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Doctoral Dissertation

A Study on Resilience in a Community-led In-city Resettlement Project: Insights from the Manggahan Low Rise Building Project in Pasig City, Metro Manila, Philippines

コミュニティ主導による都市内住宅移転事業におけるレジリエンスに関する研究：
フィリピン、マニラ首都圏パシッグ市におけるマンガハン低層住宅整備事業からの洞察

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June 2023

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Abstract

Metro Manila, a megacity with a population of more than 13 million, continues towards a trend of rapid population growth resulting to increasing informality due to housing shortages and inequality. As a result, marginalized communities such as informal settler families (ISFs) have been forced to inhabit areas with a high degree of exposure to natural hazards. This coupled with increasing disaster risks brought on by climate change presents a major challenge in achieving Goal 11 of the UN's SDGs which pursues the aim of "making cities and human settlements inclusive, safe, resilient, and sustainable".

This dissertation investigates the multifaceted concept of resilience in three scales: city scale, community scale, and household scale. It also explores the interconnectedness of resilience dimensions across the macro (city), meso (community), and micro (household) scales.

At the macro-scale, the research shows that Metro Manila cities exhibit urban resilience through strengths shown in governance, risk identification, financial considerations, societal capacity, and preparation and response. At the meso and micro scales, the study was conducted in the context of the Manggahan Low Rise Building Project, an in-city resettlement of informal settler families facilitated through a community-led approach called the People's Plan. This community-led process is supported by a local NGO, Community Organizers Multiversity (COM) which is one of its main proponents and community partners. Analysis reveals that resilience at the community level was strongly influenced by the scale and mental outlook attributes. This underscores the importance of social capital built through bridging networks in building capacities of communities. This highlights the need to not only invest in physical infrastructure but also to foster collaboration and strong partnerships with communities to provide opportunities for exchanges of ideas, expertise, and resources which can be leveraged during crisis situations. A positive mental outlook also presents great potential in contributing to community resilience. Finally, the results also reveal that redundancy and equality merit particular attention. In this regard, a review of the participatory processes involved in the implementation of the People's Plan requires further study.

Fieldwork based on observations made on public, semi-private, and private spaces in the community also yielded insights on resilient strategies of the community through their efforts at improving and developing urban greenery, spatial utilization, and housing unit modifications.

The study concludes with showing how urban resilience measures affect resilience at the community level and how the community-led approach of the People's Plan empowered the residents of the Manggahan Low-rise Building Project to facilitate resilient outcomes in their community amidst the challenges of the COVID-19 pandemic. The findings could be used as entry points into analyzing the dynamics of resilience across multiple scales and how it can inform future development and improvement of the implementation of community-led processes such as the People's Plan and ensure more inclusive and resilient futures for the urban poor.

Acknowledgements

This dissertation serves as the capstone of a PhD journey spanning over three challenging years through a global pandemic. Through it all I would not have reached this milestone without the support of many.

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List of Abbreviations

APOAMF   Alliance of People's Organizations Along Manggahan Floodway

CMP   Community Mortgage Program

COM   Community Organizers Multiversity

DRR   Disaster Risk Reduction

EFA   Elementary Factor Analysis

EWS   Early Warning System

IPCC   Intergovernmental Panel on Climate Change

ISF   Informal Settler Family

LDRRMP   Local Disaster Risk Reduction and Management Plan

NEDA   National Economic and Development Authority

NGO   Non-governmental Organization

NHA   National Housing Authority

PO   People's Organization

PPP   Public Private Partnership

UNDRR   United Nations Office for Disaster Risk Reduction

USD   U.S. Dollar

CHAPTER 1

Introduction

1.1 Background

A United Nations study in 2018 projected that urbanization worldwide will increase in the near future with 68% of the world's population (around 6.7 billion people) expected to live in urban centers (UN DESA, 2019). The accelerated rate of growth is expected to come from less developed regions while more developed regions will follow a flat and steady rate of increase (Figure 1.1).
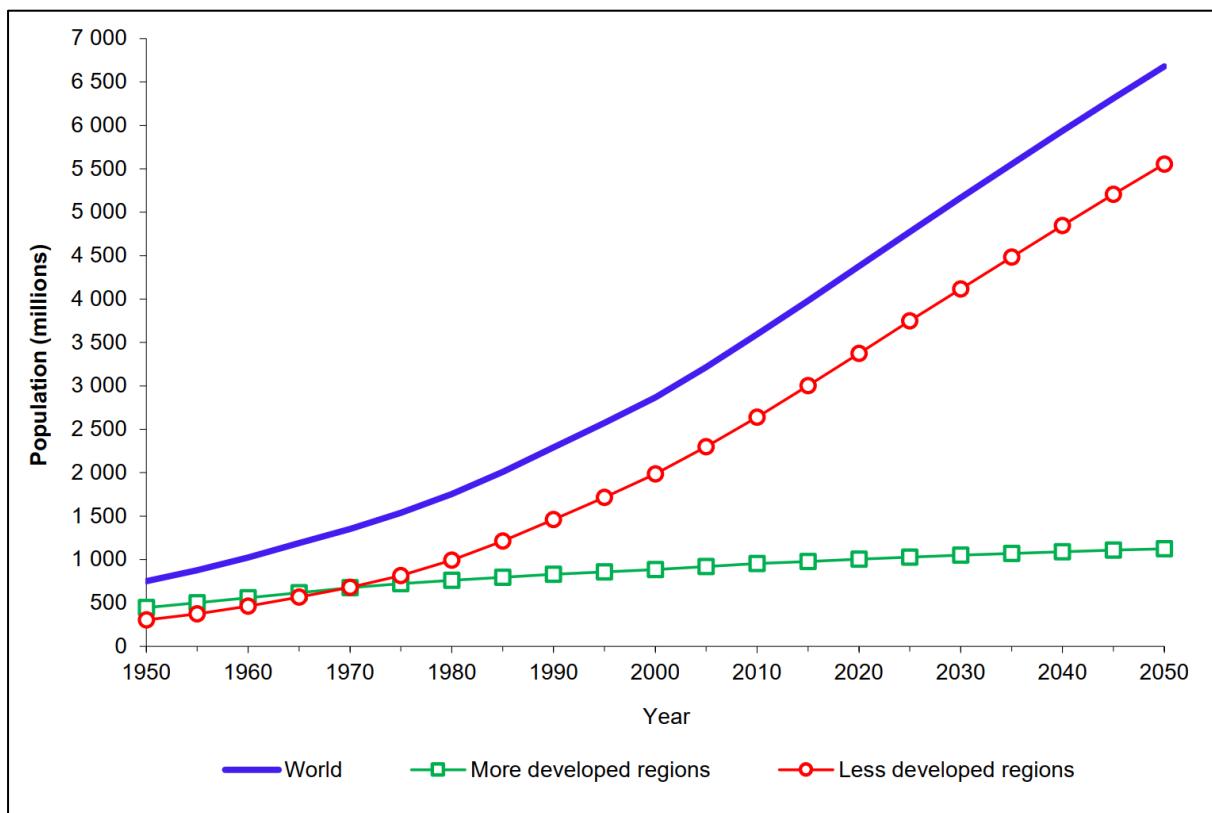
Figure 1.1 Worldwide urban population growth from 1950-2050 (Source: UN DESA, 2019)

The accelerated rate of urbanization in less developed regions has been observed in the Philippines, where over a short period from 2000 to 2010, the yearly rate of increase in the population of urban areas (3.3 percent) increased at a faster pace compared to neighboring East Asia (3.0 percent) (World Bank, 2017) (See Table 1.1).   Following this trajectory, by 2050, the Philippines will have more than 65 percent of its population, or close to 102 million people living in cities (World Bank, 2017).

Table 1.1 Urban growth in the Philippines compared to East Asia (World Bank, 2017)

Population Size Category (millions)	Philippines – Urban Population (millions)				East Asia – Urban Population (millions)			
	Number of Urban Areas	2000	2010	Ave. Annual Expansion Rate	Number of Urban Areas	2000	2010	Ave. Annual Expansion Rate
10 or more	1	12.20	16.52	3.1%	8	132.72	182.58	3.2%
5-10	0	-	-	-	17	88.98	119.83	3.0%
1-5	1	1.01	1.53	4.1%	106	154.65	211.89	3.2%
0.5-1	3	1.37	2.05	5.1%	166	88.93	117.44	2.8%
0.1 – 0.5	16	2.24	3.18	3.6%	572	114.05	145.78	2.5%
Total	**21**	**16.83**	**23.28**	**3.3%**	**869**	**579.33**	**777.51**	**3.0%**

This rapid growth unfortunately has also been marked by inequality. Poorer households have been found to score significantly worse on the housing inequality index in the Philippines among other Asian countries (Figure 1.2). There is a significant inequality in housing quality in countries such as Bangladesh, India, Nepal, and the Philippines (Finger et al., 2022).

Figure 1.2 Housing inadequacy in countries across income levels (Source: Finger et al., 2022)

Inequality in housing quality is also reflected in the proportion of urban population living in slums. In 2018, more than a billion people were estimated to be living in slums worldwide (Figure 1.3).
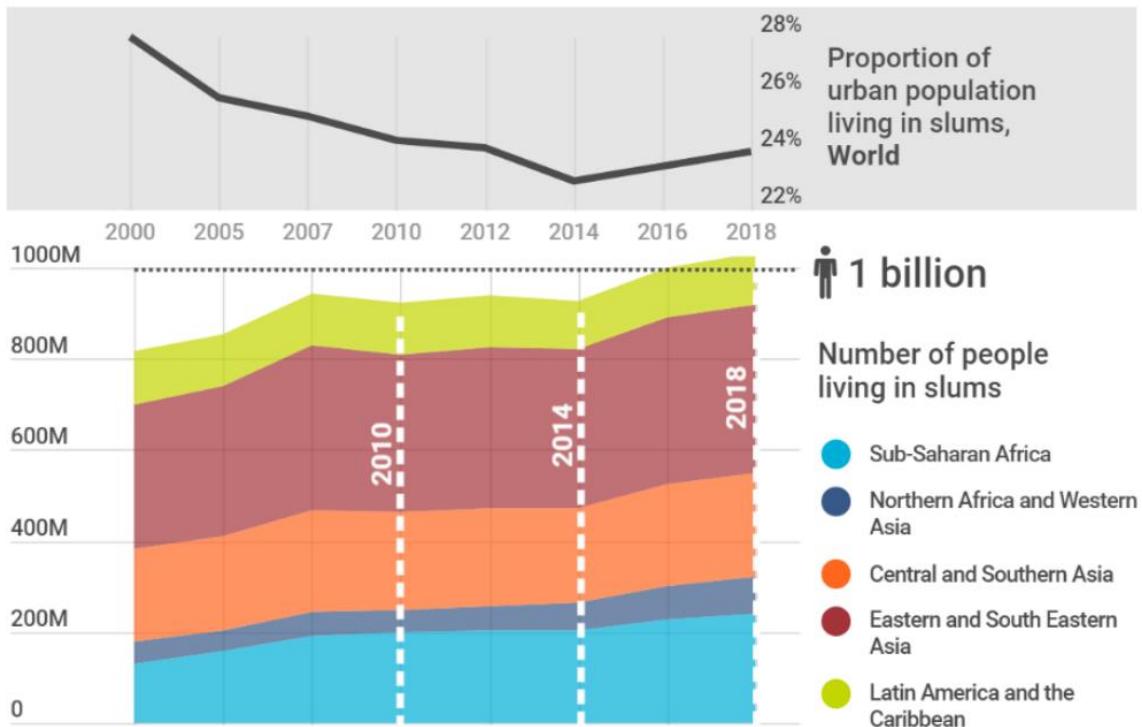
Figure 1.3 Shares of urban population living in slums (Source: Shulla & Kőszeghy, 2021)

Slums and informal settlements are characterized by low-quality housing and are often situated in vulnerable areas as a result of inadequate access to basic services and sanitation. Moreover, the lack of resources of inhabitants add to their vulnerability against the negative effects of disasters and climate change (Du, Greiving, & Yap, 2022).

It is against this backdrop that the dissertation seeks to investigate the important role of community-led processes in resettlement projects for informal settlers and argue for its mainstreaming for resilient outcomes.

1.2 Problem Statement

The Philippines is exposed to a wide spectrum of natural hazards because of its location in the Pacific Ring of Fire. According to EM-DAT, the Philippines recorded 684 disaster events from to 1900-2023. Approximately 543 disaster events, or 79.4% of the total, were hydrometeorological disasters, such as floods and storms (Table 1).

Table 1.2 Natural hazards affecting the Philippines from 1900 to 2023

Type of Hazard	Number of Events	Number of Deaths	Total Affected	Total Damages (000 USD)
Drought	10	8	6,750,894	248,298
Earthquake	42	9,937	8,283,845	2,004,475
Flood	161	3,814	36,750,136	6,871,974
Storm	382	50,882	204,747,136	40,112,358
Volcanic Activity	30	2,997	2,651,158	679,649
Wildfire	1	2	300	----
Epidemic	22	2,627	358,395	----
Insect Infestation	1	0	200	----
Landslide	35	2817	329,269	61,825
TOTAL	684	73,084	259,871,333	49,978,579

Source: EM-DAT, Centre for Research on Epidemiology of Disaster, 2023, Retrieved on 03/04/2023

The Philippine climate is typified as humid equatorial, with high temperatures and significant rainfall. The annual mean temperature is 27.1°C while the average annual rainfall is approximately 2,348 mm (World Bank Group & Asian Development Bank, 2021). According to the Philippines' Second National Communication to the UNFCCC, the annual mean temperature in the Philippines is projected to increase from 0.9°C to 1.1°C by 2020 and 1.8°C to 2.2°C by 2050 (Figure 1.4). The same document projects that annual precipitation will change from -7.5% to 23% in 2020 and -9.5% to 27.8% in 2050. This warming trend has been shown in studies to correlate with an increase in the intensity of typhoons and flooding in the future (Abello, 2017; Loo, Billa, & Singh, 2015; Tsuboki et al., 2015).
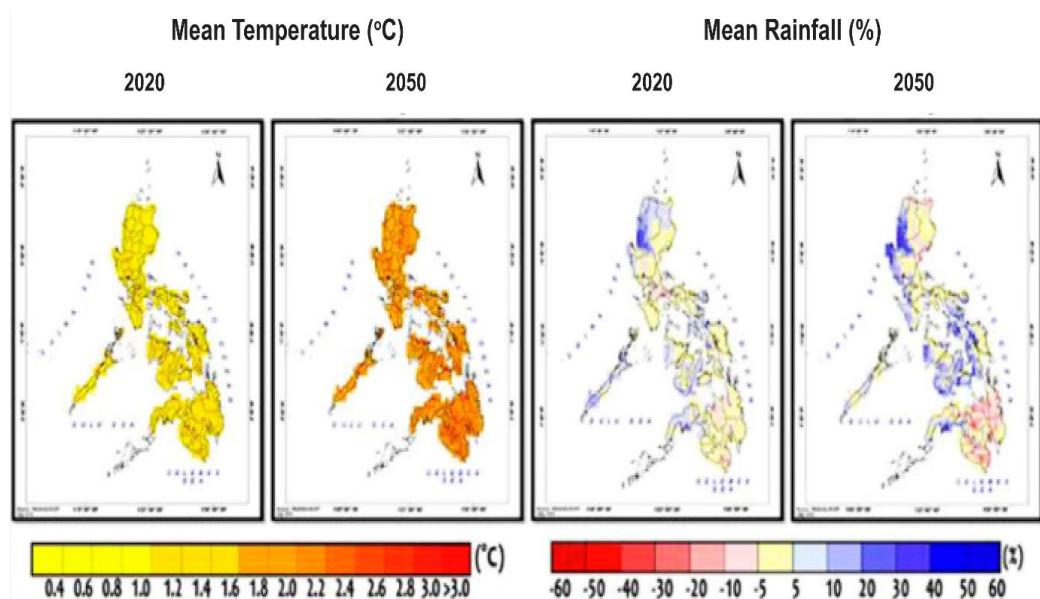
Figure 1.4 Annual projected changes in mean temperature and precipitation under a medium-range emission scenario (Source: Philippines' Second National Communication to the UNFCCC)

The trend is alarming as the Philippines is ranked 31st out of 191 countries in terms of flooding risk and 2nd highest overall in terms of typhoon risk in the 2022 INFORM Risk Index (European Commission. Joint Research Centre., 2022). The Philippines is also ranked fourth in the long-term climate risk index ranking (Figure 1.5). The climate of the Philippines is projected to change in 2030-2050 towards a trend of warmer and drier dry season and increased rainfall during the wet season (Table 1.2). Furthermore, it is projected that by 2030, annual affected population by flooding will figure to about 61,000 people and damages at around 451 million USD yearly. Average annual loss due to typhoons is projected to increase by up to 35% by 2050 due to higher likelihood of high intensity events (World Bank Group & Asian Development Bank, 2021).

Table 1.3 Annual projected changes in mean temperature and precipitation under a medium-range emission scenario (Source: Philippines' Second National Communication to the UNFCCC)

Parameters	Projected Change in 2030-2050 vs 1971-2000
Average Temperature	+2.0°C Dec-Jan-Feb
	+2.1°C Mar-Apr-May
	+1.8°C Jun-Jul-Aug
	+1.9°C Sep-Oct-Nov
Average Rainfall	-17.3% Dec-Jan-Feb
	-38.5% Mar-Apr-May
	+21.3% Jun-Jul-Aug
	+3.7% Sep-Oct-Nov
Number of days with rainfall >200mm	+8 days
Number of days with max temp. >35°C	+2031 days
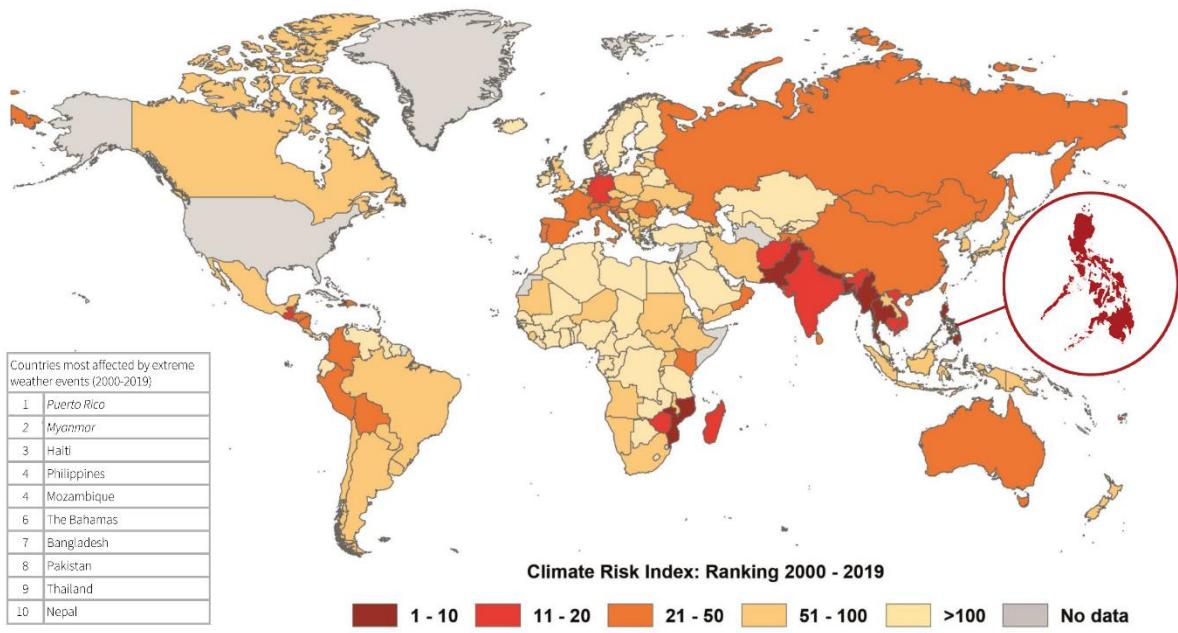
Figure 1.5 Long-term climate risk index ranking (Adapted from: Eckstein, Winges, Künzel, & Schäfer, 2019)

Given the above realities of projected increasing climate and disaster risk, it is imperative to protect and build the capacities of the most vulnerable, the urban poor. Part of the global agenda for sustainable development is to reduce disaster risk by strengthening resilience at all levels with a particular focus on the local level. One of the foremost global frameworks for disaster risk reduction, the Sendai Framework, articulates the need to protect and strengthen the resilience of people, communities, and countries by planning for and reducing disaster risk (UNISDR, 2015). Similarly, the Sustainable Development Goals (SDGs) explicitly call for resilience-building on multiple scales. Specifically, SDG 11 commits to ensuring cities are safe, inclusive, sustainable, and resilient. The New Urban Agenda also calls for strengthening the resilience of cities, with a particular focus on risk-prone areas such as informal settlements (UN-Habitat, 2020).

Currently, there is a gap in the literature which does not address the interconnectedness between the resilience of macro-scale (city level) and the meso-scale(community level) and micro-scale (household) systems (Sharifi, 2019; Sharifi et al., 2017).

In using a mixed-methods approach of assessing resilience across the macro and micro scales, this dissertation aims to answer the following research questions:

- What are the factors that contribute towards building resilience in the macro (city), meso (community), and micro (household) scales?
- How do these factors affect or influence one another?

1.3 Objectives of the Study

The principal idea of this study is that participatory processes help facilitate resilient outcomes especially in resettlement contexts. The main objectives of this study are enumerated below:

- To assess resilience attributes as manifested in the macro (city), meso (community), and micro (household) scales.
- To investigate the interconnectedness and synergies in resilience between macro, meso, and micro level scales and provide insights for policy implications and future direction for community-led resettlement

1.4 Data Collection and Analysis

In order to address the research questions, this dissertation employed several approaches to investigate resilience in different scales. The study employed thematic content analysis for investigating resilience at the macro scale and a case-study exploratory mixed-methods approach to investigate the concept of resilience as it is manifested in the community (meso) and household (micro) scales. The data collection techniques that were employed to address the research questions were as follows.

1.4.1 Planning Document Review

Secondary data were collected from policy instruments and other related documents. Mainly, local disaster management plans were reviewed and evaluated using thematic content analysis to discern the integration of the resilience attributes and ascertain the degree of resilience at the city scale.

1.4.2   Semi-structured Interviews

Semi-structured interviews were conducted with relevant stakeholders such as the government agency involved with the resettlement project, community organizers, and leaders from the community. The interviews support and confirm the secondary data. The interview questions were prepared beforehand and constructed to provide data on the following:

(a) Background and profile of the community

(b) Resilient strategies of the community

1.4.3   Household Surveys

Household surveys were conducted to collect data on resilience attributes. The survey questionnaire sought to gather the following information from the study area:

(a) Socio-economic profile of the community

(b) Perceptions of safety in the resettlement project

(c) Resilience attributes of the community

1.4.4   Fieldwork and Observations

Fieldwork and observations were conducted concurrent to the administration of the survey questionnaires. Photo documentation of spaces and resident activities was conducted to investigate resilience as it is being manifested in the built environment or spatial dimensions.

1.5 Significance of the Study

This research contributes to knowledge through its examination of resilience at multiple scales. Moreover, while resilience measurement and evaluation studies have been growing in recent years, research on post-resettlement settings remains underexplored. First, the study highlights resilience as reflected on current policies at the local or city level.

The People's Plan, as a community-led process of post-disaster resettlement, is still in its early stages of implementation and there is limited information and analyses with regards to its impact on resilient outcomes for the urban poor. The study's findings may

lead to improvement in its implementation and overall impact for resilient outcomes in the future.

1.6 Previous Studies

There have been a number of studies on resilience at the community level within the past decade (Carmen et al., 2022; Clark-Ginsberg et al., 2020; Eisenman et al., 2014; Zhang, Luo, Liu, Han, & Wang, 2023). These studies highlight the importance of the implementation of effective social infrastructure and physical infrastructure in building resilience for resettled communities. However, the implementation of resilience studies in post-resettlement contexts have been lacking and merits closer attention.

Several pilot studies of the RABIT framework have been conducted in similar marginalized communities (Haley, Heeks, & Van Belle, 2021; A. V. Ospina, Heeks, Camacho, et al., 2016; A. V. Ospina, Heeks, Ishida, et al., 2016). However, the application of the RABIT framework has yet to be implemented in Southeast Asian contexts. It is a knowledge gap that this dissertation aims to fill as the Southeast Asia region has consistently figured in the top regions with high degree of disaster risk in recent years (Atwii et al., 2022).

While there are numerous studies on urban resilience (Khazai, Anhorn, & Burton, 2018; Maquiling, De La Sala, & Rabé, 2021; Therrien, Normandin, Paterson, & Pelling, 2021) and community resilience (Carmen et al., 2022; Fazey et al., 2018; Ley, 2019; Ntontis, Drury, Amlôt, Rubin, & Williams, 2019), there is still a paucity of research with regards to the interplay of resilience across different scales (Sharifi, 2019). Moreover, there is still a lack of studies focusing on investigating resilient outcomes in post-resettlement settings and community-led resettlement. This study aims to fill these knowledge gaps.

1.7 Scope

The study involves the evaluation of resilience across multiple scales. In examining urban resilience, disaster management plans of local government units in Metro Manila were analyzed using content analysis to reveal aspects of resilience in policy and governance.

For examining community resilience, an in-city resettlement project in Pasig City, Metro Manila, the Manggahan Low Rise Building Project, was evaluated using the RABIT framework. The same community was also observed to explore resilient strategies in the built environment.

1.8 Organization of the Dissertation

This dissertation adopts a multi-scalar approach to evaluating and investigating resilience by first starting at the city level by reviewing policy and planning documents and then narrowing it down to a case study of one of the community-led, participatory resettlement projects. The overall aim of the study is to explore the concept of resilience across multiple scales and provide insight into how it is manifested in urban and in-city resettlement contexts. It is organized into seven chapters, each of which contributes towards the important aspects of the research and lays the narrative in connecting them. Figure 1.6 summarizes the organization of the dissertation in a diagram.

