9)	55%(6)	67%(8)
<b>2. Materials of foundations</b>				
Concrete and steel bars	22%(2)	7%(1)	0%(0)	25%(3)
Concrete and stones	0%(0)	0%(0)	0%(0)	0%(0)
Unknown or no foundation	78%(7)	93%(13)	100%(11)	75%(9)
<b>3. Materials of outer walls</b>				
Concrete block	100%(9)	57%(8)	82%(9)	67%(8)
Mixed wood and concrete	0%(0)	43%(6)	18%(2)	33%(4)
Makeshift/ improvised materials	0%(0)	0%(0)	0%(0)	0%(0)
<b>4. Standard CHB (6inch) used in walls</b>				
YES, it is 6 inch CHB.	0%(0)	0%(0)	0%(0)	0%(0)
NO, it is thinner than 6 inch.	100%(9)	100%(14)	100%(11)	100%(12)
It is not clear or unknown.	0%(0)	0%(0)	0%(0)	0%(0)
<b>5. Materials of columns and beams</b>				
Concrete and steel bars	33%(3)	7%(1)	0%(0)	33%(4)
Wood (coconut lumber/other)	0%(0)	36%(5)	9%(1)	33%(4)
No structural elements	67%(6)	57%(8)	91%(10)	33%(4)
<b>6. Attachment to the main building</b>				
Rebar	33%(3)	0%(0)	36%(4)	58%(7)
Nails	0%(0)	14%(2)	0%(0)	9%(1)
None or unknown	67%(6)	86%(12)	64%(7)	33%(4)
<b>7. Reinforce walls with steel bars and correct spacing in walls</b>				
YES, 10mm diameter, tied and spaced correctly	33%(3)	14%(2)	18%(2)	42%(5)
NO, fewer and smaller than 10mm.	56%(5)	43%(6)	36%(4)	8%(1)
None or unknown	11%(1)	43%(6)	45%(5)	50%(6)

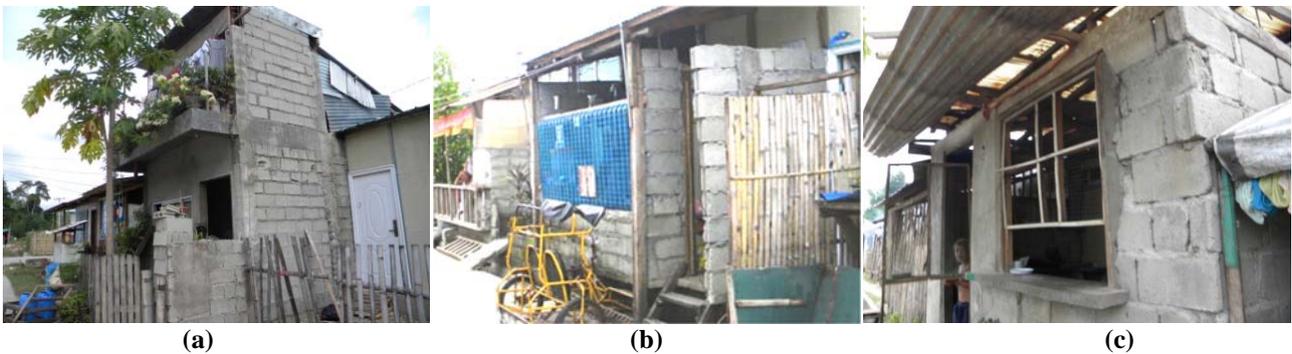
The first indicator shows the absence of professional supervision in the construction of the extensions. Thus, it is more likely that the construction codes have not been applied properly even in cases where hired workers built the extensions. For the second indicator, the study finds that foundations were not built in most of the extensions. However, when foundations were considered they were built properly with concrete and reinforced with steel bars.

The materials of outer walls in durable extensions observed in the field are CHB and mortar, (Figure 8.3, left). There are combinations of materials like low CHB walls and wood (Figure 8.3, center). The thickness of the CHB used in all the extensions is 9 cm (approximately 3.5 inch.) which is considered sub-standard.



**Figure 8.3: CHB wall (a), CHB wall completed with wood (b), and sub-standard CHB (c)**

The quality of construction of external walls is diverse as it is presented in Table 2 and Figure 8.8, only one third of the durable extensions in villages 1 and 4 included structural elements such as beams and columns which provide stability to the construction and avoid collapses in case of earthquakes.



**Figure 8.8: CHB walls confined with columns and beams (a), unconfined CHB walls with wooden poles as support for the roof (b), CHB wall without structural elements (c)**

There are other constructions that evidence the lack of technical considerations and limited skills of the builders. In Figure 8.8 (b), there are wooden poles used only to support the roof and do not provide confinement to the masonry walls. Additionally in the four villages, extensions are built without consideration for their stability evidencing lack of criteria and technical knowledge (Figure 7.8, c) even in extensions built by skilled masons.

Regarding the attachment to the main building, it was found that in villages 1, 3 and 4, rebars were considered, especially in village 4, and in village 2 mostly nails. However, as it is presented in Table 8.2, for most of the extensions in villages 1, 2, and 3 there is no attachment of the new construction to the provided house.

For indicator 6, the reinforcement of the CHB masonry with steel bars is considered with diverse criteria. For instance, in village 1 and 4, 33% and 42% of the extensions walls were reinforced properly. However, in the rest of the cases the diameter of the steel bars and the spacing did not match the standards specified in Table 8.1. This shows that although residents and builders understand the importance of reinforcement of CHB masonry, in practice it was not applied properly.

In the four villages there are differences in the residents' concerns about the quality of their houses extensions. In many cases the construction principles were considered, although not properly applied. Consequently, in the four villages there is a medium to low performance of the constructions against seismic forces. In general, there are fewer considerations in almost all the aspects analyzed because the construction of extensions has spread without any consideration for the restrictions to modify the provided houses and safe construction practices.

### 8.2.2.2 Wind resistant considerations

In order to evaluate the wind resistant performance of the extensions, eight indicators were considered and were observed in the field. These indicators were summarized following the considerations for wind resistant principles for low income houses (Shelter Cluster Philippines and DSWD, 2014; Institute of Strategy for Disaster Risk Reduction and UNDP, 2008) and non-engineered structures (Nishijima, K. and Espina, M. A., 2015) in the Philippines.

**Table 8.3. Indicators for evaluation of wind resistant performance of extensions**

<b>Indicator</b>	<b>Criteria</b>
<b>1. Builder/planner of the extensions</b>	Similarly to the assessment against earthquakes, it is assumed that building construction standards are followed if authorized people took charge of the construction.
<b>2. Materials of foundations</b>	Foundations are important as they anchor the house to the ground. Ensuring proper foundations protect the house from strong winds, earthquakes and flooding.
<b>3. Materials of outer walls</b>	The importance of the type of materials is based on the strength of CHB walls that is reduced if walls are built partially with non-permanent or precarious materials.
<b>4. Roofing materials</b>	The way how the roof is design and built is critical to protect you against strong winds and rain. The materials used define the quality of construction.
<b>5. Roof eave width</b>	In order to avoid the roof being sucked away, the eaves have to be short, but long enough to protect the walls from rain. In the observations the length of the eaves considered are: Less than 30cm, between 30cm and 60cm, and more than 60cm
<b>6. Connection between walls and foundations</b>	The joints or connections are crucial for the strength of the roof so it can't be pushed or pulled apart by the strong winds. For indicators 4 and 5 the following types of
<b>7. Connection between walls/columns and roofs</b>	connections were considered: Rebar in effect which are the stronger found, followed by nails, and the weakest for unclear or no connections.
<b>8. Interval between fasteners in roofs</b>	An appropriate attachment of the roof covering and the roof structure (rafters) avoids pull-over failure of the roof due to the strong winds. The strongest case considers an interval less than 30cm, intermediate strength in intervals between 30cm and 60cm, and weak roof in intervals more than 60cm.
<b>9. Roof eave width</b>	In order to avoid the roof being sucked away, the eaves have to be short, but long enough to protect the walls from rain. For the assessment eaves width less than 30cm are the strongest, and more than 60cm the weakest.

Table 8.4 shows the results from field observations. Indicators 1, 2, and 3, are considered crucial issues to

understand both earthquake resistance and performance against strong winds, and were presented in detail in previous section. Indicator 3 presents a middle quality on the materials used for roofing in the four villages. There is a poor consideration for connections between walls and foundations, and more specifically the absence of foundations in the outer walls of extensions. However the connections between walls or columns and roofs are varied according to the criteria presented in Table 8.3. In villages 3 and 4, nails were mainly used.

**Table 8.4: Results of field observations of wind resistant performance of extensions**

Parameters	Village 1	Village 2	Village 3	Village 4
	% (No)	% (No)	% (No)	% (No)
<b>1. Builder/planner of the extensions</b>				
Architect/engineer/NGO	0%(0)	0%(0)	0%(0)	0%(0)
Mason/ Carpenter	56%(5)	36%(5)	45%(5)	33%(4)
Self-construction	44%(4)	64%(9)	55%(6)	67%(8)
<b>2. Materials of foundations</b>				
Concrete and steel bars	22%(2)	7%(1)	0%(0)	25%(3)
Concrete and stones	0%(0)	0%(0)	0%(0)	0%(0)
Unknown or no foundation	78%(7)	93%(13)	100%(11)	75%(9)
<b>3. Materials of outer walls</b>				
Concrete block	100%(9)	57%(8)	82%(9)	67%(8)
Mixed wood and concrete	0%(0)	43%(6)	18%(2)	33%(4)
Makeshift/ improvised materials	0%(0)	0%(0)	0%(0)	0%(0)
<b>4. Roofing materials</b>				
Half galvanized iron and half concrete	0%(0)	7%(1)	0%(0)	0%(0)
Galvanized iron/aluminum with wood rafters	78%(7)	86%(12)	82%(9)	83%(10)
Traditional/Makeshift materials	22%(2)	7%(1)	18%(2)	17%(2)
<b>5. Connection between walls and foundations</b>				
Rebar in effect	0%(0)	0%(0)	0%(0)	0%(0)
Nails	0%(0)	0%(0)	0%(0)	0%(0)
Unknown or none	100%(9)	100%(14)	100%(11)	100%(12)
<b>6. Connection between walls/columns and roofs</b>				
Rebar in effect	44%(4)	43%(6)	9%(1)	17%(2)
Nails	33%(3)	43%(6)	55%(6)	50%(6)
Unknown or none	22%(2)	14%(2)	36%(4)	33%(4)
<b>7. Interval between fasteners in roofs</b>				
Less than 30cm	0%(0)	0%(0)	0%(0)	0%(0)
Between 30cm and 60cm	78%(7)	64%(9)	36%(4)	58%(7)
More than 60cm	22%(2)	36%(5)	64%(7)	42%(5)
<b>8. Roof eave width</b>				
Less than 30cm	22%(2)	0%(0)	9%(1)	8%(1)
Between 30cm and 60cm	67%(6)	79%(11)	55%(6)	58%(7)
More than 60cm	11%(1)	21%(3)	36%(4)	33%(4)

The quality of the roofing structures is vital for a good performance in case of strong winds, especially in the Philippines where typhoons regularly hit the country. In the villages analyzed it was found that the preferred materials for roofing are galvanized iron sheets with wooden rafters as the supportive structure of the roof. The type of connections between columns and roofs found in the field indicate heterogeneous criteria in the four villages. It is positive the consideration of rebar connections in villages 1 and 2. However the quality is lower in villages 3 and 4 where most of the connections were assured using nails.

Additionally it is generally observed a wider spacing between fasteners than the recommended for a strong attachment of the roof covering to the roof structure. In all of the cases the interval considered is more than 30cm that indicates a risk of a pull over failure of the roof due to strong winds.

Roof eaves wider than 30 cm make the roofs weaker in case of strong winds during the regular typhoons that hit the region. The roofs of the extensions were mainly observed a width between 30 and 60cm in the four villages: 67% in village 1, 79% in village 2, 55% in village 3 and 58% in village 4. In Figure 8.9 it is observed the types of roofs, from the most elaborated to the most precarious.



**Figure 8.9: Roofing, wooden rafters and corrugated iron sheets (a), weak support of roofs (b), and improvised materials (c)**

The main aspects that have to be considered in the analysis of structures performance are the fasteners and connections or joints that determine the failure due to strong winds (Nishijima, K. and Espina, M. A., 2015). Contrasting those considerations and the situation observed in Calaanan site and results presented in Table 4, in the four villages the extensions built present a medium to low resistance to winds that can lead to the failure of these structures in case of a future typhoon.

### **8.2.3 Assisted construction of internal housing modifications**

The occupancy terms and the housing designs only consider the construction of lofts and internal partitions as modifications of the permanent houses in villages 1, 3 and 4. Therefore, their construction is formal and can be carried out by residents or supported by NGOs and other civil organizations as it is shown in Table 8.5.

**Table 8.5: Mezzanines/lofts in the four villages**

Village	Built and funded by NGOs	Funded by residents		Total lofts built per village
		Built by mason/carpenter	Built by residents	
<b>Village 1: Mahogany</b>	 78% (7)	 11% (1)	 11% (1)	100% (9)
<b>Village 3: GK Shell</b>	Not found	 46% (6)	 54% (7)	100% (13)
<b>Village 4: Oro Habitat</b>	 89% (8)	 11% (1)	Not found	100% (9)

In village 1, 78% (7) were funded and built by an NGO. Residents funded the 22% (2), one was self-built and one by a carpenter. In village 2, the roof is too low to build lofts. In village 3, all the lofts build 100% (13) were funded by residents, 6 self-built by residents and 7 by a hired carpenter/mason. In village 4, 89% (8) of the lofts were built and funded by an NGO and only 11% (1) of the surveyed houses were funded by the household and built by a hired carpenter.

In the field this kind of extensions were also observed in the four villages, as it is presented in Table 8.5. In villages 1 and 4, NGOs built directly the lofts with skilled workers or unskilled with appropriate supervision in order to ensure the durability and strength of the lofts. Residents also hired skilled carpenters or masons to build their lofts, where the lofts were built considering the stability of the loft, although the quality of construction is diverse. Residents also built directly the lofts, as it is shown in Table 8.3. However the quality of construction is clearly low.

The variety in construction quality is similar to the situation found in the construction of extensions, where the intervention of skilled labor is crucial to increase the quality of construction. However, in case of lofts

NGOs are allowed to provide assistance that would be possible to be extended to other constructions outside the house if the local government eases the prohibition of extensions.

