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Challenges to Disaster Risk Governance in Rapidly Developing Megacities: Risk Perceptions of the Middle-Class and Coastal Informal Settlements in Metro Manila, Philippines

（急成長するメガシティにおける災害リスクガバナンスの課題: フィリピン メトロマニラの中流階級と沿岸不法占拠民によるリスク認知）

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ABSTRACT

Seventeen of the world's megacities (urban areas with more than 10 million in population) are in the Asia-Pacific Region, and this is projected to rise to 22 by 2030 (UN-Habitat and UNESCAP, 2015). Most of these densely populated urban areas are situated along the coast, and because of rapid urbanization, settlements and economic assets are intruding into the coastline, exposing them to natural hazards and the consequences of climate change (Kron, 2013; Neumann et al., 2015). Due to the combined effects of high exposure to natural hazards and a rapidly growing population (especially in developing countries), Asia saw an increase in disasters in the region (Guha-Sapir et al. 2017; Douglass 2016). However, this has not deterred cities from continuing to reclaim land from the sea, and there has been an increase in mega-reclamation projects in Asia (Martín-Antón et al., 2016).

Studies on the impacts of disasters and climate change on society have focused mainly on how it affects the poor. However, urbanization has led to a growing global middle class that the UNDP is projecting will comprise half of the world's population by 2030 (UNDP, 2013). While the global middle-class has grown exponentially due to globalization and urbanization, unplanned rapid development in developing countries has also given rise informal settlements that are highly vulnerable to extreme weather events (Revi et al., 2014). The interaction and consequences of the perceptions of risk to urban areas of members of these two social classes is the primary focus of this thesis.

Essentially, the present PhD thesis aims to elucidate how urban dweller's perception of risk and resilience in a megacity interacts with urbanization and its manifestations. This is done by using land reclamation as a tangible and visible form of urbanization, which is a divisive topic in policy and academia. Understanding this allows to discuss why traditional engineering-based

approaches to disaster risk reduction have failed in keeping up with the increasing complexity and uncertainty in urbanizing Asia (Miller and Douglass, 2016), and outline possible solutions to such problems.

To analyze such issues the thesis will use as a case study the experiences of a Southeast Asian megacity on disasters and rapid urbanization. Metro Manila is constantly at-risk to natural hazards and the persistent threat they pose to daily life influences the public perception of how the city should grow, alongside other issues such as population growth and rising inequality. Megacities in highly exposed developing countries are often leaning towards traditional physical infrastructure-based solutions to prevent disasters (Miller and Douglass, 2016). However, rapid urbanization and climate change adds complexity and uncertainty that may lead to severe disasters in the future (Field et al., 2012; Revi et al., 2014). These makes it a challenge for megacities in developing countries to keep up with the growing complex socio-economic issues in their rapidly urbanizing regions (Miller and Douglass, 2016).

The research looks at risk perception of the middle-class urban dwellers and residents of an informal settlement living on reclaimed land. This is done through an online survey of 425 middle class respondents all over Metro Manila and a household survey of 102 families in BASECO Compound, an informal settlement in reclaimed land. The research then compares, contrasts, and connects such perceptions to understand how risk narratives interact with urban development. The study found that there is a difference in perspectives of risk and preparedness between the different social classes. The middle-class are wary of the future, while informal settlers are more concerned of the present. The middle class are more active in evacuation drills and are more knowledgeable on hazards, and yet the poor are more prepared to respond to disasters. There is a social amplification of disaster risk by the middle class, who also perceive the poor to be less resilient. This dynamic allows and enables elitist policies on disaster risk that eventually legitimizes the use of disaster risk to evict the poor from the city.

The dissertation calls for an increased understanding of the nature of disaster risk and how it coalesces with the issues of rapid urbanization and sustainable development. The research finds that while disaster risk reduction programs often benefit the poor, the growing middle-class poses a challenge to this by shifting the government's focus from the vulnerable to appeasing the needs and wants of the middle-income bracket. The potential pathway to a solution is to engage the middle classes' high consciousness of environmental issues and integrate social equality discourses that explain the intricacies of poverty and inequality and vulnerability. While the research investigated risk perceptions of the middle-class and the poor regarding disaster risk, climate change, and a growing megacity, it also calls for the need for more research on the potential effects of a growing middle-income group to the core concerns of sustainable development.

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I would like to end my graduate studies journey with wise words from my favorite book by Douglas Adams: *"So long, and thanks for all the fish!"*

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LIST OF ABBREVIATIONS

BASECO	Bataan Shipyard and Engineering Company
CBDRM	Community-Based Disaster Risk Management
CCA	Climate Change Adaptation
CLR	Coastal Land Reclamation
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
FIES	Family Income and Expenditure Survey
GMMA	Greater Metro Manila Area
HHI	Harvard Humanitarian Initiative
HHWL	Highest High-Water Level
IPCC	Intergovernmental Panel on Climate Change
IPCC-AR5	Intergovernmental Panel on Climate Change 5th Assessment Report
IPCC-SREX	Intergovernmental Panel on Climate Change Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation
MLLW	Mean Lower Low Water
NCR	National Capital Region
OFW	Overseas Filipino Worker
PADM	Protective Action Decision Model
PAR	Pressure and Release Model
PRA	Philippine Reclamation Authority
SARF	Social Amplification of Risk Framework
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction 2015-2030

CHAPTER 1: INTRODUCTION

1.1 Coastal hazards in a rapidly urbanizing Asia

Coastal regions have an increased exposure to natural hazards compared to other geographical locations due to the socio-economic development opportunities that access to the coast presents (Kron, 2013). Concurrently, rapid development in these areas also continues unhindered, leading to an increase in poverty and inequality, as evidenced by the increase in impoverished coastal settlements, particularly in developing regions (Davis, 2004). The interaction between increasing disaster risk and rapid unplanned urban development has not gone unnoticed in disaster risk reduction (DRR) and climate change adaptation (CCA) studies.

The Intergovernmental Panel on Climate Change (IPCC) states the that rapid urbanization in megacities has led to an increase in highly vulnerable urban communities to climate change impacts (Field et al., 2012; Revi et al., 2014). The IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (IPCC-SREX) notes that this has manifested through the increase of informal settlements and inadequate land management in urban areas (Field et al., 2012). The Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 highlights this as amongst the risk drivers that needs to be addressed (UN-General Assembly, 2015).

Among the rapidly growing urban areas of the world, Asia accounts for more than half of the global urban population and has the most populous coastal regions worldwide (United Nations Department of Economic and Social Affairs Population Division, 2019). Asia is highly vulnerable to climate change, which makes this fast growing highly interconnected region even more susceptible to extreme events (UN-Habitat and UNESCAP, 2015). Indonesia, the Philippines, and Vietnam, for instance, are likely to experience increased flooding in the

next few decades, and settlements along their coasts and riverways will be challenged to cope with these hazards (Anh et al., 2017; Douglass, 2016; Esteban et al., 2017a; Firman et al., 2011; Takagi et al., 2016).

The key challenge in developing regions, particularly in Asia, is how to balance disaster risk, future uncertainty, and rapid urban development. While disaster risk reduction and climate change adaptation studies have typically investigated the most at-risk communities, there is a growing need to holistically understand the perception of various actors within some of the new megacities that are forming in these areas of the world. Thus, this doctoral dissertation investigates and elucidates how urban dwellers from different societal classes view the rapid changes happening within a megacity, particularly focusing on how they perceive the interaction between rapid population growth, urbanization, land reclamation, and disaster risk.