Chapter 1 provides the background of this study and includes the rationale, research questions, objectives, data collection methods and analysis, significance of the study, previous studies, scope of the study, and organization of the dissertation.

Chapter 2 presents a literature review of the important concepts underpinning the study and lays the groundwork for the theoretical framework of this dissertation. It provides a clear definition of the concept of resilience and how it was framed in this dissertation.

Chapter 3 contextualizes the study with a brief summary of the urban development process in Metro Manila over the past decades. It also explores the development of informality by elaborating on the types of informal settlements and their spatial distribution in Metro-Manila. It also discusses the strategies employed by the national government to address housing issues in Metro Manila.

Chapter 4 examined resilience at the macro level by assessing disaster risk reduction policy documents through thematic content analysis. It sheds light on the integration of resilience attributes as prescribed by the Making Cities Resilient 2030 campaign by the UNDRR to ascertain urban resilience.

Chapter 5 examines resilience at the meso level by adapting and applying the RABIT framework to investigate the resilience attributes of the in-city resettlement community. The analyses revealed that scale through social capital and mental outlook contributed significantly to the community's resilience.

Chapter 6 investigates resilience in the built environment through field observations in the same in-city resettlement community. It analyzes residents' resilient strategies in the built environment in the hierarchy of public, semi-private, and private spaces.

Chapter 7 presents a summary of the major findings of the previous chapters and includes urban planning and policy recommendations to provide an evaluation framework for resilience outcomes in community-led in-city resettlement projects. The dissertation recommends support for local green infrastructure, facilitating the promotion and development of social capital for the target communities, and ensuring inclusive participatory planning in resettlement strategies to facilitate more resilient outcomes.
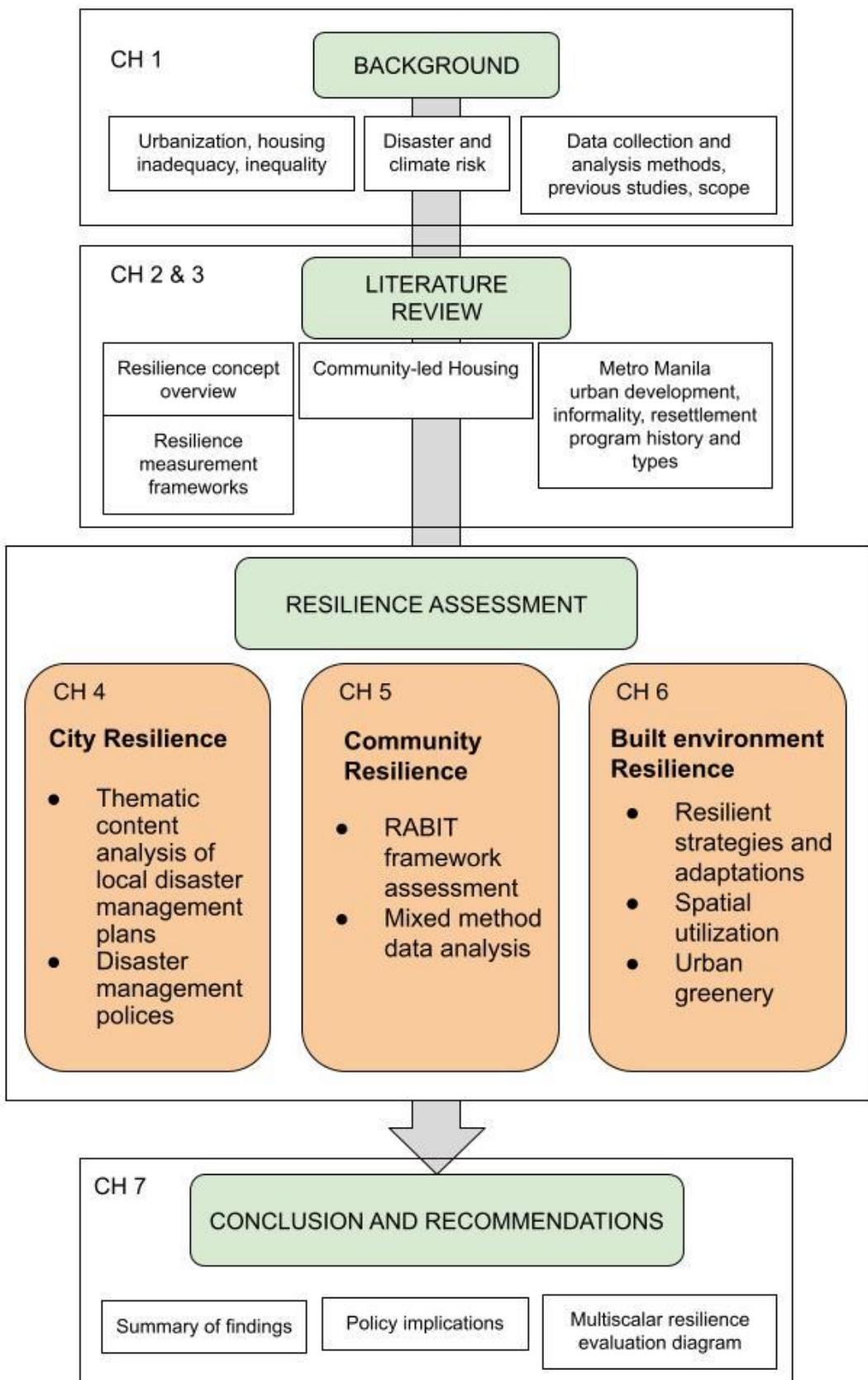
Figure 1.6 Dissertation framework and organization

CHAPTER 2

Theoretical Framework and Literature Review

2.1 Introduction

This chapter provides a theoretical framework and literature review of the concepts underpinning this dissertation. It begins with an overview of the resilience concept and provides a brief history of its development and scope within the study. It also provides a discussion of resettlement and the concept of community-led process related to housing.

2.2 Overview of Resilience

2.2.1 The Resilience Concept Conundrum

In recent years, the concept of resilience has gained currency and attention in multiple academic fields (Moser, Meerow, Arnott, & Jack-Scott, 2019). This is because it provides a workable framework for examining how systems adapt, transform, and persist despite facing serious disturbances (Vaneeckhaute, Vanwing, Jacquet, Abelshausen, & Meurs, 2017). However, scholars continue to debate its definition, policy applicability, and practice (Berkes & Ross, 2013; Meerow, Newell, & Stults, 2016). The widely accepted definition put forth by the IPCC (Field, Barros, Stocker, & Dahe, 2012) (p. 5) defines it as "the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner." In addition, Keating et al. (Keating et al., 2014) (p. 26) define it as "the ability of a system, community, or society to pursue its social, ecological, and economic development and growth objectives while managing its disaster risk over time, in a mutually reinforcing way."

Recent conceptualizations of resilience provide a non-equilibrium or evolutionary model (Amirzadeh, Sobhaninia, & Sharifi, 2022; Berkes & Ross, 2016; Meerow et al., 2016; Wardekker, 2021). Clark-Ginsberg et al. (Clark-Ginsberg et al., 2020) succinctly encapsulated the evolutionary perspective of resilience as the capacity of a system to weather external shocks while still

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maintaining normal functions and eventually moving into a state of adaptation and transformation.

For the purposes and scope of this study, resilience was examined at the city and community level. There are two strands of academic literature on community resilience: first, as described by Holling (1973) in the socio-ecological context, and second, in the psycho-social context, as explored by Alexander (Alexander, 2013). Community resilience is defined as a concept that enables the community to plan, prepare for, and more successfully adapt to actual or potentially detrimental scenarios efficiently and effectively (Asadzadeh, Kötter, Salehi, & Birkmann, 2017) (p. 148). Magis (2010) described it as the community's ability to engage, develop, and generate community resources to cope and persist in situations where there is a high degree of uncertainty and unpredictability.

2.2.2 Measuring Resilience

Resilience measurement has been increasingly considered an essential step towards reducing disaster risk and facilitating adaptation to disasters (Khazai et al., 2018; Saravanan & Garren, 2021). The Sendai Framework has advocated the application of scientific knowledge and evidence-based approaches in disaster risk reduction (UNISDR, 2015). Therefore, methods to measure and monitor resilience have become abundant in recent years (Asadzadeh et al., 2017; Borie, Pelling, Ziervogel, & Hyams, 2019; Sharifi, 2016). Jones (L. Jones, 2019) summarizes the scientific and evidence-based approaches to resilience measuring into objective and subjective. The objective approach to resilience measuring relies on self-assessed judgements and observations outside of those being measured (Beauchamp et al., 2019; Clare, Graber, Jones, & Conway, 2017). In contrast, subjective resilience measurement frameworks involve the self-assessment of the cognitive and affective capabilities of individuals or households in responding to risk (Adger, 2000; Twigg, 2009). The objective resilience approach has numerous advantages over the subjective. For instance, the objective resilience approach adopts a fixed and transparent definition of the concept of resilience (Clare et al., 2017), allows for the comparison of different areas or groups (COSA, 2017), and relies on indicators routinely collected by government agencies (Schipper & Langston, 2015).

Cutter's (2008) DROP framework utilizes a system of quantifiable indicators in six dimensions: community competence, ecological, economic, social, infrastructure, and institutional dimensions. This type of assessment has focused on the county scale, as developed in the United States (Frazier, Thompson, Dezzani, & Butsick, 2013).
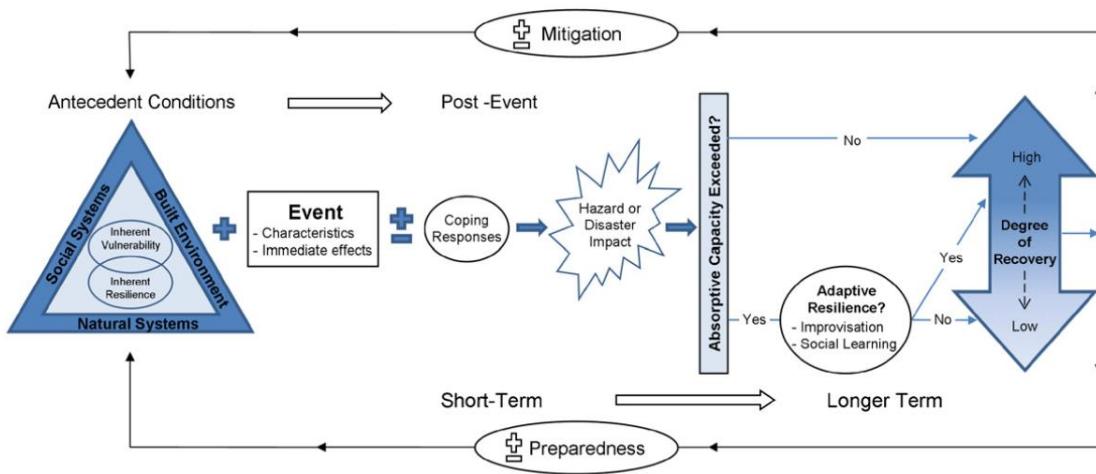
Figure 2.1 Schematic diagram Disaster Resilience of Place (DROP) framework (Source: Cutter et al., 2008)

Similarly, the Baseline Resilience Indicators for Communities (BRIC), adapted from the DROP model, is among the most consistently cited frameworks for measuring resilience (Derakhshan, Blackwood, Habets, Effgen, & Cutter, 2022). It includes 49 indicators of community resilience (Cutter, Ash, & Emrich, 2014). Although it is one of the few to examine resilience metrics at the community level (Cutter, Ash, & Emrich, 2016), implementation in Global South contexts would be a significant challenge as it relies on secondary data (Sharifi, 2016), where data access and availability is a major challenge.

Most resilience measurement methodologies rely on existing secondary data, such as census data and statistics (Tariq, 2021). Unfortunately, the adoption of these resilience frameworks presents challenges to developing countries due to the paucity of such data (Ainuddin & Routray, 2012; Mehmood, 2021). Furthermore, factors that determine resilience in measurement methodologies vary between and among geographical scales, and as such, translation, for example, from the national

to community level, tends to be cumbersome (Ainuddin & Routray, 2012; Derakhshan et al., 2022).

2.3 Resettlement as a Resilient Strategy

Resettlement is a complex social process and requires support for the affected community to enable it to cope and adapt and regain functionality as well as resilient enough to deal with social and environmental stressors (Oliver-Smith & de Sherbinin, 2014). Understanding how the role of governance or social networks affect the resettled communities' adaptive strategies pose a crucial role in helping how displacement or resettlement through development projects or disasters (Oliver-Smith & de Sherbinin, 2014). Studies point to resettlement as what should be a last resort. However, in some cases where it is unavoidable, it needs further study as to whether resettlement could be a resilient strategy in the long run.

2.4 Community-led Housing

2.4.1   Definition of Community-led Housing

Social housing refers to non-market housing as a means to provide shelter for households with limited financial resources at below market rate. It usually can be typified into two different modes depending on the level of participation of the community involved (Figure 2.3). The first type is state-led housing which is typically provided by the local government sometimes in partnership with the private sector to construct housing projects to be distributed to target households at significantly low rent and are usually heavily subsidized. Community-led housing involves a bottom-up approach with the community alongside support from NGOs and other stakeholders.
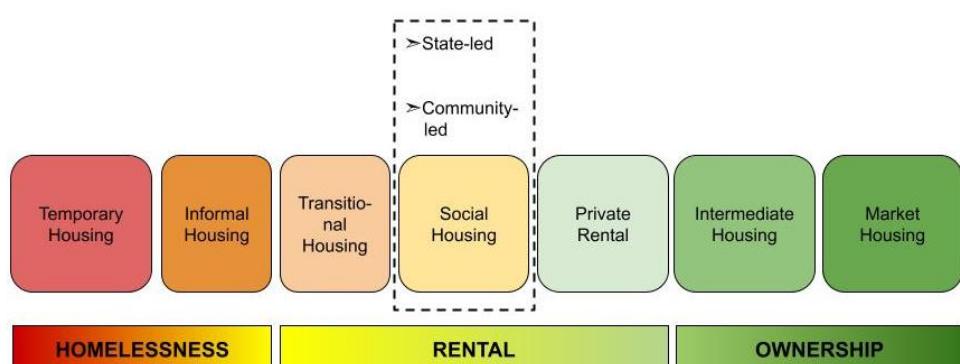
Figure 2.3 Housing supply spectrum (adapted from: City of Melbourne, 2019)

2.4.2 Forms of Community-led Housing

Different modes of community-led housing are available and include:

- Community Land Trust (CLT) is a nonprofit group consisting of residents in the same area. Households are only entitled to a portion of the property's value when sold and the rest is held in trust to be able to be affordable for low- and middle-income households.

- Co-housing refers to an arrangement wherein a group of people come together to build a community which abides by a set of rules. These rules are guided by values related to a shared idea of their vision. Contrary to what its name suggests, co-housing usually involves residents living in their own housing units while only sharing spaces for communal use.

- Housing cooperative or a "co-op" is an alternative way of residential housing in which the owners do not have ownership over the property. In this arrangement, residents are enjoined to be stakeholders in a corporation having a share of the property as a cooperative.

- Self-help housing involves low-income households who are also in charge of constructing and building their own housing units. Self-help housing can be occupied even before its completion. Incremental improvement is usually observed in this type of housing as residents can do so with their own labor in the process.

2.5 Conclusion

This chapter has presented an overview of the resilience concept and the various methodologies that have been developed to evaluate it at various scales. It focuses on the particular definition and conceptualization of resilience in this study's context in order to clarify its use in the succeeding chapters.

The study is underpinned by resilience as a pathway to reducing vulnerability of communities, specifically informal settler communities. In this study, an evaluation of resilience across multiple scales is undertaken. Resilient outcomes from community-led in-city resettlement are investigated in order to examine the interconnectedness of resilience in different scales. The next chapter presents the background and context of the location of the study area in Metro Manila.

Chapter 3

Urban Development and Informality in Metro Manila

3.1 Introduction

This chapter provides the necessary context of the Philippines and its capital, Metro Manila. It provides an overview of its urban development and informal settlement population and distribution. It also provides a brief summary of the socialized housing and resettlement schemes in Metro Manila.

3.2 Urban Development

Metro Manila, an agglomeration of 17 local government units and the nation's capital, is home to more than 13 million inhabitants (Philippine Statistics Authority, 2021). Its rapid growth in the past decades follows a pattern of urban sprawl as evidenced in the change of land cover use from 1970s to the 2000s (Figure 3.1). Rapid urbanization and in-migration have resulted in expansion to peri-urban areas and dangerous areas for habitation (e.g. marshland, along rivers, water canals, etc.) (Porio, 2014).
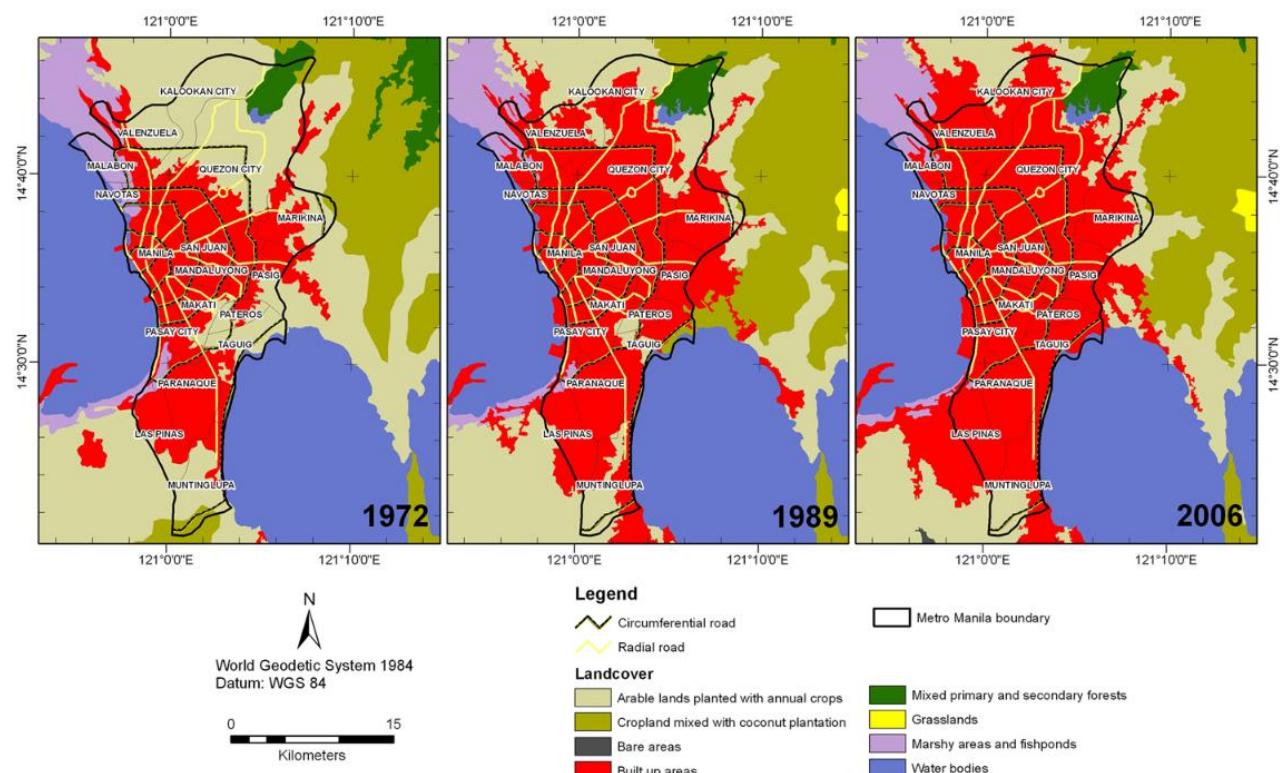
Figure 3.1 Changes in land cover use in Metro Manila showing urban sprawl over 34 years (Source: Andong & Sajor, 2017)

Megacities such as Metro Manila are characterized by high urban density and rapid population growth, which exacerbates environmental degradation and contributes to low-quality housing and poor quality of life (Abunyewah, Gajendran, & Maund, 2018; N. T. Ner, Okyere, Abunyewah, & Kita, 2022; World Bank, 2017). A dominant trend following such rapid urbanization is the formation of informal settlements (Okyere & Kita, 2015).

3.3 Informality in Metro Manila

Metro Manila has the largest share of ISF concentration with 39% of the total informal settlements in the Philippines (Figure 3.2). These ISF communities are confronted by physical, economic, social, legal, and environmental risks on a daily basis (World Bank, 2017). A report by the National Economic and Development Authority (NEDA) (NEDA, 2017) estimates that there are approximately 556,526 informal settler families (ISFs) in Metro Manila. This translates to 1 out of every 4 Metro Manila residents currently residing in informal housing (Singh & Gadgil, 2017). Of these, 104,000 ISFs are situated in environmentally hazardous zones such as dump sites, railways, and along waterways (NEDA, 2017). Flooding is a perennial threat, as an average of 20 typhoons occur in the region each year, which makes these ISFs highly vulnerable to the detrimental effects of flooding (Holden, 2018).
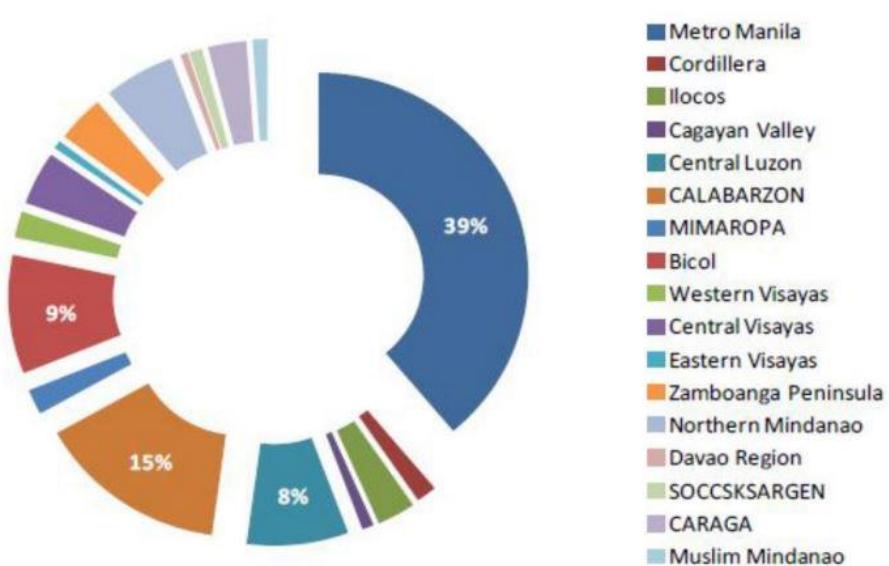
Figure 3.2 Percentages of ISFs per region in the Philippines (Source: World Bank, 2017)

Informal settlements are manifestations of multi-dimensional poverty in the Philippines (World Bank, 2017). They develop as a result of spatial and socio-economic exclusion in cities where high land prices due to land mismanagement result in a lack of affordable housing options (Shatkin, 2004). This leaves low-income families choosing to build substandard dwellings on private or public land, or sometimes danger zones, to maintain a sustainable distance from their places of work (World Bank, 2017). A satellite imagery-based study organized and specified the various types of informal settlements (Table 3.1) and their spatial distribution in Metro Manila (Figure 3.3).

Table 3.1 Informal settlement types (Source: Singh & Gadgil, 2017)

Types of Informal Settlements	Description
1. High dense	• Very dense informal settlements without any regular pattern. • No or very few open spaces • Largest type in terms of area and among the lowest levels of vegetation
2. Low dense	• Less dense informal settlements without any regular pattern. • Contains more open space or vegetation
3. Mixed	• Less dense informal settlements comprised of bigger buildings with embedded small and dense objects • Informal settlements which have grown inside residential areas
4. Linear	• Informal settlements that have developed a linear shape
5. Linear along railways	• Informal settlements that have developed along railways following a linear pattern
6. Linear along rivers	• Informal settlements that have developed along rivers following a linear pattern
7. Pocket	• Small and very densely packed informal settlements which have grown in small vacant spaces often linked to commercial or industrial units
8. "Under the trees"	• Informal settlements composed of several sections usually comprising a singular informal settlement entity • Typically located below vegetation
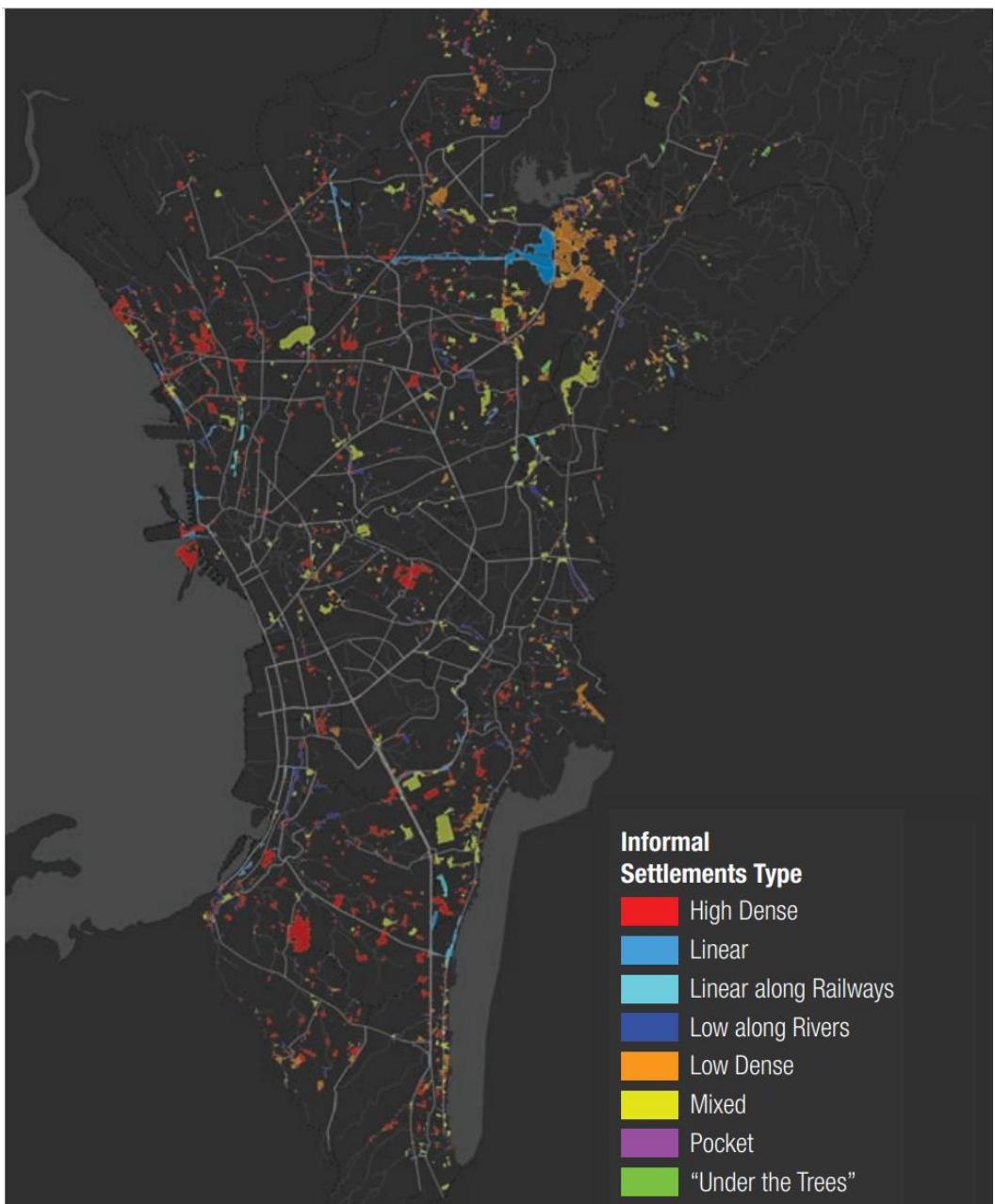
Figure 3.3 Spatial distribution of informal settlements in Metro Manila by type (Source: Singh & Gadgil, 2017)

3.4 Housing the Urban Poor in Metro Manila (1960s-2000s)

Metro Manila has been dealing with the unabated growth of informal settlements. Over the years, the national government has implemented various efforts of resettlement of informal settler communities.