The fulfillment with minimum construction standards that ensure safety and quality is not only beneficial to the residents but also represents a public concern which makes the public agents responsible to attain these objectives (Greene M., and Rojas, E., 2008).

#### **8.2.4 *Modifications in the settlement layout***

The construction of housing extensions represents an unplanned spontaneous process where the residents are in the center of the decision making. In this context, public sector, mainly the local authorities, tends to influence the design of private housing through the introduction of policies for the residential development. The control of housing design is predicated on efforts to avoid poor housing conditions (Kallus, R. and Dychtwald, S., 2010) through the application of control policies in the development of urban spaces. However, Kallus, R. and Dychtwald, S. (2010) also found that the application of control policies is controversial considering that from one side it is understood as a interference on the private interests, an offence to residents' individual rights, and a limitation of their personal freedom. On the other hand, the shape of the settlement is defined beyond the design of the housing itself, where the decisions concerning housing influence the development of the public realm and consequently the safety of the community.

##### **8.2.4.1 *Consequences of the construction of housing extensions in the settlement layout***

The different types of changes in the initial layout of the villages analyzed as a result of the construction of housing extensions are presented in Figure 8.10.

There is a heterogeneous texture in the façades of the housing blocks that is evident by the variety in the location of the extensions, the materials used, the vertical differences of the extensions (single floor and two stories). In village 1, 2 and 4 it is clearly observed the different types of extensions mainly in front of the houses. However in village 3 the extensions are not visible since they are located in the rear of the houses as it is shown in Figures 7.10 and 7.11(right). The frontal or lateral extensions in villages 1, 2 and 3 are not limited to the property line of the lot assigned to the households. Moreover, some residents invaded public spaces or neighboring properties, like in village 1 (see Figure 8.10).

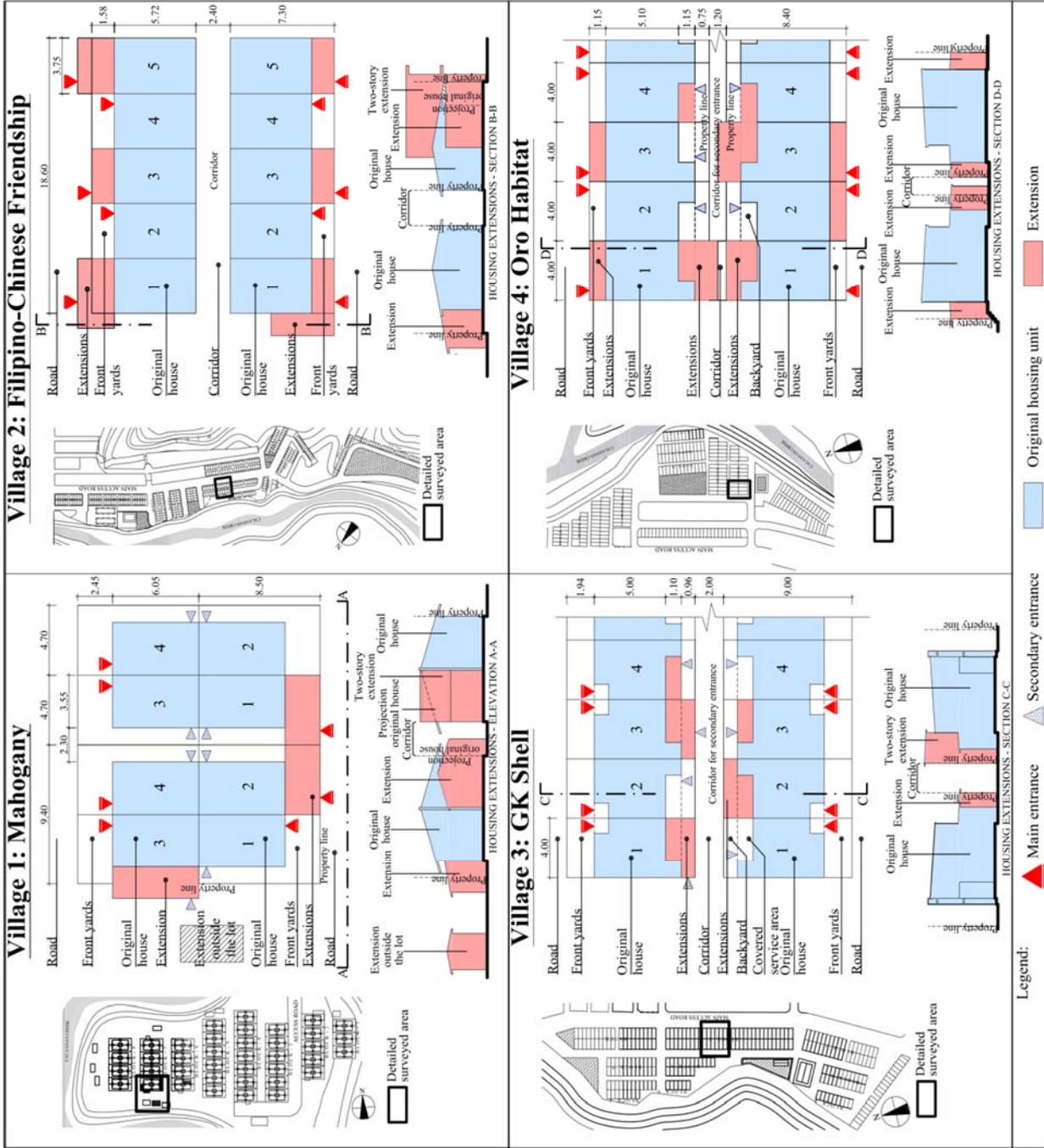
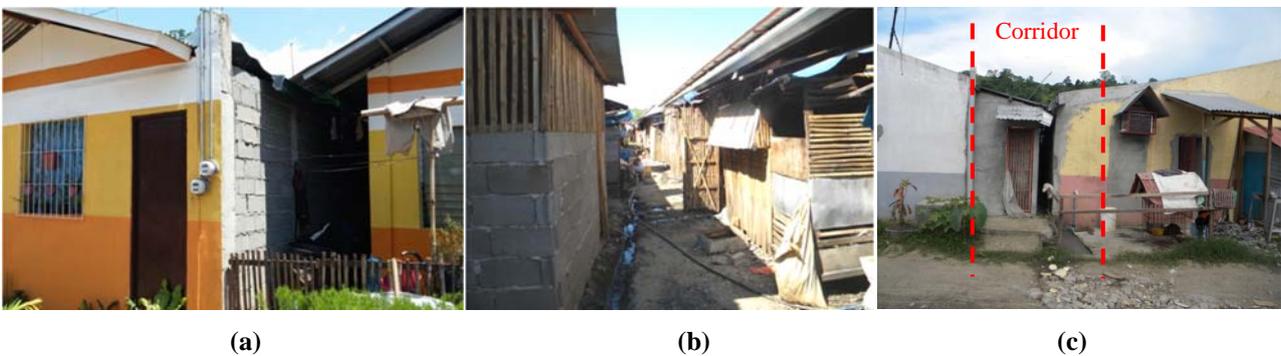


Figure 8.10: Types of changes in housing block layouts – plans and sections



**Figure 8.11. Façades of houses in Village 1 (a), Village 2 (b), and Village 3 (c)**

The corridors considered between housing blocks were intended to enable secondary entrance to the houses and evacuation routes in case of emergencies. Residents have not respected these spaces extending their houses which in many cases block these corridors partially like in villages 1 (Figure 8.12, a) and 3 (Figure 8.12, b). Additionally, some cases extensions completely block the corridors, as observed in village 4 (see Figures 8.10 and 8.12, c). The only village where there are few cases of blockage of rear corridors is in village 2, basically because there is no secondary access that connects the house with these spaces. The use of these circulation spaces for the construction of diverse types of extensions distorts their character and functionality, but also my represent a risk for the residents, since most of them use firewood for cooking in the improvised kitchens built with flammable materials (see Figures 8.12, b).



**Figure 8.12: Secondary entrances in Village 1 (a), Village 3 (b), and Village 4 (c)**

As a result of the analysis it is observed that the lack of architectural guidance and the general non-compliment of the prohibition to modify the houses lead to a situation of limitless of the housing extensions in both variety and size, which in many cases invaded public areas such as roads or secondary circulations. Moreover, the blockage of these paths where residents built kitchens with burnable materials (wood, bamboo, nipa leaves) produces a high risk of fires mainly because the residents use firewood for cooking.

### 8.3 Key findings

This study presents the actual situation in the short term after the allocation of the residents in the permanent houses when the process of construction of housing extensions and modifications in the settlements are in

process of consolidation. In the process of housing modification, it was observed a pro-active attitude of the residents towards the adaptation of their built environment, which follows two principles: spontaneous and progressive development.

The initial finding is the failure of the prohibition to modify the provided houses, since the construction of housing extensions are the priority of the residents as they are the result of unsatisfied needs or other reasons not considered in the top-down planning and construction of permanent houses. Residents proved that they can adapt and modify provided houses according to their needs and priorities. Although in initial stages there is little consideration about the construction quality, the process of modification involves a permanent improvement of the extensions. The long-term implies an important investment and consequently a bigger effort from residents that increase concerns about the quality of construction regarding the longer lifespan of the extensions.

The findings regarding safe housing conditions that are challenged by the construction of housing extensions reveal that there is a low performance of these structures in case of earthquakes, and strong winds experienced during typhoons or tropical storms. However, it was observed also that there are some building principles that were partly applied but failed under the national regulations and technical guidelines. Therefore, there is the risk to generalize the incurrence on “informal” construction practices, where the residents are unaware of the potential exposure due to the impossibility to receive financial or technical support, and rely only on the available labor that as was presented in this study has limited knowledge of appropriate construction considerations.

It is crucial a change of attitude from the local authorities about the construction of housing extensions for a more permissive approach that allow the provision of technical assistance or training directly to households, hired workers or indirectly through NGOs assistance or other civil organizations. Regarding the limitations of local government to undertake the responsibility of the whole process, it is important to consider the inclusion of various stakeholders for the appropriate housing development, and the fulfillment of minimum construction standards.

The development policies and initiatives should consider the residents as active actors of the process, since they proved their capacities for decision making and financing their own development. Residents should not be considered victims and passive recipients of help since this tend to promote dependency.

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## **Chapter 9:**

# **Conclusions**

### **9.1 Discussion of findings**

This doctoral thesis analyzed the long-term post-disaster recovery in the city of Cagayan de Oro in the Region of Mindanao in Southern Philippines. Additionally to the housing provision process, this study analyzed the post-occupancy adaptation of the houses performed by the beneficiaries in Calaanan site. The adaptations that were targeted are the unauthorized housing extensions. Firstly, the analysis focused on the housing satisfaction under the premise that housing extensions are the result of unsatisfied needs of the residents. Subsequently, the study explored the motivations and reasons for the construction of housing extensions, patterns and types of constructions. In the last chapter the main issue was centered in the impacts of the construction of housing extensions, mainly regarding whether housing extensions cause deterioration of housing and living conditions and promote the development of unsafe environments.

### **Chapters 1 and 2**

The current global trend of high and rapid urbanization with large concentration of people in cities is evidencing the vulnerabilities created by human interventions. The fact that there are more disasters recorded and the consequences and losses are higher is directly related to the number of people affected, number of casualties, economic losses and destruction of housing and infrastructure. The disproportionately high impact on urban poor in comparison with wealthier has evidenced also that the causes are not directly related to the economic condition of the people. In fact, the difference lies in how the settlements are established. Poor communities have limited resources to access a formally established settlement, and in many cases settle in highly vulnerable areas and marginal settlements with precarious housing conditions.

Disasters treat a community in different ways, i.e. health, economy, socio cultural structures, environment, infrastructure, housing and others. In which the housing has an important role because it represents the immediate environment of a family, the nexus with the community in the settlement, and the starting point for development. After a disaster it is crucial to ensure the safety of the people owing the appropriate housing conditions and avoid replicate pre-disaster vulnerabilities or create new ones.

The complexity of the process of long-term disaster recovery requires the establishment of coordination and collaboration bodies to channelize the support of affected communities by the disaster. It is necessary to consider the challenges that have to support the communities until their completely recovery.

Resettlement is the housing recovery approach that causes high impacts on people's living conditions and livelihoods. This approach is the least advised and represents a bigger challenge for affected communities.

However, in cases that the field assessment indicated that it is the most appropriate approach due to the vulnerabilities of the sites, it is necessary to have especial attention to local conditions and lifestyles of housing beneficiaries (Jha, A. K., & Barenstein, J. D., 2010).

### **Chapter 3**

The high level of exposure to multiple hazards in the Philippines questions the current reactive trend of the actions, which emphasize the post-disaster response more than preventive measures to avoid the impacts of disasters. The high economic and social costs as a result of recurrent disasters evidence the lack of an integrated approach to manage disaster risk prevention activities with the community and specially, the reduction of pre-disaster vulnerabilities lying on the inappropriate location of settlements.

There is a clearly established system for post disaster recovery that involve multiple governmental agencies, and each of them has established a particular system to collaborate with NGOs, volunteers and other actors from the private sector. Additionally, as a result of the leadership role of governmental agencies, as it is specified in the Disaster Risk Reduction Management Plan, there is no consideration for community participation. Therefore the tendency is to favor top-down approaches for reconstruction, such as resettlement, and the approaches that imply high residents' control, such as community-driven reconstruction through SHFC's CMP, do not have a higher impact that is evidenced in the low number of houses built through this system in comparison with the approaches.

The process for housing provision, as it was explained in this chapter, in pre and post-disaster contexts are similar, the stakeholders and the institutional framework are the same. In fact, much of the experiences of social housing in normal times have been applied to organize the construction of houses after disasters. The institutional and operational systems work effectively, since the roles of the stakeholders are in most of the cases clearly defined, the national and local partners (NGOs and private sector) are defined in both cases. Therefore, the operation mode is understood by both governmental and the non-governmental counterpart. However, the evaluation post-occupancy stage in order to incorporate the feedback from housing beneficiaries has not yet considered for the improvement of the process of housing provision.

### **Chapter 4**

The large flow of migrants, the rapid growth of the city, the establishment of informal settlements or squatter areas in the proximities of rivers' banks, determined the vulnerabilities that threaten the local residents. In addition to the lack of an integral disaster management measures that must be integrated not only to post-disaster response, but prevention, mitigation and by the adoption of pro-active measures. This contributed to the massive destruction of the city after the disaster.