1.2 Literature Review and Research Gaps

1.2.1 Overview of coastal disaster awareness in coastal communities

Coastal disaster awareness has increased drastically in the last two decades due to media exposure to events associated with tropical cyclones and tsunamis (Esteban et al., 2013). While media exposure appears to have increased disaster awareness, this does not necessarily lead to early evacuation and disaster preparedness, as seen in the case of communities in Bangladesh (Kelman et al., 2018). A knowledge gap between what the media broadcasts and residents understand exists, where residents misunderstand or are confused by warning information, which leads to improper evacuation, as seen in tropical cyclone events in the Philippines and the Dominican Republic (Yore and Walker, 2020). Disaster awareness and disaster experience does not make impoverished communities relocate, as such communities prioritize access to livelihoods and economic opportunities, as seen in the case of small island communities in the

Danajon Bank, the Philippines (Jamero et al., 2017). Finally, disaster awareness decays over time, unless disaster education programs are implemented (Esteban et al., 2013).

Disaster risk reduction and sustainable development are closely linked. However, disaster risk reduction strategies in the developing regions of Asia have failed to address both disaster risk and urbanization (Miller and Douglass, 2016). Metro Manila's experience with typhoon Ketsana in 2009, where nearly a thousand died, highlights this complexity. Despite this, mega infrastructure projects are still favored, such as the Metro Manila Reclamation Project and Indonesia's Great Garuda Seawall, even if experts and civil society have voiced concern about effectiveness and social repercussions (Colven, 2017; Takagi et al., 2017; Valenzuela et al., 2020a). Despite the increasing uncertainty to extreme events and climate change, rapid urbanization goes undeterred in the region. While urbanization has led to a rising middle class, it has also widened the gap between the rich and the poor. Moreover, massive coastal infrastructure development such as coastal land reclamation (CLR) has been on the increase in Asia.

1.2.2 Risk perception and social inequalities in a megacity

Urbanization has led to a growing global middle class that is expected to comprise half of the global population by 2030 (UNDP, 2013). However, vulnerability is a core concept situated at the nexus of the study of disasters, climate change, and sustainable development, and has been often associated with poverty and inequality (Winser et al., 2004). While the rise of the middle-class may be seen as a sign of curbing poverty, rapid urbanization in developing countries has given rise to new informal settlements that are vulnerable to extreme weather (Revi et al., 2014). Disaster awareness surveys mostly involve these communities, which have shown that poverty and improper disaster education exacerbate risk, as these communities tend to underestimate the hazards, overestimate their capacity to respond, and focus more on the needs of the present than on disaster preparedness (Esteban et al., 2017a; Kurita et al., 2006;

Mercado, 2016; Takagi et al., 2017; Valenzuela et al., 2020b). Nevertheless, organized vulnerable groups have also shown willingness to engage in community-based disaster risk management (CBDRM) activities that minimize losses from such events (Pineda, 2012). There is also a strong social cohesion amongst informal settlements, which forms an integral component of their disaster resilience (Usamah et al., 2014).

While disasters impact various sectors of society differently, with the poor often suffering more than the others, they can also force large numbers of people into poverty (Hallegatte et al., 2016). The compounding costs of disasters has been increasing over the past few decades (Guha-Sapir et al., 2017), and has led to residential instability, where people who lack resources are the first to suffer (Elliott and Howell, 2017). Rising wealth inequality and the increasing costs of damage from disasters are linked, even in wealthy countries such as the United States (Howell and Elliott, 2019). In Asia, where many countries have a wide wealth distribution inequality, disaster studies focus on the lower-income classes which have been labelled as 'vulnerable' and are subsequently the target of disaster resilience projects. While the literature on disaster risk reduction and climate change adaptation in coastal megacities is continuously growing, the middle class, a sector of society where members may fall into poverty as disaster costs compound over time, is not well studied. Understanding their perceptions and how these drive urban development policies is vital to ensure the long-term sustainability of urban areas. This thesis will thus attempt to fill this gap in academic literature.

Despite limited evidence, the Intergovernmental Panel on Climate Change 5th Assessment Report (IPCC-AR5) states that there is high agreement that urban dwellers may exert pressure on city governments through cooperative multilevel governance to address disaster and climate risks (Revi et al., 2014). The relative lack of evidence regarding this largely stems from the coalescing and diverging concepts of vulnerability, which focuses on specific groups, and resilience, which looks at the ability of a system to bounce back (Revi et al., 2014; Turner,

2010). Lacking in this are studies of the role of the middle class, a non-'vulnerable' group that nevertheless has the ability to demand the government to provide better services and drive policy reforms (Albert et al., 2015; Birdsall, 2010; Desai and Kharas, 2017).

1.2.3 Coastal land reclamation in the context of urbanization, disaster risk reduction and climate change adaptation

Risk-informed and proper land use management is central to effective disaster risk reduction and climate change adaptation in coastal urban areas, especially in megacities that are prone to the effects of land subsidence, extreme coastal hazards, and sea level rise (Cao et al., 2021; Dedekorkut-Howes et al., 2020; Field et al., 2012; Revi et al., 2014). This also requires a multistakeholder approach in creating urban development plans that consider various types of risks within and surrounding a megacity (Chan et al., 2018; Hiroi et al., 2015; Sundermann et al., 2014; United Nations University et al., 2014). Choosing a preferred disaster risk reduction and climate change adaptation strategy to use as a central principle in urban development is often a contentious social issue, especially in developing regions where elite politics have a strong influence in which actions to adapt (Alvarez and Cardenas, 2019; Douglass, 2016)

Typically, plans to address climate change impacts and future disaster risks fall under a combination of 3 types of strategies: managed retreat, accommodate, and protect. "Managed retreat" refers to a planned abandonment of areas potentially exposed to future risks, "accommodate" strategies are those that enable adaptation of buildings and surroundings to future threats, and "protect" is to invest in defenses that would stop future hazards from entering settlements (Nicholls, 2011). A fourth category, "attack" has been added, and is identified as strategies that promote 'advancing the line" and refers to infrastructure designed to be built on

top of water, such as ports, piers and coastal land reclamation (Dedekorkut-Howes et al., 2020; Esteban et al., 2018b; Lee, 2014; Nicholls, 2011). In rapidly growing megacities such as Metro Manila and Jakarta, mega coastal infrastructure development, particularly coastal land reclamation as a solution to both population woes density and disaster risks, are often preferred by local elites (Colven, 2017; Herbeck and Flitner, 2019; Miller and Douglass, 2016; Takagi et al., 2017). Coastal land reclamation is considered primarily as an attack-type strategy that intersects with managed retreat, accommodate, and protect adaptation options which makes it very alluring in urban areas (Dedekorkut-Howes et al., 2020). However, it is also the most contentious amongst the options.

There is a debate regarding the link between land reclamation and disaster risk. Reclaimed land can serve as a buffer zone for communities to coastal hazards, while it does not prohibit construction and development in the newly formed coastal area (Lee, 2014; Wolf, 2013). On the other hand, reclamation can increase the risk of liquefaction during earthquakes, such as the 1995 Kobe Earthquake (Martín-Antón et al., 2016). Reclamation also disrupts environmental processes in a coastal zone (Chee et al., 2017). As a whole, there is uncertainty on the effects of reclamation and similar coastal infrastructures, as there are little research that has studied 'attack'-type adaptation strategies that involve building on water (Dedekorkut-Howes et al., 2020).