In the 1960's, the National Housing Authority (NHA) was established to implement the relocation of informal settlements in Metro Manila and transferred them to mass

housing off-city. The agency operated in a centralized and top-down manner and was largely unsuccessful as the relocated informal settlers found themselves having no job opportunity in their new location. They shortly sold off their housing units and went back to live in informal settlements in Metro Manila.

By the 1980's and through the 2000's more options and social housing approaches were explored. On-site upgrading was facilitated through the Community Mortgage Program (CMP) which provided financing support for urban poor communities to secure land tenure (Porio & Crisol, 2004). This led to on-site upgrading being a viable option and helped preserve informal settler communities as they were able to remain in place and upgrade their current housing structures. Resettlement projects by location can be classified into two categories: (1) in-city resettlement, which refers to a resettlement site located in the same LGU and (2) off-city resettlement which refers to resettlement sites outside of the administrative boundaries of the LGU. Figure 3.4 illustrates the upgrading and resettlement types based on location and distance from the original informal settlement community. A review conducted by Ballesteros and Egana (2013) examined the efficiency and effectiveness of the different approaches to resettlement by the NHA and found that in-city options to be the most effective and efficient.
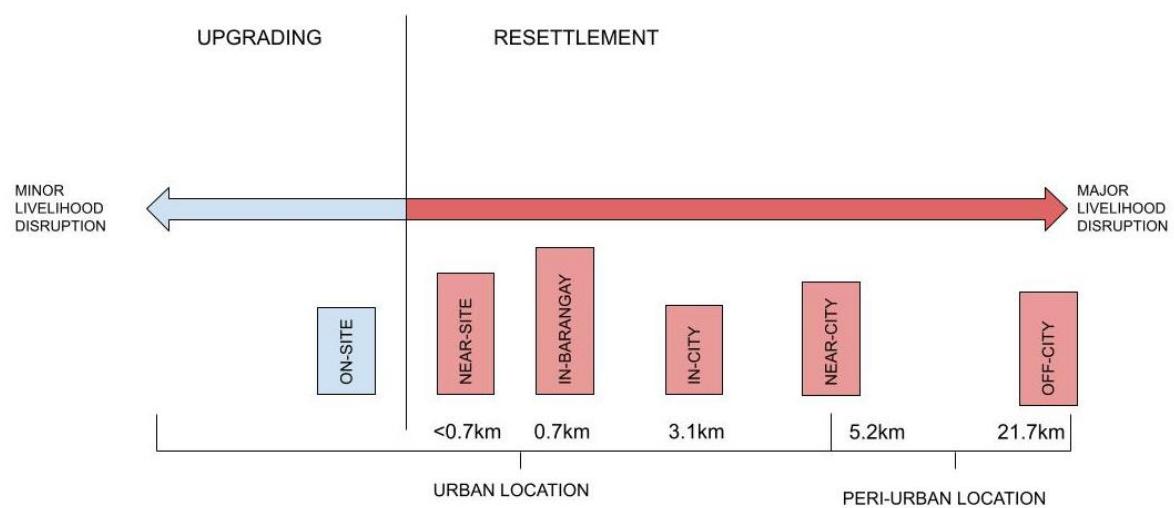
Figure 3.4 Upgrading and relocation types based on distance and location (Adapted from: Lauer, Reyes, & Birkmann, 2021)

Resettlement projects can be composed of different housing typologies. These are single-detached, duplex, rowhouses, and low-rise buildings (Figure3.5). Lauer et al.

(2021) found that resettlement projects found outside of the city consisted mainly of rowhouses and sometimes single-detached and duplex houses. Meanwhile, in-city, near-site, and in-city resettlement projects mainly consisted of multi-story, low-rise buildings as a result of the NHA's pivot towards more vertical housing developments (Lauer et al., 2021).
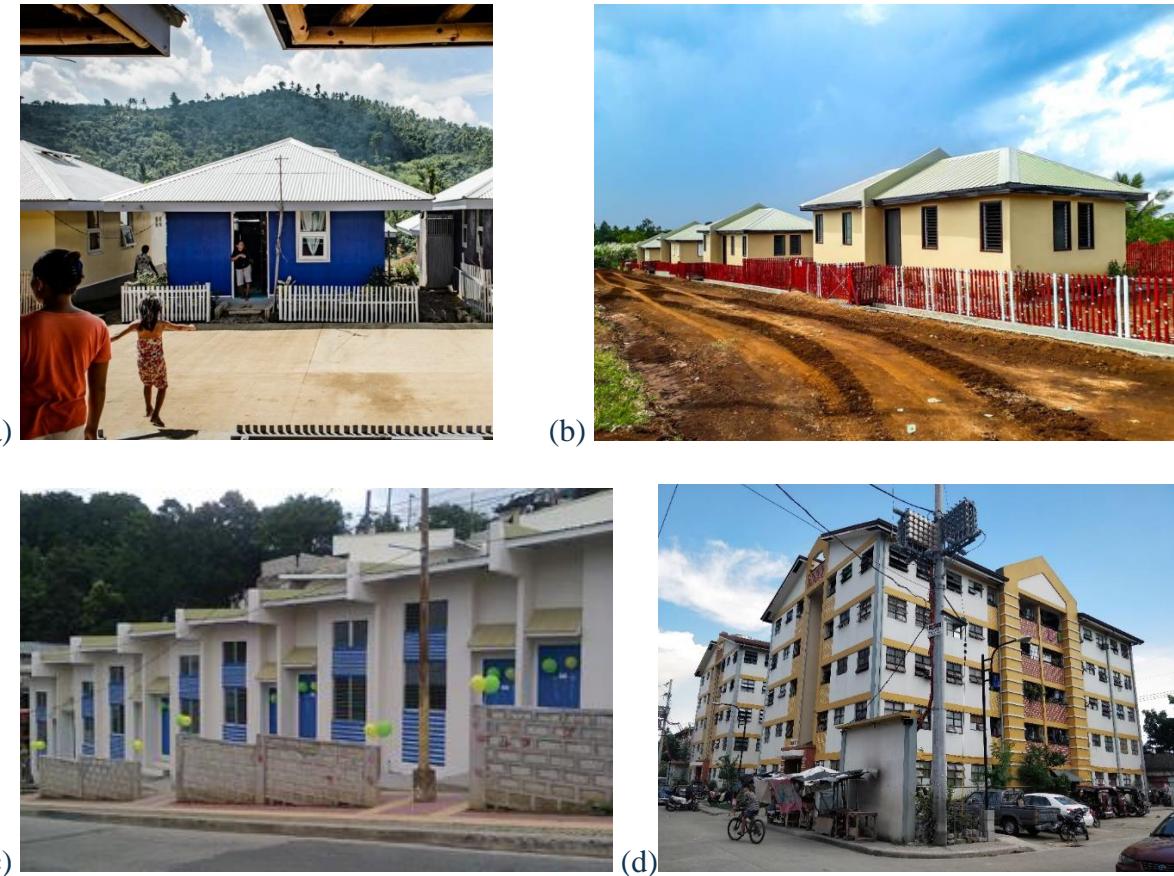
Figure 3.5 Resettlement housing typology (a)single-detached; (b) duplex; (c) rowhouse; (d) low-rise building (Source: (appsdev@imanila.ph, 2021; "The Quezon City Socialized Housing Program," n.d., Author's own, 2022)

3.5 Resettlement Process

The resettlement process consists mostly of four phases (See Figure 3.6). Phase 1 is called the pre-relocation or the social preparation phase. It involves the identification of beneficiaries and resettlement sites, planning and architectural and engineering design, and finally resource mobilization. Processes in this phase involve intensive planning and negotiations among all stakeholders and requires the longest time due to agreements that have to be made by the NHA with the LGU, community, and developers

(Ballesteros & Egana, 2013). Phase 2 is the implementation and relocation phase and starts with the identification of intended beneficiaries and their social preparation. It is also considered the physical phase and involves the physical construction of the relocation sites and the demolition of the previous settlements (Lauer et al., 2021). Phase 3 signals the end of the project development and starts when the relocation is completed. Phase 3 transitions into phase 4 wherein estate management and monitoring of the relocation project is involved. The status quo for resettlement process remained predominantly top-down until the development of an alternative bottom-up process called the People's Plan.
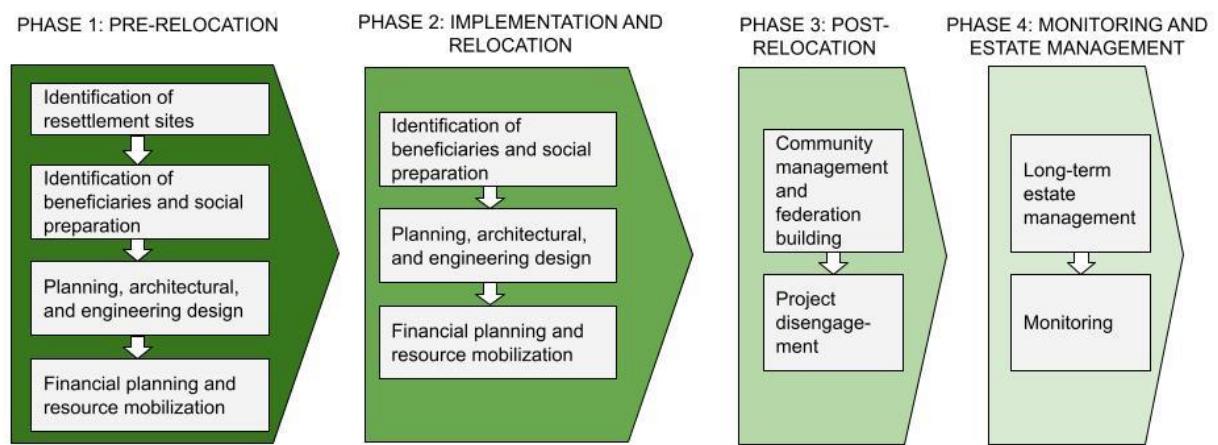
Figure 3.6 Resettlement process in the Philippines (adapted from: Lauer et al., 2021)

3.6 Paradigm Shift: The People's Plan (2011-2016)

On 26 September 2009, unprecedented rainfall and subsequent flooding caused by tropical storm Ketsana (known locally as "Ondoy") submerged 34% of Metro Manila. The effects were devasting for approximately 4.9 million residents, including 464 casualties, 37 missing persons, and an estimated USD 240 million in damage to property and infrastructure (Gilbuena, Kawamura, Medina, Amaguchi, & Nakagawa, 2013). Following the aftermath, the national government set aside PHP 50 billion to relocate ISFs living within 3 meters of eight priority waterways across Metro Manila (Figure 3.7) and provide them with safer housing (Doberstein, Tadgell, & Rutledge, 2020). To gain access to the funds, affected communities were tasked to prepare and submit a community-based resettlement plan called the People's Plan (Tadgell, Mortsch, & Doberstein, 2017).

8 PRIORITY WATERWAYS IN METRO MANILA

1. TULLAHAN RIVER
Quezon City, Caloocan City, Valenzuela City, and Malabon City

2. SAN JUAN RIVER
Quezon City, San Juan City, and Mandaluyong City

3. MANGGAHAN FLOODWAY
Pasig City

4. MARICABAN CREEK
Taguig City, Makati City, and Pasay City

5. ESTERO DE MAYPAJO
Manila City, Caloocan City, and Navotas City

6. ESTERO TRIPA DE GALLINA
Pasay City and Makati City

7. PASIG RIVER
Pasig City, Makati City, Mandaluyong City, and Manila City

8. ESTERO DE SUNOG APOG
Manila City

Figure 3.7 Waterways in Metro Manila identified as priority areas and the cities they crossed (adapted from Vallarta, 2013).

The People's Plan is a community-led blueprint for empowering communities and marks a shift in the conventional top-down process typically employed by the government in their resettlement programs (Galuszka, 2020). As such, it draws upon self-initiative, self-reliance, and self-governance to foster community empowerment and resilience (Patino, 2016). It serves as way for ISFs to engage with the government to push for their right to safe and affordable housing. The ISF community is tasked to handle several responsibilities on their own, such as site selection for resettlement and negotiations with builders regarding the design and costs of the construction (Tadgell et al., 2017). However, the process takes a considerable amount of time, with implementation from start to finish taking an average of six years, the bulk of which is spent on site selection, whereas only a short period of time is allocated to its design phase (Shiraishi & Tanoue, 2022). Focus on the initial phases tend to diminish the

important long-term processes with incorporation into the new settlement (Lauer et al., 2021) Nevertheless, despite these challenges in its implementation it is noteworthy due to its shift towards a more inclusive and bottom-up approach in resettlement of ISF communities.

3.6 Conclusion

This chapter presented the urbanization and growth context of Metro Manila. It also provided a brief history of socialized housing efforts by the national government to address the challenges presented by rapid urbanization and its accompanying informality. The resettlement process, building typology and resettlement types were also discussed and covered briefly in this chapter.

It concludes with an explanation of the People's Plan, a community-led process of resettling ISFs living in danger zones across Metro Manila which marked a shift from the top-down process of resettlement to a bottom-up approach of inclusive practices involving the concerned communities.

Chapter 4

Urban Resilience Assessment

4.1 Introduction

This chapter provides the necessary background on the disaster management system and policies in the Philippines. It begins with a brief history of disaster governance in the Philippines and focuses on planning documents at the local level. Local-level planning documents were discussed and analyzed using thematic content analysis. The chapter concludes with policy implications for enhancing urban resilience in local government units across Metro Manila.

4.2 Background

Given the history of disasters in the Philippines, a legislative response was first initiated in 1978 with the passing of Presidential Decree 1566, which created the National Disaster Coordinating Council. The 1978 law saw several proposals for revision in the succeeding decades but remained mostly unchanged. The destruction left in the wake of Ondoy at the capital in 2009 spurred the passing of the Republic Act 10121 or the Disaster Risk Reduction Law of 2010, which replaced the outdated reactive approach of Presidential Decree 1566 in 1978. It ushered in a paradigm shift where more focus was directed to addressing the need to reduce vulnerability and a shift to more proactive measures rather than the reactive measures that had been the status quo for the last three decades.

The new law was also guided by the agenda set forth by the Hyogo Framework of Action which shifts the responsibilities of disaster preparedness, mitigation and vulnerability reduction to local governments (UNISDR, 2005). Each level of government was mandated to establish their own Disaster Risk Reduction and Management Council (DRRMC) as part of an extensive DRRM network. This is also in line with the law's intention to implement DRRM across all levels of government, with the replication of the DRRM framework at the national, regional, provincial, city, municipal, and barangay levels, as shown in Figure 4.1.
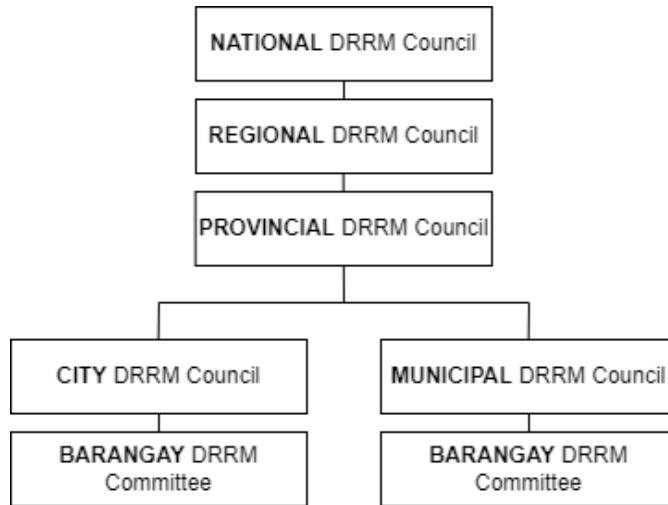
Figure 4.1 DRRM network (Source: Authors' elaboration)

The national DRRM framework has four priority areas: Disaster Prevention and Mitigation, Disaster Preparedness, Disaster Response, and Recovery and Rehabilitation, with increasing prioritization for prevention and mitigation. Each priority area is represented by a designated government agency that acts as a vice chairperson (Padagdag, 2018). To ensure interoperability at different scales, a consistent organizational structure of actors and their responsibilities is shared at the local level up to the national level.

The DRR law also mandated the creation of disaster risk reduction and management plans at the national, regional, and local levels (Balgos, 2014). The National Disaster Risk Reduction and Management Plan (NDRRMP), Regional Disaster Risk Reduction and Management Plans (RDRRMPs), and Local Disaster Risk Reduction and Management Plans (LDRRMPs) form part of a network of plans, as prescribed by RA 10121 or the DRRM Law.

As mandated by the law, each LGU is tasked with producing its own LDRRMP (Balgos, 2014). LDRRMP is a plan that focuses on the implementation of DRRM programs, projects, and activities at the local level. By virtue of the Law, the LDRRMPs are reviewed at a higher level; for example, the Barangay Disaster Risk Reduction and Management (BDRRM) plan is reviewed by the City/Municipality level, the City/Municipality Disaster Risk Reduction (C/MDRRM) plan is reviewed at the provincial level, and the Provincial Disaster Risk Reduction and Management

(PDRRM) plan is reviewed at the regional level (OCD, 2015). The Office of Civil Defense (OCD) is heavily involved in this process and provides review reports based on feedback from the review team. (Figure 4.2)
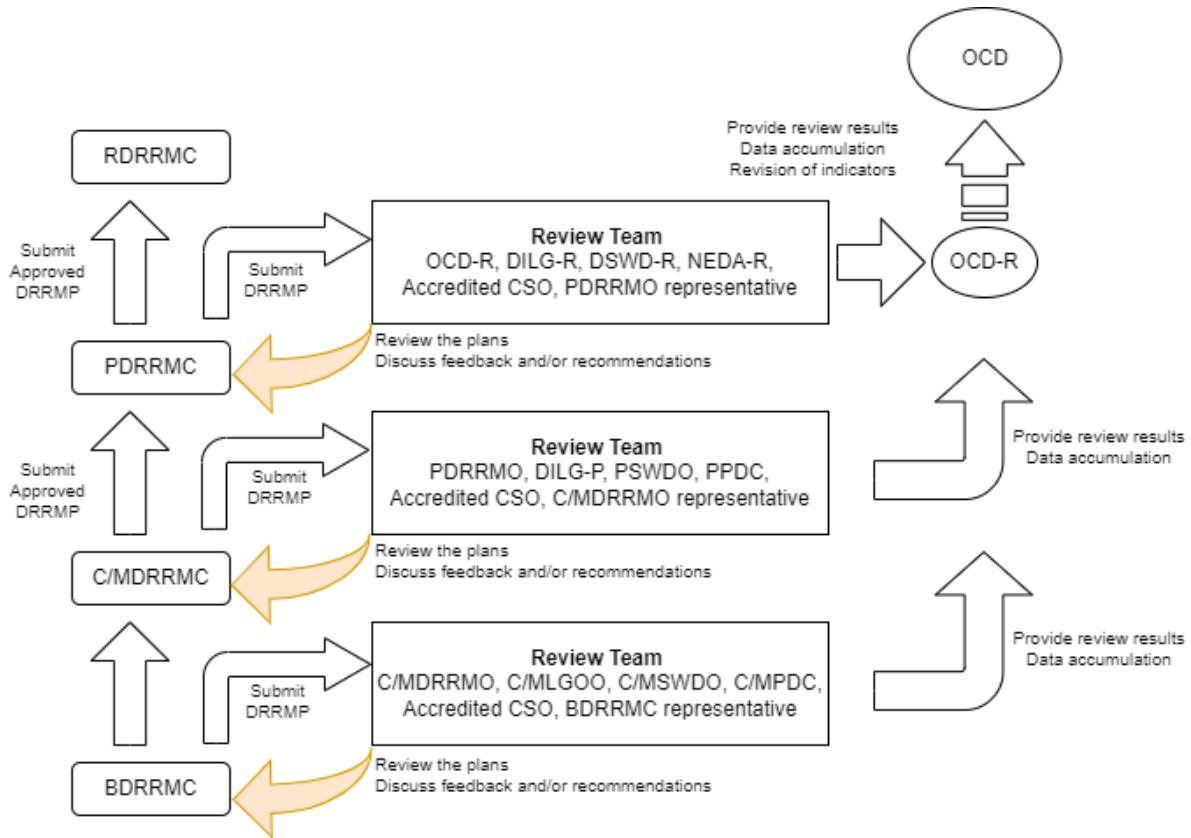
Figure 4.2 DRRMP review and approval flow chart (Source: Adapted from OCD, 2015)

Local government units in Metro Manila are highly decentralized as a result of the Local Government Code of 1991, which encouraged local autonomy and mandated all LGUs to be responsible for emergency measures to be undertaken during and after disasters (Balgos, 2014). This includes the mandate to plan for disaster risk reduction through planning and implementation arrangements at the local level. However, there is no disaster risk management plan at the regional level (OCD, 2015). This may be attributed to the fact that the Metro Manila Development Authority (MMDA) lacks the financial and human resources to carry out its intended function as a regional-level governing body for Metro Manila (Aspiras, 2022; Laquian, 2008).

Considering this, this chapter sought to evaluate the integration of disaster resilience into LDRRMPs at the individual city level and determine urban resilience across cities

in Metro Manila. It adapted the UNDRR guidelines to cities' pathways to resilience in order to develop an assessment framework.

4.3 Methodology

4.3.1 Research Approach

This study utilized thematic content analysis to examine LDRRMP across 11 Local Government Units (LGU) Metro Manila, Philippines, to determine their alignment with resilience attributes prescribed by the UNDRR's Disaster Resilience Scorecard for Cities. Content analysis is a systematic procedure that allows researchers to analyze textual data to identify and aggregate framings, patterns, constructs and expressions to address a research problem or question (Krippendorff, 2018). It is also an unobtrusive and non-reactive research method that leverages the inherent availability, stability, exactness, and broad coverage of documents (Bowen, 2009). The analysis follows the hermeneutic principle of interpretation based on excerpts and quotations. While we are aware of some critiques of this method, such as inconsistency and lack of coherence (Nowell, Norris, White, & Moules, 2017), recent studies have demonstrated the usefulness of content analysis in framing, problematization, and integration of sustainability and resilience themes in emerging discourses on planning for urban sustainable development. Moreover, this type of analysis has recently gained traction as a useful tool for evaluating planning instruments across a variety of interrelated fields of urban resilience (Diko et al., 2021; Fatemi, Okyere, Diko, & Kita, 2020; Ordóñez & Duinker, 2013; Pieterse, du Toit, & van Niekerk, 2021).

4.3.2 Materials

LDRRMPs are documents that detail the implementation of DRRM programs, projects, and activities at the local level. As mandated by Republic Act 10121, each local government unit is required to formulate LDRRMPs to complement and align with the national-level framework. The list of LDRRMPs of cities included in the analysis is enumerated with their corresponding period coverage in Table 4.1. The documents were accessed either through the public domain or solicited from local government units. Eleven (11) out of the 17 local government units in Metro Manila responded and provided the requested documents used in the study.