This question the efficiency of the "event-basis" approach for disaster response and the reactive actions, for instance it is only after Typhoon Washi that a Disaster Risk Reduction Management office (DRRM) was

created in the LGU. Another issue is the lack of clear guidelines for housing reconstruction or resettlement. Therefore it hinders any self-criticism and feedback from previous experiences for the improvement of the resettlement management based on the current experiences in Cagayan de Oro.

There were different housing reconstruction approaches adopted for post Typhoon Washi recovery. The focus is the Agency-Driven Reconstruction in Relocation Site, top-down process, where the local government directly influenced the decisions taken during different stages and took the leadership in the inter-agency. This promoted the improvement in the capacities of different offices involved and the implementation of disaster preparedness activities through the Disaster Risk Reduction Management office.

Additionally, since it was evident that the advantage to have public land for emergency use which enabled timeliness in the construction and allocation of permanent housing. Subsequently, the current administration is working on purchasing land to continue with the land banking initiatives.

Local governments should clarify the policies to ensure the land and housing security to households in resettled sites, arrange the formal transfer of the property rights to residents and promote the sustainable development of these new communities.

Resettlement is adopted in more recent disaster recovery processes in the Philippines, i.e. the reconstruction projects after the typhoon Haiyan (Arroyo, 2015) that hit the central region of the country in 2013. Thus, the lessons learned from the management of the resettlement in Cagayan de Oro can be useful to improve future actions.

## **Chapter 5**

From the analysis of residential satisfaction and living conditions, there are various issues that emerged for the improvement of future resettlement projects:

The informal nature of pre-disaster settlements evidenced poor construction quality and limited access to facilities. Consequently, the positive perceptions of resettled communities are not surprising: in the new settlements, they have access to basic services and facilities, and although local government keeps the formal ownership of the houses, occupancy rights were awarded to residents, so there is no threat of eviction (Oxfam, 2014).

Residents' satisfaction with their current houses is generally positive, although there are some differences between the four villages. Negative perceptions are related to appropriateness to the locality such as thermal comfort and construction quality.

Despite the lack of control over housing planning and construction resulting from the entirely top-down

resettlement, it is evident that communities are not passive recipients of help. Despite the residents' negative perception of their economic situation, they are able to build complementary structures progressively in order to ease their daily activities, with or without external support, thus displaying a proactive attitude.

Additionally, the differences in the approach for post-occupancy community support from government but especially from NGOs in the four villages analyzed, illustrated how easily residents' attitudes are influenced. For instance, in village 3, the supporting NGO discouraged residents from building extensions in front of the housing provided in order to promote compliance with local regulations and occupancy terms. On the other hand, in village 2, due to the lack of control, different types of extensions proliferated with limited concern about residents' safety.

The analysis of living conditions highlighted the lack of essential spaces for daily activities, such as kitchen, service and rest areas. Consideration had not been given in planning to the characteristics of a tropical country, where residents tend to develop their activities in outdoor or intermediate spaces due to high temperatures inside the houses.

The main difficulty expressed by the residents is the reconstruction of livelihood opportunities, which should be one of the main priorities of community support activities carried out by local government and other agencies. The assistance-based support from these agencies only causes dependency and hinders the development of these communities; which is explained by the negative perception of residents' current economic situation and the difficulties to find livelihood opportunities.

The construction of housing extensions, despite their illegality, clearly demonstrates a need for residents to work actively as they conceive of them as housing improvements. Thus, it is necessary to review housing designs and consider them as "core houses" as regards the possibility of residents improving them. This demonstrates the need to change the approach in order to allow housing modifications, and consequently promote assistance by NGOs in order to improve the construction quality and safety of these complementary structures. This is especially true, considering that this study showed that NGOs can have a positive influence on the attitude of residents by motivating or discouraging certain types of extension.

## **Chapter 6**

This study presents the different types of housing extensions and their main characteristics which are the response of specific residents' motivations based on their needs not considered in the NGO-government built permanent housing and provide the opportunity for residents' control over their built environment.

The understanding of local conditions and residents' needs must be considered in the housing planning, either to include in the housing provided or consider their future construction by residents. It is clear that in this kind of resettlement projects, there is a lack of acknowledge of specific residents' housing needs because

the priority was to build a large number of houses and the NGOs and government were under pressure to complete the housing construction and allocation of resettled residents. Additionally, it is unlikely even with extensive community participation activities, to cover the different and specific needs of the residents. Therefore, it is necessary to consider a change in the approach for post-disaster housing reconstruction from top-down to community inclusive management approach for future events. Furthermore, for already built houses it is important a flexible attitude of the local government over housing modifications, and in coordination with other stakeholders (such as NGOs and other government agencies) provide technical assistance in order to avoid poor construction practices. It is possible to take advantage of the high level of influence of NGOs in local communities (as it was proved in village 3), which can lead to a positive change for the compliance of construction standards.

The location of extensions is influenced by the housing design, its position in the provided lot and in the settlement. Therefore it is necessary that implementing agencies and government agencies involved recognize these issues in order to redesign the houses for future projects considering a proper use of the spaces but also provide flexibility for resident-initiated housing modifications inside or outside the house, but also avoid the informal use of land beyond the provided lot.

## **Chapter 7**

This chapter explored the patterns of housing modifications and the reasons for their construction, which change in accordance with the beneficiaries' adaptation to this new environment through the process of inhabitation. This process generated a variety of self-built structures, which were limited by the available lot area. However, the needs and preferences of residents underpin the tendency for and motivation to extend their living space.

The construction of extensions is unavoidable, as it is the result of the process of inhabitation and is essential for dwellers' adaptation. Therefore, such extensions should be taken into account at the planning stage and flexibility in the housing design should be increased accordingly. This would support the proactive attitude observed within residents' inclination to transform their houses regardless of their economic situation.

Consideration of local conditions—identifying patterns in beneficiaries' daily activities and family structure characteristics, livelihood opportunities, and an understanding of the local climate—is critical for the provision of suitable housing and the construction of locally sensitive solutions.

## **Chapter 8**

This study presents the actual situation in the short term after the allocation of the residents in the permanent houses when the process of construction of housing extensions and modifications in the settlements are in process of consolidation. In the process of housing modification, it was observed a pro-active attitude of the residents towards the adaptation of their built environment, which follows two principles: spontaneous and

progressive development.

The initial finding is the failure of the prohibition to modify the provided houses, since the construction of housing extensions are the priority of the residents as they are the result of unsatisfied needs or other reasons not considered in the top-down planning and construction of permanent houses. Residents proved that they can adapt and modify provided houses according to their needs and priorities. Although in initial stages there is little consideration about the construction quality, the process of modification involves a permanent improvement of the extensions. The long-term implies an important investment and consequently a bigger effort from residents that increase concerns about the quality of construction regarding the longer lifespan of the extensions.

The findings regarding safe housing conditions that are challenged by the construction of housing extensions reveal that there is a low performance of these structures in case of earthquakes, and strong winds experienced during typhoons or tropical storms. However, it was observed also that there are some building principles that were partly applied but failed under the national regulations and technical guidelines. Therefore, there is the risk to generalize the incurrence on “informal” construction practices, where the residents are unaware of the potential exposure due to the impossibility to receive financial or technical support, and rely only on the available labor that as was presented in this study has limited knowledge of appropriate construction considerations.

It is crucial a change of attitude from the local authorities about the construction of housing extensions for a more permissive approach that allow the provision of technical assistance or training directly to households, hired workers or indirectly through NGOs assistance or other civil organizations. Regarding the limitations of local government to undertake the responsibility of the whole process, it is important to consider the inclusion of various stakeholders for the appropriate housing development, and the fulfillment of minimum construction standards.

The development policies and initiatives should consider the residents as active actors of the process, since they proved their capacities for decision making and financing their own development. Residents should not be considered victims and passive recipients of help since this tend to promote dependency.

## **9.2 Key issues to consider for the improvement of the process of housing supply**

The findings of this study are centered on the following issues that answer the research questions posed in the first chapter:

### ***9.2.1 Positive outcomes from an entirely top-down resettlement process***

Resettlement is generally seen as the worst scenario for post-disaster housing recovery. To remove

communities from their land is considered to leave uprooted communities, lack of livelihood opportunities, destroy community links and cultural backgrounds. Therefore resettlement is the less advised approach and is expected to be adopted in extreme cases where the vulnerabilities are the result of highly vulnerable settlement locations. On the other hand, resettlement is one of the approach that is widely adopted in post-disaster housing recovery in the Philippines. Therefore it is important to analyze the outcomes in Cagayan de Oro that may be useful at the time to plan future resettlement projects.

The study revealed that the process resulted fast in the provision of permanent housing considering the high housing needs. This was possible due to the available land purchased by the local government before the disaster through the land-banking program. In addition, the national and local coordination structure worked in a way that allowed the development of stakeholders' capacities in the process of resettlement. Issues regarding security of land and housing tenure were partially assured through usufruct, which provides limited ownership rights to the housing beneficiaries, but prevents from future evictions.

### ***9.2.2 Despite of high residential satisfaction households actively modify their homes***

In the analysis of housing satisfaction, residents' expressed positive attitudes about their housing conditions after the resettlement. Negative perceptions were related to the considerations of local conditions in the design of the houses.

The residents stressed the lack of spaces for the development of their daily activities and the high temperatures in the interior of the provided houses as main indicators for housing modification. Additionally, residents expressed the lack of livelihood opportunities as one of their main difficulties. However, despite their economic constrains, residents are willing to invest on the improvement of their housing and living conditions.

### ***9.2.3 Multiple reasons and multiple features of housing extensions***

Housing extensions can be located around the provided house as well as outside the assigned lot, even in neighboring private property. The construction can be precarious or planned for a longer lifespan; they can be one or two story. The initial motivations can change and the final use can be different. There are no single reasons for housing modification. In fact, reasons can be overlapped and are changing as a result of the process of inhabitation.

### ***9.2.4 Failure of the prohibition and success of persuasion***

Aravena, who won the Pritzker Prize in 2016, have a huge experience in social housing projects in Chile, and during the planning process he acknowledged the importance of put the people in the center of the process as he claims: "We won't ever solve the problem unless we use people's own capacity to build." (Aravena, A., 2014)

In this study, it was observed that despite the lack of community control over housing planning and construction resulting from an entirely top-down resettlement process, residents are not passive receivers or external support from the government or NGOs. Instead, they built housing extensions attached to the original houses in a progressive way. Despite their economic situation, there is an active attitude to improve their houses. The priorities of the residents about their houses are evident since housing modifications spread in the settlements analyzed despite the prohibition set by the local government.

However, in Village 3, that was built by Gawad Kalinga, and where this NGO is still working actively with the community on development projects, there is a permanent discourse of discouragement of the construction of housing extensions. The NGO were success restricting the construction of extensions in front of the houses where they are more evident, however, it was not possible to completely avoid their construction.

#### ***9.2.5 Permissiveness may lead to reduce negative impacts***

Goethert have researched the phenomenon of incremental housing, where residents take a dynamic attitude towards the improvement of their built environment. The target of his studies are mainly low income and marginal settlers where it was observed that the priority should be to help residents to improve the way they produce their housing as he claims “If they can do it, we can help them do it better” (Goethert, R., 2014)

In this thesis, there was no clear evidence of the deterioration of the housing conditions as the result of the construction of housing extensions in the villages analyzed in Calaanan site. Although, there is a poor quality of construction and limited considerations about safety in case of earthquakes and strong winds observed in the extensions built by residents. The lack of technical support and professional supervision resulted in a failure of the fulfillment of national construction regulations and technical guidelines.

However, the only housing modifications that are authorized in the occupancy conditions, the lofts or mezzanines, have been considered by NGOs as a way to support the most vulnerable families. For instance in villages 1 (Mahogany) and 4 (Oro Habitat), NGOs built the lofts for selected households. In the comparison of the quality of construction between NGO assisted and the owner built lofts it is clearly shown the improvement in the quality and stability of the construction.

Consequently, it is important to consider a flexible approach from the local government about the construction of extensions that allow NGOs to support financially and technically the construction of the extension through the direct involvement in the construction or through training households in safer construction practices that promote the fulfillment of minimum construction standards.

### **9.3 Implications for future research**

This research was conducted 20 months after the first housing beneficiaries moved in the provided houses in Calaanan site. As it was observed throughout the research, in this short term there were diverse changes in the houses and settlements; however these changes are in progress of consolidation. Therefore it is important to consider the middle and long term evaluation timeframes in order to have a broader scenario of the advantages and limitations of post-disaster resettlement projects for the resettled communities.

This research targeted only the agency-driven housing projects in resettlement sites, however it was not possible to extend the study to agency-driven reconstruction projects carried out in the original settlements, where similarly basic housing units were provided but with tenure security is not a limitation and may influence in the way how residents modify the provided reconstructed house.

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## **Appendices**

Appendix 1 : Summary semi-structured interviews

Appendix 2 : Schedule of activities and questionnaire survey in Calaanan site

Appendix 3 : Form Household questionnaire survey for living conditions and observation of safety of housing extensions

Appendix 4 : Data obtained about general information of residents and demographics

Appendix 5 : Data obtained about residents' perception about their pre- and post-disaster housing conditions and livelihood

Appendix 6 : Data obtained about direct observation of the extensions and modifications built by the residents



**Appendix 1 : Summary semi-structured interviews**



## Summary semi-structured interviews

N°	Code	Organization/Institution	Interviewee	Position	Date	Place
1	LGU 1	Office of City Planning and Development, Cagayan de Oro	Eng. Isidro G Borja	Head of the Office	09 July 2014	Cagayan de Oro City Hall
2	LGU 2	Office Shelter and Housing Multi-Sectoral Task Force, Cagayan de Oro	Mr. Ramon Fernandez	Head of the Office	10 July 2014	Cagayan de Oro City Hall
3	LGU 3	Office of Building Official, Cagayan de Oro	Arch. Maria Concepcion A. Alcantara	Acting Chief Processing Division	04 August 2014	Cagayan de Oro City Hall
4	LGU 4	Estate Management Division, Cagayan de Oro	Ms. Virginia Diguinon	Head of the Office	05 August 2014	Cagayan de Oro City Hall
5	LGU 5	Office City Disaster Risk Reduction Management Office	Col. Mario Verner S. Monsanto	Head of the Office	10 July 2014	Cagayan de Oro City Hall
6	GOV 1	Department of Social Welfare and Development DSWD – REGION 10 - CDO	Ms. Glofel Uayan	DSWD Regional Focal Person of NHTS-PR (National Household Targeting System for Poverty Reduction)	06 August 2014	DSWD Region 10, Cagayan de Oro
7	GOV 2	National housing Authority NHA - REGION 10 - CDO	Engineer Yudy Fernandez		21 July 2014	Cagayan de Oro City Hall
8	GOV 3	Office of Civil Defense (OCD) - REGION 10 - CDO	Ms. Ana C. Cañeda	Director OCD Region 10	06 August 2014	OCD Office CDO
9	IP 1	Misamis Oriental Filipino Chinese Chamber of Commerce	Mr. Efren Uy	President	09 July 2014	Office of FCCC

10	IP 2	Gawad Kalinga Office in Cagayan de Oro	Mr. Tito Alex C. Besinga	Provincial Management Coordinator	10 and 16 July 2014	GK Office CDO
11	IP 3	Habitat for Humanity Office in Cagayan de Oro	Ms. Lerma Bernardette V. Reyes	Project Head Habitat for Humanity Philippines, Cagayan de Oro	16 and 31 July 2014	HFH Office in Cagayan de Oro
			Eng. Eliezer Vicente Bañares	Designer and construction assessor HFH Philippines		
12	IP 4	Oro Habitat for Humanity	Ms. Mary L. Canencia	Program Coordinator Oro Habitat for Humanity	21 August 2014	OH Office in Calaanan Site, Cagayan de Oro
13	IP 5	Red Cross Philippines, Cagayan de Oro	Dr. Myra G. Lee	Regional Administer Red Cross Philippines		Red Cross Philippines CDO
14	IP 6	Xavier university	Eng. Dexter S. Lo	Director XU Engineering Resource Center Coordinator XU Disaster Risk Reduction and Management Program	22 July 2014	XU School of Eng.
15	IP 7	Xavier university	Mr Alexie Colipano	XU Community Support Official	22 July 2014	XU School of Eng.