Despite this discussion and uncertainty on whether reclamation increases or reduces risk; rapid urbanization continues unabated. Megacities such as Manila are reclaiming coastal areas to address population density problems and take advantage of economic opportunities (Chee et al., 2017). Economic opportunities drive settlements to build on water, intruding into hazard prone land, and thus, increasing exposure (Valenzuela, et al., 2020). In Asia, the most vulnerable to coastal hazards are the poor (Delica-Willison, 2003). However, only a few studies have investigated the disaster awareness of settlements on reclaimed land. It is imperative to

elucidate why disaster risk reduction strategies in developing countries should consider socio-economic issues that drive communities to live in coastal regions.

1.2.4 Research Gaps

Developing countries in a rapidly urbanizing regions tend to prefer engineering and relocation-based disaster risk reduction strategies but many studies have highlighted that it is incapable to address the complexity and uncertainty of urban development (Alvarez and Cardenas, 2019; Colven, 2017; Miller and Douglass, 2016; Pelling, 2012; Takagi et al., 2017; Yee, 2018). This doctoral dissertation will provide an understanding of this by analyzing how the perceptions of urban dwellers of risk and urbanization contribute to the complexity of risk reduction and sustainable development in megacities. The literature review provides a deeper understanding of the complexity of disaster risk reduction in rapidly developing urban areas.

First, it was noticed that while disaster awareness has been increasing, it has not led to effective action (Esteban et al., 2018a; Harnantyari et al., 2020; Kelman et al., 2018; Suppasri et al., 2015; Valenzuela et al., 2020b; Yore and Walker, 2020). This is primarily because impoverished coastal communities prefer to live in at-risk zones and yet, relocation of these settlements are seen as an immediate solution to reducing disaster risk, especially in very populous cities (Alvarez and Cardenas, 2019; Balgos, 2015; Islam, 2018; Jamero et al., 2017; Siriwardane-de Zoysa, 2020; Yee, 2018).

Second, disaster studies have tended to focus on at-risk communities but have largely ignored a broader sector that most of the urban dwellers belong: the middle-class. There is a need to understand the implications of a growing middle-class to pro-poor and vulnerability reduction policies (Davis, 2004; Desai and Kharas, 2017; Ley, 1994; Never and Albert, 2021). While literature suggests that eviction under the guise of relocation have been a core policy

that elites have created as a central component of disaster risk reduction (Alvarez and Cardenas, 2019; Yee, 2018), there are no studies on who potentially enables such narratives.

Third, coastal areas are typically more prone to be developed, especially through coastal land reclamation, due to urbanization pressure and yet, these areas are often populated by impoverished communities (Davis, 2004; Kron, 2013; Martín-Antón et al., 2016; Revi et al., 2014; Siriwardane-de Zoysa, 2020). While these settlements are being painted as increasingly being vulnerable and exposed to hazards, there are no studies on how they perceive the impacts of the coastal developments happening around them and how they view them interacting with natural hazards and other risks.

1.3 Metro Manila as a case study

Metro Manila, the Philippines' economic and political center, represents well the issues that were discussed in the literature review. Metro Manila is at high risk to natural hazards, which influences public perception of how the city should grow, alongside other issues such as population growth and rising inequality.

The flooding due to Typhoon Ketsana resulted in the relocation of informal settlements as a core flood protection strategy in Metro Manila (Balgos, 2015; Singson, 2013). This disaster resurfaced the historical class tensions between the poor and elites, which enabled a risk narrative that underpins the poor as both vulnerable to and as a cause of floods (Alvarez and Cardenas, 2019). Thus, informal settlements are perceived by policymakers as contributing to the blockage of floodways, despite the reality that the megacity has been negligent in investing and implementing environmental management policies (United Nations University et al., 2014).

The way in which disaster risk management policies are used to remove vulnerable communities from waterways and coastal zones is termed by Alvarez and Cardenas (2019) as

"resiliency revanchism", or the politics of revenge of the elites to the poor by using the concepts of resilience and building back better. This stems from debt-driven infrastructure development in the 1970s, especially in Metro Manila, but was rendered unmanageable by the growing debt that led to the poor condition of the city's infrastructure(Stauffer and Broad, 1992). These failed modernization schemes have also led to a mass exodus of the poor to Metro Manila. With Metro Manila being one of the most at-risk cities in the world to natural hazards, this provides a prime opportunity to use a disaster event to pursue eviction of the poor from the megacity. The 2009 Typhoon Ketsana event became the trigger to use disaster risk reduction to pursue an elitist vision of urban development. For the elites, in the context of resiliency revanchism, evicting the poor from the city serves to address two woes: addressing an urgent need to be safe from a riskier future and realizing their ideal vision of the city – one that is clean and aesthetically pleasing (Alvarez and Cardenas, 2019). The 2009 Ketsana floods painted the poor as both the cause of flooding and the most at-risk to disasters, leading to the institution of policies that center on relocation of the poor as a form of resilience building (Alvarez and Cardenas, 2019; Balgos, 2015; Castelo, 2019). However, missing from this is the potential role of the middle-class in enabling or disabling elitist policies on risk and resilience in a megacity.

Beyond the role of the middle-class in influencing disaster policies and urbanization, there is little to no discussion on their awareness of disaster and climate risk. A 2018 study by the Harvard Humanitarian Initiative (HHI) shows that while Metro Manila leads the country in investing in disaster preparedness, this accounts for only 38% of the respondents living in the metropolis (Bollettino et al., 2018). The same study also highlights that despite being highest in investments and access to basic services, Metro Manila is amongst the lowest of 17 regions in the ability of respondents to respond, adapt, cope, and recover from disasters. The HHI study does not describe how the middle class perceives the disaster and climate risk of the megacity. Investigating how members of the middle-class view risk would therefore be useful to

understand the risk narrative they conscribe to and how this may influence the way in which the megacity should develop, despite potential gaps in their own knowledge of risk and practice.

Finally, Metro Manila has been investing in coastal land reclamation through private-public partnerships and currently has at least 22 such projects at varying stages of development (See **Figure 1.1**), all of which aim to provide the city with employment opportunities and reduce population density (Rivas, 2019; Roxas, 2019). For example, the City of Pearl Reclamation Project, which is also in the area where BASECO Compound is currently located, would convert the area to a prime residential community hub that has high end mixed use facilities to cater to its potential residents (City Government of Manila, 2018). These projects promise to bring sustainable development and smart city technologies to Metro Manila. Those who are in favor of the City of Pearl Reclamation Project emphasizes that the proposed project is designed to be the "world's biggest smart city" that would generate 100,000 jobs and would reclaim Manila's former glory (Manalo, 2018; Tapnio, 2019). However, the City of Pearl Reclamation Project and other planned coastal land reclamation projects in Manila Bay are opposed by academics and civil society groups, as they are seen to destroy the environment, exacerbate flooding, evict coastal communities, and destroy livelihoods (Abad, 2019; Castelo, 2019; De Vera-Ruiz and Fernandez, 2019; Rodolfo, 2014, 2013).