Table 4.1

List of LDRRMPs (Local Disaster Risk Reduction and Management Plans) and their respective years of coverage

Local Government Unit	Period of Coverage
1. Pasig City	2017-2022
2. Municipality of Pateros	2018-2024
3. Navotas City	2020
4. Makati City	2019-2030
5. Las Piñas City	2019-2025
6. Caloocan City	2020-2022
7. Quezon City	2014-2020
8. Mandaluyong City	2017-2022
9. Muntinlupa City	2017-2022
10. San Juan City	2017-2021
11. Parañaque City	2021-2030

4.3.3 Analytical Framework

The analytical framework was adapted from the United Nations Office for Disaster Risk Reduction (UNDRR) Disaster Resilience Scorecard for Cities, which draws on the ten essentials of resilience (Figure 4.3). The purpose of this scorecard is to cover the many issues that cities face and serve as a guide for local governments to develop their own local disaster risk reduction strategies and plans. In this case, this scorecard provides a useful guide for understanding local government planning and framing resilience in disaster risk reduction and management plans (K. Jones, Pascale, Wanigarathna, Morga, & Sargin, 2021). Furthermore, the empirical relevance of the criteria was ascertained through a review of the existing literature to demonstrate the validity of their selection for content analysis (see justification and indicative references in Table 4.2).
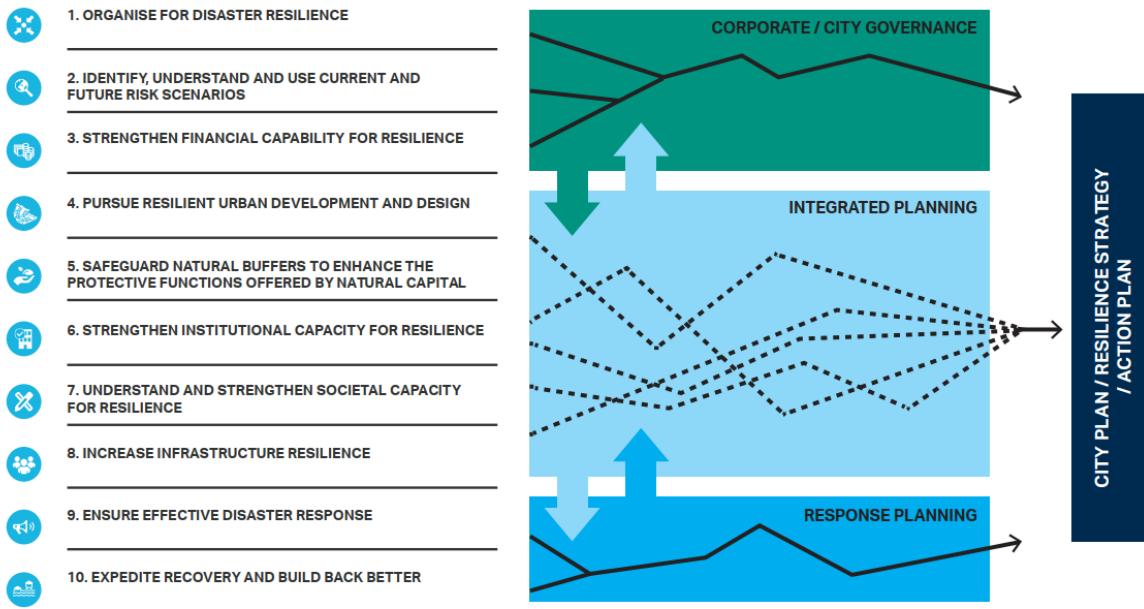
Figure 4.3 Ten essentials of resilience (Source: UNISDR, 2017)

Using this as a reference, an analytical framework for evaluating the LDRRMPs and their alignment with the UNDRR's ten essentials of resilience (UNISDR, 2017) was formulated, as shown in Table 4.2.

Table 4.2 RABIT framework resilience attributes and indicators (Adapted from: (N. Ner, Okyere, Abunyewah, Frimpong, & Kita, 2023; A. Ospina & Heeks, 2016)

Thematic Area	Criteria	Code	Description	Justification and Indicative References
1. Governance	Policies and Legislation for DRR	PLDRR	Clear formulation of goals, objectives, policies, and ordinances for disaster risk reduction	Having policies and legislative frameworks for disaster risk reduction helps achieve widespread consensus and compliance with DRR measures across all sectors of society (UNISDR, 2005)
	Organizational Structure	OS	Clear and outlined responsibilities and duties of agencies that address disaster risk reduction	Disaster risk reduction requires a wide range of knowledge, skills, and resources which are developed through organizational partnerships (Trias, Lassa, & Surjan, 2019)
	Multi-sectoral Relationships	MR	Stipulates collaboration with public and private sector, civil society, and other related organizations	Collaborating with relevant agents such as non-government stakeholders provide several advantages such as capitalizing on trust for more effective public policy (Matsuoka & Gonzales Rocha, 2021)

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2. Risk Identification	Hazard Maps	HM	The existence of up-to-date hazard maps that provides spatial information of hazard distribution and intensity	Maps and the plotting of hazard-prone areas strengthen local capacity to critically appraise disaster risk in their immediate environment (Cadag & Gaillard, 2012)
	Risk Scenario Projections	RSP	Clear identification and projection of disaster risk scenarios	Resilient development planning requires an understanding of not only past events but also an anticipation of future hazards that have not happened yet (Lagmay, Santiago, & Pulhin, 2021)
	Disaster Impact Assessment	DIA	Maintains a database of potential losses/damage based on projected outcomes	Data on loss and damage is a critical element for disaster risk management (UNDP, 2013)
3. Financial Considerations	Ring-fenced Budget for DRR	RFB	Sets aside funding from the local government budget specifically for disaster management actions annually	Explicit budget allocation for disaster risk reduction is crucial to achieve mainstreaming for effective action (Matsuoka & Shaw, 2014)
	Innovative Financing Schemes	IFS	Provides for strategies to seek access to supplementary funding and financial instruments outside of the local government budget	Exploration of all possible traditional and innovative resources is essential for financing DRR activities (Ishiwatari & Surjan, 2019)
	Contingency Fund	CF	Builds a contingency fund to meet immediate post-disaster needs	Financial preparedness through contingency funds promises a more efficient system of response to weather shocks. (Suarez & Linnerooth-Bayer, 2011)
4. Urban Development	Risk-sensitive Land Use Zoning	RLUZ	Applies appropriate land use zones with consideration for degree of risk and exposure	Risk-sensitive development is required to reduce risk when planning new development in the city (Leck et al., 2018)

	Resilient Urban Development	RUD	Promotes integration of disaster resilience in urban development plans and projects	Scholars emphasize the adoption of resilient concepts as a guiding principle for designing new development in hazardous areas (Stevens, Berke, & Song, 2010)
	Building Code Standards	BCS	Building code standards are promoted and address hazards faced by the locality	Building standards enables effective regulation to reduce disaster risk and significantly decreases disaster losses (Krimgold, 2011)
5. Ecosystem Protection	Awareness and Understanding of Ecosystem Services	AUES	Understands the functions of natural ecosystems within the city and how they contribute to mitigating disaster risks	Ecosystems play a crucial role in the DRR context with growing evidence of their relevance and effectiveness (Sebesvari et al., 2019)
	Promotion of Green Infrastructure	PGI	Active promotion of green infrastructure on urban development	Green infrastructure can be a viable component of disaster risk management programs and deliver multiple benefits to achieve environmental and social goals (Browder, Gartner, Lange, Ozment, & Rehberger Bescos, 2019)
6. Institutional Capacity	Skills and Experience	SE	Existence of a dedicated technical staff of DRR professionals	Human resources for disaster risk reduction require significant investments in recruiting competent personnel or by providing existing staff with relevant technical, planning, and management training (Twigg, 2015)
	Training Delivery	TD	Describes a training program for the city's DRR professionals which is regularly conducted and reviewed	Regular training and workshops are better ways of developing skills and knowledge as opposed to one-off training sessions (Twigg, 2015)
	City-to-City learning	CCL	Facilitates knowledge-sharing with other cities facing similar challenges	City-to-city learning offers several advantages such as accelerated transfer of knowledge and experience, joint knowledge creation, empowerment of local governments, etc. (Ilgen, Sengers, & Wardekker, 2019)
7. Societal Capacity	Community Participation	CPE	Local community networks are identified and	Active public engagement and participation is a crucial part of the success of disaster

and Empowerment			empowered as partners in DRR initiatives and activities	management policies and programs and is of profound significance to disaster risk reduction efforts (Abunyewah, Gajendran, Maund, & Okyere, 2020)
	Capacity-building Programs for Vulnerable Sectors	CPVS	Espouses the "leave no one behind" mindset and conducts regular training programs for the most vulnerable populations in the city	Empowering the most vulnerable social groups in the disaster management process coupled with the support of the least vulnerable are crucial to successful implementation of disaster management activities. (Tanwattana, 2018)
	Public Awareness and Education Programs	PAEP	Promotes DRR awareness and education campaigns for its citizens	A culture for disaster awareness is essential for disaster governance while low awareness hinders disaster risk reduction efforts. (Valenzuela, Esteban, Takagi, Thao, & Onuki, 2020)
8. Infrastructure Protection	Critical Infrastructure Review	CIR	Identifies measures for the protection of critical infrastructure such as schools, hospitals, and road networks in disaster planning	Examining elements at risk such as critical infrastructures promotes effective risk reduction and climate change adaptation. Spatial indicators such as land use, road network, location of schools and hospitals, etc. should be available (Birkmann, 2013)
	Protective Infrastructure	PI	Identifies measures to provide and maintain protective infrastructure such as dikes, levees, spillways, etc.	Construction of protective infrastructure and also protecting critical infrastructure available is crucial to decrease the risk of disasters (Malalgoda, Amaratunga, & Haigh, 2014) Ensuring protective or risk mitigating infrastructure such as flood defenses is critical to reducing the creation of risks from hazards and impacts of climate change (UNISDR, 2017)
	Continuity of Infrastructure and Essential Services	CIES	Identifies emergency plans for restoration of essential infrastructure and services (e.g., electricity, water, communication)	Continuity of essential services such as electricity and water supply is essential for modern resilient societies (van der Merwe, Biggs, & Preiser, 2018)

9. Preparation and Response	Early Warning System	EWS	Identifies measures to provide and maintain a multi-hazard early warning and communication system	Early warning systems (EWS) play a pivotal role in significantly decreasing the loss of lives and livelihoods due to hazards and disasters (Cowan, O'Brien, & Rakotomalala-Rakotondrandria, 2014)
	Emergency Response System	ERS	Existence of emergency response system that takes into account all responsible actors in the event of a disaster	Establishing a robust emergency response system is important in vulnerable contexts and may help in reducing the impacts of disasters (Rahman, Khan, & Shaw, 2015)
10. Recovery	Post-disaster Recovery Plan	PRP	A process for post-disaster recovery involving post-disaster needs assessment and reconstruction is in place	The recovery plan, which seeks to reduce future risk and facilitates post-disaster recovery, is an essential element of risk reduction. (Shaw, 2014)
	Disaster Survivor Participation	DSP	Focuses attention on the needs of survivors and affected population and promotes their participation in decision-making process for recovery	Including disaster victims in the decision-making process as opposed to participation through selected stakeholders complements government reconstruction efforts (Otsuyama & Shaw, 2021)

4.3.4 Scoring Criteria

Each LDRRMP was scored against the outlined criteria using a three-point scale, where '0' indicates that the criterion is not mentioned or present in the LDRRMP at all, '1' indicates the criterion is mentioned without sufficient detail or elaboration to ascertain its relevance or priority in the LDRRMP, and '2' indicates the criterion is mentioned and detailed in its scope and elaboration to assert its relevance or priority in the LDRRMP. The average scores were recorded for each thematic area and classified as follows:0-50% = Poor Integration, 51-79% = Weak Integration, and 80-100% = Strong Integration. For the purposes of this study, scores were not for ranking, but to identify the extent of integrating disaster resilience elements into local development plans and areas for improvement. To address weaknesses in

thematic content analysis, such as possible inconsistency and lack of coherence, this study adopted a three-stage process. In the first stage, all the authors discussed the criteria for scoring and pre-tested the documents by sharing individual textual interpretations. The second stage involved running the documents through the evaluation process, and the inconsistencies were clarified and reconciled through discussions between the authors. For the third and final stages of the process, disaster risk management practitioners sought to provide further clarification and alignment across the results of the analyses.

4.4 Results
4.4.1   Governance

An essential component towards achieving the goal of a resilient city is competent and robust disaster governance. Policies and institutional frameworks provide competent guidance for decision-making and disaster risk reduction actions. Metro Manila LGUs in this regard performed well across the LDRRMPs reviewed where 9 out of 11 had a strong integration rating (Table 4.3). The plans typically reference international accords, such as the Hyogo Framework of Action and the Sendai Framework for Disaster Risk Reduction, as well as the national legislation on DRR and the National DRRMP. This was reflected in the plans' explicit mention of legislative frameworks and emphasis on organizational structure and multi-sectoral approaches. Quezon City's LDRRMP emphasizes the importance of this thematic area, as follows:

> "The full implementation of the DRRMP would require sustained attention, institutional commitment, detailed planning, significant investments, multi-sectoral and multi-stakeholder partnerships, and adequate competencies (Quezon City DRRMO, 2013, p. 14)"

The two LGUs with weak ratings in the criterion relating to multi-sectoral relationships were Navotas City and San Juan City. Navotas City briefly touches on the concept of a multi-sectoral approach by listing representatives from different sectors in its DRRM Council, with no further details regarding their specific roles and capacities. San Juan City acknowledges "the [city] government's limited

funding capacity" and mentions that the "national government, the civil society, and the private sector are expected to play a significant role in supporting the funding of disaster risk reduction measures" but falls short of outlining the means and the specific actors or stakeholders involved (San Juan City DRRMO, 2017, p. 62).

In contrast, Parañaque City's LDRRMP shows a priority to *"develop, strengthen and operationalize mechanisms for partnership or networking with the private sector, CSOs, and volunteer groups"* with specific targets and implementation periods such as the creation and maintenance of a database of key actors and stakeholders and the formulation of coordination mechanisms guidelines for partnership arrangements (Parañaque City DRRMO, 2020, pp. 21, 86–87).

4.4.2   Risk Identification

Having a clear understanding of hazard risks enables cities to plan meaningful disaster risk reduction measures. Risk assessments and analyses lead to better-informed decision making, project prioritization, and planning for risk reduction measures. This was observed in all the LGUs that have a high degree of awareness of the natural hazards they are faced with, likely due to the numerous studies, such as the one by JICA in 2004 and the UNDP GMMA Project in 2012, which highlighted the high level of risk in Metro Manila. In addition, all LGUs had Geographic Information System (GIS)-based hazard maps produced from these studies. Some LGUs, such as Pasig City, had even partnered with DRR specialist organizations such as Earthquakes and Megacities Initiative to *"generate significant amount of consolidated hazard, vulnerability, risk and capacity data, as well as in-depth understanding of the arrangements, plans, and experiences of the city to manage and prepare for disasters"* (Pasig City DRRMO, 2017, p. 3) and further deepened their disaster risk knowledge with additional scientific information and analysis.

However, Navotas City's plan, out of eleven LDRRMPs examined, had a weak rating because its data on risk scenarios and disaster impacts were limited to historical data with no consideration for future probable scenarios (Table 4.4).

4.4.3 Financial Considerations

Proper funding and dedicated resources for disaster risk reduction allow local governments to carry out their plans. The integration of the thematic area of financial considerations was generally strong with seven LGUs (Table 4.5). For example, Pateros garnered a perfect score with its innovative means of optimizing resources through "DRRM groupings" and specified additional funding sources as well as "six-year financial projections" (Pateros DRRMO, 2018, pp. 9, 160) in addition to its ring-fenced budget and contingency fund for DRR. Muntinlupa City describes the "proposed programming of the city DRRM Fund, other dedicated DRRM resources, and other regular funding sources and budgetary support of the MCDRRMO, and lists in detail the other sources of funding (Muntinlupa City DRRMO, 2017, pp. 80–81).

As mandated by the DRR law of 2010, each LGU was required to maintain a DRRM fund as well as a "Quick Response Fund" for emergency purposes. As such, the performance in the ring-fenced budget and contingency fund criteria among LGUs was generally high. LGUs that were rated weak and poor included Las Piñas City, Caloocan City, Quezon City, and Mandaluyong City, which have ineffective or no funding schemes (Table 4.5).

4.4.4 Urban Development

Pre-emptive measures help avoid significant disruption and incapacitation of infrastructure, which causes severe social, health, and economic consequences. The thematic area of urban development, which calls for resilient urban development, land-use zoning, and building code standards, showed mixed results across the 11 LGUs. Overall, four LGUs showed strong integration, 3 LGUs showed weak integration, and 4 LGUs showed poor integration (Table 4.6). Parañaque City LGU, which scored 100% as part of its push for resilient infrastructure, stated:

> "Application for construction permit of new residential and high-rise buildings require the strict compliance of the National Building Code and the Green Building Code for sewage treatment plant, sanitation standards, fire safety measures, flood mitigation measures and earthquake safety measures" (Parañaque City DRRMO, 2020, p. 65). Additionally, the plan identifies a "new localized building code" as part of city measures to ensure that building projects

are sensitive to disaster risk reduction and contribute to climate change adaptation.

On the contrary, Navotas City and Mandaluyong City scored 0% overall and showed no conceptualization or prioritization for any of the criteria under this thematic area. Caloocan City and Las Piñas City both scored 16.7% overall. Caloocan City's LDRRMP mentions "disaster and climate change-resilient infrastructure" in passing with no further specifics towards their implementation (Caloocan City DRRMO, 2020, p. 104).

4.4.5   Ecosystem Protection

Ecosystems, as shown in multiple studies, provide a multitude of co-benefits, one of which is the provision of protective buffers against natural hazards. However, LGUs in Metro Manila still need to be improved, as the analysis showed that the majority of the LGUs performed poorly in the thematic area of ecosystem protection. Overall, 8 LGUs out of 11 LGUs showed poor integration, while one LGU showed weak integration (Table 4.7). Navotas City scored highly in the awareness and understanding of ecosystem services criterion with its recognition and preservation efforts of its mangrove ecosystem but fell short in the promotion of green infrastructure criterion due to its linear parks development program being secondary to its informal settler clearing project, leading to its weak rating.

In addition, three LGUs showed no indication for both criteria outlined in this thematic area. These results are troubling considering the importance of ecosystems in DRR. Only Makati City and Parañaque showed strong integration for the thematic area, with each LGU explicitly mentioning the important role of ecosystems in reducing risks from natural hazards in their respective LDRRMP. Makati City's LDRRMP notes:

> "Healthy natural ecosystems will serve as buffer for impacts of disasters and climate change and serve as foundation to avoid trigger of impact chain to other sectors especially on social sector that may impact exposure of vulnerable population to health risks (e.g., communicable

diseases and toxic and hazardous exposure) (Makati City DRRMO, 2019, p. 28)."

4.4.6 Institutional Capacity

A well-trained and competent institutional component provides strong guidance for the DRR efforts of local governments. However, this remains a challenge for most LGUs in Metro Manila, as most LGUs showed weak integration for this thematic area. Based on the analysis, eight LGUs performed well with the criteria for skills, experience, and training delivery, but scored poorly with the city-to-city learning criterion (Table 4.8). For example, San Juan City provided a detailed breakdown of budget allocation and fund sourcing towards training and enhancement of human resources as well as a projected timeline for their completion, which led to high scores in the skills, experience, and training delivery criteria. Its overall performance is affected by the lack of inclusion of city-to-city learning in its LDRRMP. The absence of prioritization and conceptualization of city-to-city learning in all LGUs is problematic, as the Sendai Framework specifically highlights knowledge-sharing and peer learning at the local level as a priority.

4.4.7 Societal Capacity

Participation in an active citizenry is a key component of the disaster risk reduction process. Awareness, education, and capacity-building programs help to build stronger and well-equipped communities. Analysis of the data showed that 7 LGUs out of 11 showed strong integration for this thematic area (Table 4.9). For instance, Las Piñas City's LDRRMP exhibited prioritization for, and described in detail, its commitment to empowering communities and providing capacity-building programs for vulnerable groups. The plan also identifies vulnerable sectors and indicates measures to mitigate the impact of disasters on these sectors. One of the plan's objectives specifies, "to build capacities particularly of the vulnerable sectors to manage and reduce hazard impacts" (Las Piñas City DRRMO, 2019, p. 65). It also had a unique population database, where data were rich in the vulnerable population (i.e., women, children, and the elderly). It also specifies capacity-building projects with outlined budgets and timeframes.

In addition, two LGUs (San Juan City and Parañaque City) showed weak integration, while another two (Navotas City and Caloocan City) showed poor integration in this thematic area. Navotas City and Caloocan City score highly in the criteria for community participation and empowerment, and public awareness and education programs, but tend to fare poorly in considering the building of the capacity of its most vulnerable social groups.

4.4.8 Infrastructure Protection

Consideration of vital infrastructure such as health facilities, schools, and road networks is of paramount importance in the event of a disaster, as they provide essential social services and enable mobility and safety nets (Birkmann, 2013). Therefore, it is necessary to pay special attention to protecting such facilities. The performance for this thematic area was strong in general, with eight LGUs showing strong integration (Table 4.10). Parañaque City's LDRRMP, in particular, showed strong integration for this thematic area by identifying and mapping critical infrastructure, as well as a detailed breakdown of projects relating to protective infrastructure and the restoration of essential services. Mandaluyong City provides in its objectives: "To ensure road accessibility and restore necessary utilities the soonest possible time" and specifies a lead agency as well as support agencies and a detailed flow of coordination between them (Mandaluyong City DRRMO, 2017, p. 31).

Navotas City showed weak integration, whereas Caloocan City and San Juan City showed poor integration (Table 11), where these elements were either mentioned in passing or not mentioned at all.

4.4.9 Preparation and Response

Preparedness efforts and early warning systems ensure that communities and individuals under the threat of natural hazards can act appropriately in a timely manner to prevent loss of life and reduce damage to property. Overall, 8 out of the 11 LGUs showed strong integration of the thematic area of disaster preparation and response. In addition, two LGUs showed weak integration, while one LGU showed poor integration in this thematic area (Table 4.11). Most LGUs had established early warning and emergency response systems, which were reflected in their respective

LDRRMPs. Navotas City did not feature early warning systems in its LDRRMP and only briefly mentioned its emergency response program, with no further details to determine its priority or relevance.

4.4.10 Recovery

Having a well-planned and participatory recovery and reconstruction process facilitates the ability of a city to re-activate itself and recover from the effects of a disaster. Unfortunately, all the 11 LGUs evaluated showed poor integration in the thematic area of recovery (Table 4.12). This is partly due to the notable absence of participatory processes for disaster survivors during the post-disaster recovery phase. While most LGUs have detailed post-disaster recovery plans, these are mostly top-down approaches, where there is no opportunity for disaster-affected communities to provide input for their mode of recovery and rehabilitation. In the case of Navotas City, the concept of "build back better" is mentioned in passing under its disaster rehabilitation and recovery section, with no further details or actions outlined to pursue its realization (Navotas City DRRMO, 2020, p. 63).

Figure 4.4 shows the radar diagrams produced for each LGU. Each radar diagram for the LGU shows a pictorial representation of its performance for each thematic area. An overview of each LGU's strengths and weaknesses can be drawn from the radar diagrams and can aid in comparing and contrasting LGUs.