## CITY PLANNING AND DEVELOPMENT, CAGAYAN DE ORO

**Interviewee:** Eng. Isidro G Borja  
**Position:** Head of the Office of City Planning and Development, Cagayan de Oro  
**Date:** 09 July 2014  
**Location:** Office of City Planning and Development, Cagayan de Oro City Hall

### **Role of the Local Government:**

The role of the local government is to provide support to disaster affected families, for shelter assistance, it can be provided directly or through implementing partners (NGOs, community organizations, etc) or other donors. For Cagayan de Oro, the local government provided land for allocation of victims from the initial stages of emergency and transitional shelter and currently for the permanent housing, following the The Urban Development and Housing Act (UDHA) of 1992, in which it is stipulated that the LGUs (Local Government Units) should acquire land for social housing purposes and post disaster housing support.

### **Coordination:**

In the initial post Sendong shelter stage there were two main coordination bodies that participated in the provision of Tents, and subsequently Bunkhouses and Amakan as transitional shelters, these platforms were the Shelter Cluster that worked closely with the **Local Inter-Agency Committee (LIAC)** formed by the LGU Cagayan de Oro, and was chaired by the city mayor.

Through LIAC the LGU land were designated to each agency for emergency, transitional, also the land development and provision of infrastructure, which is still ongoing in most of the relocation sites. During the settlement planning process the priority was the construction of the houses to allocate the affected residents, mainly the informal settlers in the areas along the Cagayan River, they were evicted from these public land and relocated in different sites.

### **Infrastructure and Housing construction:**

In the initial stage, the land development or preparation (funded by the Government Calamity Fund) was the first priority, it was done by the LGU in available municipal land acquired before, and the infrastructure works started simultaneously with the housing construction, unfortunately in most of the cases the infrastructure were finished after the conclusion of housing construction or after the victims were allocated, and even there are many works that are still ongoing. This was a consequence of the urgency to provide housing regardless an appropriate planning of the settlements, this is something we are trying to change, now for the settlements that are on construction we are prioritizing the provision of water and drainage lines and power supply, as well as access routes and communal centers and health facilities.

The provision of facilities in relocation sites became complicated due to the different actors involved and the former condition of the residents as informal settlers. For instance, the public water and drainage lines are provided by the local government until communal faucets, but the arrangements and application for individual connections should be done by the beneficiaries, who can be supported by the implementing agencies, but it is challenging in a context of dependency.

Sewage include a combined system, the housing construction included the provision of a septic tank for the partial treatment of the wastes and later the connection to public drainage. The use of septic tanks produces 70% of the wastes treatment, up to 1m<sup>3</sup> per day biological treatment. This helps to avoid sanitary problems in relocation sites due to the delay in the construction or complete of infrastructure.

**Tenure status and ownership:**

In the present, the housing beneficiaries, Sendong Victims, have been granted with an “occupation Permit”, that it is not a property title, the system is called “Usufruct”, this means that the residents can live in the houses permanently, however they do not have the right to modify or built permanent structures in the provided land, also they cannot rent or sell the houses or lot.

The transfer o the property to the beneficiaries is now one of the concerns of the LGU, however it is a long process and it is not planned to be soon.

**Facilities and support provision to victims:**

Besides the physical support in relocation sites, the local government is working on community support to the beneficiaries in the new communities, there are different programs that are carried out through the Office of State Management Division of the LGU, these activities focus on livelihood or working and income opportunities; education through different training activities and governance; health through the health centers, recreation facilities and others.

The major problems are the lack of income activities, peace and order and governance in relocation sites.

## **SHELTER AND HOUSING MULTI-SECTORAL TASK FORCE, CAGAYAN DE ORO**

**Interviewee:** Mr. Ramon Fernandez

**Position:** Head of the Office Shelter and Housing Multi-Sectoral Task Force, Cagayan de Oro

**Date:** 10 July 2014

**Location:** Shelter and Housing Multi-Sectoral Task Force, Cagayan de Oro City Hall

### **Role of the Office:**

The office was created in August 13<sup>th</sup> 2013, as an initiative from the new mayor who assumed its position in July of the same year.

The role of this office is to organize the housing provision for Sendong victims, coordinate with NGOs and other governmental offices like the DSWD and NHA. Besides of coordination with different stakeholders involved in victims support, this office is responsible to supervise ongoing housing construction projects and those completed by the previous administration.

Prior to the creation of this office these were responsibilities of the Estate Management Division, which took over because of the lack of continuity of LIAC. In addition this office works closely with the City Planning through their dependencies like the Office of Building Officials, Estate Management Division, Engineering Office and Social Welfare Office of the local government.

The current activities of the office are:

- To coordinate the ongoing projects for Sendong Victims, the demand for housing to allocate victims of the typhoon is still high, there are projects that already have donors and the implementing agencies are prepared to start the construction, however the lack of land causes a delay in the start of the projects, the LGU is now looking for new land that can be suitable for the development of post disaster and social housing projects.
- To supervise and monitor the completed projects and the community development in relocation sites, the office is permanently visiting the relocation sites, to supervise the progress of the construction of the houses, however this is mainly focused on the number of housing completed, the construction standards and quality is directly supervised by the implementing agency or the funded agency that can be a governmental agency (DSWD, NHA and others) or private (corporations, private donors, etc).
- Procure new land to complete the needed housing for Sendong victims and social housing projects, definitely the priority is to complete the needed housing for the Sendong victims, but the LGU is also focusing on the provision of social housing to vulnerable and low income residents.
- Coordinate social housing construction, considering different criteria that have to be fulfilled by the applicants, the local government can provide the land and coordinate the construction of the houses with NGOs or other implementing agencies.

- Organize the appropriate development and supply of housing in the city, the terrible consequences of the Typhoon Washi or Sendong was the consequence of a long term mal development of the city and disorganized growing, the residents of vulnerable areas were informal settlers, that the previous administrations allowed them to live in these precarious conditions, and as a result we had to face a massive relocation to ensure the safety of the victims.

The LGU is now preparing a housing Plan that will consider different aspects for a planned and appropriate development of the settlements in the city.

**Coordination:**

The LGU acquired land for social housing and emergency housing post disaster in previous administrations, according to the Act 7279, through Land Banking. These lands distributed in different areas in Cagayan de Oro were used for relocation of residents of vulnerable areas along Cagayan River, mostly for informal settlers.

In the coordination with the NGOs and other implementing agencies, the LGU provided the land for the construction of houses that were assigned according to the priority and the capacities of the NGOs, and in coordination with DSWD and other governmental offices, managed the distribution of funds for the construction of the permanent houses.

**Unoccupied housing in relocation sites:**

In Calaanan relocation site there are houses built by the LGU and FCCC that were affected by landslides, due to its unsafe location in a hill, and as a consequence their residents had to be relocated to other sites. Also there are houses built by FCCC built in one of the last phases that have never been occupied, due to its difficult access.

Now we are trying to find a solution for this, specially because we are under pressure to provide housing to the victims of the disaster that were forced to leave the city or are living with relatives, and also this issues are raising the awareness in the relocation site about possible vulnerabilities specially to landslides.

**Situation in former informal settlements and vulnerable areas:**

The areas along Cagayan River are considered highly vulnerable, however there are two types of land here, the public land where the informal settlers had their houses before the relocation and the land formally acquired, in this case the settlers have the title of the land and it is more difficult to relocate them.

In case of former informal settlers in places like “Isla de Oro”, they were relocated and the houses were destroyed by the typhoon or later demolished, these areas have been designated as “No Built Zones”, where any residential use of the land is prohibited, and it is permanently patrolled in order to avoid new informal settlements. Unfortunately, due to the lack of working opportunities in relocation sites, many victims tried to

build their houses in these areas, since they are located closer to the city markets (Carmen and Cogon market) that are the center of economic activities; this is a big challenge for the LGU.

Recently there are plans to change the status from “NO Built” to “non Residential areas”, that will provide flexibility for the use of these lands, for industrial or other uses.

Then, in case of formal settlers in highly risky areas, there are plans to built walls and other infrastructure to provide protection in case of a sudden rise of Cagayan River waters, however this also includes relocation of a large number of residents, this is a difficult problem that will have to be addressed in the near future.

## OFFICE OF BUILDING OFFICIAL, CAGAYAN DE ORO CITY

**Interviewee:** Arch. Maria Concepcion A. Alcantara  
**Position:** Acting Chief Processing Division, Office of Building Official  
**Date:** 04 August 2014  
**Location:** Office of Building Official, Cagayan de Oro City Hall

### Role of the Office:

This office is responsible to evaluate construction projects and issue building permits for private constructions and supervise it during construction.

For the construction of housing in relocation sites, this office provided the construction permits, the projects were submitted by the NGOs and other implementing agencies. The case of Post Sendong housing construction was special and enters in the category of Emergency process, and the approval progress can be shortened up to 2 to 3 days, also considering that these projects were “government Projects” that were discussed previously in LIAC meetings where they were pre evaluated.

### Standards for Housing in Relocation Sites:

The standards followed for the evaluation of the projects are specified in the National Building Code of the Philippines; and in case of social housing and emergency we consider also the Minimum Design Standards and Requirements for Economic and Socialized Housing Projects.

### Minimum Lot Area

Type of Housing	Economic (sq.m.)	Socialized (sq.m.)
a. Single detached	72	64
b. Duplex/single attached	54	48
c. Row houses	36	28

### Floor Area Requirement

The minimum floor area requirement for single-family dwelling shall be 22 square meters for economic housing and 18 square meters for socialized housing.

In case of the houses in relocation sites, the minimum area considered is 20.00 m<sup>2</sup>, it was only considered one room due to the limited area, but the residents can complete it with internal non permanent partitions.

The concrete hollow blocks considered are mainly 4” or 6”.

Other specifications are included in the related codes and regulations.

**Procedure for provide Construction Permits:**

The procedure for approval of projects is as follows:

- Pre Evaluation Stage; where the required documents are evaluated and in case of priority it can be faster and can be exempted of payment.
- Evaluation; following the established requirements regarding minimum floor area, spaces, materials and others.

**Coordination with other offices:**

After the disaster the main coordination was with LIAC and the other offices of the local government. With this new administration we have the Shelter and Housing Task Force Office, which is directly working in relocation sites and are preparing the Housing Plan for the city.

For supervision of the extensions built by the beneficiaries, the office responsible is the Estate Management Division, that gives notifications to stop informal constructions and modifications of the provided housing, however so far we could not carry out demolitions due to the lack of personnel in this office and because it is a sensitive issue for the communities in the sites.

Although the beneficiaries of the houses signed a contract in which it is specified the restrictions for informal constructions, we do not have the capacity to stop them.

## **ESTATE MANAGEMENT DIVISION, CAGAYAN DE ORO CITY**

**Interviewee:** Ms. Virginia Diguinon  
**Position:** Estate Management Division Chief  
**Date:** 05 August 2014  
**Location:** EMD Office, Cagayan de Oro City Hall

### **Role of the Office:**

The role of this office after Sendong was the selection of beneficiaries in coordination with DSWD, monitor the welfare of the victims in evacuation centers, transitional shelters and now in permanent housing in relocation sites.

Currently we conduct different education activities, coordinate the support and distribution of assistance in relocation sites and monitor the provision of facilities and promote residents welfare and livelihood opportunities.

### **Process for Post Sendong shelter support to victims**

Immediately after the typhoon Sendong, the affected people were transferred to Evacuation Centers (schools, Barangay centers and other public facilities).

Then, they were allocated in tents camps and transitional housing according to the progress of the response, and the available land for the location of tents and construction of transitional shelters. The location of these emergency shelters was in public spaces and some already in available land from the LGU acquired through Land Banking (usually for social housing projects but the allocation of Sendong victims was the priority) that later was used for the construction of permanent housing.

### **Development of housing in Calaanan Relocation Site:**

The first relocation site where permanent houses were built is Calaanan, since it is the largest, initially it was thought that this site could cover most of housing needs, however the demand is much higher than expected.

First tents were allocated in the site, followed by the construction of bunk houses as temporary shelters, where the victims were transferred. The priority was the people living in tents located in schools sports grounds because the school classes had to start soon.

Subsequently, the construction of houses started in different communities inside the site by different NGOs, whose designs were previously approved.

**Beneficiaries' selection:**

We formed a "Selection Committee" that is responsible to prepare a list with victims that are qualified following the following criteria:

Their houses had to be severely damaged, or live in high risky areas, be permanent settlers of these houses; the priority is for single mothers, widows, persons with disabilities and large families.

Once the beneficiaries are included in the master list, they are assigned a house per family in relocation sites through lottery, trying to keep former communities together.

**Pre Occupancy:**

Before transfer the beneficiaries to the houses in relocation sites we conduct Pre-Occupancy Seminars" in which we explain the conditions for occupancy, the system used is Usufruct that means that the residents do not have legal rights over the property of the land or the house, once the houses were finished it was turn over the responsibility of the LGU.