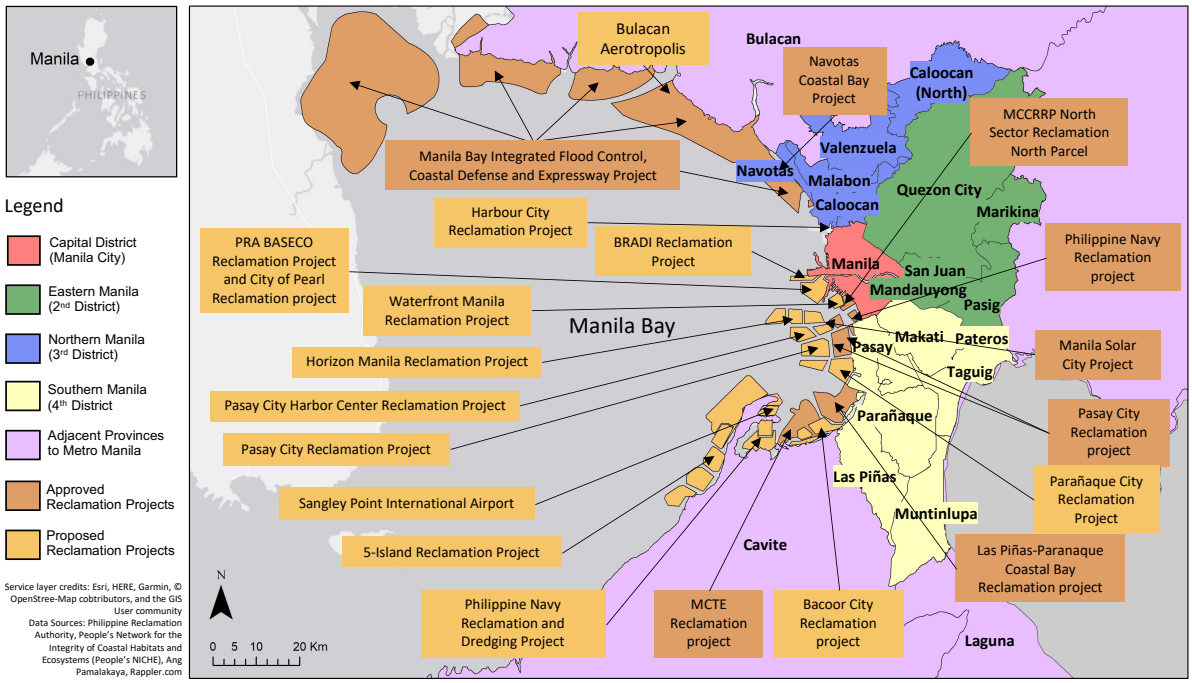

Figure 1.1 *Approved and Proposed Reclamation Projects in Manila Bay*

1.4 Research Questions and Objectives

The PhD research aims to elucidate how urban dweller's perception of risk and resilience in a megacity interacts with urbanization (and its manifestations.) This is done by comparing the perspectives of the middle-class and the poor in Metro Manila, the Philippines. This dissertation uses land reclamation as tangible and visible form of urbanization, which is a divisive topic in policy and academia. This allows a discussion (and a potential solution) on why traditional engineering-based approaches to disaster risk reduction have failed in keeping up with the increasing complexity and uncertainty in urbanizing Asia.

This research asks the following questions:

- How do urban dwellers from different social classes view disaster risk, future uncertainty, and the urban development that is happening in their city and what are the potential implications of their views?

- How do urban dwellers perceive the adaptation options that their cities are implementing and the coalescing nature of urban development and disaster risk reduction?
- How should flood risk management strategies typically employed by developed countries consider the geographical, social, and economic complexities in rapidly developing regions that are at risk to natural hazards and climate change impacts?

This study answers these questions by formulating the following objectives:

- Investigate the perception of disasters and climate change amongst those who dwell in a coastal megacity.
- Elucidate how the perceptions of urban dwellers interact with urban development infrastructure, using land reclamation as a central example.
- Rethink how disaster risk governance should be approached through the interpolation of the concepts of risk society and disaster risk reduction.

1.5 Significance of this research

On a global scale, this doctoral dissertation contributes to the growing understanding of the intricacies of disaster risk reduction, climate change adaptation, and urbanization by elucidating how the perspectives of different urban dwellers interact with each other. This is highly relevant to rapidly urbanizing regions such as in Southeast Asia, wherein development priorities often clash with each other despite the global sustainability frameworks calling for a better integration between sustainable development, disaster risk reduction, and climate action.

The research contributes to this discussion by highlighting the role of the middle class in influencing and enabling risk policies in a megacity which, to the author's best knowledge, has never been explored in literature before. Moreover, this dissertation also looks at the perception

of risk in impoverished communities living in reclaimed land, a coastal zone that appeared due to urban development pressure. While most disaster research tends to look at how disasters or urbanization affect such communities, this doctoral dissertation attempts to look at how these communities live with risk and urban development pressure.

1.6 Structure of this dissertation

This chapter covers the overall background of the dissertation and presents a general view of what the dissertation aims to achieve and its academic significance.

Chapter 2 discusses the various research frameworks used in this study: Pressure and Release Model, the Social Amplification of Risk Framework, and the Protective Action Decision Model. Chapter 2 also combines these frameworks and presents how to integrate social and temporal issues into the Multilayer Safety Protection Philosophy that was discussed earlier.

This dissertation employs a mixed methods approach, as often used in sustainability science, to gather data. Chapter 3 discusses the various methodologies employed by this research and how they are used to achieve the research objectives.

Chapters 4 and 5 presents the results of the doctoral dissertation. Chapter 4 focuses on the middle-class perception of risk and urbanization in a megacity and its implication towards urban development and sustainability. Chapter 5 focuses on the risk perception of impoverished coastal communities living on reclaimed land, which this research uses as an analogy of the tangible manifestations of urbanization.

Chapter 6 compares the results of chapter 4 and 5. It discusses how the risk perception of middle-class and the impoverished coastal communities interact, influence, and impacts disaster risk reduction and climate change adaptation policies in a megacity.

Finally, Chapter 7 concludes this dissertation. The chapter highlights the doctoral dissertation's contributions, recommendations, and limitations. It also informs the reader on potential future research that can be derived from this study.

CHAPTER 2: RESEARCH FRAMEWORK

The concepts of risk governance, resilience, and sustainability are interconnected, especially in a rapidly developing world. However, developing countries in Asia have long been emulating development strategies employed by developed countries, though in many instances these have seen little success. The reason is not as simple as because of the inherent economic limitations of a developing country. but often due to the nuances of the definitions of vulnerability that is core to disaster risk reduction studies. This chapter navigates these nuances through a discussion of the theoretical foundations of disaster risk and its implications to the contemporary application towards sustainable development.

This chapter discusses the concept of risk society and how it influenced the foundations of disaster risk reduction, particularly as to how disaster risk is defined. This is followed by how risk perception influences development. Finally, a discussion is given on the implications of the risk perception of the middle class and the poor to risk governance. This chapter ends by presenting the conceptual framework on which this dissertation is built – one that can discuss how urban dwellers' perception of risk influences the development of urban areas in developing countries and its implications.

2.1 Risk Society, Stratification, and Disaster Risk Reduction

The concept of risk society plays a key role in the discussion of disaster risk and risk governance (Mythen, 2015). The concept of a risk society appeared because of the social impacts of the environmental and ecological concerns in the 1980s, particularly after the Chernobyl disaster in 1988. Ulrich Beck (1992) in his book "Risk Society: Towards a New Modernity", argues that environmental risks are a product of an industrial society and not just

a side-effect of modernization. Risk society, in his work, is *"a society that has a systemic way of dealing with hazards and insecurities that was introduced by modernization itself"* (Beck, 1992). Anthony Giddens (1999) further expands this discussion. For Giddens, Risk Society is defined as "*a society increasingly preoccupied with the future (and also safety), which generates the notion of risk"* (Giddens, 1999). Both sociologists have argued that while society has always been subject to disasters that are brought about by natural hazards, industrialization and modernization has exposed contemporary society to risks that are manufactured by development processes themselves. For instance, global warming and climate change. Moreover, the solutions that were created to address development issues, such as chemical agriculture and nuclear energy, are seen with skepticism and caution by the inhabitants of a risk society. The risk society is identified by a populace that is becoming increasingly vigilant of the potential new risks created by solutions of the past, leading to the emergence of concepts such as the precautionary principle and sustainability (Mol and Spaargaren, 1993).