Table 4.3

LGU scores for the thematic area of governance

LGU	PLDRR	OS	MR	Total	Score (%)	Rating
Pasig City	2	2	2	6	100	Strong
Pateros	2	2	1	5	83.3	Strong
Navotas City	2	1	1	4	66.7	Weak
Makati City	2	2	2	6	100	Strong
Las Piñas City	2	2	2	6	100	Strong
Caloocan City	1	2	2	5	83.3	Strong
Quezon City	2	2	2	6	100	Strong
Mandaluyong City	1	2	2	5	83.3	Strong
Muntinlupa City	2	2	2	6	100	Strong
San Juan City	1	2	1	4	66.7	Weak
Parañaque City	2	2	2	6	100	Strong

Table 4.4

LGU scores for the thematic area of risk identification

LGU	HM	RSP	DIA	Total	Score (%)	Rating
Pasig City	2	2	2	6	100	Strong
Pateros	2	2	2	6	100	Strong
Navotas City	2	1	1	4	66.7	Weak
Makati City	2	2	2	6	100	Strong
Las Piñas City	2	2	2	6	100	Strong
Caloocan City	2	2	2	6	100	Strong
Quezon City	2	2	2	6	100	Strong
Mandaluyong City	2	1	2	5	83.3	Strong
Muntinlupa City	2	2	2	6	100	Strong
San Juan City	2	2	2	4	100	Strong
Parañaque City	2	2	2	6	100	Strong

Table 4.5

LGU scores for the thematic area of financial considerations

LGU	RFB	IFS	CF	Total	Score (%)	Rating
Pasig City	2	2	2	6	100	Strong
Pateros	2	2	2	6	100	Strong
Navotas City	2	1	2	5	83.3	Strong
Makati City	2	2	1	5	83.3	Strong
Las Piñas City	2	0	2	4	66.7	Weak
Caloocan City	2	0	0	2	33.3	Poor
Quezon City	2	0	2	4	66.7	Weak
Mandaluyong City	2	0	2	4	66.7	Weak
Muntinlupa City	2	2	2	6	100	Strong
San Juan City	2	1	2	5	83.3	Strong
Parañaque City	2	2	2	6	100	Strong

Table 4.6

LGU scores for the thematic area of urban development

LGU	RLUZ	RUD	BCS	Total	Score (%)	Rating
Pasig City	2	2	2	6	100	Strong
Pateros	2	2	0	4	66.7	Weak
Navotas City	0	0	0	0	0	Poor
Makati City	2	2	2	6	100	Strong
Las Piñas City	1	0	0	1	16.7	Poor
Caloocan City	0	1	0	1	16.7	Poor
Quezon City	2	2	2	6	100	Strong
Mandaluyong City	0	0	0	0	0	Poor
Muntinlupa City	2	0	2	4	66.7	Weak
San Juan City	0	2	2	4	66.7	Weak
Parañaque City	2	2	2	6	100	Strong

Table 4.7

LGU scores for the thematic area of ecosystem protection

LGU	AUES	PGI	Total	Score (%)	Rating
Pasig City	1	1	2	50	Poor
Pateros	2	0	2	50	Poor
Navotas City	2	1	3	75	Weak
Makati City	2	2	4	100	Strong
Las Piñas City	1	0	1	25	Poor
Caloocan City	1	0	1	25	Poor
Quezon City	0	1	1	25	Poor
Mandaluyong City	0	0	0	0	Poor
Muntinlupa City	0	0	0	0	Poor
San Juan City	0	0	0	0	Poor
Parañaque City	2	2	4	100	Strong

Table 4.8

LGU scores for the thematic area of institutional capacity

LGU	SE	TD	CCL	Total	Score (%)	Rating
Pasig City	2	2	0	4	66.7	Weak
Pateros	1	2	0	3	50	Poor
Navotas City	1	2	0	3	50	Poor
Makati City	2	2	0	4	66.7	Weak
Las Piñas City	2	2	0	4	66.7	Weak
Caloocan City	1	2	0	3	50	Poor
Quezon City	2	2	0	4	66.7	Weak
Mandaluyong City	2	2	0	4	66.7	Weak
Muntinlupa City	2	2	0	4	66.7	Weak
San Juan City	2	2	0	4	66.7	Weak
Parañaque City	2	2	0	4	66.7	Weak

Table 4.9

LGU scores for the thematic area of societal capacity

LGU	CPE	CPVS	PAEP	Total	Score (%)	Rating
Pasig City	2	2	2	6	100	Strong
Pateros	2	2	2	6	100	Strong
Navotas City	1	0	2	3	50	Poor
Makati City	2	2	2	6	100	Strong
Las Piñas City	2	2	2	6	100	Strong
Caloocan City	0	0	2	2	33.3	Poor
Quezon City	2	2	2	6	100	Strong
Mandaluyong City	1	2	2	5	83.3	Strong
Muntinlupa City	2	2	2	6	100	Strong
San Juan City	2	0	2	4	66.7	Weak
Parañaque City	2	0	2	4	66.7	Weak

Table 4.10

LGU scores for the thematic area of infrastructure protection

LGU	CIR	PI	CIES	Total	Score (%)	Rating
Pasig City	2	2	1	5	83.3	Strong
Pateros	2	2	1	5	83.3	Strong
Navotas City	2	2	0	4	66.7	Weak
Makati City	2	2	2	6	100	Strong
Las Piñas City	2	2	2	6	100	Strong
Caloocan City	0	0	1	1	16.7	Poor
Quezon City	2	2	2	6	100	Strong
Mandaluyong City	2	1	2	5	83.3	Strong
Muntinlupa City	2	2	2	6	100	Strong
San Juan City	0	0	2	2	33.3	Poor
Parañaque City	2	2	2	6	100	Strong

Table 4.11

LGU scores the thematic area of preparation and response

LGU	EWS	ERS	Total	Score (%)	Rating
Pasig City	2	2	4	100	Strong
Pateros	2	2	4	100	Strong
Navotas City	0	1	1	25	Poor
Makati City	2	2	4	100	Strong
Las Piñas City	2	2	4	100	Strong
Caloocan City	1	2	3	75	Weak
Quezon City	2	2	4	100	Strong
Mandaluyong City	1	2	3	75	Weak
Muntinlupa City	2	2	4	100	Strong
San Juan City	2	2	4	100	Strong
Parañaque City	2	2	4	100	Strong

Table 4.12

LGU scores for each criterion under the thematic area of recovery

LGU	PRP	DSP	Total	Score (%)	Rating
Pasig City	2	0	2	50	Poor
Pateros	2	0	2	50	Poor
Navotas City	1	0	1	25	Poor
Makati City	2	0	2	50	Poor
Las Piñas City	2	0	2	50	Poor
Caloocan City	2	0	2	50	Poor
Quezon City	2	0	2	50	Poor
Mandaluyong City	2	0	2	50	Poor
Muntinlupa City	2	0	2	50	Poor
San Juan City	2	0	2	50	Poor
Parañaque City	2	0	2	50	Poor

PLDRR – Policies and Legislation for DRR
OS – Organizational Structure
MR – Multi-sectoral Relationships
HM – Hazard Maps
RSP – Risk Scenario Projections
DIA – Disaster Impact Assessment
RFB – Ring-fenced Budget for DRR
IFS – Innovative Financing Schemes
CF – Contingency Fund
RLUZ – Risk-sensitive Land Use Zoning
RUD – Resilient Urban Development
BCS – Building Code Standards
AUES – Awareness and Understanding of Ecosystem Services
PGI – Promotion of Green Infrastructure
SE – Skills and Experience
TD – Training Delivery
CCL – City-to-City Learning
CPE – Community Participation and Empowerment
CPVS – Capacity-building Programs for Vulnerable Sectors
PAEP – Public Awareness and Education Programs
CIR – Critical Infrastructure Review
PI – Protective Infrastructure
CIES – Continuity of Infrastructure and Essential Services
EWS – Early Warning System
ERS – Emergency Response System
PRP – Post-disaster Recovery Plan
DSP – Disaster Survivor Participation

Figure 4.4 Radar graphs of 11 LGUs' performance for the ten thematic areas

4.5 Findings

This chapter sought to evaluate the extent to which disaster resilience attributes, as stipulated in the UNDRR framework, are integrated into the local disaster risk reduction plans of 11 LGUs in Metro Manila. Integrating resilience into local plans remains a major policy concern because of the ramifications for building adaptation and fostering sustainable transformations at the community level in vulnerable contexts, where the battle for resilient societies could be won or lost. In this section, the findings related to strengths, weaknesses, and gaps are discussed.

4.5.1 Strengths

The results indicate that elements under the thematic areas of governance, risk identification, financial consideration, societal capacity, preparation, and response have strong integration across cities in Manila. For example, all 11 cities scored very well in terms of having a legislative framework and policies for DRR, which is attributed to both the history of exposure to disasters and national-level stringent disaster management laws enacted in 1978 and 2010 (Balgos, 2014). This finding aligns with previous research that indicates that Global South cities with high levels of exposure to major disasters, such as those in South Africa, Indonesia, and the Philippines, often develop disaster risk reduction legislation and policies to enhance their resilience (Llosa & Zodrow, 2011). For local disaster resilience planning, such legislative frameworks are integral to providing legal support and guidelines for local government units to integrate disaster risk reduction into local development planning (Botha & Van Niekerk, 2013; Pelling & Holloway, 2006).

Similarly, the results also show that LGUs were quite competent in terms of risk identification, especially with regard to the awareness of hazards, where it was observed to be well integrated across all LGUs. In addition, all LGUs utilized GIS to show the spatial distribution of natural hazards and disaster impacts. In the Global South context, this finding contrasts with recent studies in disaster-prone cities such as Accra, Dhaka, and Ekurhuleni, where the lack of integration of geographic information systems is considered to impede disaster risk reduction efforts, thereby forestalling local planning efforts towards community disaster resilience. (Abunyewah et al., 2022; Fatemi et al., 2020; Musakwa, 2017). In the case of the LGU, the use of GIS is significant because such geographically embedded data of

hazard-prone areas could enhance the local decision-making capacity to critically appraise and respond to disasters (Cadag & Gaillard, 2012). However, such geographic tools should not supplement local indigenous disaster risk knowledge to provide avenues for co-learning and co-design in disaster resilience planning (Hiwasaki, Luna, Syamsidik, & Shaw, 2014).

Seven out of the 11 LGUs showed strong performance in the thematic area of financial considerations. Among these LGUs, Pateros stands out because of its strong performance, despite being limited in resources compared to all other LGUs (COA, 2020). It is perhaps precisely due to this limitation that Pateros has explored in its plans to crowdsource financial resources, pool personnel, and volunteers, as well as seek outside sources of funding to supplement their DRRM budget. In this case, Caloocan City, the lowest performing LGU in this thematic area, may benefit from examining Pateros' example linking and resource pooling strategies for disaster risk reduction. This further reinforces the need for peer learning and coordination among LGUs in Metro Manila through shared platforms that open opportunities for city-to-city learning.

4.5.2   Weaknesses

The study also revealed weaknesses in urban development and institutional capacity. Integrating disaster resilience planning into urban planning is important for dealing with other shocks and stresses at the local level, given that the impacts of disasters are localized (UNISDR, 2015). However, in the context of Metro Manila, findings indicate that only a handful of cities, such as Pasig City, Makati City, Quezon City, and Parañaque City, have integrated resilient land use zoning. These cities have partnered with experts in the field of DRRM to formulate their LDRRMP and, as a result, have produced a plan based on current DRRM practices and standards. On the other hand, some cities, such as Navotas City and San Juan City, did not have human resource capacity or financial capital to seek external expertise for the design and formulation of the DRRMP (Navotas City DRRMO, 2020; San Juan City DRRMO, 2017). This impedes their ability to incorporate resilience concepts into urban planning in the majority of LGUs in Metro-Manila. This suggests that there is a prevalent tendency for development to continue without assessing its impact on aggravating disaster risks (Malalgoda et al., 2014). This also

lends credence to recent suggestions for a system framing urban resilience, where disaster risk reduction becomes a core component of urban development planning (Pizzo, 2015).This implies the need for coordinated, integrated, and intersectoral workings among various stakeholders at the local level (Pasquini, Ziervogel, Cowling, & Shearing, 2015).

4.5.3   Gaps

The results also showed two significant gaps in the integration of disaster resilience attributes at the local level. All LGUs performed poorly in terms of the criteria for disaster survivors' participation in recovery plans. In particular, the plans did not mention active engagement in post-disaster planning and recovery. This situation is clearly at odds with the ongoing discourse on resilience in international frameworks (for example The Sendai Framework, SDGs, New Urban Agenda, etc.) and disaster scholarship that underscores the critical need to actively engage disaster survivors in post-disaster decision-making and recovery strategies to ensure that affected populations do not only recover but 'bounce forward' in their resilient capacities (Meerow et al., 2016; Nakhaei, Khankeh, Masoumi, Hosseini, & Parsa-Yekta, 2016). Consequently, there is a need to learn from the existing practices in Kesennuma, Japan, where the direct participation of survivors has aided recovery and rebuilding for both people and their spatial settings (Otsuyama & Shaw, 2021). Such experiences call for rethinking the praxis of disaster recovery in the local disaster management planning process to uphold the agency of disaster victims and centralize their needs and perspectives.

Second, there is troubling inattention to ecosystem protection as a disaster risk-reduction measure in all LGUs. Specifically, the results showed that all LGUs, with the exception of Makati City and Parañaque City, performed poorly in the thematic area of ecosystem protection. Makati City's exceptional performance in this thematic area, and other thematic areas in general, may be attributable to its membership in urban resilience networks, such as Making Cities Resilient 2030 and CITYNET Yokohama (CITYNET Yokohama, 2018; DILG, 2021). Moreover, Makati City consistently ranks among the richest of the Metro Manila LGUs, which would significantly bolster their budgets for DRR programs (CNN Philippines, 2021). Parañaque City also performed well in this thematic area due to its

geographical context, being a coastal city with access to critical ecological systems such as mangrove forests. This awareness of its socio-ecological system is reflected in the LDRRMP. The deficiency in the other nine LGUs is particularly concerning, given the evidence on the role of ecosystem protection measures (EPM) in fostering disaster resilience both at the national and local levels (Browder et al., 2019; Sebesvari et al., 2019). In the context of EPM, Nature-based Solutions (NbS) offer a useful socio-ecological approach for city authorities to enhance disaster resilience, while addressing other development challenges that affect adaptive capacities (Young et al., 2019). Here lies the potential of NbS as an important approach for local governments to explore the theme of ecosystem protection for disaster resilience, action planning, and interventions. Examples in Southeast Asian contexts include the construction of urban wetlands, promotion of open green spaces in Bangkok, Thailand, and preservation of mangrove forests in Vietnam (World Bank, 2021). Therefore, there is a need for cities in Metro Manila to learn about and integrate nature-based solutions in their planning.

The study's findings indicate that opportunities for inter-city learning are not being harnessed, as all LGUs omit city-to-city learning in their LDRRMP. Disaster risks and vulnerabilities are transboundary, extending beyond administrative boundaries, and call for inter-city/municipality coordination to respond to disaster risks. The absence of city-to-city learning is a missed opportunity to share resources and knowledge, increase learning capacity, reinforce local networks, and empower local governments (Ilgen et al., 2019). This finding suggests that metropolitan-level coordination is needed to promote intercity learning and cooperation through exchange platforms. It is important to examine the importance of bonding relationships between Metro Manila LGUs to define and strengthen their actual working relationships and formal protocols (Aspiras, 2022).

4.6 Conclusion

This chapter set out to analyze and examine the integration of resilience themes in local disaster risk reduction plans and thereafter identify their strengths, weaknesses, and gaps that need to be addressed. Drawing on useful frameworks for thematic content analysis, our study showed that across the 11 LGUs' LDRRMPs, the thematic areas of governance, risk identification, financial considerations, societal capacity, and

preparation and response showed a strong integration of resilience. The results for urban development, institutional capacity, and infrastructure protection show weak integration. Ecosystem protection and recovery proved to be areas with poor integration of resilience.

Based on these findings, this chapter presents three main implications for improving disaster risk reduction planning from the perspective of the content and integration of important attributes to guide better strategies and implementation practices. First, there is an urgent need to strengthen the mandate of the current meso-level authority in the Metropolitan Manila Development Authority as a coordinating body to promote inter-city learning and cooperation by creating exchange platforms (e.g., information, tools, resources, etc.) with respect to disaster planning and management. Second, city authorities' understanding of NbSs should be enhanced to promote appreciation and integration into the disaster management planning process, which might entail bringing specific actors together, such as policy makers, urban planners, disaster managers, ecologists, development professionals, engineers, and architects. Finally, city-level disaster professionals should expand participation avenues in the disaster recovery phase by encouraging and creating platforms for the active engagement of disaster victims in the recovery process. Here, rethinking the current post-disaster recovery strategies and shifting to a more inclusive and bottom-up approach is warranted.

In conclusion, given the limitation that this is a content analysis of text contained within the plans and based on a subjective assessment of attributes, it provides an opportunity for future research to empirically investigate concrete projects in cities to ascertain the extent of resilience consideration. Despite these limitations, the findings of this chapter should provide important pointers on the weaknesses and gaps in local plans that need to be addressed as part of efforts aimed at improving local disaster reduction management and eventually building resilience at the city level.

Chapter 5

Community Resilience Assessment

5.1. Introduction

This chapter provides an overview of the study area, Manggahan LRB project. It also investigates the attributes of the community that contribute or influence its resilience.

5.1.1   Overview of Community Resilience

Extant studies conducted at the national and regional levels seem inadequate for resilience analysis at the local level (Frazier et al., 2013). In addition, Keating et al. (Keating et al., 2017) noted that few community disaster resilience measurement frameworks have been implemented in the field, with no empirical validation.

Measuring resilience at different spatial scales to understand contextual situations, develop interventional strategies to mitigate disaster impacts, and strengthen communities' ability to recover from and successfully adapt to adverse events is a key aspect of the resilience agenda. Over the years, the concept of resilience has extensively evolved across many disciplines, including disaster management (Graveline & Germain, 2022; Manyena, 2006). The etymological and conceptual changes in the concept have resulted in a proliferation of disaster-resilience assessment tools and indexes with different indicators (Marzi et al., 2019). For instance, the place-based composite resilience indices illustrate the important facets of resilience (Cutter et al., 2014). In addition, the baseline resilience indicators for community resilience (BRIC), the community disaster-resilience index (CDRI), Foster's resilience-capacity index (RCI), and the disaster resilience of place (DROP) are employed to measure resilience at the provincial level (Bakkensen, Fox-Lent, Read, & Linkov, 2017; Cutter et al., 2008; Gao, Barzel, & Barabási, 2016; Peacock, 2010). All these resilience assessment tools have a similar objective of equipping communities to proactively adapt to, cope with, and thrive in the face of disaster events (Jiang et al., 2022; Khazai et al., 2015). However, each assessment tool has its limitations.

According to Dianat et al. (Dianat, Wilkinson, Williams, & Khatibi, 2022), most resilience-assessment tools do not measure all attributes of resilience. Marzi et al. (Marzi, Mysiak, & Santato, 2018) indicated that using a composite-index

approach provides a clear picture only at the higher administrative levels and neglects the inherent variability of performance at the lower levels. Most importantly, the BRIC was developed considering context-specific issues in the United States, which makes generalization and application to Global South cities difficult (Cutter, Burton, & Emrich, 2010; Frazier et al., 2013). Global South cities are characterized by informal settlements, defined as areas with locational characteristics that include flood-prone areas, poor infrastructure, and low socio-economic profiles (Abunyewah et al., 2018; Okyere & Kita, 2015). Even though informal settlements are a major hotspot for disaster, few resilience assessment tools apply to this context. One resilience assessment tool that considers informal settlement characteristics is the Resilience Assessment Benchmarking and Impact Toolkit (RABIT) framework. The RABIT framework was developed based on an informal context of disaster vulnerability and works within the data and skill-set limitations in informal areas (Haley et al., 2021). This study, therefore, employs the RABIT framework in a low-income resettled housing community to ascertain its resilience. Specifically, it seeks to understand from a localized informal context and with reference to the dimensions of the RABIT framework which areas are contributing better to the community's resilience and where improvements are needed to enhance resilient capacities and futures.

5.1.2   RABIT Framework

The RABIT framework was conceptualized and developed by researchers from the University of Manchester to tackle the issues of knowledge gaps from current resilience measurement tools. It was designed to address the lack of robust tools for measuring the baseline metrics of resilience and the evaluation of the impact of development interventions on the level of resilience (A. Ospina & Heeks, 2016). The framework was designed specifically with the context of developing countries in mind. It also offers a holistic and in-depth understanding of resilience at the community level (A. V. Ospina, Heeks, Camacho, et al., 2016).

Ospina and Heeks (A. Ospina & Heeks, 2016) identified eight attributes as properties that communities have to a lesser or greater degree (see Table 5.1). These include robustness, self-organization, and learning, considered core characteristics of resilient systems, and referred to as foundational attributes. The other five

characteristics are redundancy, rapidity, scale, diversity and flexibility, and equality, which are enabling attributes and facilitate the operationalization of the foundational attributes (A. Ospina & Heeks, 2016). The framework has already been piloted in two separate case studies involving marginalized communities in Africa and Latin America (Haley et al., 2021; A. V. Ospina, Heeks, Camacho, et al., 2016). The two pilot studies utilized a small sample size in their assessment but nevertheless yielded emergent findings that were not brought to light in previous resilience evaluations in marginalized urban communities (Haley et al., 2021). Surprisingly, the framework has yet to be used in Southeast Asia—a region that, according to the latest World Risk Report (Atwii et al., 2022), hosts some of the cities that face the highest disaster risks. In this regard, this study hopes to contribute to and extend its application in the Southeast Asian region, specifically the Philippines. More importantly, it seeks to contribute to a better understanding of community resilience and generate insights for disaster risk reduction for resilience planners and practitioners.

Table 5.1 Resilience attributes as described by the RABIT Framework

Resilience Attribute	Definition	Indicators
Robustness	The ability of a community to sustain a level of stability amid environmental shocks and disruptions	• Physical-infrastructure safety • Coordination between the community and local authorities in the area
Self-organization	The ability of a community to adjust itself and its protocols under the threat of serious disturbances without external influence	• Level of trust between community members • Collaboration networks • Trust in community leaders
Learning	The ability of the community to leverage past experiences to strengthen current skills and innovate and plan creatively for the future	• Awareness of present risks • Access to drills and training • Knowledge-sharing between members
Redundancy	The degree to which resources and functions are diversified in the event of a major emergency or disruption	• Contingency options • Diversified income sources • External support

Rapidity	The capacity of a community to act swiftly and access resources efficiently in emergency situations	• Access to early-warning systems • Swift action in response to emergency events • Immediate support from external networks during emergencies
Scale	Access to a wide range of assets and support to facilitate recovery and overcome the deleterious effects of serious disruptions	• Contact between the community and organizations or institutions that operate at a higher level • Collaborations between the community and the private and public sector • Cross-scale relationships
Diversity	Availability of a wide variety of courses of action and opportunities to the community and its ability to innovate and improvise given the circumstances	• Variety of options available to the community • Implementation of innovative methods • Perception of change as opportunity, as opposed to a threat
Equality	Degree to which the community distributes its resources and opportunities to members of the community equally	• Participation and enhanced competencies • Inclusivity and transparency
Mental Outlook	Set of attitudes, feelings, and views that shape the willingness and adaptability	• Positive mindset • Expression of hope • Adaptability or willingness to change

5.2. Study Area: The Manggahan Floodway Resettlement Project (LRB)

5.2.1 History

The Manggahan Floodway in Pasig City was constructed in 1986 to alleviate flooding in Metro Manila. Shortly thereafter, informal settlers then began occupying its embankments (Galuszka, 2020). A Supreme Court ruling in 2008 mandated the clearing of waterways that feed into Manila Bay (Doberstein et al., 2020). The catastrophic floods in the following year only served to solidify efforts to evict communities living along waterways, as the public sector looked to blame them for clogging the floodway (Alvarez, 2019; Galuszka, 2020; Maningo, 2022b).

Under the threat of eviction, 11 people's organizations (PO) formed the Alliance of People's Organizations Along Manggahan Floodway (APOAMF) in 2010 with support from a local non-government organization (NGO), Community Organizers Multiversity (COM). With the help of COM, APOAMF was able to follow through with the People's Plan, navigate the complicated and lengthy bureaucratic process, and negotiate with various state actors (Maningo, 2022b). This community-embedded process of resettlement informed the selection of the site for the case study. Specifically, the Manggahan LRB resettlement project is one of the first to employ community participation and developed along the lines of deeper engagement and dialogue with the affected residents in flood-prone areas. This provides an opportunity to empirically ascertain how so-called community-based resettlement programs shape resilient outcomes in informal settings.

Further, it needs to be mentioned that, from the government side, the project was framed around building disaster risk reduction through the resettlement (Alvarez, 2019). It is noteworthy that in spite of the seemingly successful resettlement program, there still remain some challenges, such as halted construction of the remaining buildings due to problems with the sub-contractor, the ongoing technical problems with the project's sewage treatment plant (Galuszka, 2020), and the lack of play spaces for the children in the community, which had not been planned for due to the short design phase allotted for the project (David, 2021).

5.2.2 Overview

At the time of the research fieldwork, the project had housed some 573 households. These households were resettled from the nearby east and west embankments of the floodway, which are severely vulnerable to floods (Figure 5.1). The project has a total of 15 planned buildings, of which only 10 have been completed. Each building has a total of five floors, with each floor containing 12 units. A community member is elected to serve as a representative for their building. The building representative is also supported by five leaders, each in charge of one floor. It is through this community structure that functions such as information dissemination and rule enforcement are enabled (Maningo, 2022a).

Figure 5.1: Location and aerial photograph of study area (Source: OpenStreetMaps)

The Manggahan LRB community also has an established organizational structure with committees assigned to deal with issues and concerns within the resettlement project (See Figure 5.2). A Disaster Risk Reduction (DRR) committee, for example, is tasked to facilitate DRR drills and training conducted in the community. These drills and training are provided by the local government as part of their DRR capacity-building mandate (N. T. Ner et al., 2022).
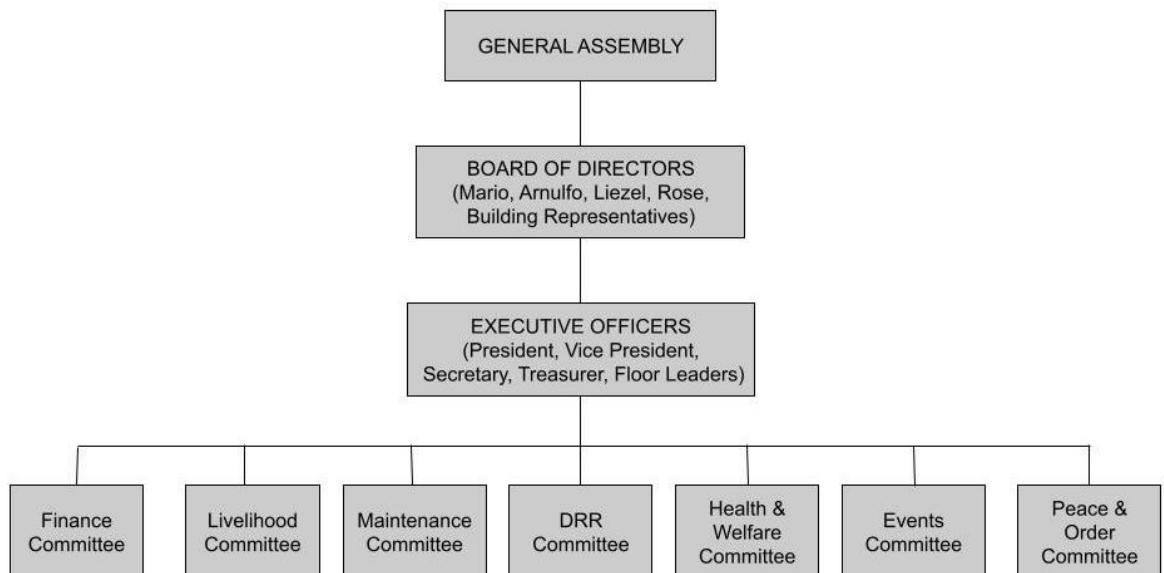
Figure 5.2 APOAMF organizational structure (Source: APOAMF)

5.3. Methodology

5.3.1. Data and Sample Collection

A validated survey instrument from Haley et al. (Haley et al., 2021), which conceives resilience as nine attributes, was adapted for this study. These resilience attributes include learning, robustness, rapidity, scale, diversity, flexibility, equality, redundancy, and mental outlook. Each attribute was measured using a Likert scale of 1–5 (1 = strongly disagree and 5 = strongly agree). This instrument provides a holistic and measurable approach to resilience and design to fit the characteristics of marginalized and informal communities—high-risk locations, high population density, and economic and political marginalization. Appendix A provides details of the instrument employed in this study.