Another aspect explained in these seminars is the process for individual connection of water and electricity that has to be done through individual applications of the residents. Also we explain that after they are transferred to the houses the maintenance and repair is responsibility of the residents. Finally, we explain that in any case it is allowed the construction of extensions or modifications of the houses, however we cannot stop them yet.

Once the beneficiaries know the conditions of occupancy, they sign a contract and they receive an "Entry Pass" issued by the Shelter and Housing Development Task Force Office LGU Cagayan de Oro, which allow them to live in their assigned houses.

**Activities after transferring of beneficiaries:**

We monitor if the beneficiaries are not living permanently in the assigned houses because there are cases they returned to their former houses in vulnerable areas or rented the houses to have extra income, this is prohibited in the contract signed between them and the LGU.

The victims were allocated in the sites in groups or batches according to the availability of houses:

- The first group of 586 families was assigned houses in Calaanan in December 2012, in Quadruplex houses built by Habitat for Humanity and 74 of them in pre fabricated houses donated by the FCCC.
- The second group were allocated in row Houses built by Gawad Kalinga (Phase II A), 122 families in December 2012.
- The third group of beneficiaries were transferred in December 2012, 40 families to Calaanan Phase III.
- The fourth group to Indahag Relocation Site also in December 2012, this time 40 families were transferred.

- The fifth group to the Single detached houses built by Gawad Kalinga in Berjaya Site, 149 families was allocated here.
- Subsequently the victims were transferred according to the availability of housing.

**Current activities:**

We monitor the welfare of the residents, their safety in the relocation sites, for instance due to the heavy rains and the unsafe location of some of the houses, a number of houses built by the LGU and FCCC were damaged and we coordinated the transfer of these families to other houses in the same site or in other sites where we have available housing units.

We also promote the respect to the conditions of the contract signed between the LGU and beneficiaries for the correct use of the houses, since the tenancy use is usufruct, it means that the residents cannot make modifications in the structure of the houses or build informal extensions that can damage the main house structure, unfortunately I this last issue many residents take weekends when there is no personnel to build their extensions.

We also coordinate the support for livelihood through trainings and distribution of support items in the community. Also we conduct education and values formation activities focus on safety and governance.

We coordinate cash for work and food for work programs that helps the residents to maintain their families, this in coordination with DSWD.

**DEPARTMENT OF SOCIAL WELFARE AND DEVELOPMENT (DSWD)  
REGION 10, CAGAYAN DE ORO**

**Interviewee:** Ms. Glofel Uayan

**Position:** DSWD Regional Focal Person of NHTS-PR (National Household Targeting System for Poverty Reduction)

**Date:** 06 August 2014

**Location:** Office of Department of Social Welfare and Development (DSWD) Region 10, Cagayan de Oro

**Role of DSWD:**

The DSWD role after disasters is to provide assistance to the victims, for shelter assistance it is through the “Omnibus Guideline on Shelter Assistance”, provide documentation and specifications for housing funded by DSWD.

**Coordination and partnerships:**

Specifically for post Sendong shelter assistance, the DSWD coordinated with the local government to fund housing in relocation sites, provided their housing design as a reference for the NGOs and other implementing agencies.

For the projects funded by the DSWD, the implementing partner is Habitat for Humanity Philippines, and we do the supervision directly of the projects that we fund.

For selection of beneficiaries we have our specific guidelines

**Monitoring and supervision:**

We monitor the living conditions of the residents of the relocation settlements, we provide economic assistance through the program “Cash for Work” which includes small tasks inside their communities like cleaning and /or maintenance.

Although the housing conditions in have improved, now they live in formally built houses, there are different problems in the new communities; for instance transportation and accessibility from the city is difficult, this enhances the livelihood or income source problems, since the relocation sites are located far from urban areas and commercial centers where the residents used to work.

We also observe the appropriate supply of infrastructure, that in many cases is still ongoing and the progress of the construction of the houses, mainly those ones funded by DSWD.

## MISAMIS ORIENTAL FILIPINO CHINESE CHAMBER OF COMMERCE

**Interviewee:** Mr. Efren Uy  
**Position:** President of the Misamis Oriental Filipino Chinese Chamber of Commerce  
**Date:** 09 July 2014  
**Location:** Office of FCCC

The Filipino Chinese Chamber of Commerce is a private organization that group Filipino Chinese Communities along the country. We host different activities and events, and raise funds to support community development activities and post disaster support to survivors.

### **Shelter Support in Cagayan de Oro:**

After Typhoon Sendong we considered to provide housing for victims, based on the urgency of this because they were living in evacuation centers and emergency shelters and tents.

We discussed about the kind of support we could provide, besides of the emergency items and food distributed to the survivors, we decided to fund semi-permanent housing for the victims. Then we gathered funds from other Filipino Chinese organizations in the Philippines and simultaneously coordinated with the local government to fulfill with their requirements for social housing and the provision of land in the most appropriate location.

Once the LGU decided the location of the Filipino Chinese Houses in Calaanan, they gave us parameters between 20 to 30m<sup>2</sup>. Of floor area, we started to look for providers in China, finally we provided pre-fabricated houses with 25.00 m<sup>2</sup>. of floor area with an approximated lifespan of 10 to 20 years.

We agreed with the LGU that the works related to land development and provision of drainage, water, roads and other infrastructure were their responsibility, also that the maintenance and any repair of the houses after the turn over is responsibility of the local government and the residents.

The summary of the process for the coordination and the construction of the houses:

01 month after Sendong the local government started the identification of appropriate land for construction of permanent housing for survivors.

Once the LGU notified the FCCC about the availability of land and the requirements for the houses, we started to look for a supplier in China, this took 01 month..

The following 03 months we started the construction of the houses, they were directly shipped from China, the company sent 02 engineers to supervise the construction of the houses and instruct the local workers about the assembly process. We provided row houses, with 05 housing units in each row, the construction was fast approximately 01 row (05 houses) per week, with a cost of PHP 350 000.00 per row, that was entirely funded by the Filipino Chinese Chamber of Commerce.

**Post occupancy support:**

We are a private organization, we do not provide further support, and this is responsibility of the local government and NGOs working in the area.

**Current activities:**

We organize different activities related to support activities, celebrations, social activities, and others in coordination with local governments.

Also we focus on post disaster support to victims, for instance in case of Typhoon Yolanda (Haiyan), we donated certain quantity of money to the local government, we preferred not to build houses there due to the magnitude and the difficulties in the sites.

## **GAWAD KALINGA CAGAYAN DE ORO**

**Interviewee:** Mr. Tito Alex C. Besinga  
**Position:** Provincial Management Coordinator, Gawad Kalinga Cagayan de Oro  
**Date:** 10 and 16 July 2014  
**Location:** Gawad Kalinga Office in Cagayan de Oro

### **BACKGROUND OF THE ORGANIZATION:**

Gawad Kalinga is a Philippine-based poverty alleviation and nation-building movement, is a civil organization based on Catholic community Organizations.

Their role is to provide support to low income groups, mainly in the Philippines, and provide empowerment formation and activities to alleviate extreme poorness.

Their support is not limited to distribution of different items, in fact their approach is to work together with the community in order to provide opportunities for their own development, there are different initiatives like community farms, community values formation and workshops for community driven development projects, and others.

For post disaster assistance to the victims, GK provides emergency relief items, and support for permanent housing, in case of Cagayan de Oro, they built houses in coordination with the LGU and funders, mainly private, and their support continues through permanent values formation and community development activities.

### **POST SENDONG SUPPORT:**

The Provincial office coordinated with the headquarters in Manila for the appropriate support in Cagayan de Oro, also the needed partners and funders for housing assistance. One of our key partners and funders is San Miguel Corporation, but also supported our activities Shell and the Malaysian based Berjaya Corporation.

### **Coordination for the housing support:**

The direct coordination was with the local government, for land use and different issues relate the immediate mobilization of resources for housing construction.

The inter agencies coordination was done by the LIAC and chaired by the city mayor, once the land was assigned to the NGOs for housing construction, we coordinated the approval of the housing design and once the construction started we reported the progress.

The coordination with non governmental agencies and corporations we done mainly with donors, San Miguel Corporation which already partnered with us provided a generous support for Sendong housing construction. Also Berjaya Corporation contacted GK for support Sendong victims, and donated 2000 houses.

**STAGES OF RELOCATION AND HOUSING CONSTRUCTION:**

<b>Planning:</b>	
<p>The approach was to build in Relocation sites due to the highly vulnerable location of former settlements and the informal occupancy of the residents in public areas.</p> <p>The local government assigned different sites to NGOs and other implementing agencies for the construction of houses for victims.</p>	
<b>Beneficiaries selection:</b>	
<p>According to the list provided by the local government and the DSWD, to prioritize the selection of qualified beneficiaries.</p>	
<b>Comparison 02 sites:</b>	
<b>Site 01: GK Shell Village - Calaanan</b>	<b>Site 02: Berjaya – Camaman-an</b>
<p><b>Housing design:</b></p> <p>For our row houses in Calaanan Site we used the designs of the National Housing Authority as a model for our final design, this mainly considering the maximum number of houses possible in the limited area.</p> <p>We followed the requirement of 18.00m2. minimum for floor area, and we did not consider internal partitions, this should be done by the residents.</p> <p>In the houses that were built later, we consider that it is important to close the area of the kitchen, because the lack of privacy and security in the area, in the houses built later we built the wall in the back of the houses covering the sink and kitchen, but it also creates a problem with the “dirty kitchens” or wood fire kitchens that most of the residents use in these sites.</p> <p>The houses are designed to build a loft as an extensions that should be done by the residents according to their needs.</p>	<p><b>Housing design:</b></p> <p>For our houses in Berjaya site in Camaman-an, we considered the design of single detached, due to the availability of funds from our donor.</p> <p>Unfortunately, we realized that the location of the houses in the hill is not appropriate, and the use of the land formerly was agriculture, this means that the soil is soft and this causes some cracks in the walls of the houses. However the preparation of the land was responsibility of the local government.</p>
<b>Construction:</b>	<b>Construction:</b>

<p>There was no participation of the beneficiaries during the construction or design, because they were unknown until they were allocated by the local government.</p> <p>In some cases they were involved in small construction activities, like cleaning, through sweat equity, but due to the urgency of housing and the pressure to finish it timely, we prioritized the progress of the construction.</p> <p><b>Technical Characteristics of the housing:</b>  Land area: 36.00 m2. (4.00x9.00m)  Floor area: 24.00 m2. (7.00x6.00m)</p> <p>The materials selection and the supply was done entirely locally, although the price of the materials were higher.</p> <p>The construction system was the conventional, using concrete hollow blocks for the walls, reinforced concrete for the structural elements, metal structure for the roof and galvanized layers.</p> <p>Both the design and the technical specifications were approved by the local government through the Office of Building Official.</p> <p>During the construction we had teams of 10 to 15 workers responsible to build one row (08 housing units).</p> <p>It took an average of 01 month per house.</p> <p>The expected lifespan of the houses is 15 to 20 years.</p> <p>The same houses were provided to beneficiaries with different needs and number of family members, we understand that eventually they will modify and extend the houses. However, we know that they are not allowed to build other structures in front of the house, although it is in the same lot provided, that is why we consider the construction of a loft as an acceptable modification of the provided house, but this has to be done by the residents according to their needs, we do not provide support for it.</p>	<p>The same model was applied in Berjaya for the construction of the houses, we hired skilled personnel, and the residents help in minimum tasks.</p> <p><b>Technical Characteristics of the housing:</b>  Land area: 49.00 m2. (7.00x7.00m)  Floor area: 25.00 m2. (5.00x5.00m)</p> <p>These considerations are similar to the houses in Calaanan.</p>
<p><b>Infrastructure and Services:</b></p>	<p><b>Infrastructure and Services:</b></p>

<p>The construction of access roads is responsibility of the LGU.</p> <p>For provision of drainage we included a septic tank for every two houses, then the canal from the septic tank for the public collector and the public lines are responsibility of the local government.</p> <p>For the water and electric lines, we coordinated with the LGU for communal connections, however for individual connections the arrangements have to be done by the residents, this causes different problems due to the sense of dependency from them.</p> <p>In GK houses in Calaanan, most of them already have individual connections of water and electricity, whereas there are still some that need to apply for these services.</p>	<p>This was the first housing project of GK in Cagayan de Oro after Sendong, we started the construction as soon as we could, although the coordination with the local government took long time.</p> <p>We realized that the way how the infrastructure was not the most appropriate, since the housing construction started just after the land preparation, and the infrastructure works started later or simultaneously with the houses.</p> <p>Consequently, when the beneficiaries were allocated they di not have water or electricity, and later they had communal supply of water, and had to apply for electric connections.</p>
<p><b>Post Occupancy:</b></p> <p>Unlike other NGOs or donors, we are permanently conducting activities with the community.</p> <p>We organize workshops and monitor the communities.</p> <p>We have different programs:</p> <ul style="list-style-type: none"> <li>• Health</li> <li>• Livelihood</li> <li>• Governance</li> <li>• Security</li> <li>• Environment</li> <li>• Mabuhay or welfare</li> </ul> <p>Besides the residents or community associations we have the local leaders that coordinate with us.</p>	<p><b>Post Occupancy:</b></p> <p>We have the same format for community empowerment and development.</p>

**Comments and Remarks:**

The major problems we identified in the community are:

- Cultural differences, the beneficiaries came from different areas, there are different religious beliefs and values.
- Personal Interests, the residents prioritize the personal needs and interest over the communal welfare.
- Livelihood, due to the location of the new settlements and the lack of skills of the beneficiaries, they have limited working opportunities, this enhances the feeling of dependency. This means that they still

consider themselves victims, and they wait for the support from the local government or other NGO instead of look for a job. We are trying to change this through values formation and the creation of new working alternatives for them in our communities.

## **HABITAT FOR HUMANITY PHILIPPINES CAGAYAN DE ORO**

**Interviewee:** Ms. Lerma Bernardette V. Reyes, Project Head Habitat for Humanity  
Philippines, Cagayan de Oro  
Eng. Eliezer Vicente Bañares, Designer and construction assessor HFH  
Philippines

**Date:** 16 and 31 July 2014

**Location:** Habitat for Humanity Office in Cagayan de Oro

### **BACKGROUND OF THE ORGANIZATION:**

Habitat for Humanity Philippines has been established in 1992. This is a non-governmental organization focused on shelter support to needed communities. HFH Philippines works extensively in social housing provision to low income sectors and post disaster shelter assistance to victims.