On the other hand, central to the discussion of sustainability and development is the concept of social stratification, which refers to the categorization of people into groups based on social and economic factors such as wealth and social status. In disaster risk studies, risk, as defined in the pressure and release model (PAR), is a function of hazard and vulnerability (Wisner et al., 2004a). Disasters, in this model, are a result of a progression of vulnerability and its interaction with hazards. The primary root cause of vulnerability is the lack of access of the most-at-risk individuals to social, political, and economic institutions, which creates conditions of poverty and inequality (Wisner et al., 2004a). The root causes of vulnerability then interact with dynamic pressures such as population change, poor governance, and rapid urbanization. This creates unsafe conditions in society, which means that when hazards strike the system, disasters happen. This concept of disaster risk has grown through the years and is used by government and academia.

However, the concept of stratification in global disaster risk reduction frameworks is shifting towards horizontal vulnerability, along the lines of age, gender, race, ethnicity. For instance, despite acknowledging poverty and inequality as the main cause of disaster risk, the Sendai Framework for Disaster Risk Reduction has identified women, children, and 'people in vulnerable situations' (which eludes to the elderly, indigenous groups, and migrants), as the most at risk (UN-General Assembly, 2015). While this has generated success in encouraging action to address vulnerability along this kind of categorization, holistic understanding vertical vulnerability risk, especially income disparities, has taken a back seat. This leads to a neglect of the potential implications of a growing middle-class (as well as the widening gap between the rich and the poor) to pro-poor policies (Desai and Kharas, 2017).

The middle-class is a key driver of social policies, economic growth, and development (Easterly, 2001). Birdsall (2010) indicates that the middle class, defined by its higher educational attainment, are more likely to push for accountability and good governance. In 2015, half of the Filipino middle-class who are 24 years and older are likely to have attained tertiary education than those in the lower income bracket (Albert et al., 2018b). Despite their vital role in development, there is no consensus on who constitutes the middle class (Albert et al., 2015; Birdsall, 2010), though income is often part of the classification. The absolute minimum starting point for members of this income class should be to earn more than USD 2/day, which is the absolute poverty line designated by the World Bank and adopted by most countries (Banerjee and Duflo, 2008). However, other scholars are more inclined to establish a starting income of USD 10/day, stating that achieving economic security is what separates them from the poor (Birdsall, 2010; Kharas, 2010). While the middle class have better access to basic services than lower income classes, those within and lower than the low middle income bracket are more likely to encounter housing insecurity, which can bring them to poverty as a result of compounding disaster costs (Albert et al., 2018b; Howell and Elliott, 2019). In the

present study the middle-class will hence be defined as those *"having achieved a sense of economic security that allows to concern themselves with the future."*

To elucidate the potential implications of a growing middle-class to disaster risk reduction policies, it is imperative to return to how the concept of a risk society discusses stratification. Beck (1992) argues that traditional forms of social class, a system rooted on wealth disparity, is replaced by the concept of 'social risk positions' which are achieved through an individual or a group's ability to use networks of knowledge in order to avert risk (Beck, 1992). The distribution of risk in a risk society adheres to class patterns, wherein wealth accumulates on the upper classes while risk accumulates to the bottom. Giddens (1991) also argues that, in a risk society, older forms of class structure maintain a stronger foothold to their positions of power, as the classes have differential access to self-actualization and empowerment (Giddens, 1991). Thus, in the discourse of risk society, those in a state of poverty accumulate risk while those who are in a state of economic security can use their position to be free of risk.

In a risk society, inhabitants actively consider risk as part of their daily lives (Beck, 1992; Giddens, 2003; Mythen, 2015). This dissertation discusses how the middle-class, as those who have recently achieved economic security, view disaster risk, climate change, urbanization, and the future of their city. Their views potentially inform how they want the city to develop. This will be contrasted to the perception of risk in informal settlements, especially those who live in reclaimed land. Coastal informal settlements in reclaimed land are both exposed to natural hazards, as well as being recipients of development aggression (especially through constant fear of eviction). Thus, their views provide insights as to how risk accumulates and is distributed along class lines. Comparing the middle-class and the poor provides a discussion on the implications of this growing social class to development of a city.

2.2 Disaster Risk Perception and Urbanization

People's acceptance of the appropriate disaster risk management reclamation strategies relies on their awareness and understanding of disasters and climate change and how it affects them. The public's perception of risk is often inaccurate, as it is easily influenced by mediums of communication which can validate strongly held ideas as well as incite fear and frustration (Slovic, 1986). To understand how each social class views risk, this study employs the Social Amplification of Risk Framework (SARF) to understand middle class perception and the Protective Action Decision Model (PADM) to investigate the poor's perception of risk and decision-making.

2.2.1 Individual stations of the Social Amplification of Risk Framework

The Social Amplification of Risk Framework provides insights on the nuances of the portrayal of risks and its implications towards risk governance (Kasperson, 2015). In SARF, risk amplification (or attenuation) takes place when a given risk event passes through different sources, channels, social and individual stations of amplification (Kasperson et al., 1988). The middle-class's perception of threats and the perceived appropriate responses may lead to a social portrayal of risk that eventually prescribes the risk narrative of the city. The perception of risk and its amplification is influenced by physical consequences, information coverage, individual perception, public response, and societal and economic impact of the hazard in question (Kasperson et al., 1988; Renn et al., 1992).

To understand how the middle class potentially views and amplifies risk, this study focuses on the risk perception of typical individuals. Focusing at the personal level, or in what SARF defines as the *Individual Station of Amplification*, provides insights as to why people in this social class are compelled to view various risks within the city. Renn et al. (1992) state that

the individual station of amplification takes place through a process of information going through attention filters, decoding, inferences, comparison, evaluation, belief formation, rationalization, and taking action. This is further influenced by the place and cultural context where an individual is located (Masuda and Garvin, 2006).

Table 2.1 shows how the SARF was adapted to the present study to target members of the urban middle-class, elaborating on how risk perception is amplified at the individual stations of amplification, as highlighted in Kasperson et al (1988) and Renn et al. (1992):

Table 2. 1 *Individual stations of amplification of risk and its adaptation to this study (Adopted from Kasperson et al (1988) and Renn et al. (1992))*

Steps	Brief description, adopted from Kasperson et al (1988) and Renn et al. (1992)	Manifestation in this study
Risk information passes through attention filters	The individual selects and processes signals that come from their social, cultural, and natural environment.	Individuals are asked to rate the perceived risk of various places in the city such as their residence, workplace, coastal areas, and reclaimed land. They are then asked about concepts regarding hazards, vulnerability, and exposure.
Decoding of Signals	The individual deciphers the meaning of the selected information through various processes of investigation and assessment.	
Drawing Inferences	The individual arrives to a conclusion of the inherent meaning of the signals.	Individuals evaluate the future risk of the city. They are then presented with negative statements on urban governance, environmental concerns, and physical defenses for them to make inferences on what causes disasters. Individuals evaluate whether they agree or disagree with these statements.
Comparing decoded messages	The meaning of received messages are compared to each other, to similar information, as well as personal experience.	
Evaluation of messages	The individual rates the importance or urgency of the received message.	
Formation of specific beliefs	Generation, adoption, or assertion of beliefs in relation to the subject of the received message	Individuals are asked about their perception of an urban development concern (which in this study is coastal land reclamation). Statements on potential positive or negative effects of urban development are presented, and they are asked to provide their perception about these ideas. Individuals are asked on their perception of relocation of communities affected by the urban development concern. They are also asked on their perceived best relocation option.
Rationalization of beliefs	Sorting, categorization, and reinterpretation of beliefs to minimize conflict of ideas	
Propensity to act	Generation of potential actions that are in line with the individual's beliefs.	