To test the resilience of the study area to multiple hazards (typhoon, fire, flood, and earthquake), survey data were collected from 236 participants in the Manggahan LRB community in Pasig City, Philippines, using the simple random-sampling technique. The questionnaire was administered with a combination of face-to-face and pen-and-paper methods. The data field study was conducted from July to August 2022, spanning a period of 2 months. Before data collection, the researchers conducted a reconnaissance survey (5–11 July 2022) to become familiar with the topography of the study area and build a good rapport with members of the community and leaders. With the help of the community leaders, a reference group was formed to help create awareness about the study and encourage the residents to voluntarily take part. In addition, the community reference group evaluated the questionnaire and made recommendations for the structure and wording of the survey instruments. This helped to improve the readability of the questionnaire survey. The questionnaire was then pretested (12–15 July 2022) using 10 respondents who were conveniently sampled from the study area as a further step to improve and finetune the questions. Collection of survey data was conducted over the course of one month (20 July–18 August 2022).

The target sample size was determined using Slovin's formula based on the total households (573) in the community. Based on the total households, a confidence level of 95%, and a margin error of 5%, 231 households were determined to be the optimal sample size. Survey collection was implemented based on 10 clusters,

corresponding to the existing 10 low-rise buildings currently occupied in the study area and using a simple random-sampling method to select participants/households.

The questionnaire surveys employed for the study comprised three sections. The first section was made up of the inclusion criteria, participant information sheet, and consent form. The second part of the questionnaire entailed respondents' demographic information, such as gender, age, education, employment status, marital status, and monthly income. Section 3 of the survey instrument consisted of adopted questions based on the variables described in the RABIT Framework.

Semi-structured interviews were also conducted with community leaders to further add contextual and qualitative depth to the quantitative analysis. Interview questions were formulated and organized in advance. Purposive sampling method was employed to select interviewees from each cluster.

5.3.2. Case Study Demographics

The socio-demographic characteristics of the survey participants are summarized in Table 5.2. In this study, 79.2% of the respondents were females, whereas the remaining 20.8% were males. Concerning the age cohort of the sampled population, the majority, comprising 35.6%, were aged 45–54. The results also show that 52.5% of respondents were married, whereas 52.1% had secondary high school education and more than one-third were employed. Majority of the respondents were from the poor (62.3%) and low income (25.8%) economic class.

Table 5.2 Socio-demographic characteristics of survey participants

Demographic Factors	Components	Percentage (%)
Gender	Female	79.2
	Male	20.8
Age	15–24	6.8
	25–34	13.1
	35–44	22.5
	45–54	35.6
	55–64	18.2
	65$^+$	3.8
Marital status	Single	13.6
	Married	74.1
	Separated	4.2
	Widowed	8.1

	Employed	39.4
	Unemployed	16.5
Employment status	Retired	3.0
	Student	4.7
	Housewife	36.4
	Primary school/junior high school	19.9
	Senior high school	52.1
Educational background	Vocational (post-SHS)	15.7
	Tertiary (undergraduate and postgraduate)	11.4
	No formal education	0.8
	11,001–22,000 (low income)	25.8
	22,001–44,000 (lower middle income)	4.2
Level of income (PHP)	44,001–77,000 (upper middle income)	2.1
	Less than 11,000 (poor)	62.3
	Prefer not to answer	5.5

5.4. Results

Tables 5.3 and 5.4 present the results of the elementary factor analysis (EFA). The Kaiser-Meyer-Olkin test indicates that the sample was adequate for the analysis, as evidenced by a score of 0.923, which is higher than the suggested threshold point of 0.6 (Smith, 2002). The Bartlett test of sphericity was also significant ($X2 = 6260.132$, $df = 1035$, $p = 0.000$), indicating that the correlation between the variables is not equal and, consequently, fits for PCA. Table 2 shows the proportion of variance explained by these factors. Only factors with eigenvalues above one were retained, which is the acceptable level used for EFA (Hayton, Allen, & Scarpello, 2004). Overall, nine factors were reported to have eigenvalues greater than 1. The first component had an eigenvalue of 15.33, which corresponded to 33.33% of the total proportion of variance explained.

Overall, the nine factors accounted for 65% of the total variance that explained resilience, which is above the 50% criterion recommended by Samuels (2017) and Streiner (2012) as the minimum threshold. In other words, the nine components explained 65% of the resilience in the study. Table 1 reports the rotation sums of the squared loadings. According to Costello and Osborne (2005), varimax rotation adds another layer to EFA by clarifying the relationships among the factors. The rotation seeks to maximize the variance shared among the components by increasing the squared correlation of items and decreasing the correlation of items that are dissimilar. Here, it was observed that the proportion of variance explained by the first component was 14.378%. The remaining components showed greater variance.

Table 5.3 Proportion of total variance explained

Factors	Initial Eigenvalues			Extracted sums of squared loadings			Rotation sums of squared loadings		
	Total	% of var	Cumm %	Total	% of var	Cumm %	Total	% of var	Cumm %
1	15.33	33.33	33.33	15.33	33.33	33.33	6.61	14.38	14.39
2	2.60	5.65	38.99	2.60	5.65	38.99	5.21	11.33	25.70
3	2.47	5.36	44.35	2.47	5.36	44.35	3.03	6.58	32.28
4	2.35	5.10	49.45	2.35	5.10	49.45	2.80	6.09	38.36
5	1.80	3.91	53.35	1.80	3.91	53.35	2.76	5.99	44.35
6	1.74	3.79	57.14	1.74	3.79	57.14	2.59	5.63	49.98
7	1.34	2.91	60.05	1.34	3.79	57.14	2.44	5.30	55.28
8	1.22	2.65	62.71	1.22	2.91	60.05	2.37	5.16	60.44
9	1.10	2.39	65.10	1.10	2.65	62.71	2.14	4.66	65.10
10	0.99	2.14	67.27						
11	0.93	2.03	69.27						
12	0.91	1.98	71.25						
13	0.83	1.81	73.06						
14	0.82	1.77	74.83						
15	0.74	1.61	76.44						

Table 5.4 Rotated components matrix of dimensions of resilience

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
Scale 1	.693								
Scale 2	.750								
Scale 3	.729								
Scale 4	.772								
Mental outlook 1		.647							
Mental outlook 2		.752							
Mental outlook 3		.772							
Mental outlook 4		.770							
Mental outlook 5		.808							
Mental outlook 6		.773							
Mental outlook 7		.662							
Robustness 3			.614						
Robustness 4			.714						
Robustness 5			.724						
Robustness 6			.672						
Robustness 7			.693						
Robustness 8			.663						
Diversity 1				.747					
Diversity 2				.694					
Diversity 3				.636					
Self-organization 2					.681				
Self-organization 3					.737				
Self-organization 4					.672				
Rapidity 1						.678			
Rapidity 2						.608			
Rapidity 3						.661			
Learning 1							.617		
Learning 2							.694		
Learning 4							.684		
Redundancy 1								.676	
Redundancy 2								.767	
Redundancy 3								.705	
Equality 1									.640
Equality 3									.655
Equality 4									.790

Figure 5.3 shows the scree plot, which depicts the order of the eigenvalues from the largest to the smallest. The scree plot presented uses values reported in the extraction of the sums of squared loadings. The figure shows a significant difference between the first and second components.
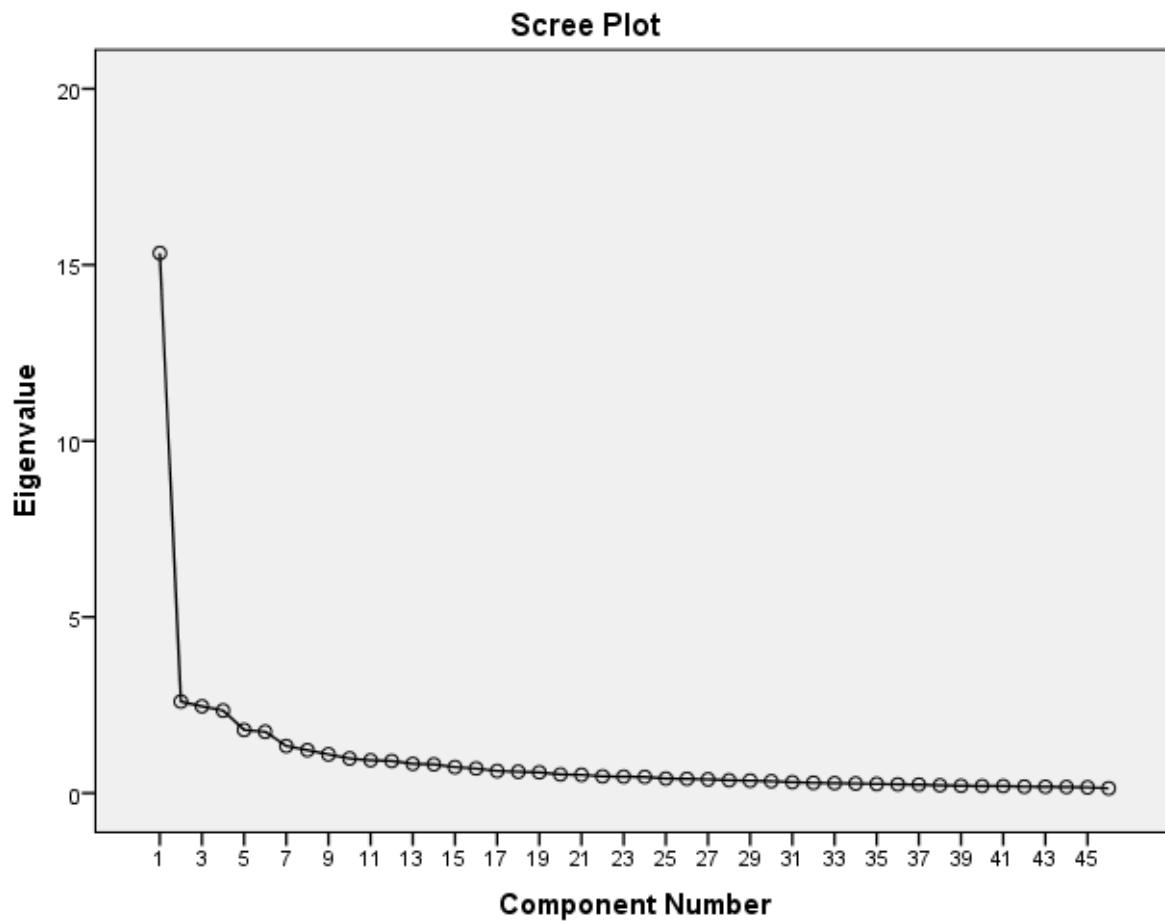

Figure 5.3 Scree plot ordering of Eigen values

Table 5.4 reports the factor loadings of the individual items on the nine factors reported in this study. In line with the arguments made by Pantauvakis and Psomas (2016), coefficients of items that were less 0.6 were removed, and only those items with coefficients above 0.6 were reported. Table 3 shows the reported items with coefficient above 0.6 corresponded to the scale dimension of resilience. Table 3 shows the reported items with a coefficient above 0.6, corresponding to the mental outlook dimension of resilience. Similarly, items with a coefficient above 0.6 for factor 3 corresponded to the robustness dimension of resilience. However, items such as 'I do the necessary preparations

to anticipate and respond to flood disasters/emergencies' (robustness 1) and 'The building I live in is safe against hazards such as flooding' (robustness 2) had items less than 0.6, and therefore were excluded (see Table 5.4). Items with a coefficient of more than 0.6 corresponded to the diversity dimension of resilience. However, the item 'Our community is made up of members with a diverse set of skills and training' (diversity 4) was excluded because it had a coefficient less than 0.6.

Further, items with coefficients above 0.6 corresponded with the self-organization dimension of resilience; however, similar to those items in the other dimensions highlighted, the item 'I am ready to assist my neighbors during emergencies and trust that they will do the same for me' (self-organization 1) was excluded from the list of items in factor 5 because it did not meet the 0.6 thresholds. As summarized in Table 3, after careful analysis of the factor loadings for factors 6, 7, 8, and 9, it was concluded that these factors represented the rapidity, learning, redundancy, and equality dimensions of resilience based on the items loaded in these factors. Therefore, various dimensions of resilience can be ranked by their contribution to resilience in the following manner: scale, mental outlook, robustness, diversity, self-organization, rapidity, learning, redundancy, and equality.

5.5. Findings

The results generated and the analytical framework provided insight into the resilience of the study area. First, the reliability and validity tests showed that the RABIT framework is a valid and suitable method for assessing the resilience of the Manggahan LRB community. As a result, this study supports the assertions made by Heeks and Ospina (2015) that the RABIT framework is suitable for low-income and marginalized contexts. The EFA results revealed that each of the nine attributes contributed to resilience, although there were both variations and similarities among the attributes in terms of the strength of their overall contribution, which was assessed using the eigenvalues and percentage variance of each attribute. The findings indicate that when ranked from the largest to the smallest contributor to resilience, the attributes can be ranked as follows: scale, mental outlook, robustness, diversity, self-organization, rapidity, learning, redundancy, and equality. Furthermore, the findings from the EFA also show that the scale attribute

contributed largely to resilience in the study area relative to the other attributes. This finding is informative and shows that depending on the study context, the contributions from the nine resilience attributes may not be the same. For instance, utilizing the RABIT framework, Haley et al. (2021) found that in Masiphumelele, a low-income community in South Africa, the strength of resilience is based on the contribution of self-organization and scale. Understanding why some attributes have a more significant impact on fostering resilience in different low-income communities is an interesting issue to explore.

In this study, scale was identified as the most important contributor to resilience in the study area. Scale, according to Folke et al. (Folke et al., 2010) borders the breadth of available resources and can be utilized by a community to effectively overcome the impact of a disaster or disturbance. Resources can take various forms and may include natural, physical, financial, and social capital as well as other support systems available to the community. In the context of the current study, it can be argued that the community's long-standing relationship and support received from COM has been beneficial to the Manggahan LRB community, as they have been able to foster multiple partnerships and leverage these support systems to overcome threats of eviction and call for support from local and national governments. One result of these partnerships is the People's Plan, which provides an opportunity for broader engagement to promote resilience. Thus, strong partnerships with NGOs are instrumental to building resilience in the Manggahan LRB community, and it is therefore not surprising that a stronger coefficient was reported for items such as scale 2 ("The community has strong collaborations with the local and national government") and scale 4 ("The community has regular interactions with NGOs, academic organizations, etc. on disaster preparation and response"). Similarly, several studies have pointed to the importance of community–institutional collaborations as a form of social capital (bridging networks) in building community resilience (Aldrich, 2023; Aldrich & Meyer, 2015; Carmen et al., 2022; Kerr, 2018; Lucini, 2013). This highlights the need to invest in physical infrastructure and foster collaboration and strong partnerships to provide opportunities for exchanges and flows of ideas, expertise, and resources that can be leveraged in times of difficulty. These collaborations and partnerships, as a form of social infrastructure, can help resettled communities anticipate and overcome future disasters

(Aldrich, 2017). A community organizer who has worked with the community for over a decade further confirms the important role of scale in the community:

> "…With the Huairou Commission, a global organization, they have received support from them. As for government institutions, they were able to receive support from the LGU and also the Office of the Vice President at the time with former Vice President Leni [Robredo]. From the Presidential Commission for the Urban Poor (PCUP), too. Ateneo de Manila also gives them support. It's easy for them because they gain access through our wide network. For us, our network of partners is basically also their network. Through these networks they were able to tap into expertise that would otherwise not be available to them." (COM Community Organizer, 08 August 2022)

Mental outlook was the second ranked contributor to the community's resilience. Positive perspectives about their community were also reflected in the observations shared by the interviewed community organizer:

> "When they (APOAMF) related their hopes and dreams to us it was evident. Back then when we were crafting the People's Plan with them, we discussed with them what their hopes and dreams were and they told us they aspired for a decent living. What is decent living for them, what is a happy life for them, we asked. They said it would be the absence of danger—the danger of eviction foremost and also dangers from flooding and earthquakes. They said it also means them having three square meals a day and they are earning from and having a job. It also means having their children go through and finish schooling. Recently, we did a re-evaluation to get an update on their aspirations. We asked them what changed in their lives and what improvements they observed. They mentioned that a big improvement is that they did not need to uproot their lives too far and have access to basic

services like hospitals for example. Our family was kept intact, they mentioned."

Expressions of hope and overall positive outlook on the future were also shared by one of the community leaders:

"In my case I think our life has improved somehow. Since my husband and daughter has been able to return to work, we were able to recover. [During the pandemic] it seemed we would be mired in debt but good thing in 2021 my husband was able to return to work. By the grace of God, our youngest has also been able to find work and now we are slowly getting back on our feet." (community leader 23, 27 July, 2022)

The next attributes that made an almost similar contribution to resilience in the Manggahan LRB community after scale and mental outlook were robustness and diversity. Robustness refers to the ability of a community to sustain itself from shocks and disruptions and ensure some level of stability (Haley et al., 2021). Robustness undoubtedly requires essential infrastructure and collaboration between state and non-state actors. Indeed, the government's implementation of the resettlement plan has been instrumental in reducing the vulnerability of the resettled community since it provides safe housing, essential services, and infrastructure required for improved living (Fayazi & Lizarralde, 2013). Though opposed at the initial stages, the plan came to fruition due to successful engagement with stakeholders such as the government and NGOs. The strong coefficient for robustness items highlights the relevance of improved housing and infrastructure in building resilience.

In the case of diversity, it can be argued that the community made efforts to increase the range of options to press home their demands for support and engagement. Therefore, it is not surprising that there were strong coefficients for diversity 2 ("I am able to identify potential opportunities emerging from change") and diversity 3 ("The community comes up with innovative and creative solutions to problems that arise in times of emergency").

Despite the point made for diversity, there were difficulties that the community faced, which limited their ability to take action to promote their interests. For instance, their status as a resettled community means that they must still depend on the government for many of the services they need. In the case of redundancy, it can be argued that the support gained from external bodies, such as livelihood programs from the women-led international NGO Huairou Commission (Igup, Belgira, & Tapel, 2021), could also have contributed to building the community's resilience. Nonetheless, it needs to be mentioned that although the community has been able to leverage the support, they received from COM to fight against eviction orders, they are still dependent on the government resettlement project for infrastructure and basic amenities. The challenges highlighted for diversity and redundancy explain why they did not contribute significantly to resilience in the community.

The next attributes that made almost similar contributions to resilience were self-organization, rapidity, and learning. Beginning with self-organization, it highlights how a community can adjust itself and its practices under serious threats or pending disturbances. The community partnership forged between other organizations such as COM and APOAMF to follow through with the People's Plan, effectively mobilize themselves, and work with their leaders to negotiate and implement the resettlement program is a clear case in point. Indeed, items with a strong coefficient for self-organization indicated strong trust in leadership, participation, and mobilization. This finding corresponds to those of previous studies on self-organization in similar low-income, informal, and marginalized communities in Accra, where community adjustments are made possible through collaboration, network building, and trust in community structures (Abunyewah et al., 2022; Amoako, Cobbinah, & Mensah Darkwah, 2019).

Rapidity, or swift access to assets such as disaster-related information and resources, is the factor that contributes the least to the community's resilience. Although Early Warning Systems (EWS) are already in place to disseminate disaster-related information (Gilbuena et al., 2013) in the community, previous studies have indicated that access to disaster risk information and communication channels embedded in existing social structures and timely updates improve preparedness and adaptive capacities (Abunyewah et al., 2022).

This highlights the importance of an information system that leverages community trust and leadership to further enhance the community's receptiveness and alertness towards disaster risk information, thereby influencing their intentions to prepare for present and future risks (Abunyewah et al., 2020; Okyere et al., 2023). This point was further elaborated by the community organizer when highlighting the importance of trust with regards to disaster risk information dissemination:

> "Sometimes they do not believe information on the television or Facebook. It seems the way they pay attention to the information is different when it comes from us, which I can attribute to our longstanding partnership and trust built between us and the community. I think it makes them more attentive. Sometimes they already come across the news or information on social media but they don't pay much attention to it. When we do advisories to them and forward the information to them, they tend to pay attention more and be more ready. When we relay the information, they make sure to take action and also explain it to the whole community."

Learning, as an attribute of resilience, has been found to have strong links with access to DRR-related drills and training. Cui and Han (Cui & Han, 2019) argued that by participating in drills, training, and other forms of capacity building, the community can improve its resilience and recover from systemic disturbances. In the study area, the COVID-19 pandemic led to the suspension of DRR-related drills and training in the community over the past two years as shared by one of the community leaders.

> "I did some training in the past that involves for example in case of fire or an earthquake. For example, taking care of the topmost floor down to the first floor and how to operate equipment. People from the LGU (Pasig) came down here to teach us these things. There had been two [training sessions] so far but due to the pandemic it was stopped." (community leader 26, 23 July 2022)

Nonetheless, the influence of past learning experiences had some level of impact on residents, given the contribution it made towards building the resilience of residents. Indeed, there were high coefficients for items such as learning 2 ("I have received and shared lessons from past experiences with flooding from other members") and learning 4 ("The community leverages past experiences to anticipate and plan differently in the future"), which clearly indicate that residents' learning experiences with past disasters have been instrumental in shaping their preparedness for future disaster occurrences.

The two attributes that made the smallest contributions to resilience were redundancy and equality. Redundancy is the availability or spareness of alternative sources of income. Its relatively low contribution to the community's resilience may be explained by the lack of savings or low coverage of financial instruments such as insurance in the community. At the time of the study, efforts towards improving this aspect were still in the early stages as shared by the community organizer:

> "At present we are slowly trying to develop it through livelihood programs. We have already started to educate them about microfinance which would enable them to borrow money through low-interest loans. A percentage of the repayment of these loans go towards disaster insurance. At least when they have a little savings, they can have something to tide them over. We initiated this project due to what happened during the pandemic."

Equality entails the fair distribution of opportunities and capacity-building programs and fostering participation among all members of the community. Promoting inclusivity and participation among community members has been found to be instrumental in quick and effective outcomes for improvement (Nakhaei et al., 2016; Ntontis et al., 2019). In the context of this study, delays in resettling all disaster-prone households (only 573 have been resettled out of 900 households) and lags in providing infrastructure facilities, such as issues with the sewage-treatment plant for the entire community (Maningo, 2022b) and the lack of public spaces and playgrounds for children (David, 2021), might explain the comparatively limited contribution of equality to resilience in the study area.

5.6. Conclusion

This chapter contributes to emerging research on resilience measurements at the community level. It applied the RABIT framework, a community-level resilience measurement tool, to assess the resilience of a resettled informal settler community displaced by the catastrophic 2009 floods in Metro Manila. The study also demonstrated its utility and relevance in evaluating resilience at the community level, focusing on marginalized urban communities. Resilience attributes were assessed and validated to determine whether they were statistically significant factors in community resilience. Analysis of the survey data revealed that although all attributes were statistically relevant, their contributions to the community's resilience varied. The results showed that the attributes of scale, mental outlook, and robustness proved to be relatively strong contributors to the community's resilience. Diversity, self-organization, rapidity, and learning were found to have similar levels of contributions. The attributes of equality and redundancy were found to be relatively weaker, and thus require more attention. The study has shown that although the Manggahan LRB community and its resettlement as a DRR approach are seemingly trending towards a resilient outcome, some challenges remain that merit closer scrutiny.

CHAPTER 6

Resilience in the Built Environment and Socio-spatial Utilization

6.1. Introduction

This chapter examines resilience in the built environment through the assessment of spatial characteristics and how the residents have developed and utilized the housing units and how it was observed in the study area. It uncovers the resilient strategies undertaken by the residents to respond to challenges presented by crisis situations which in this case was the COVID-19 pandemic.

6.2 Overview of the Built Environment in the Study Area

6.2.1   Site Development

The Manggahan Low Rise Building Project consists of 15 low rise buildings built in three phases (Figure 6.1). Phase 1 which was completed in 2015 consisted of 2 buildings and housed 120 households. Phase 2 was completed in 2018 and added an additional 6 buildings comprising of 360 units to the project. As of July 2022, phase 3 has yet to be completed with the stoppage of construction due to issues with the contractor. Only 10 out of the 15 planned buildings have been built and occupied so far. No timeline has been provided for the completion of the remaining buildings and the relocation of the remaining household beneficiaries.
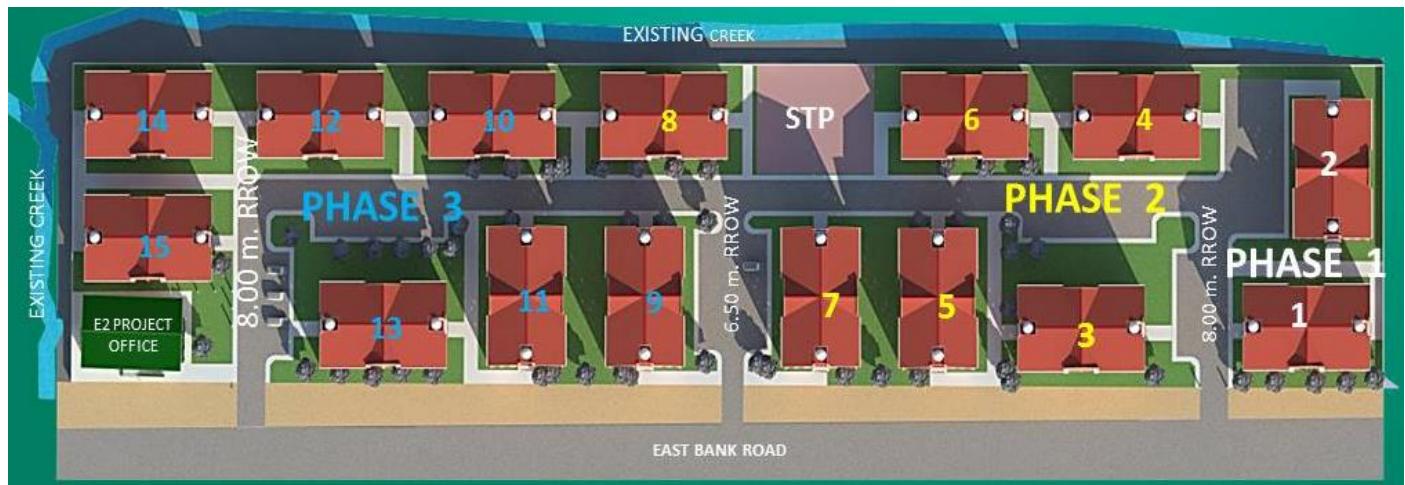
Figure 6.1 Proposed site development plan (Source: NHA)

6.2.2 Building Units

Building units in the resettlement project consisted of low-rise buildings consisting of five storeys and of reinforced concrete construction (Figure 6.2). Each floor consists of 12 units provided with two stairwells on both sides (Figure 6.3). Accessibility for PWD is provided on the ground floor with the provision of a PWD-friendly unit.