HFH Philippines provides support from early stages of the disaster response distributing housing repair kits and emergency shelter kits; and also provide permanent houses in relocation sites and repair damaged houses on site.

We coordinate with local and national governments; we are partners with different governmental agencies in the Philippines. Also we coordinate with national and local networks, like the Shelter Cluster and local inter agencies committees.

### **POST SENDONG SUPPORT:**

Habitat for Humanity has a long experience in social housing and post disaster housing assistance. We also have strategic partners and donors, for post Sendong response, the major private donor is San Miguel Corporation and from the national government the DSWD and on a smaller scale the National Housing Authority; later we extended this network to other private and religious organizations.

We provided initial shelter assistance and considered the long term support through the provision of permanent housing that finally resulted in the construction of housing in relocated sites assigned by the local government.

### **Coordination for the housing support:**

For housing assistance after Typhoon Sendong, we coordinated with the local government for the most appropriate support needed and with other organizations and governmental offices involved through LIAC (Local Inter Agencies Committee).

Also we are partners with the DSWD which provided funds for the housing construction in relocation sites in Cagayan de Oro.

The key coordination for the development of the housing projects was through LIAC for the assignment of the land in relocation sites, the building permits were issued by the local government, and the monitoring of the progress was done by the LGU, donor agencies (DSWD, NHA, private donors and others) and the technical supervision by HFH.

The projects were built by HFH directly and implementing partners, i.e. All Hands Volunteers, Oro Habitat, and local constructors.

**STAGES OF RELOCATION AND HOUSING CONSTRUCTION:**

<b>Planning:</b>	
<p>The survivors were informal settlers living in precarious housing in highly vulnerable areas besides the Cagayan River or in islands in the river, like Isla de Oro, that later the local government designed as No Built Zones.</p> <p>Then, the approach for provide permanent housing to affected communities was in relocation sites. The LGU used the land available purchased through the program of Land Banking by previous administrations.</p> <p>The LGU and LIAC determined the suitable areas and the NGOs that were going to build the houses.</p> <p>There were also private donors for the land, i.e. Xavier University which donated about 6ha. and later the catholic church and others.</p>	
<b>Beneficiaries selection:</b>	
<p>The responsibility to qualify beneficiaries and the location to be assigned was under the Estate Management Division Office, part of the Local Government. The beneficiaries had to fulfill with certain requirements. In case of Xavier Ecoville, besides of the qualification requirements from EMD, the residents of transitional housing built in the land lent by Xavier University located besides the permanent houses had the priority. For houses in relocation sites where the land was provided by the LGU the selection and allocation of beneficiaries were done by the offices of EMD from the local government in coordination with the DSWD Region 10.</p>	
<b>Comparison 02 sites:</b>	
<b>Site 01: Mahogany, Calaanan Site</b>	<b>Site 02: Xavier Ecoville, Lumbia</b>
<p><b>Housing design:</b></p> <p>The houses built in this community are the called “quadruplex” that is a building with gable roof divided in four housing units with the comfort rooms grouped in the middle.</p> <p>This design was adopted with the objective to maximize the land, as a suggestion of the chairman (the country vice president) of the Housing &amp; Urban</p>	<p><b>Housing design:</b></p> <p>The design adopted for the Xavier Ecoville is Row houses; this means that the housing units were built in blocks of 10 or more.</p> <p>The design was proposed by the local government, that later was submitted to the Office of Building Official for its approval and to the San Miguel corporation which is the funder of this project.</p>

<p>Development Coordinating Council; this is the umbrella agency that groups other governmental agencies working on housing in the country.</p> <p>This design was submitted to the local government for its approval and discussed in the LIAC meetings. Also it was submitted to the donor agencies (DSWD for other communities in Calaanan and San Miguel Corporation in case of Mahogany).</p> <p>We understand the advantages and the limitations of the provided housing. This design restricts future extensions by the beneficiaries, that although it is not allowed according to the conditions by the LGU it is necessary to develop their daily activities, like kitchen areas that have to be located outside the house because the residents use firewood procured from the surrounding trees for their called “dirty kitchens”.</p> <p>Definitely the decision was taken without consideration of the communities, this because of the urgency to act promptly, and the limited budget allocated for each housing unit that was PHP 110 000.</p>	<p>Also the representatives of Xavier University were permanently consulted about this, since this institution is the developer of the project and owner of the land, then responsible of the project.</p>
<p><b>Construction:</b></p> <p>HFH works with different implementing partners or contractors but also manages directly the construction.</p> <p>For the construction of houses in Mahogany, the construction partner was the NGO All Hands Volunteers, which is an international volunteer organization focused on post disaster assistance, and has a long relationship with HFH, from projects in Haiti, Japan and other.</p> <p>In the contract signed between AHV and HFH it was specified the budget provided through HFH, the specifications and the deadlines for the project completion. AHV hired skilled personnel and complemented the work with local and international volunteers, HFH supervised the progress and the quality of the construction.</p>	<p><b>Construction:</b></p> <p>For the construction HFH worked with local contractors, with supervision from the local office of HFH and from the Xavier University.</p> <p>The materials were purchased locally, through HFH that is certificated by the government with a tax deduction certificate, and then the materials can be purchased at lower prices.</p> <p>In both cases it is expected the construction of a loft according to the needs of the residents, this is not directly funded by HFH but we coordinate with the NGO Kagayan Evangelical Disaster Response Network (KEDRN) for the selection and prioritize of beneficiaries.</p> <p><b>Technical Characteristics of the housing:</b> Lot area: 29.60 m2. (4.00x7.40m)</p>

<p><b>Technical Characteristics of the housing:</b></p> <p>Lot area: 39.95 m2. (4.70x8.50m)</p> <p>Floor area: 21.00 m2. (3.50x6.00m)</p>	<p>Floor area: 24.80 m2. (4.00x6.20m)</p>
<p><b>Infrastructure and Services:</b></p> <p>The access roads from the city are built until the first phase of Calaanan Site but for Mahogany it haven't been built yet, this is responsibility of the LGU.</p> <p>For drainage and water supply, the houses have a septic tank that is shared every two houses, there is no connection to public drainage canals.</p> <p>There is no potable water available in the community, there is a communal well, and through an electric pump the residents can have water from a communal faucet.</p> <p>Another NGO provided tanks for rain water collection; every 02 houses share one tank.</p> <p>There are individual electrical connections to each house.</p>	<p><b>Infrastructure and Services:</b></p> <p>There are concrete built access roads.</p> <p>The houses have individual electric connections.</p> <p>The septic tanks have been provided, for individual water connections, the residents have to apply to the water district, this has to be done directly by each house, this is a problem since not all want to spend the fee.</p> <p>This evidences the sense of dependency within the beneficiaries.</p>
<p><b>Post Occupancy:</b></p> <p>HFH does not provide direct support to residents, however HFH coordinates with other NGOs and volunteer organizations for complementary assistance to the community.</p> <p>The LGU through EMD is responsible of monitoring the welfare and social problems in the community.</p>	<p><b>Post Occupancy:</b></p> <p>Xavier University is conducting different activities with the community, values formation and livelihood support projects.</p> <p>There are livelihood support facilities where is expected to train the residents in different skills such as bakery and supply the small shops in the site.</p>

**Comments and Remarks:**

So far there is no post occupancy evaluations in the relocation sites, however Xavier University is working actively in Xavier Ecoville, for the other relocation sites, the local government and the DSWD are the direct responsible to provide assistance and training to the community.

One of the major problems that we observed in the sites is the sense of dependency from the residents, and the consequent passive attitude waiting for external support.

## ORO HABITAT FOR HUMANITY CAGAYAN DE ORO

**Interviewee:** Ms. Mary L. Canencia, Program Coordinator Oro Habitat for Humanity

**Date:** 21 August 2014

**Location:** Oro Habitat for Humanity Office in Calaanan Site, Cagayan de Oro

### **BACKGROUND OF THE ORGANIZATION:**

Oro Habitat for Humanity is a local Non-profit organization working only in Cagayan de Oro, it is affiliated with Habitat for Humanity Philippines.

Oro Habitat started its operation in 2000 as an implementing partner of HFH Philippines, initially working in social housing (regular projects), where the beneficiaries are called partners because they have to contribute with the cost of the houses through regular payments.

For Post Sendong houses, Oro Habitat acted as a builder of HFH Philippines.

### **POST SENDONG SUPPORT:**

Habitat for Humanity Philippines involved different local NGOs and partners (builders) to construct houses.

### **Coordination for the housing support:**

The coordination was through the LIAC (Local inter Agency Committee) which decided the location of housing and allocation of NGOs.

The funds were received through Habitat for Humanity, the supervision of the construction progress and quality was done directly by Oro Habitat and Habitat for Humanity. HFH and OH signed an agreement where it is specified the budget, technical details and time schedule.

### **STAGES OF RELOCATION AND HOUSING CONSTRUCTION:**

<b>Planning:</b>
The construction of houses was decided to be in relocation sites due to the vulnerabilities in affected areas. This decision was taken in coordination with LIAC. The design of the housing was provided by HFH Philippines, and the technical staff of Oro Habitat is responsible to review and submit the documentation for the building permits.
<b>Beneficiaries selection:</b>
The beneficiaries were selected by the local government through the Estate Management Division office. The first priority were those people whose house were completely destroyed and the renters and sharers of the houses had second priority.
<b>Site: Oro Habitat Village Calaanan</b>

**Housing design:**

The houses built in this community are the called “row houses”, built in blocks on housing units. This design was adopted to maximize the use of the land and allocate a larger number of beneficiaries, in the first projects this was the priority over the local cultural factors and requirements of affected people. This design was submitted to the local government for its approval and discussed in the LIAC meetings.

**Construction:**

HFH works with different implementing partners or contractors but also manages directly the construction. Oro Habitat has acted as a contractor of Habitat for Humanity Philippines.

The beneficiaries were transferred in batches (groups), the total of 240 units in Calaanan, the last groups were transferred in the last quarter of 2013.

Oro Habitat is also in coordination with the Evangelical NGO KEDRN for the provision of funds and assistance for the lofts in the settlement.

**Technical Characteristics of the housing:**

Land area: 29.60 m<sup>2</sup>. (4.00x7.40m)

Floor area: 24.80 m<sup>2</sup>. (4.00x6.20m)

**Infrastructure and Services:**

The public lines of drainage have not been completed, although the septic tanks were provided.

The power supply in the settlement is partially completed, due to the problems with the budget and difficulties for individual application for the service to the power company.

For the individual connections the resident had to apply for it, most of the houses have already individual water connections.

**Post Occupancy:**

The LGU through EMD is responsible of monitoring the welfare and social problems in the community.

About the transfer of the property to the beneficiaries, it is not clear yet how and when this process will be done.

**Comments and Remarks:**

So far there is no post occupancy evaluations in the relocation sites, however Xavier University is working actively in Xavier Ecoville, for the other relocation sites, the local government and the DSWD are the direct responsible to provide assistance and training to the community.

One of the major problems that we observed in the sites is the sense of dependency from the residents, and the consequent passive attitude waiting for external support.



**Appendix 2 : Schedule of activities and questionnaire survey in Calaanan site**



**SCHEDULE OF ACTIVITIES AND QUESTIONNAIRE SURVEY IN CALAANAN:**

<b>DATE</b>	<b>ACTIVITIES</b>
August 04 <sup>th</sup> to 07 <sup>th</sup>	Preparation for questionnaire survey, coordination with EMD for support from assigned LGU workers in the site
August 07 <sup>th</sup>	Pre questionnaire survey in LGU built houses in Calaanan
August 08 <sup>th</sup>	Identification of households for questionnaire
August 11 <sup>th</sup>	Questionnaire Survey Mahogany
August 12 <sup>th</sup>	
August 13 <sup>th</sup>	
August 14 <sup>th</sup>	Questionnaire Survey GK Shell
August 15 <sup>th</sup>	
August 18 <sup>th</sup>	
August 19 <sup>th</sup>	Questionnaire Survey Filipino – Chinese Houses
August 20 <sup>th</sup>	
August 21 <sup>th</sup>	
August 22 <sup>th</sup>	Questionnaire Survey Oro Habitat
August 25 <sup>th</sup>	
August 26 <sup>th</sup>	
August 28 <sup>th</sup>	
	Leave Cagayan de Oro



Map of Calaanan and the Sites for Household Questionnaire



**Appendix 3 : Form Household questionnaire survey for living conditions  
and observation of safety of housing extensions**



**Questionnaire survey on Household living conditions in Relocated Sites and Physical Environment Safety in Calaanan, Cagayan de Oro, Philippines**

Site: HFH/GK/FCC/OH Number:.....
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This questionnaire aims to analyze the level of awareness about hazards by households in rebuilt and relocated settlements, how you participated in the housing planning and reconstruction and what is your current perception about the safety of your Barangay and your house. This questionnaire will finally provide information about your personal and communitarian understanding of your vulnerabilities and your capacities, and your involvement during reconstruction and how you and your community's opinions were considered.

All the information will be strictly used for academic purposes and kept confidential. Thank you very much for your cooperation.

*Sandra M. Carrasco M. PhD Candidate, Kyoto University  
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**A GENERAL INFORMATION**

**A.1 Demographics**

<b>A.2.1</b>	Respondant age		Respondant gender		Male		Female					
<b>A.2.2</b>	What is the gender of the head of the family?				Male		Female					
<b>A.2.3</b>	How many <b>family units</b> live in the house?											
<b>A.2.4</b>	Please Specify the <b>ages and number</b> of your household members											
	Under 3 yr		3-10 yr		11-20yr		21-39yr		40-60 yr		Over 60 yrs	
	F	M	F	M	F	M	F	M	F	M	F	M

**B COMMUNITY PERCEPTION OF SAFETY**

**B.1 VULNERABILITIES AND HOUSING SITUATION BEFORE SENDONG (WASHI)**

**B.1.1 Geographic Information**

Where did you live <u>BEFORE SENDONG</u> ? (Barangay, Area)

**B.1.2 What were Construction Materials of the Roof of your house?**

*Please mark with an "X" in the correspondent space, and if the option is not listed, please fill in "Other"*

Galvanized iron/aluminum .....	<input type="checkbox"/>	Cogon/nipa/anhaw.....	<input type="checkbox"/>
Half galvanized iron and half concrete.....	<input type="checkbox"/>	Makeshift/salvaged/improvised materials...	<input type="checkbox"/>
Wood .....	<input type="checkbox"/>	Others.....	<input type="checkbox"/>

**B.1.3 What were Construction Materials of the Outer Walls of your house?**

*Please mark with an "X" in the correspondent space*

Concrete/stone.....	<input type="checkbox"/>	Bamboo/sawali/cogon/nipa.....	<input type="checkbox"/>
Wood .....	<input type="checkbox"/>	Makeshift/salvaged/improvised materials..	<input type="checkbox"/>
Half concrete/stone and half wood.....	<input type="checkbox"/>	No walls.....	<input type="checkbox"/>

**B.1.4 What are the facilities you had BEFORE SENDONG and your CURRENT HOUSE?**

*Please mark with an "X" in the correspondent space, and if the option is not listed, please fill in "Others"*

	BEFORE SENDONG		IN RELOCATED HOUSING		Comments
	YES	NO	YES	NO	
<b>Drainage</b>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Drainage</b>	<input type="checkbox"/>	
<b>Water</b>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Water</b>	<input type="checkbox"/>	
<b>Electricity</b>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Electricity</b>	<input type="checkbox"/>	
<b>Other (specify)</b>			<b>Other (specify)</b>		

**B.1.5 What was your land tenure status?**

Please mark with an "X" in the correspondent space, and if the option is not listed, please fill in "Other"

- Own house and lot.....  Share house with relatives/friends.....   
 Rent house/room, including lot.....  Other (please specify) .....