2.2.2 Protective Action Decision Model

On the other hand, the Protective Action Decision Model is designed to investigate a community's perception of a natural hazard where social, environmental, and socially transmitted warnings inform pre-decisions that prompt the various perceptions of a threat and subsequent protective actions (Lindell and Perry, 2012). The perception of risk and coastal land reclamation in a coastal informal settlement provides insights as to how the poor view and weigh disaster risk, along other urban development concerns such as impending land reclamation. Thus, this study adapts and modifies the Protective Action Decision Model by Lindell and Perry (2012) to understand their perception on reclamation, natural hazards, and their subsequent actions (See **Figure 2.1**)

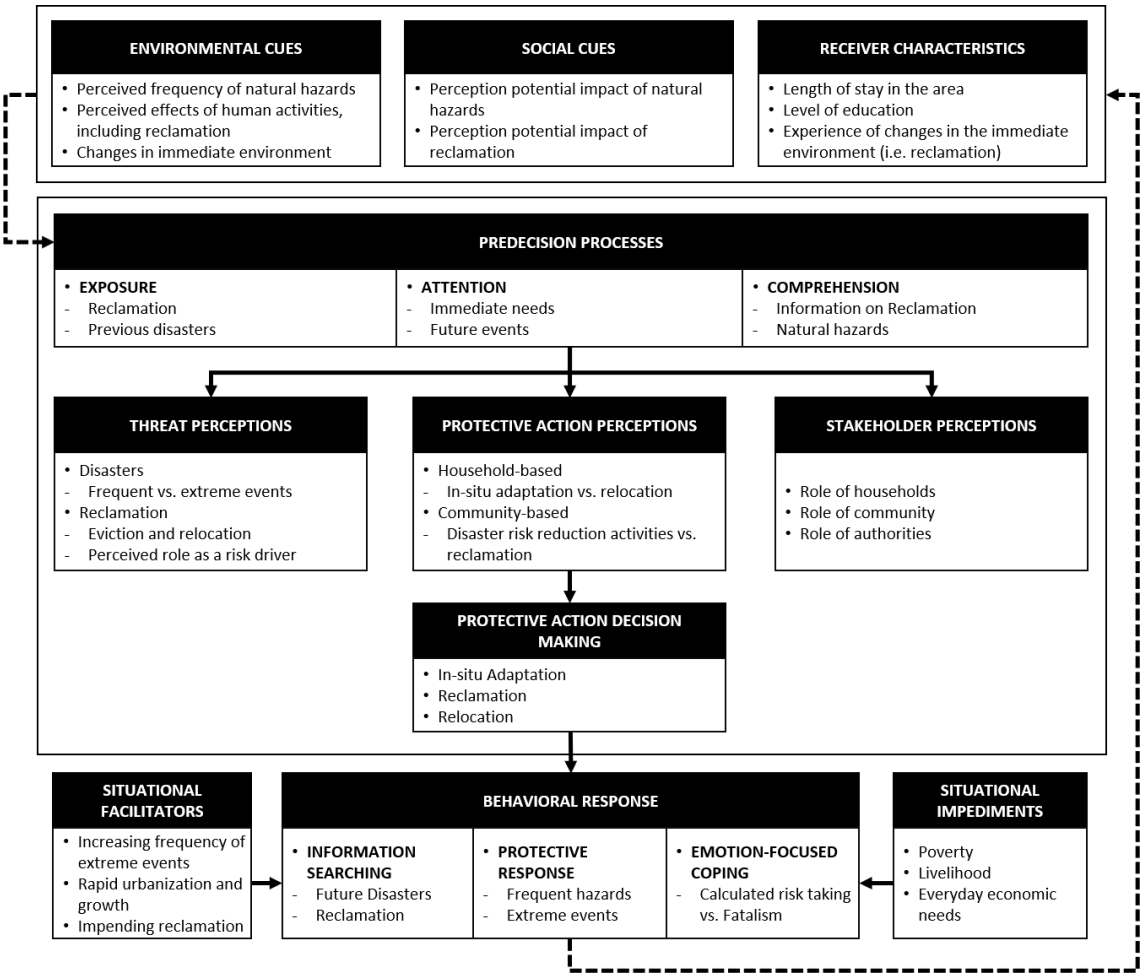

Figure 2. 1 *Conceptual framework for Perception on Reclamation and Disaster Risk, adapted from Lindell and Perry's Protective Action Decision Model (2012)*

A modification of the PADM was necessary, focusing on environmental and social cues as well as receiver characteristics as the initial stage of the information flow. The removal of channel access and preference and warning messages was necessary as the study treats reclamation as both a threat and a protective action. Rodolfo (2014) stated that Manila Bay is at risk to storm surges, and that reclamation projects in the area are not yet tested against major earthquakes. Coastal informal settlers face relocation due to reclamation projects (Abad, 2019). These form the prevailing societal view of land reclamation as a threat to local communities and their surrounding environment in the form of relocation and perceived increased disaster risk, as evidenced by the media and local scholars. These environmental and social cues on reclamation form the foundation of ideas and perceptions that would potentially feed into the coastal community's potential decisions and actions. However, there is little to no discussion on the benefits of reclamation amongst local journalists and academicians. Thus, there is a heavy reliance on experiencing the effects of reclamation firsthand.

In PADM, following these cues is a decision making process in which a threat elicits information searching, protective response, and emotion-focused coping (Lindell and Perry, 2012). The results of these actions, as well as the introduction of new environmental and social cues, feedback again into the pre-decision process.

2.3 Elucidating the risk perception of the middle-class and the poor and its implications to risk governance of megacities and sustainable development

Understanding how the middle-class and the poor view disasters, climate change, and urbanization, under the frame of a risk society, allows fresh insights about why disaster risk reduction strategies in developing countries are challenged by the increasing complexity of urban risk governance. This is done by combining the concepts of risk society and how it formed policies and frameworks on risk reduction that are often crafted by elites; how the process of disaster risk is understood and amplified by the middle-class; and how informal settlements act on their understanding of risks and pressures. This is shown through the conceptual framework summarized in **Figure 2.2**:

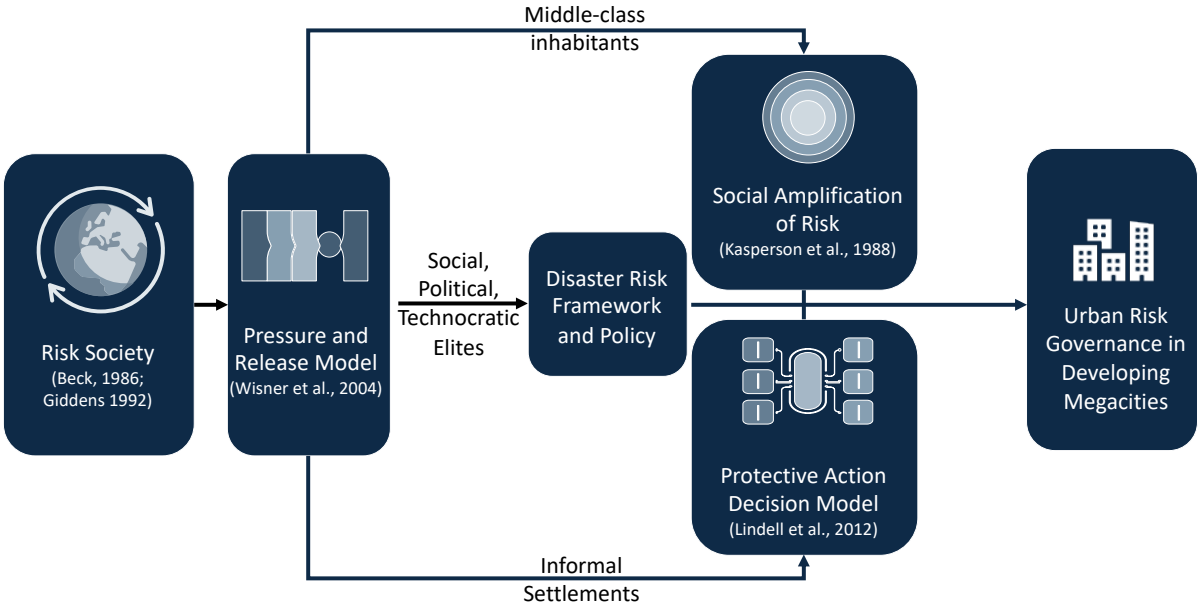

Figure 2. 2 *Conceptual Framework of the Dissertation*

By following this conceptual framework, this dissertation provides insight into two critical discussion points on the current challenges to disaster risk governance: the changing dynamics of the Anthropocene, and the failure of traditional disaster risk management mechanism.

First, urban risk governance is challenged by the difficulty in separating the dynamics of human transformation of landscapes, such as through land reclamation, and natural hazards such as tropical cyclones, earthquakes, and tsunamis (Miller and Douglass, 2016). Land reclamation, a key feature of urbanization and industrialization that aims to ease population density, is under intense scrutiny in a risk society. Large coastal megadevelopment projects such as the Great Garuda Project in Jakarta and the multiple massive coastal reclamation activities in Metro Manila are often under public scrutiny due to their potential environmental impacts (Colven, 2017; Mutia and Asteria, 2018; Rodolfo, 2013; Valenzuela et al., 2020a). This is despite literature on the benefits and impacts of land reclamation to natural hazards, as discussed in Chapter1, being divisive. The concept of risk society and reflexive modernity, particularly on how inhabitants view a technological solution that addressed a previous development woe, is examined in this dissertation through the perception of the middle-class and the poor. The middle-class, as a group that has increasingly being attuned to environmentalism (Cotgrove and Duff, 1980), may best represent the inhabitants of a risk society, while the poor are representative of those who have yet to enjoy the fruits of development and economic growth.

Second, it is understood that the physical infrastructure and relocation solutions implemented by these countries tend to be perceived as a management problem rather than a governance issue (Miller and Douglass, 2016). As a result, ineffective risk governance amplifies the vulnerability of members of society that are already marginalized, particularly those in coastal informal settlements, to both disasters and development aggression (Hardoy et al., 2013; Kovats and Akhtar, 2008). This dissertation, through an analysis of risk perceptions of the middle-class and the poor on issues that are central to risk governance (natural hazards, climate change, and urbanization), presents an understanding on how the views of one social class may amplify the risks of the marginalized. Central to this is the argument on how

scientific assessments, without concern for social issues such as stratification and marginalization, can be used to allow unjust policies that do not benefit the poorest in society. Disaster risk reduction policies in developing countries are often based on the technocratic understanding of risk by elites that exacerbate the vulnerability of the poor through relocation and eviction under the guise of resilience-building (Alvarez and Cardenas, 2019; Yee, 2018). Disaster studies have clearly defined the concept of vulnerability along the lines of poverty and inequality (Turner, 2010; Wisner et al., 2004a). On the other hand, there is little understanding on how the growing middle-class can effect pro-poor policies (Desai and Kharas, 2017). Thus, this dissertation elucidates the implication of the views of a growing middle-class on disaster risk, climate change, and urbanization to policies that promote poverty reduction and alleviation.

CHAPTER 3: RESEARCH METHODOLOGIES

3.1 Case study area: Metro Manila, Philippines

Metro Manila, the National Capital Region (NCR) of the Philippines, has a population of around 13.5 million residents and is divided into 4 districts (Albert et al., 2020). The City of Manila is the lone representative of the capital district. The 2nd District, Eastern Manila, comprise of Mandaluyong, Marikina, Pasig, Quezon City, and San Juan. The Ortigas Center, a central business district within the boundaries of Pasig, Mandaluyong, and Quezon City, is the second most important business district in Metro Manila. The 3rd District, Northern Manila, comprise of Caloocan, Malabon, Navotas, and Valenzuela. This district is noted to have the highest population of people living in the low income and poor income brackets. Finally, the 4th district of Metro Manila, Southern Manila, comprise of Las Piñas, Makati, Muntinlupa, Parañaque, Pasay, Pateros, Taguig. The Makati Central Business District, Metro Manila's primary business district, is in this area.

One of the features of megacities around the world is that its urban sprawl spills over to adjacent regions. As a megacity develops, people from neighboring cities and provinces commute to and from the urban center to access the services that a megacity provides. For example, while the Tokyo Metropolis refers to the 23 wards within Tokyo, the Greater Tokyo Area also encompasses the neighboring prefectures of Kanagawa, Chiba, Saitama, Ibaraki, Tochigi, Gunma, and Yamanashi. In the Philippines, the term "Greater Metro Manila Area" (GMMA), refers to the National Capital Region plus the adjacent provinces of Bulacan, Cavite, Laguna, and Rizal. The population of the adjacent provinces equate to around 14 million people alone. When combined with the population of those who reside within Metro Manila, about 27 million people are living in the GMMA, accounting to nearly a quarter of the Philippine population (Albert et al., 2020).

3.1.1 Urban Development and Disasters in Metro Manila: Policies and Trends

In 2009, Tropical Cyclone Ketsana, locally named "Ondoy", flooded the Metro Manila and in its wake, two landmark laws were passed: The Climate Change Act of 2009 and the Philippine Disaster Risk Reduction and Management Act of 2010. These laws served as basis for projects that aim to alleviate floods in Metro Manila. The Metro Manila Integrated Flood Management Plan identifies 3 issues at the core of urban flooding (Singson, 2013):

1) Lack of an integrated plan to address flooding and other water disasters
2) Rapid urbanization and lack of effective land use plans
3) Waterways encroached by illegal structures

The plan calls for the relocation of informal settlers living along danger zones and waterways, as they are deemed to be one of the contributors to flooding. However, while danger zones and no build zones are indeed often resided on by informal settlers, they have also often been excluded from platforms of negotiation (Morin et al., 2016). Furthermore, it is interesting to note that while informal settler communities are trained by local government and civil society in disaster preparedness, their fear of eviction and relocation originates from the disaster risk management policies of the metropolis (Balgos, 2015).