**Figure 6.2** Rendered perspective of the building units (Source: NHA)
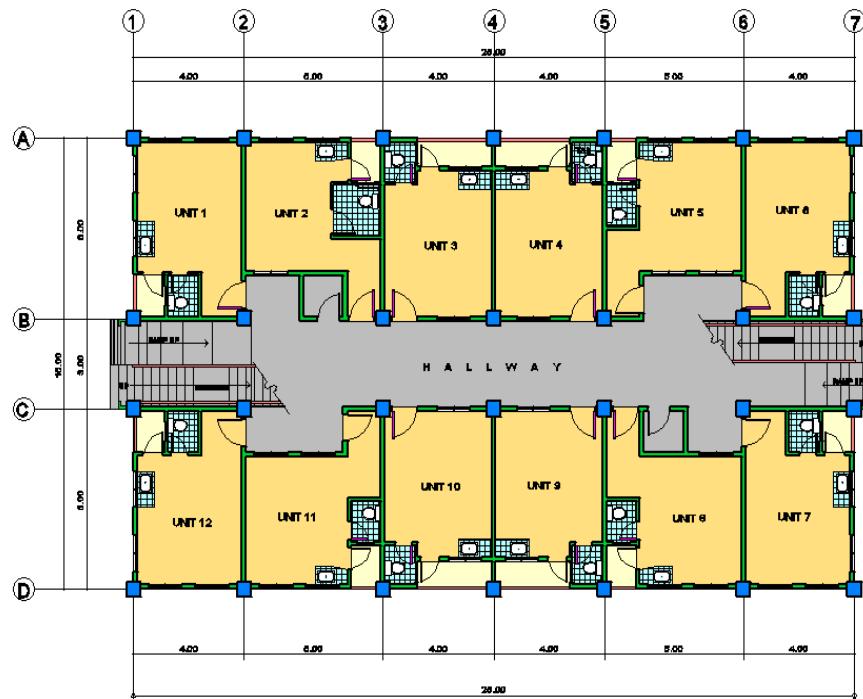
Figure 6.3 Typical floor plan of a building unit (Source: NHA)

6.2.3 Housing Units

Housing units are available in three types (Figure 6.4). Each unit has roughly 24 square meters of floor area and is provided with a sink, toilet and bath, and access to a balcony. The units are handed over to the beneficiary in a blank state save for the most basic of finishes such as tilework for the sink and toilet. Residents were permitted to furnish and customize their unit according to their needs provided they still adhere to building safety guidelines.

(a)   (b)   (c)
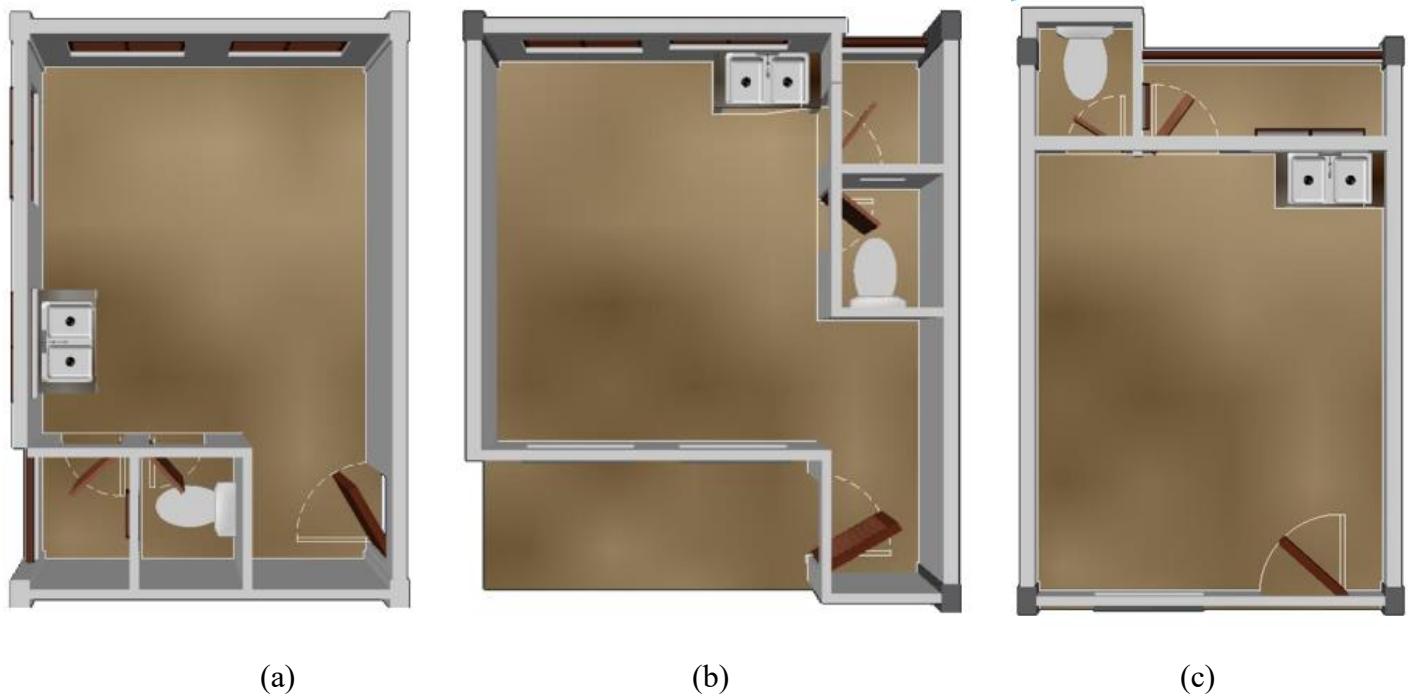
Figure 6.4 Initial housing unit plans (a) unit type a; (b) unit type b; (c) unit type c (Source: NHA)

6.3 Resilience in the Built Environment

An extensive study on the current literature about resilient strategies by Castaño-Rosa et al. revealed three main characteristics of resilient strategies as it relates to the built environment. The study considered green and healthy infrastructure, adaptable infrastructure, and equitable infrastructure as the three main characteristics of resilient strategies in the built environment.

6.3.1 Green and Healthy Infrastructure

Recent studies show that urban greenery and development to be a marker for livable and resilient communities (Mabon & Shih, 2021; Meerow, 2019; Raymond et al., 2017). Greening projects have a universal appeal due to the many co-benefits they offer which have profound effects not only on well-being but also sustainability. Provision of open spaces and greenery help enable healthy behaviors and bring the community together (Tidball & Krasny, 2014). Moreover, recent studies point to the potential of community gardens to contributing towards community resilience following disasters (Shimpo, Wesener, & McWilliam, 2019).

6.3.2 Adaptable Infrastructure

Adaptable infrastructure entails the ability of the built environment to be able to be changed and be flexible to respond to disruptions and changes. Strategies that enable the community to rethink existing buildings for new purposes and enable practical solutions ensure more resilient outcomes. Examples of such strategies were explored in a study by Asharhani and Sari (2022) in which housing modifications as responses to the constraints and stresses brought about by the COVID-19 pandemic were documented and analyzed.

6.3.3 Equitable and Inclusive Infrastructure

Equitable and inclusive infrastructure entails strategies that make sure all inhabitants take part in creating a sense of ownership of the built environment. A consensus-building approach through capacity-building and empowerment strategies ensure that members of the community are able to come together and organize to take on challenges posed by disaster or crisis situations.

6.4 Crisis in the Community: COVID-19 Disaster

At the time of the fieldwork, the community was facing another wave of increasing COVID-19 cases (Sarao, 2022). As a result, the community members point to the

pandemic as a disaster they have been collectively experiencing. As some residents shared:

"The pandemic was horrible. Really in terms of what we experienced then, being prohibited from going outside and finding ways to get food to eat. Many communities here had trouble with getting aid. Good thing here we have a lot of NGOs who extended help." (community leader 27, 23 July 2022)

"During the pandemic for example, someone from our floor tested positive and was afraid and ashamed and as a building representative I was the one they sought for help. What I did was to ask our president here to call for a meeting on what to do. I told their family to isolate in place. We figured out how to secure food for the afflicted member. I called for help from members from each floor to donate some food. I also consulted the leadership if we could use some of our community fund to lend help those who need it. They could borrow from the fund and pay it back little by little. We isolated the sick in quarantine and after a month they were able to recover and was able to return to work after a month." (community leader 29, 24 July 2022)

Prior to the pandemic, the community had not experienced disasters since moving to the resettlement project. The relocation site is situated on a higher elevation and has considerably lower flood risk. One resident reported:

"It's because we have been here for a couple of years and we have not experienced the same as down there other than weak earthquakes that we have felt here. Down there when they announce the signal strength (of typhoons) we are already very much ready." (community leader 26, 23 July 2022)

6.5 Research Methodology

Field observations were based on a hierarchy of spaces based on public-private spectrum and provided for a systematic way to organize the spaces in the community. The study employed the use of several qualitative techniques such as direct observation, non-participant observation, and semi-structured interviews. Architectural

measurement was also employed to illustrate the residents' housing modifications and use of space in the community.

6.6 Findings

6.6.1 Green and Healthy Infrastructure

It is observed that in most housing schemes, neighborhood public spaces are often just leftover negative spaces instead of being integrated and designed for a specific purpose for activities (Gulati, 2020). Despite these constraints, it was evident that the residents were active in improving their surroundings and sought more support towards this goal. The issue of public space became even more important in the extended lockdowns implemented during the COVID-19 pandemic.

6.6.1.1 Urban Greenery

Urban greenery and agriculture serve as a strategy to develop more resilient, livable, and sustainable cities and communities. Challenges presented by the COVID-19 pandemic showed how important fresh food access is to communities (Iida, Yamazaki, Hino, & Yokohari, 2023).

With lockdown restrictions in place, the residents maximized the urban farming potential within their community to improve their food security. The community organizer related how the residents improved their food security amidst the strict lockdowns in Metro Manila:

> "They also did urban gardening inside which we (COM) helped facilitate. They were able to solicit seedlings from the private sector. Before the pandemic, around 2019 we already helped them set up their urban gardens. They were able to expand and develop it because a lot of community members were also interested in gardening. The maintenance of the gardens is up to the members of each building. They have arranged as a community when to plant and water the gardens. They then share the harvest among the

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members. Some sell their vegetables while others give them to neighbors for free. They also planted herbs which they use for medicinal purposes." (COM Community Organizer, 08 August 2022)

The residents utilized farm plots (Figure 6.5a, Figure 6.5d) to cultivate vegetables and medicinal plants (Figure 6.5b, Figure 6.5c). The community sought the support of the private sector to provide them with seedlings and other farming tools. Their partner NGO, COM, also helped organize training for community health workers to take advantage of the medicinal herbs available for traditional medicine.

Residents who lost their jobs due to the lockdown were also able to turn to planting vegetables as a source of income. One community member who worked as a tricycle driver and lost his main source of income relates how he and his fellow drivers shifted to urban gardening during the lockdown:

"During the lockdown most of us drivers stopped plying our routes. We shifted to planting bananas and vegetables because these are the ones that grow fast and also easy to sell." (community leader 24, 23 July 2022)

6.6.1.2 Open Spaces

Provision of open spaces for community well-being is an important adaptation-based solution. Open spaces allow for socializing and fosters social cohesion among members of the community. Unfortunately, the main priority of both the government agency and the community during the design phase of the project was to accommodate as many beneficiaries as possible, planning for open spaces was neglected. As a result, the lack of public space has become a persistent issue in the LRB community as more and more beneficiaries move in (David, 2021).

Figure 6.5 Spatial distribution of green spaces in the community

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6.6.2 Equitable and Inclusive Adaptation

6.6.2.1 Community Adaptation During the Pandemic

Due to the strict lockdowns during the onset of the COVID-19 pandemic, residents in the Manggahan LRB had limited mobility and could not freely move outside of their community. In response to this, some enterprising residents started to put up their own stalls within the community to sell fresh food and other necessities (Figure 6.6c). Others cooked food and snacks and sold them on carts (Figure 6.6b). The community organizer from COM related the community's response and adaptation to the extended lockdowns:

> "When the lockdowns were enforced and they were forbidden to go outside, many saw the opportunity to set up stores and sell food items inside the community. They made requests to the NHA to let them sell food and other essentials since they were having trouble accessing food during that time." (COM Community Organizer, 08 August 2022)

Before the pandemic, such structures or activities were strictly prohibited in the premises. An official from the NHA described how the strict enforcement of this rule was relaxed during the pandemic as requested by the residents:

> "During the pandemic, they requested for some businesses to operate inside due to the lockdown which we allowed. It was strictly prohibited before but because of the pandemic and in consideration for them we allowed it." (NHA officer, 12 July 2022)
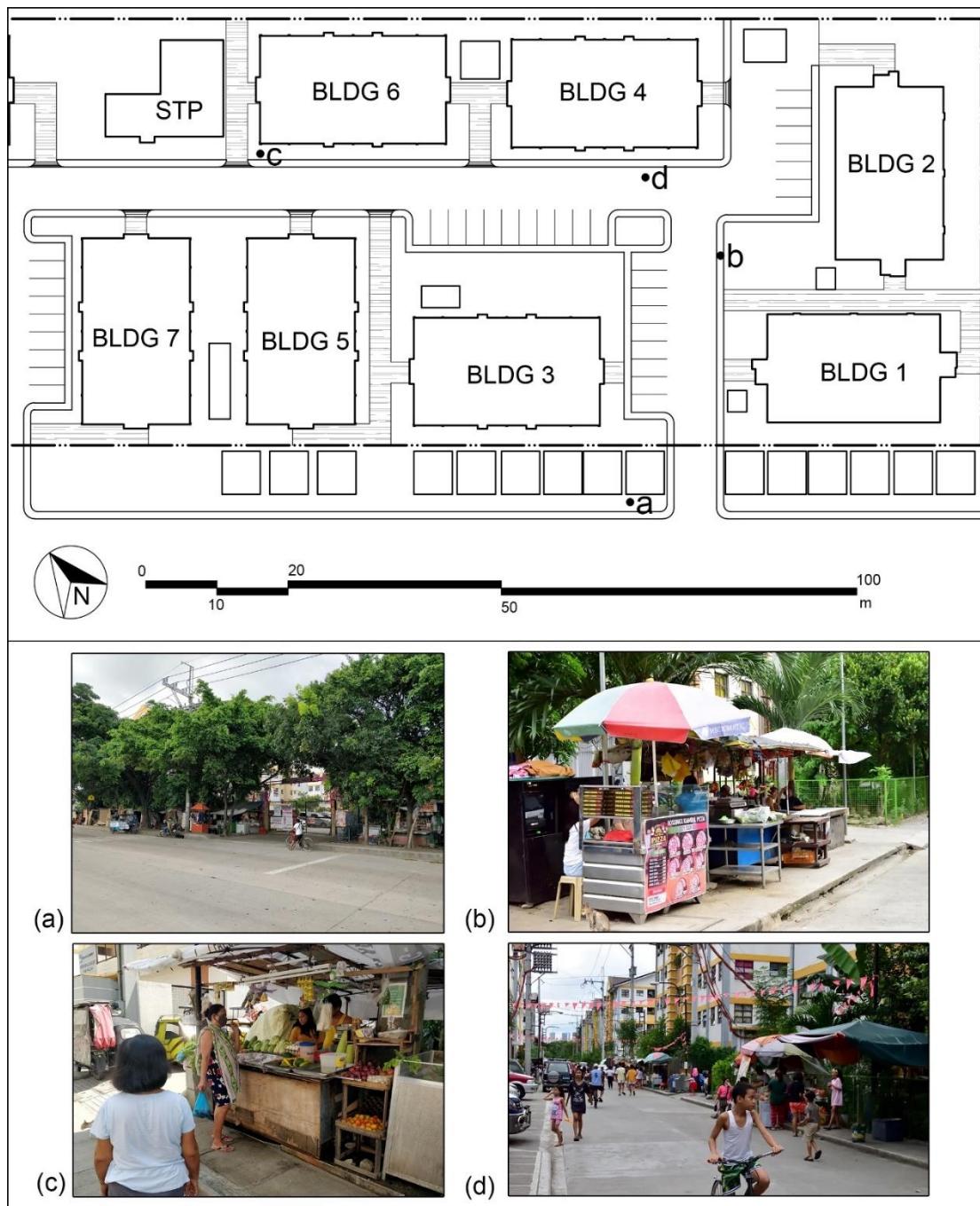
Figure 6.6 Adaptation in public spaces in the community

6.6.2.2 Disaster Risk Reduction-influenced Adjustments

DRR training and education have influenced the behavior of residents especially with regards to the use of hallways and corridors. Cleaning and maintenance are a shared responsibility between neighbors and is an activity involving both the young and old (Figure 6.7a).

It also influenced in them a "leave-no-one-behind" mentality when it comes to implementing their evacuation procedures and provides a social safety net for the most vulnerable members of the group.

"The system we have here is per family. The number one priority here are the PWD and the elderly. What we do here in our floor is I take note of them and prioritize them, so no one gets left behind." (Community leader 29, 24 July 2022)

"They have allocated units designed for persons with disabilities on the first floor. With social and financial assistance programs too, they give priority to them as well. They have a mechanism to help the vulnerable sectors in their community and they do follow through with it. They may not have it set formally but I am sure they are doing it for the vulnerable members of their community." (COM Community organizer, 08 August 2022)

Social gatherings in the hallways such as celebration of birthdays which were commonplace before the pandemic had been strictly regulated during the pandemic. Use of the hallways for social gatherings requires the approval of the floor leader and is limited to a small number of participants (Figure 6.7c). Semi-private space in the community is often an extension of their own units with rules strictly enforced and adhered to by the residents themselves. Hallways in the buildings often serve as semi-private spaces to the residents.
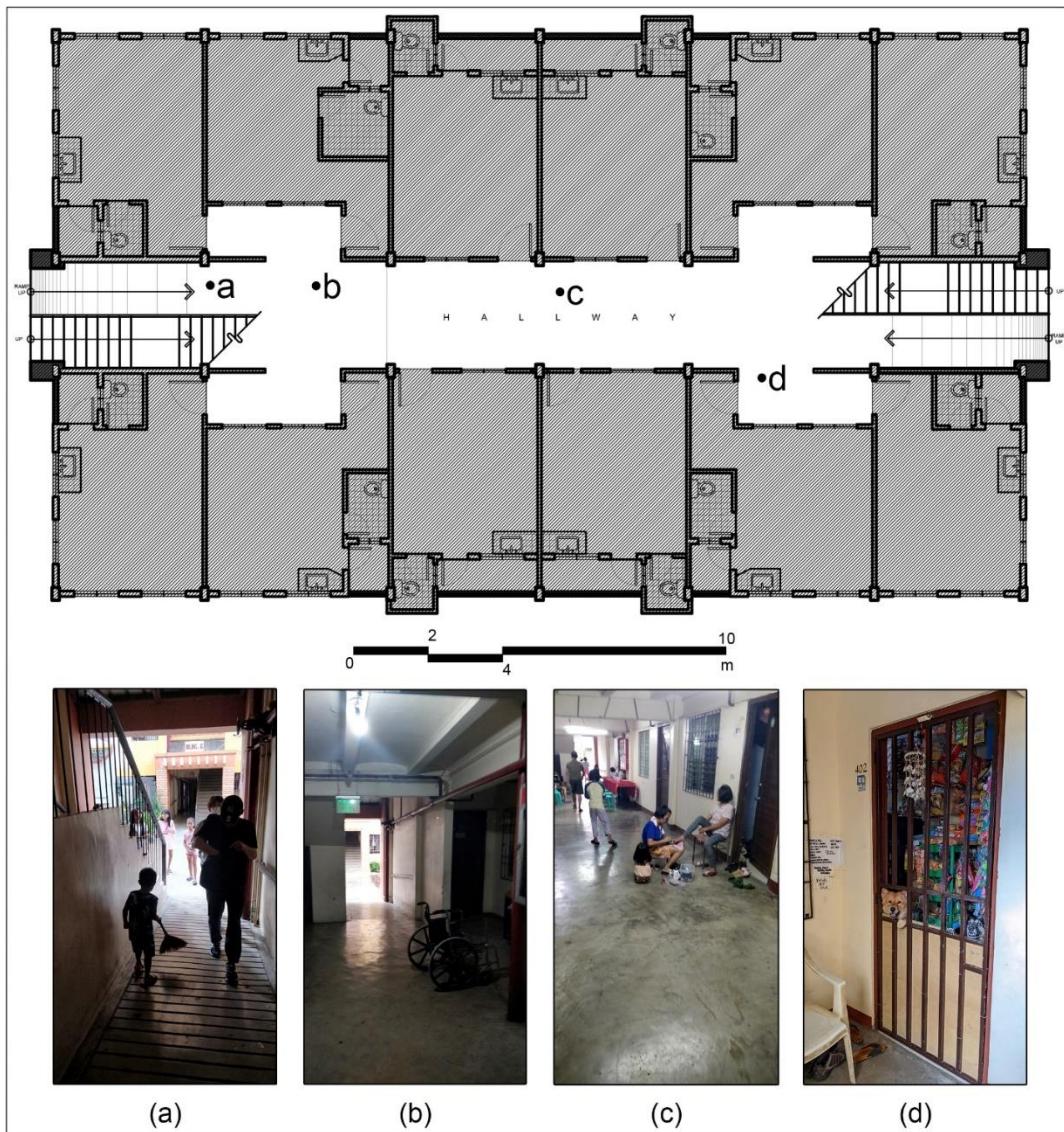
Figure 6.7 Accessibility and activities in the semi-private space

6.6.2.3 Hallway Activities

Hallways in the buildings often serve as semi-private spaces to the residents. Observations regarding the use and maintenance of these spaces were recorded and analyzed. Hallways in the building provide ancillary spaces for interacting with their neighbors and other activities for socialization. Limited space within the housing units and play spaces outside usually meant children had nowhere to play but in the hallways (Figure 6.8a). In general, all residents follow the rule for keeping the hallways clear from obstructions as influenced by their DRR training (Figure 6.8d)

Figure 6.8 Activities adaptations in the semi-private space

6.6.3 Adaptability of the Spaces

Private space is defined as the innermost space the family needs exclusively for private use such as sleeping, cooking, and storage. Residents are provided with only 24 square meters of livable space in the housing complex. As such, living in a different social milieu necessitated customizations and adjustments. Field observations revealed three modes of customization by the residents: for livelihood and income-generation, needs and preferences, and lastly, pandemic-influenced modifications.

6.6.3.1 Space Modification for Livelihood and Income Generation

Adjusting the space for their livelihood or income generating activities was one of the commonly observed modifications. Some residents converted part of their unit to accommodate their trade or business. These businesses provide them with extra income and during the extended period of lockdowns was their main source of livelihood. One resident converted part of the entryway and living space into a barbershop (Figure 6.9).

Figure 6.9 Resident converts part of unit into a barber shop

Another resident converted their unit into a sundry shop to sell small commodities to their neighbors (Figure 6.10). Part of the entryway is used to stock small grocery items such as rice, coffee, canned goods, powdered milk, and the like. The windows and doorway serve as display areas for these items for sale.

Figure 6.10 Resident converts part of unit into a sundry store

6.6.3.2 Housing Modifications According to Needs and Preferences

Some residents configured their units to prioritize space according to their needs and preferences. For example, one resident who is also a leader in the community prioritized and allocated more space to their living area to accommodate social functions (Figure 6.11). The sleeping area was configured to allow just the bare minimum space for bunkbeds. The kitchen space (Figure 6.11c) was also modified to have an island style counter fitted with wheels for easier mobility. This provided the resident with much more flexibility to configure her kitchen and living space to accommodate and entertain more people.

Figure 6.11 Resident modifies housing unit to prioritize social functions

Some households expanded their floor space in order to accommodate their growing family or extended family members.

"The culture of Filipinos of keeping extended family was an issue. The housing units were supposed to only hold 5-6 people but sometimes they can go up to 11 people in one unit. These days it is common for unit owners to host more people like when their children get spouses they would still stay there." (COM community organizer, 08 August 2022)

In some cases where there were more than five members in a family, the household adds a loft space to their housing unit (Figure 6.12). The loft space offers more sleeping space for extended family as well as storage space for storing and hanging clothes and other personal belongings (Figure 6.12c).