**B.1.6 What was the damage of your house by Sendong?**

Please mark with an "X" in the correspondent space.

- Totally Destroyed  Major damage  Partial Damage  No damage

**B.1.7 Do you think you were exposed to hazards BEFORE SENDONG?**

Potential Disasters	What kind of disasters do you think you were exposed? (Write an "X" in all that apply)	How would you rate the frequency of this occurrence? (Rate 3=High, 2=medium, 1=low)	How would you rate the difficulty to coping with this hazard for your household? (Rate 3=High, 2=medium, 1=low)	How would you rate the degree of negative impact of this hazard on your household? (Rate 3=High, 2=medium, 1=low)	How would you rate the difficulty to cope with this disaster for your family? (Rate 3=High, 2=medium, 1=low)
Tropical Storm	<input type="checkbox"/>				
Flood	<input type="checkbox"/>				
Earthquake	<input type="checkbox"/>				
Fire	<input type="checkbox"/>				
Landslide	<input type="checkbox"/>				
Other (specify)	<input type="checkbox"/>				

**B.2 CURRENT VULNERABILITIES AND HOUSING SITUATION**

**B.2.1 When did you move to this settlement (Barangay)?**

Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_

**B.2.2 Have you being living here permanently?**

Yes  No

If NO please explain why?  
 .....

**B.2.3 Did you go back to your former home?**

Yes  No

If YES please explain why?  
 .....

**B.2.4 What kind of hazards do you think you are exposed AFTER SENDONG?**

Potential Disasters	What kind of disasters do you think you were exposed? (Write an "X" in all that apply)	How would you rate the frequency of this occurrence? (Rate 3=High, 2=medium, 1=low)	How would you rate the difficulty to coping with this hazard for your household? (Rate 3=High, 2=medium, 1=low)	How would you rate the degree of negative impact of this hazard on your household? (Rate 3=High, 2=medium, 1=low)	How would you rate the difficulty to cope with this disaster for your family? (Rate 3=High, 2=medium, 1=low)
Tropical Storm	<input type="checkbox"/>				
Flood	<input type="checkbox"/>				
Earthquake	<input type="checkbox"/>				
Fire	<input type="checkbox"/>				
Landslide	<input type="checkbox"/>				
Other (specify)	<input type="checkbox"/>				

**C. HOUSING AND LIVELIHOOD**

**C.1 PRESENT HOUSEHOLD SITUATION**

**C.1.1 At present what is your household’s overall situation COMPARED WITH BEFORE THE TYPHOON SENDONG?**

Please mark with an “X” in the correspondent space.

	Better	Same	Worse	Don’t know
Economic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Education	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Housing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Barangay environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**C.1.2 Satisfaction about settlements and houses**

Please mark with an “X” in the correspondent space

Features	Satisfied	Indifferent	Non Satisfied	No Answer
Location of the site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Size of the plot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Size of the house	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strength of the house	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thermal Comfort (is the house hot?)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acoustic Comfort (privacy)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality of construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fulfil your needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**REMARKS / COMMENTS** (i.e. why it is inconvenient the location of the site, the building looks to be fragile, etc)

.....

.....

.....

.....

.....

**D. HOUSING SAFETY SURVEY**

**D.1 DIRECT OBSERVATION OF THE EXTENSIONS AND MODIFICATIONS BUILT BY THE RESIDENTS**

**D.1.1 Classification of the extension**

Permanent  Temporary

**D.1.2 Location of the extension**

Front of the house  Back  Outside of the lot  Other .....

**D.1.3 Use of the extension**

Kitchen  Shop  Rest Area  Loft  Annexed house  Other .....

**D.1.4 Reason/motivation for extension**

.....

**D.1.5 Who provided the Funds for the construction?**

Household  Same NGO that built the house  Other NGO  Other .....

**D.1.6 Time of construction**

When was the extension built.....  
How long did it take.....

**D.2 MATERIALS OF EXTENSIONS**

**D.2.1 Walls**

Concrete block.....  Bamboo/sawali/cogon/nipa.....   
Wood.....  Makeshift/salvaged/improvised materials.....   
Half concrete and half wood.....  No walls.....

**D.2.2 Columns and Beams**

Concrete and steel bars.....  Half concrete and half wood.....   
Wood (coconut lumber/other).....  No structural elements.....

**D.2.3 Foundation**

Concrete and steel bars.....  Concrete and stones.....  Unknown or no foundation.....

**D.2.4 Roof**

Galvanized iron/aluminum.....  Cogon/nipa/anahaw.....   
Half galvanized iron and half concrete.....  Makeshift/salvaged/improvised materials...   
Wood.....  Others.....

**D.3 SEISMIC SAFETY CONSTRUCTION OF EXTENSIONS:**

**D.3.1 Who built the extensions?**

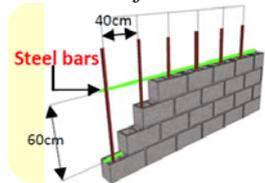
Self-construction  Mason  Carpenter  Other.....

**D.3.2 Attachment to the main building (connections to the core house)**

Rebar  None  Unknown

**D.3.3 Are steel bars of standard size and spacing used in walls ?**

*This checks if standard size and spacing of steel bars were used as reinforcement.*



YES (10mm diameter, tied and spaced correctly)   
NO, fewer and smaller than 10mm.   
None or unknown.

**D.4 TYPHOON SAFETY CONSTRUCTION**

*The following questions are about house wind-resistant performance/*

**D.4.1 What is the interval between fasteners? (If the intervals for two directions, i.e. perpendicular and parallel to roof edge, are different, larger one.)**

Less than 30cm  Between 30cm and 60cm  More than 60cm

**D.4.2 How is roof structure connected to wall or column?**

Rebar in effect  Nails  Others or unknown

**D.4.3 How is wall connected to foundation?**

Rebar in effect  Nails  Unknown

**D.4.4 How wide is eave?**

Less than 30cm  Between 30cm and 60cm  More than 60cm

+++Thank you very much for your cooperation+++



**Appendix 4 : Data obtained about general information of residents and demographics**



## A. General information

### A.1 Demographics

A.2.1 Table 1: Respondent age and gender

Ages	Number	%	F	M
10 - 20	5	2%		
20 - 30	54	21%		
30 - 40	60	24%	78	176
40 - 50	61	24%		
50 - 60	43	17%		
60 +	31	12%		
<b>Total</b>	<b>254</b>	<b>100%</b>	<b>254</b>	

A.2.2 Table 2: Gender of the head of the family?

	Gender	
	M	F
<b>Number</b>	200	54
<b>%</b>	79%	21%

A.2.3 Table 3: Number of family units in the house

N° families	households	%
1	235	92%
2	20	8%
<b>Total</b>	<b>255</b>	<b>100%</b>

A.2.4 Table 4: Ages and number of your household members

Age group	Village 1		Village 2		Village 3		Village 4		All villages	
	No of family members	%	Number of family members	%						
1 to 3	6	10%	25	37%	25	39%	15	23%	71	28%
4 to 6	37	63%	26	39%	28	44%	38	59%	129	51%
7 to 10	12	20%	16	24%	11	17%	10	16%	49	19%
More than 10	4	7%	0	0%	0	0%	1	2%	5	2%
<b>Total</b>	<b>59</b>	<b>100%</b>	<b>67</b>	<b>100%</b>	<b>64</b>	<b>100%</b>	<b>64</b>	<b>100%</b>	<b>254</b>	<b>100%</b>



**Appendix 5 : Data obtained about residents' perception about their pre- and post-disaster housing conditions and livelihood**



## B Community Perception of Safety

### B.1 Vulnerabilities and Housing Situation Before Sendong (Washi)

B.1.1 Table 1: Location of house before the disaster

Location of former house	Village 1	Village 2	Village 3	Village 4	Total per barangay	
					Number	Percentage
Isla de Oro	9	19	9	19	56	22.05%
Barangay Carmen	22	22	18	22	84	33.07%
Barangay Macasandig	10	4	10	4	28	11.02%
Barangay Balulang	2	2	0	9	13	5.12%
Barangay Kauswagan	1	0	3	1	5	1.97%
Barangay Canitoan	1	2	8	5	16	6.30%
Barangay Puntod	4	10	10	0	24	9.45%
Barangay Consolacion	2	2	3	0	7	2.76%
Barangay Macabalan	4	6	1	2	13	5.12%
Barangay Bonbon	0	0	1	0	1	0.39%
Barangay Tablon	1	0	1	1	3	1.18%
Barangay Agusan	1	0	0	0	1	0.39%
Barangay Cugman	2	0	0	1	3	1.18%
<b>Total household per village</b>	<b>59</b>	<b>67</b>	<b>64</b>	<b>64</b>	<b>254</b>	<b>100.00%</b>

### B.1.2 What were Construction Materials of the Outer Walls of your house?

Village	Concrete/stone		Mixed wood - concrete/stone		Mixed wood - locally available materials		Mixed wood makeshift/improvised materials	
	No	%	No	%	No	%	No	%
Village 1	0	0%	10	17%	35	59%	14	24%
Village 2	2	3%	10	15%	31	46%	24	36%
Village 3	2	3%	23	36%	8	13%	31	48%
Village 4	4	6%	13	20%	13	20%	34	53%
Total	8	3%	56	22%	87	34%	103	41%

### B.1.3 What were Construction Materials of the Roof of your house?

Village	Wood - galvanized iron / aluminium		Mixed galvanized and concrete		Mixed wood - locally available materials		Mixed wood - makeshift/improvised	
	No	%	No	%	No	%	No	%
Village 1	34	58%	5	8%	3	5%	17	29%
Village 2	22	33%	2	3%	16	24%	27	40%
Village 3	18	28%	1	2%	9	14%	36	56%
Village 4	12	19%	8	13%	2	3%	42	66%
Total	86	34%	16	6%	30	12%	122	48%

**B.1.4 What were the facilities you had BEFORE SENDONG and now in your CURRENT HOUSE?**

Village	Facilities supply	Former house				Relocation site			
		YES		NO		YES		NO	
		No	%	No	%	No	%	No	%
Village 1	Drainage	31	53%	28	47%	59	100%	0	0%
	Water	49	83%	10	17%	59	100%	0	0%
	Electricity	47	80%	12	20%	47	80%	12	20%
Village 2	Drainage	35	52%	32	48%	67	100%	0	0%
	Water	44	66%	23	34%	67	100%	0	0%
	Electricity	46	69%	21	31%	60	90%	7	10%
Village 3	Drainage	31	48%	33	52%	64	100%	0	0%
	Water	49	77%	15	23%	64	100%	0	0%
	Electricity	53	83%	11	17%	62	97%	2	3%
Village 4	Drainage	29	45%	35	55%	13	20%	51	80%
	Water	49	77%	15	23%	23	36%	41	64%
	Electricity	51	80%	13	20%	19	30%	45	70%

**B.1.5 What was your land tenure status?**

Village	TYPES	No	%
Village 1	Own house (in public land)	33	56%
	Rent	16	27%
	Share house (relatives or friends)	10	17%
Village 2	Own house (in public land)	47	70%
	Rent	14	21%
	Share house (relatives or friends)	6	9%
Village 3	Own house (in public land)	48	75%
	Rent	8	13%
	Share house (relatives or friends)	8	13%
Village 4	Own house (in public land)	55	86%
	Rent	6	9%
	Share house (relatives or friends)	3	5%

### B.1.6 What was the damage of your house by Washi (Sendong)?

Village	Damage level	No	%
Village 1	Totally destroyed	52	88%
	Major damage	6	10%
	Partial damage	1	2%
	No damage	0	0%
Village 2	Totally destroyed	62	93%
	Major damage	3	4%
	Partial damage	2	3%
	No damage	0	0%
Village 3	Totally destroyed	63	98%
	Major damage	0	0%
	Partial damage	1	2%
	No damage	0	0%
Village 4	Totally destroyed	57	89%
	Major damage	2	3%
	Partial damage	5	8%
	No damage	0	0%

## C. HOUSING AND LIVELIHOOD

### C.1 Present household situation

#### C.1.1 At present what is your household's overall situation compared with that before the Typhoon Washi(Sendong)?

#### Ranking per village: Residents' perception of their pre- and post-disaster housing and socioeconomic situation

Indicators	Village 1	Village 2	Village 3	Village 4	Average per indicator
1) Housing	0.69	0.39	0.70	0.83	<b>0.66</b>
2) Neighborhood environment	0.71	0.68	0.73	0.77	<b>0.72</b>
3) Community life	0.67	0.63	0.73	0.83	<b>0.71</b>
4) Security	0.72	0.37	0.64	0.85	<b>0.64</b>
5) Economic situation	0.25	-0.04	0.59	0.37	<b>0.29</b>
6) Health	0.46	0.59	0.72	0.81	<b>0.64</b>
7) Education	0.37	0.49	0.69	0.79	<b>0.58</b>
<b>Average per village</b>	<b>0.55</b>	<b>0.44</b>	<b>0.68</b>	<b>0.75</b>	

Ranking criteria: Satisfied (+1), Indifferent (0), Non satisfied (-1), No response ---

1) Housing					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	43	43	47	54
	Indifferent	14	6	8	2
	Non satisfied	2	17	5	4
	No response	0	1	4	4
Scoring	Satisfied (+1)	43	43	47	54
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-2	-17	-5	-4
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.69</b>	<b>0.39</b>	<b>0.70</b>	<b>0.83</b>