Figure 6.12 Resident adds loft to housing unit to accommodate more family members

6.6.3.3 COVID-19 Pandemic-influenced Modifications

Extended lockdowns which were enforced for a total of 518 consecutive days disrupted the daily life and livelihood of residents in Metro Manila and across the Philippines (Chiu, 2021). During the lockdown, the mode of schooling was forced to transfer to a full online learning environment (Barrot, Llenares, & Del Rosario, 2021). To support this new mode of online learning for their children, some households modified their housing units to accommodate more privacy and have a dedicated space for their children for attending their classes virtually. Some residents put up partitions (Figure 6.13b) to delineate their children's study area.
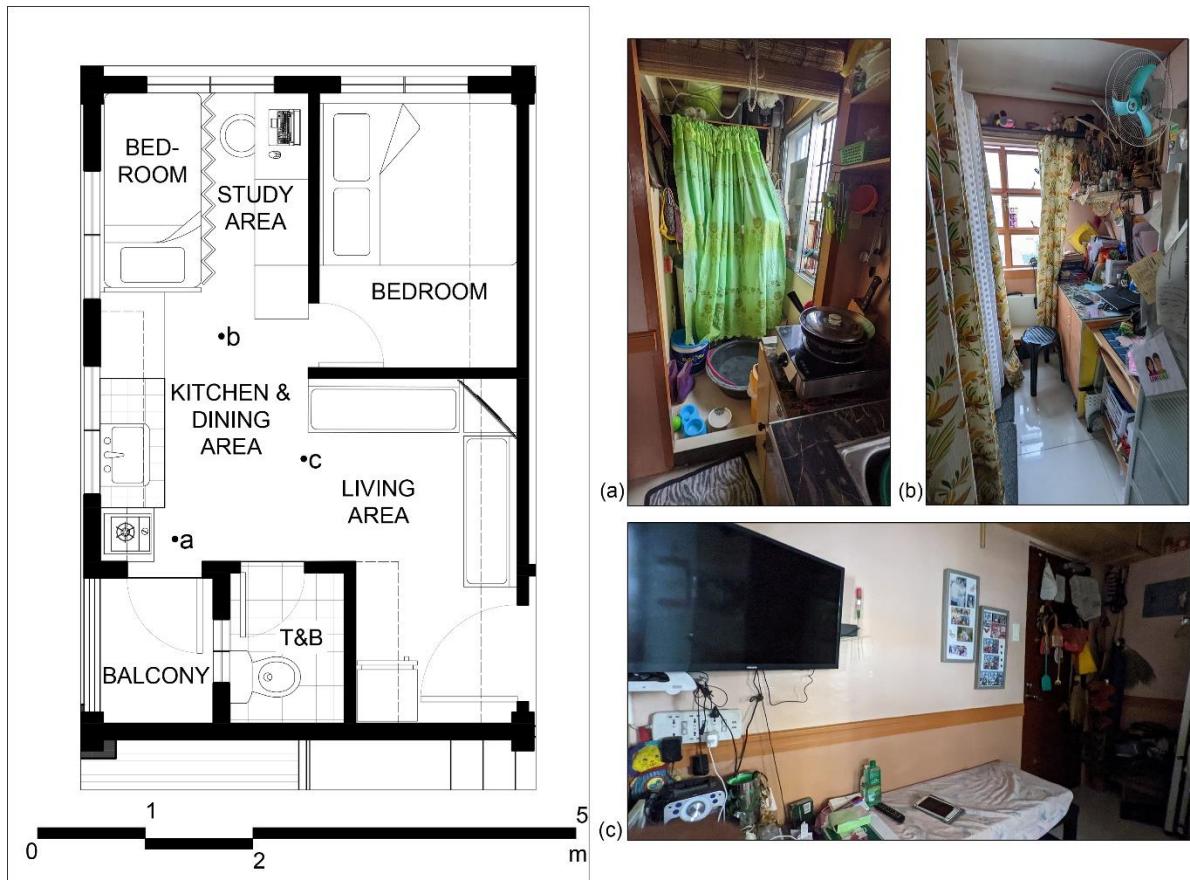
Figure 6.13 Resident allocates private study area to accommodate their children's online classes

One resident opted to build a lofted area to separate their sleeping spaces from the living area and their children's study area (Figure 6.14). The household chose to modify their housing unit to be able to maximize the floor area and give better privacy and space that is more conducive to studying for their children (Figure 6.14b).

These modifications were carried out with the help of skilled community members. One community leader relates:

"The men here have different skills, some are carpenters, some are welders. Here at the fourth floor, we have a carpenter who made most of everyone's cabinetry." (community leader 22, 26 July 2022)

Figure 6.14 Resident adds loft and study area to delineate sleeping space and study area

6.7 Conclusion

This chapter provided some insights into the adaptations and physical modifications of housing units and the surrounding built environment by residents to demonstrate the resilient strategies in the in-city resettlement project of Manggahan LRB. It presented several modes of adaptation and adjustments as observed in the hierarchy of spaces (private, semi-private, and public).

It was observed that urban greenery in the community's public spaces proved to be a resilient strategy during the COVID-19 pandemic. Urban gardens helped provide the community with a supply of fresh vegetables and supported food security during the extended periods of lockdown.

Semi-private spaces such as hallways in the buildings provide ancillary spaces for social activities of residents such as social gatherings and play spaces for children. Rules regarding the use of the hallways are enforced by floor leaders and are centered around keeping it free from obstruction and maintaining cleanliness. It was observed

that residents in general follow these rules having been influenced by the DRR training provided to them.

Finally, housing modifications in the housing units by residents were observed to be influenced by three factors: livelihood and income generation, needs and preferences, and lastly, responses to the COVID-19 pandemic lockdowns.

CHAPTER 7

Conclusion and Recommendations

7.1 Introduction

This chapter summarizes the findings from the previous chapters and concludes the dissertation. Planning and policy recommendations are then outlined and directions for future research are prescribed.

7.2 Summary of Findings

Major findings were organized based on scale starting with the macro scale down to the micro scale as presented in the previous chapters.

7.2.1 Urban Resilience (Macro Scale)

- Governance, risk identification, financial considerations, societal capacity, and preparation and response were found to be strong attributes of resilience of Metro Manila cities
- Urban development and institutional capacity were found to be major weaknesses in Metro Manila cities
- Ecosystem protection is not prioritized at all across a significant majority of Metro Manila cities
- Participatory processes for disaster recovery are not being implemented
- City-to-city learning is not being implemented

7.2.2 Community Resilience (Meso Scale)

- Social capital plays a pivotal role in ensuring long-term resilient outcomes for a resettled community
- Mental outlook is a strong contributor to the community's resilience
- Robustness of facilities is key to improving a positive perception on safety
- Learning requires attention as the pandemic has affected the DRR training in the community

- The pandemic revealed the weakness in terms of redundancy or resource spareness in the community

7.2.3 Built Environment Resilience (Meso and Micro Scales)

7.2.3.1 Green and Healthy Infrastructure

- Despite green spaces not being integrated in the design of the project, residents have found ways to create pockets of green space and urban gardens to improve their surroundings as well as using it as a resilient strategy for food security during the pandemic
- The community leveraged social capital to get the resources needed to initiate and maintain development of the green spaces in their community
- The community trained members in traditional medicine to take advantage of the medicinal plants at their disposal
- The green spaces also served as areas for rest and socializing.

7.2.3.2 Adaptable Infrastructure

- Residents set up their own community marketplace to adapt to the constraints of the strict lockdowns due to the pandemic
- At the household level, housing units were modified to suit the needs of the residents
- Residents modified their units to respond to the constraints and challenges posed by the COVID-19 pandemic

7.2.3.3 Equitable and Inclusive Infrastructure

- Inclusive use of the built environment is reflected in the support for the vulnerable members of the community not only in the physical sense but also in the social sense wherein the community provides a social safety net
- Lack of open and play spaces for children highlight a need to include them in the early phases of planning and design of the development with community participation

7.3 Planning and Policy Recommendations

Taking into consideration the abovementioned summary of findings, the following suggestions.

DRR governance and risk identification are strong points at the city or macro level and permeates down to the community level. The local government unit of Pasig has provided the necessary direction towards DRR awareness, and this has been observed to influence down to the community level. The Manggahan LRB community's organization has formalized its own DRR committee to spearhead activities relating to disaster preparedness and response.

On the other hand, the lack of prioritization for ecosystem protection at the city or macro level affected prioritization and integration of green spaces in the planning and design of the resettlement project. The community had to make up for the deficiencies in planning for green and open spaces by seeking assistance from their support networks. The provision of green spaces and open spaces should be provided for and integrated in the design of the resettlement project from the start.

Considering the pivotal role that social capital plays in cross-cutting issues in the community, all concerned agencies and actors should look to facilitate the establishment of social capital networks for resettlement communities.

Design considerations for resettlement projects should not only consider the bare minimum requirements of socialized housing but also for future needs and modifications and transformations. This entails taking into consideration an incremental approach in the development of design guidelines which enable residents to make adjustments to their housing units according to their evolving needs without compromising on health and safety standards.

Due to the short design phase of the resettlement project, the implementation of the People's Plan should explore ways of finding a more two-way exchange of communication between the ISF communities it engages with. This would entail facilitating and streamlining time-consuming processes such as site selection in phase 1 or the pre-relocation phase of the resettlement process.

The study revealed synergies between resilience at different scales. In order to maximize the potential of building resilient communities and cities, investigations into resilience at different scales should be holistically considered. A proposed framework shown in Figure 7.1 presents an evaluation framework for a holistic assessment of resilience across multiple scales.
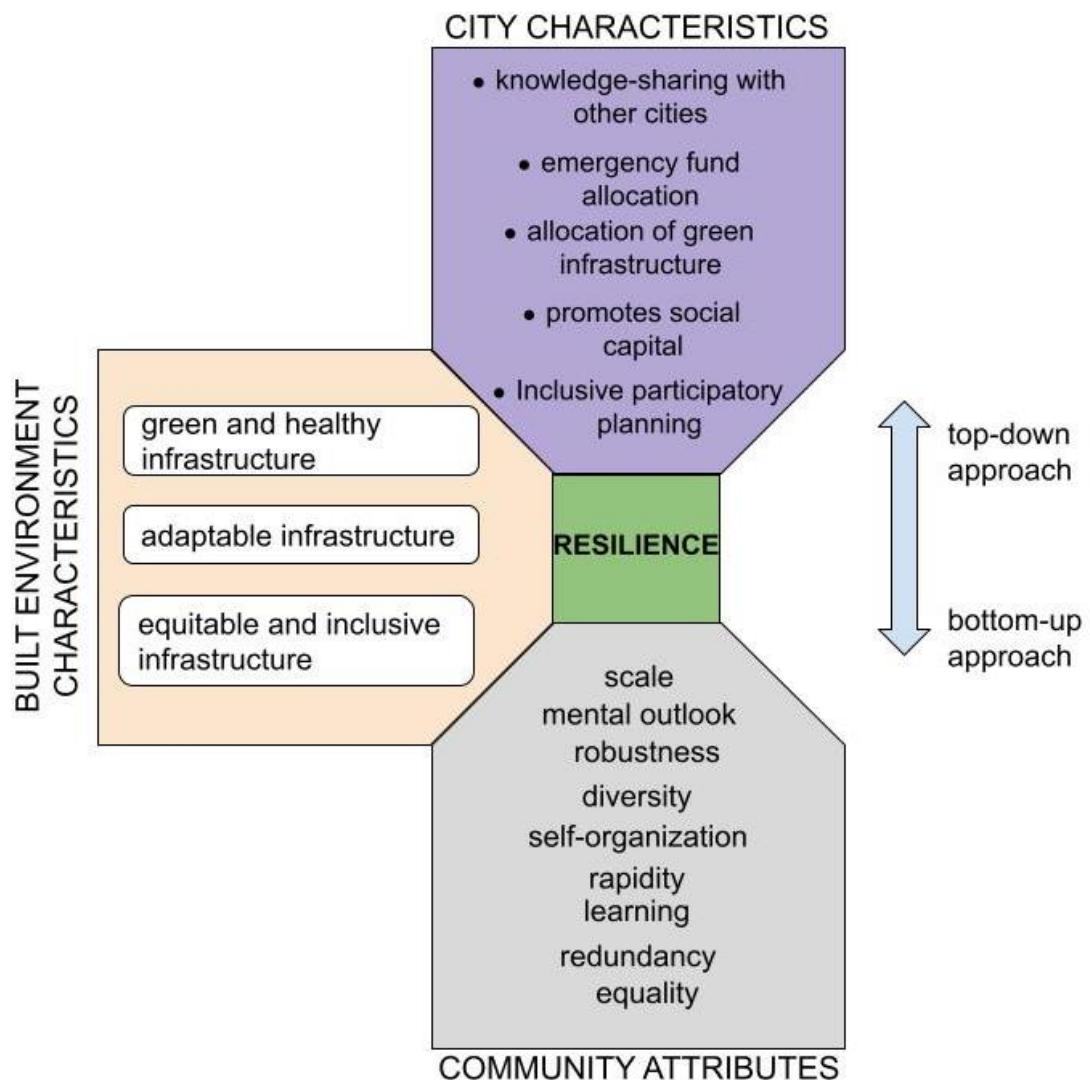

Figure 7.1 Evaluation framework for resilience across scales (macro, meso, and micro scales)
(Author's own elaboration)

7.4 Future Research

This study sought to investigate resilience through a multi-scalar approach and revealed useful insights for building resilience in in-city resettlement contexts. The following recommendations and suggestions below provide directions for future research.

- Future research may benefit from conducting further studies on other modes of resettlement projects such as including on-site, near-city, off-city resettlement projects to provide a comparative analysis of resilient outcomes in different resettlement contexts.

- Conducting a longer timeline and scheduling of fieldwork activities to provide a more comprehensive and complete assessment of resilience could better reflect situations on the ground.

- Urban resilience assessment could also be improved by conducting interviews with the relevant government offices to confirm and improve the analysis of plans and policies.

- Harmonization of resilient evaluation frameworks to better align resilience dimensions could also provide significant improvement of resilience measurement across studies.

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APPENDICES:

Appendix A. INTERVIEW QUESTIONS (NHA)

Name of Interviewee: _____Position: _____

Location/Date/Time of Interview:

_____

1. **Background**

   1.1 Could you please give a brief history of the project?

   2.1 Who are the stakeholders/organizations involved?

   3.1 How many buildings are presently constructed and how many people are currently residing in the project?

   4.1 Please walk us through the selection process for the project's beneficiaries.

   5.1 Does the project have any program for incoming residents to help them adjust to living in the community?

   6.1 Could you explain in detail about the estate management/maintenance of the project?

   7.1 What are the issues/problems faced by the community? How have they managed to overcome or cope with it?

2. **Disaster Risk Management**

   1.1 Could you please tell us about the disaster risk profile of the area? What natural hazards are present?

   2.1 Has there been any incident recently that has affected the community negatively (fire, flood, etc.)?

   3.1 Does the project have any disaster/climate resilient features (i.e. design against flooding, earthquakes, etc.)?

   4.1 Does the project have its own early warning system?

   5.1 Does the project have disaster mitigation projects (i.e. rain garden, regular drainage clearing, etc.)? How about pre-, during, and post-disaster plans (i.e. preparedness training, evacuation procedures, etc.)?

   6.1 Were the residents consulted on flood control measures?

3. **Lessons Learned**

   1. To what extent have the goals of the project been achieved? Would you say it has been a success? Why or why not?

   2. What were the important lessons learned from the project? How will you use these learnings on succeeding implementation of the People's Plan?

Appendix B. INTERVIEW QUESTIONS (APOAMF)

Name of Interviewee: _____ Position: _____

Location/Date/Time of Interview: _____

1. **Local Context**

    1.1 What are the strengths and weaknesses of the community?

    2.1 What are the issues/problems faced by the community?

2. **Incidents and local response**

    2.1 Has there been any incident recently that has affected the community negatively (fire, flood, etc.)?

    2.2 How did the community respond to the impacts? What was done, why, and were there any other people or organizations involved in helping?

3. **Community Resilience Attributes**

    3.1 Robustness

    - In your opinion, is the community prepared to respond to disasters or climatic events/emergencies? Why or why not?

    - Are there any physical interventions/measures that has been adopted in the community to prevent damage in case of emergencies?

    3.2 Self-organization

    - Can you tell me about the capacity of the community members to organize among themselves in case of crisis/emergencies?

    - Are you a member of local groups or associations? How strong are the community's ties to those groups?

    3.3 Learning

    - Do people in the community share their experiences and their knowledge with each other?

    - Are there any training/awareness-raising activity about climate change and disaster response taking place in this community? Are you aware if those issues are taught to children at school?

    3.4 Redundancy

    - Does the community have access to reserve funds in case of emergency?

    - If you were not able to access support from neighbors, friends, or family in times of emergencies who would you go to for help?

    3.5 Rapidity

    - In your opinion, does the community act and respond rapidly to emergencies or climatic events?

    - Do you consider that community members have the ability to access resources swiftly?

- Are there any early warning systems operating in this community?

3.6 Scale

- Are members of the community in contact with institutions/organizations that are not based in this neighborhood?
- Do you know of any examples of associations or collaborative work between the community, the private sector, NGOs, and/or local/national authorities?

3.7 Diversity and Flexibility

- Would you consider the community adapts well to change? Why or why not?
- Does the community implement innovative and creative practices? Can you give me some examples?

3.8 Equality

- Do you consider that the needs and opinions of all community members (particularly between seniors and youths, or among people with higher and lower income) are being heard and considered? If yes, how so?

3.9 Mental Outlook

- Do you think members of the community have a positive outlook on their lives and futures as a result of living here in this settlement?

Appendix C. INTERVIEW QUESTIONS (COM)

Name of Interviewee: _____Position: _____

Location/Date/Time of Interview: _____

1. **Local Context**

   1.1 What are the positive characteristics/strengths of the community?

   1.2 What are the problems faced by the community?

   1.3 In the time that you have worked with this community, what have been the situations of emergency or risk that you have had to face? For example, moments of crisis or disasters that needed to be overcome?

   1.4 In your experience, has there been any incident related to climate change that has affected the community? What was the response to those incidents?

   1.5 Are there any measures that have been taken to prevent or mitigate those impacts in the future?

2. **Community Resilience Attributes**

   2.1 Robustness

   - In your opinion, is the community prepared to respond to disasters or climatic events/emergencies?

   - Are there any physical infrastructure/physical measures that have been adopted in the community to prevent damage in case of climatic emergencies?

   - How vulnerable is the community's infrastructure and housing to the impact of climatic emergencies or events?

   - How has RA10121 or the DRRM Act influenced the community?

   2.2 Self-organization

   - What can you tell me about the capacity of the community members to organize among themselves, in case of crisis or problems?

   - Is there a high or a low degree of trust among members of the community?

   - Are there social networks or networks of collaboration operating in the community? How strong are those networks?

   2.3 Learning

   - Do you think that the community has learned from past experiences, for example in the case of natural disasters or climatic events? If yes, how did that learning took place? (for example, with the help of which tools or which groups)

   - Is it common for people in the community to share their experiences and their knowledge with each other? Or are they rather guarded with their knowledge?

- Has any training/awareness-raising activity about climate change taken place in this community?
- Do you think that traditional knowledge/indigenous practices are being taken into account, or are being lost?

2.4 Redundancy

- Do community members generally depend on a single income source, or do they have access to multiple sources? (e.g. do they sell different products, receive remittances)
- In this community, are there several institutions/organizations that work on the same issues? (for example, multiple cooperatives, multiple NGOs)
- Do community members have the custom of saving money? In case of disasters or emergencies, do they have contingent financial resources that they can use?

2.5 Rapidity

- Do you consider that, in case of emergency or climatic events, the community responds and acts rapidly?
- Do you consider that community members can access resources swiftly? For example, immediate support from friends/institutions/insurance, in case of need?
- Do you know of any early warning system operating in this area?

2.6 Scale

- In your opinion, are members of the community in contact with institutions/organizations that are not based in this area? For example, with institutions that operate at the regional or national level? Which institutions? For what purpose are they in contact?
- In situations of emergency or crisis, have community members received support from institutions or groups that are not part of the community?
- Do you know of any examples of associations or collaborative work between the community, the private sector, NGOs and/or local/national authorities?

2.7 Diversity and Flexibility

- Do you consider that the community adapts well to change? For example, to changes in the economic, political, or environmental situation.
- In your opinion, do community members identify options to do things differently from the past? For example, in cases of emergencies or disasters, do they look for options, or apply the same measures that they have always used?
- What are the main sources of information for community members? Where do they access information?
- Do you think that the community implements innovative practices? Can you give any examples?
- Do you consider that community members see change as a threat or as an opportunity?

2.8 Equality

- In your opinion, are the decisions that affect the community taken in a participative manner?

- Are there gaps among different community groups, for example between seniors and youth, or among people with higher and lower income?

- Do you consider that the needs and opinions of all community members (including seniors, youth, women-headed households, the disabled, etc.) are being heard and considered? (for example as part of community projects/initiatives, local organizations)

2.9 Mental Outlook

- In your opinion, are the residents somewhat hopeful for their future in the community? Please elaborate.

- What have you observed among the residents that might contribute to their positive mindset in living in the community?

- How well have the residents adapted or adjusted to living in mid-rise type of residence? Could you cite specific changes you have observed?

- How quickly do the residents accept to changes in their economic, political, or environmental situation? Could you cite some specific instances from your observation?

3. **Peoples' Plan and DRR**

3.1 Could you please explain the DRR component of the People's Plan? How is it being implemented currently in the community?

3.2 What were the important lessons learned from the project? How will you use these learnings on succeeding implementation of the People's Plan?

Appendix D. HOUSEHOLD QUESTIONNAIRE

1. Survey Respondent Profile

1.1 Name: _____

1.2 Sex
- o Female
- o Male

1.3 Age
- o 15-24 y/o
- o 25-34 y/o
- o 35-44 y/o
- o 45-54 y/o
- o 55-64 y/o
- o More than 65 y/o

1.4 Marital Status
- o Single
- o Domestic Partnership
- o Divorced
- o Widowed

1.5 How many are you in the household?
- o 1
- o 2-3
- o 4-5
- o More than 5

1.6 Educational Background
- o No formal education
- o Primary / JHS
- o Secondary / SHS / Vocational
- o Tertiary

1.7 Occupation
- o Unemployed
- o Student
- o Housewife
- o Self-employed
- o Private company employee
- o Government employee
- o Retired

1.8 Monthly household income
- o Less than 11,000
- o 11,001-22,000
- o 22,001-44,000
- o 44,001-77,000
- o 77,001-132,000
- o More than 132,000
- o Prefer not to answer

1.9 How long have you been living in this community?
- o Less than a year
- o 1-2 years
- o 3-4 years
- o 5-6 years
- o More than 7 years

1.10 Which type of natural hazard have you experienced (You may select more than one)
- o Floods
- o Earthquakes
- o Typhoons
- o Fires

2. Resilience Attributes

2.1 Robustness

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I do the necessary preparations to anticipate and respond to flood disasters/emergencies	o	o	o	o	o
The building I live in is safe against hazards such as flooding	o	o	o	o	o
The building I live in is safe against typhoons	o	o	o	o	o
The building I live in is safe against earthquakes	o	o	o	o	o
The building I live in is safe against fires	o	o	o	o	o
Lifeline utilities such as electricity and water are easily restored following a disruption	o	o	o	o	o
Assistance from the government (e.g. rescue, fire brigade) is accessible to the community during emergency situations	o	o	o	o	o
Community infrastructure are strong to prevent or mitigate impacts from disasters such as flooding, etc.	o	o	o	o	o

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2.2 Self-organization					
I am ready to assist my neighbors during emergencies and trust that they will do the same for me	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
Local leaders are highly capable and are able to perform their duties responsibly during emergencies	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I regularly participate in disaster prevention and response programs initiated in the community	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
Local groups (e.g. DRM) actively participate in disaster preparation and response	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
We adopt technology to mobilize resources for disaster preparedness and response	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
2.3 Learning					
I am knowledgeable of the severity and places of high flood risk in our area	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I have received and shared lessons from past experiences with flooding from other members	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
We have access to drills and other training activities and take part in them	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
The community leverages past experiences to anticipate and plan differently in the future	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
2.4 Redundancy					
We maintain an emergency fund just in case of serious disruption to our livelihood	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I have diversified income sources to sustain me in times of emergency	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I have access to financial instruments such as insurance or informal group credit	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I receive support from family, friends, and neighbors in times of emergency	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
2.5 Rapidity					
I have access to early warning and up-to-date information on upcoming flood hazards and other emergency events	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
Emergency information is rapidly disseminated among members of the community	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
We are able to swiftly implement evacuation protocols should a disaster occur	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
We are able to promptly receive emergency aid and/or food after a disaster has occurred	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree

Local leaders and institutions effectively coordinate emergency preparation and response activities	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree

2.6 Scale

The community has various partnerships with NGOs, academic organizations, and even international agencies	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
The community has strong collaborations with the local and national government	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
We have received aid (e.g. scholarships, skills training, health services, etc.) as a result of these types of partnerships	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
The community has regular interactions with NGOs, academic organizations, etc. on disaster preparation and response.	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree

2.7 Diversity and Flexibility

I have several options or courses of action available to me in case of emergencies	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I am able to identify potential opportunities emerging from change	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
The community comes up with innovative and creative solutions to problems that arise in times of emergency	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
Our community is made up of members with a diverse set of skills and training	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree

2.8 Equality

I feel my needs and opinions are considered in the decision-making process of our community	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
The decision-making process on disaster management in our community association is transparent	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
Resources on disaster management such as aid are distributed fairly among members of the community	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
Capacity-building programs and opportunities are available to all including the marginalized groups (e.g. PWD, youth, elderly)	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I am involved in taking decisions about steps to undertake against the effects of natural hazards such as flooding, typhoon, etc. that affect me	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree

2.9 Mental Outlook

I am generally hopeful about my family's future in this community	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I think our quality of life will improve when impacted by disaster	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I am willing and determined to adapt and change should a disaster occur	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree

I think we can overcome any challenge brought on by disasters and the like in this community	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
I am confident that I could deal efficiently with unexpected events such as flooding for example	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
When I am confronted with problems brought about by disasters such as flooding, for example, I find solutions to them	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree
We are able to deal with impacts of natural hazards such as flooding on our life by ourselves	○ Strongly Disagree	○ Disagree	○ Neutral	○ Agree	○ Strongly Agree