2) Neighborhood (village) environment					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	41	52	47	51
	Indifferent	14	5	13	4
	Non satisfied	1	8	2	5
	No response	3	2	2	4
Scoring	Satisfied (+1)	41	52	47	51
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-1	-8	-2	-5
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.71</b>	<b>0.68</b>	<b>0.73</b>	<b>0.77</b>

3) Community life					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	41	52	47	52
	Indifferent	13	5	15	4
	Non satisfied	3	10	1	3
	No response	2	0	1	5
Scoring	Satisfied (+1)	41	52	47	52
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-3	-10	-1	-3
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.67</b>	<b>0.63</b>	<b>0.73</b>	<b>0.83</b>

4) Security					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	43	32	36	41
	Indifferent	12	7	10	3
	Non satisfied	2	13	4	2
	No response	2	15	14	18
Scoring	Satisfied (+1)	43	32	36	41
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-2	-13	-4	-2
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.72</b>	<b>0.37</b>	<b>0.64</b>	<b>0.85</b>

5) Economic situation					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	30	30	43	41
	Indifferent	11	4	14	3
	Non satisfied	16	33	6	18
	No response	2	0	1	2
Scoring	Satisfied (+1)	30	30	43	41
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-16	-33	-6	-18
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.25</b>	<b>-0.04</b>	<b>0.59</b>	<b>0.37</b>

6) Health					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	34	50	48	54
	Indifferent	11	5	14	4
	Non satisfied	9	11	2	4
	No response	5	1	0	2
Scoring	Satisfied (+1)	34	50	48	54
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-9	-11	-2	-4
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.46</b>	<b>0.59</b>	<b>0.72</b>	<b>0.81</b>

7) Education					
Criteria		Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	31	42	44	50
	Indifferent	9	4	10	2
	Non satisfied	12	13	4	5
	No response	7	8	6	7
Scoring	Satisfied (+1)	31	42	44	50
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-12	-13	-4	-5
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.37</b>	<b>0.49</b>	<b>0.69</b>	<b>0.79</b>

### C.1.2 What is your usual income source activity (job)?

Current occupation										
Occupation	Village 1		Village 2		Village 3		Village 4		Total	
	No	%	No	%	No	%	No	%	No	%
Local Business	6	10%	14	21%	5	8%	2	3%	27	11%
Hawker	4	7%	3	4%	1	2%	5	8%	13	5%
Labour	19	32%	18	27%	20	31%	10	16%	67	26%
Construction	10	17%	3	4%	7	11%	5	8%	25	10%
Unemployed	3	5%	12	18%	11	17%	21	33%	47	19%
Driver	9	15%	4	6%	6	9%	9	14%	28	11%
Other	8	14%	13	19%	14	22%	12	19%	47	19%
<b>Total per village</b>	<b>59</b>	<b>100%</b>	<b>67</b>	<b>100%</b>	<b>64</b>	<b>100%</b>	<b>64</b>	<b>100%</b>	<b>254</b>	<b>100%</b>

### C.1.3 What is your average daily family income?

Village	Average family income		
	Low Php 0 to 100	Medium Php 101 to 200	High Php 200 +
Village 1	7	16	36
Village 2	21	11	35
Village 3	13	15	36
Village 4	21	2	41
<b>Total</b>	<b>62</b>	<b>44</b>	<b>148</b>

### C.1.4 Satisfaction about settlements and houses

**Ranking per village: Residents' satisfaction with present housing situation**

Indicators	Village 1	Village 2	Village 3	Village 4	Average per indicator
1) Location of the settlement	0.85	0.75	0.84	0.87	<b>0.83</b>
2) Size of the lot	0.85	0.75	0.84	0.87	<b>0.83</b>
3) Size of the house	0.78	0.39	0.73	0.74	<b>0.66</b>
4) Strength of the house	0.91	0.12	0.59	0.77	<b>0.60</b>
5) Quality of construction	0.95	0.09	0.58	0.56	<b>0.55</b>
6) Thermal comfort	0.45	-0.15	0.54	0.43	<b>0.32</b>
7) Acoustic comfort and privacy	0.69	0.05	0.64	0.79	<b>0.54</b>
8) Housing functionality	0.37	0.14	0.80	0.71	<b>0.50</b>
<b>Average per village</b>	<b>0.71</b>	<b>0.20</b>	<b>0.67</b>	<b>0.70</b>	

Ranking criteria: Satisfied (+1), Indifferent (0), Non satisfied (-1), No response ---

1) Location of the settlement					
Criteria		Village 1	Village 2	Village 3	Village 4
<b>No Household</b>	Satisfied	51	58	57	56
	Indifferent	7	1	4	0
	Non satisfied	1	8	3	4
	No response	0	0	0	4
<b>Scoring</b>	Satisfied (+1)	51	58	57	56
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-1	-8	-3	-4
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.85</b>	<b>0.75</b>	<b>0.84</b>	<b>0.87</b>

2) Size of the lot					
Criteria		Village 1	Village 2	Village 3	Village 4
<b>No Household</b>	Satisfied	49	52	55	54
	Indifferent	8	2	2	2
	Non satisfied	1	12	7	5
	No response	1	1	0	3
<b>Scoring</b>	Satisfied (+1)	49	52	55	54
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-1	-12	-7	-5
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.83</b>	<b>0.61</b>	<b>0.75</b>	<b>0.80</b>

3) Size of the house					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	45	45	55	54
	Indifferent	13	3	1	0
	Non satisfied	0	19	8	8
	No response	1	0	0	2
Scoring	Satisfied (+1)	45	45	55	54
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	0	-19	-8	-8
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.78</b>	<b>0.39</b>	<b>0.73</b>	<b>0.74</b>

4) Strength of the house					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	52	36	49	54
	Indifferent	5	2	2	0
	Non satisfied	0	28	12	7
	No response	2	1	1	3
Scoring	Satisfied (+1)	52	36	49	54
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	0	-28	-12	-7
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.91</b>	<b>0.12</b>	<b>0.59</b>	<b>0.77</b>

5) Quality of construction					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	55	35	50	47
	Indifferent	3	2	1	3
	Non satisfied	0	29	13	12
	No response	1	1	0	2
Scoring	Satisfied (+1)	55	35	50	47
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	0	-29	-13	-12
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.95</b>	<b>0.09</b>	<b>0.58</b>	<b>0.56</b>

6) Thermal comfort					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	29	27	46	43
	Indifferent	23	3	5	1
	Non satisfied	4	37	12	17
	No response	3	0	1	3
Scoring	Satisfied (+1)	29	27	46	43
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-4	-37	-12	-17
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.45</b>	<b>-0.15</b>	<b>0.54</b>	<b>0.43</b>

7) Acoustic comfort and privacy					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	43	33	52	54
	Indifferent	12	2	1	1
	Non satisfied	3	30	11	6
	No response	1	2	0	3
Scoring	Satisfied (+1)	43	33	52	54
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-3	-30	-11	-6
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.69</b>	<b>0.05</b>	<b>0.64</b>	<b>0.79</b>

8) Fulfills your needs					
	Criteria	Village 1	Village 2	Village 3	Village 4
No Household	Satisfied	33	32	54	41
	Indifferent	5	2	7	0
	Non satisfied	14	24	3	7
	No response	7	9	0	16
Scoring	Satisfied (+1)	33	32	54	41
	Indifferent (0)	0	0	0	0
	Non satisfied (-1)	-14	-24	-3	-7
	No response ---	--	--	--	--
	<b>Total rank</b>	<b>0.37</b>	<b>0.14</b>	<b>0.80</b>	<b>0.71</b>



**Appendix 6 : Data obtained about direct observation of the extensions and modifications built by the residents**



## D.2 MATERIALS OF EXTENSIONS OR MODIFICATIONS OF CORE HOUSES

### D.2.1 Walls

Walls of Precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Concrete block	0	0%	0	0%	0	0%	0	0
Mixed wood/concrete	0	0%	2	9%	0	0%	1	1
Wood	4	13%	1	4%	0	0%	5	5
Traditional materials	23	74%	16	70%	8	80%	14	14
Makeshift/improvised	2	6%	2	9%	2	20%	8	8
No walls	2	6%	2	9%	0	0%	3	3

Walls of durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Concrete block	9	100%	8	57%	9	82%	8	67%
Mixed wood/concrete	0	0%	6	43%	1	9%	2	17%
Wood	0	0%	0	0%	1	9%	2	17%
Traditional materials	0	0%	0	0%	0	0%	0	0%
Makeshift/improvised	0	0%	0	0%	0	0%	0	0%
No walls	0	0%	0	0%	0	0%	0	0%

### D.2.2 Columns and Beams

Columns and beams in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Concrete and steel bars	0	0%	0	0%	0	0%	0	0%
Half concrete and half wood	0	0%	0	0%	0	0%	0	0%
Wood (coconut lumber/other)	28	90%	15	65%	9	90%	25	83%
No structural elements	3	10%	8	35%	1	10%	5	17%

Columns and beams in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Concrete and steel bars	3	33%	1	7%	0	0%	4	33%
Half concrete and half wood	0	0%	0	0%	0	0%	0	0%
Wood (coconut lumber/other)	0	0%	5	36%	1	9%	4	33%
No structural elements	6	67%	8	57%	10	91%	4	33%

### D.2.3 Foundations

Foundations in Precarious Extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Concrete and steel bars	0	0%	0	0%	0	0%	0	0%
Concrete and stones	0	0%	0	0%	0	0%	0	0%
Unknown or no foundation	31	100%	22	100%	10	100%	31	100%

Foundations in Durable Extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Concrete and steel bars	2	22%	1	7%	0	0%	3	25%
Concrete and stones	0	0%	0	0%	0	0%	0	0%
Unknown or no foundation	7	78%	13	93%	11	100%	9	75%

### D.2.4 Roof

Roof in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Galvanized iron and concrete	0	0%	0	0%	0	0%	1	3%
Galvanized iron and wood rafters	30	97%	17	74%	8	80%	27	87%
Traditional materials	0	0%	1	4%	0	0%	0	0%
Makeshift/improvised	1	3%	5	22%	2	20%	3	10%

Roof in durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Galvanized iron and concrete	0	0%	1	7%	0	0%	0	0%
Galvanized iron and wood rafters	7	78%	12	86%	9	82%	10	83%
Traditional materials	0	0%	0	0%	1	9%	0	0%
Makeshift/improvised	2	22%	1	7%	1	9%	2	17%

### D.3 SEISMIC SAFETY CONSTRUCTION OF EXTENSIONS:

#### D.3.1 Who built the extensions?

Builder of precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Self-construction	28	90%	23	100%	9	90%	30	97%
Mason/ Carpenter	3	10%	0	0%	1	10%	1	3%
NGO staff	0	0%	0	0%	0	0%	0	0%

Builder of durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Self-construction	4	44%	9	64%	6	55%	8	67%
Mason/ Carpenter	5	56%	5	36%	5	45%	4	33%
NGO staff	0	0%	0	0%	0	0%	0	0%

#### D.3.2 Attachment to the main building (connections to the core house)

Attachment to the main building in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Rebar	2	6%	0	0%	0	0%	2	6%
Nails	14	45%	11	48%	3	30%	9	29%
None or Unknown	15	48%	12	52%	7	70%	20	65%

Attachment to the main building in durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Rebar	4	44%	0	0%	4	36%	7	58%
Nails	0	0%	2	14%	0	0%	1	8%
None or Unknown	5	56%	12	86%	7	64%	4	33%

#### D.3.3 Are steel bars of standard size and spacing used in walls ?

Proper steel bars size and spacing walls in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
YES (10mm diameter, tied and spaced correctly)	0	0%	0	0%	0	0%	0	0%
NO, fewer and smaller than 10mm.	0	0%	0	0%	0	0%	0	0%
None or unknown	31	100%	23	100%	10	100%	31	100%

Proper steel bars size and spacing walls in durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
YES (10mm diameter, tied and spaced correctly)	3	33%	2	14%	2	18%	5	42%
NO, fewer and smaller than 10mm.	5	56%	6	43%	4	36%	1	8%
None or unknown	1	11%	6	43%	5	45%	6	50%

#### D.4 TYPHOON SAFETY CONSTRUCTION

D.4.1 What is the interval between fasteners? (If the intervals for two directions, i.e. perpendicular and parallel to roof edge, are different, larger one.)

Interval between fasteners in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Less than 30cm	2	6%	0	0%	0	0%	0	0%
Between 30cm and 60cm	18	58%	14	61%	3	30%	11	35%
More than 60cm	11	35%	9	39%	7	70%	20	65%

Interval between fasteners in durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Less than 30cm	0	0%	0	0%	0	0%	0	0%
Between 30cm and 60cm	7	78%	9	64%	4	36%	7	58%
More than 60cm	2	22%	5	36%	7	64%	5	42%

D.4.2 How is roof structure connected to wall or column?

Connection of roof and wall or column in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Rebar in effect	1	3%	1	4%	0	0%	0	0%
Nails	28	90%	17	74%	9	90%	27	87%
Others or unknown	2	6%	5	22%	1	10%	4	13%

Connection of roof and wall or column in durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Rebar in effect	4	44%	6	43%	1	9%	2	17%
Nails	3	33%	6	43%	6	55%	6	50%
Others or unknown	2	22%	2	14%	4	36%	4	33%

#### D.4.3 How is wall connected to foundation?

Connection of wall and foundation in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Rebar in effect	0	0%	0	0%	0	0%	0	0%
Nails	6	19%	0	0%	0	0%	0	0%
Others or unknown	25	81%	23	100%	10	100%	31	100%

Connection of wall and foundation in durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Rebar in effect	0	0%	0	0%	0	0%	0	0%
Nails	0	0%	0	0%	0	0%	0	0%
Others or unknown	9	100%	14	100%	11	100%	12	100%

#### D.4.4 How wide is eave?

Roof eave width in precarious extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Less than 30cm	3	10%	2	9%	1	10%	3	10%
Between 30cm and 60cm	24	77%	17	74%	8	80%	25	81%
More than 60cm	4	13%	4	17%	1	10%	3	10%

Roof eave width in durable extensions								
	Village 1		Village 2		Village 3		Village 4	
	No	%	No	%	No	%	No	%
Less than 30cm	2	22%	0	0%	1	9%	1	8%
Between 30cm and 60cm	6	67%	11	79%	6	55%	7	58%
More than 60cm	1	11%	3	21%	4	36%	4	33%