Compounding this fear is reclamation. The Philippine Reclamation Authority (PRA) promotes a coastal defense strategy with reclamation as an enabling component (Philippine Reclamation Authority, 2016). Informal coastal settlements have lived along dykes and reclaimed areas, and have adapted to coastal flooding (Siriwardane-de Zoysa, 2020). The PRA allocates resources to communities that are to be affected by reclamation (Philippine Reclamation Authority, 2016). However, the impacts of the Philippine Reclamation Authority's interventions on communities to be affected by costal land reclamation are not

known, and exposure and vulnerability to disasters have been used by authorities to evict these settlers out of coastal areas that are to be reclaimed (Abad, 2019; Cheng, 2012). The reality is that city aesthetics are usually prioritized, and a technocratic interpretation of risk serves as the basis to evict informal settlers from waterways (Alvarez and Cardenas, 2019), and potentially, from reclaimed land.

3.1.2 Defining Metro Manila's middle-class

Urban dwellers are mostly constituted by the middle-class, who plays a pivotal role in driving social policies, economic growth, and development as a result of higher educational attainment and achieving economic security (Birdsall, 2010; Desai and Kharas, 2017; Easterly, 2001; Revi et al., 2014). In 2015, half of the Filipino middle-class who are 24 years and older are likely to have attained tertiary education, a much higher proportion than those in the lower income bracket (Albert et al., 2018b). Albert et al. (2020, 2018b) defines the Filipino income classes by using official poverty lines and the 2018 Family Income and Expenditure Survey (FIES), and sorts them into 7 income groups (See **Table 3.1**)

Table 3. 1 *Definition of Income Group Classifications by Albert et al. (Albert et al., 2020)*

	Poor	Low income but not poor	Middle-Income			Upper income but not rich	Rich
			Lower	Middle	Upper		
Per Capita Income Definition	Less than the official poverty line	Between the poverty line and 2x the poverty line	Between 2x and 4x of the poverty line	Between 4x and 7x of the poverty line	Between 7x and 12x of the poverty line	Between 12x and 20x of the poverty line	At least 20x of the poverty line
Monthly family income in Philippine Peso (PhP)	< PhP 10,957	PhP 10,958 – 21,914	PhP 21,915 – 43,828	PhP 43,829 – 76,699	PhP 76,700 – 131,483	PhP 131,484 – 219,140	> PhP 219,140

	Poor	Low income but not poor	Middle-Income			Upper income but not rich	Rich
			Lower	Middle	Upper		
Monthly family income in Japanese Yen (JPY) *(1 JPY = PhP 0.43)*	< JPY 25,201	JPY 25,202 – 50,402	JPY 50,403 – 100,804	JPY 100,805 – 176,408	JPY 176,409 – 302,411	JPY 302,412 – 504,022	> JPY 504,022

The middle-class consists of households who earn an income that falls between 2 to 12 times the poverty threshold. These 3 tiers comprise about 40.2% of the population of the country in 2015, most of whom live in urban areas such as Metro Manila and its adjacent provinces (Albert et al., 2018b). **Table 3.2** shows the distribution of the Filipino Population by income group in Metro Manila and its adjacent provinces.

Table 3. 2 *Distribution of the Filipino Population ('000) by Income Group in the Greater Metro Manila Area (Albert et al., 2020)*

Location	Poor	Low income but not poor	Middle-Income			High income but not rich	Rich	Total
			Lower	Middle	Upper			
National Capital Region								
Capital District *Manila*	55.3	463.5	888.3	322.1	89.3	25.5	6.0	1,849.0
Eastern Manila (2nd District) *Mandaluyong, Marikina, Pasig, Quezon City, San Juan*	111.0	1,184.8	2,102.6	957.7	342.9	114.7	28.2	4,841.9
Northern Manila (3rd District) *Caloocan, Malabon, Navotas, Valenzuela*	100.2	970.5	1,304.4	414.0	89.7	18.5	2.5	2,899.7
Southern Manila (4th District) *Las Piñas, Makati, Muntinlupa, Parañaque, Pasay, Pateros, Taguig*	42.2	832.1	1,752.8	819.3	296.5	85.6	33.8	3,862.2
Total NCR	308.7	3,450.9	6,048.1	2,513.1	818.4	244.3	70.5	13,452.8
Adjacent Provinces								
Bulacan	178.6	1,257.7	1,337.2	539.3	165.4	32.4	1.3	3,512.0
Cavite	211.2	1,314.3	1,580.1	656.2	205.8	35.9	4.1	4,007.6
Laguna	125.0	810.2	1,288.3	686.9	242.2	50.1	24.1	3,226.9

Location	Poor	Low income but not poor	Middle-Income			High income but not rich	Rich	Total
			Lower	Middle	Upper			
Rizal	137.6	845.3	1,347.0	481.9	199.6	44.3	29.8	3,085.6
Total Neighboring Provinces	652.4	4,227.5	5,552.6	2,364.3	813.0	162.7	59.3	13,832.1
Total for Greater Metro Manila Area	961.1	7,678.4	11,600.7	4,877.4	1,631.4	407.0	129.8	27,284.9

Of the nearly 27 million people living in GMMA, around 18 million are considered to belong to the middle-income bracket. Of the 18 million middle class residents, 11.6 million people belong to the lower middle-income bracket – the bracket that can fall back into poverty in the event of a major disaster or catastrophe. It is worth to note that some of these live in informal settlements, as noted by the 2015 FIES report, which indicates that 69% of informal settlers in Metro Manila are part of the lower middle-class (Philippine Statistics Authority, 2015).

The Filipino middle-class is more likely to have completed secondary education than lower classes, and its members tend to have stable salaried jobs and even experience international labor opportunities throughout their professional lives (Albert et al., 2018b; Never & Albert, 2021; Philippine Statistics Authority, 2015). According to the 2015 FIES, a vast majority (73%) of the Overseas Filipino Workers (OFW) are members of the middle-class, and such jobs provide a source of sustained income to their families (Philippine Statistics Authority, 2015). Overall, member of the middle-class in the Philippines have a stable source of income, which generally leads to a sense of economic security. Thus, research highlights that consumption patterns and consumption capacities of the Filipino middle-class is a key unifier, rather than sociological aspects such as occupation (Never & Albert, 2021).

The Filipino middle-class fits the description of the middle-class that was introduced in Chapter 2, where members of this class should have a sense of economic security, access to

information, and the privilege to worry about the future. Never and Albert (2021) conducted a focus group discussion where participants noted that middle-class families do not worry about their immediate needs, with enough money to cover daily expenses and live a comfortable life. They find in their study that middle-class are very particular with social mobility and that they will also prefer to distance themselves from poorer sections of society (Never & Albert, 2021). Never and Albert's (2021) study also highlights that the middle-class aspires to move up the social ladder, which is reflected by their consumption patterns, where they will likely invest in household goods, environmental awareness, energy efficiency, better education options, and private transportation.

Finally, it is important to note that the middle-class has been a key factor that enabled regime change in the country's history. For instance, both the 1986 EDSA Revolution that ended the Marcos's dictatorship as well as the 2001 EDSA Revolution that ousted President Estrada amidst corruption allegations happened largely due to the participation of the middle-class (Kimura, 2003; Rivera, 2006). Thus, they can play a critical role in enabling policies in the city.

3.1.3 BASECO Compound

The Bataan Shipyard and Engineering Company (BASECO) Compound (see **Figure 3.1**, providing an overview of disaster risk and reclamation projects in the study site) is a 0.64 km^2 area of reclaimed land located at a low-lying coastal zone at the mouth of the Pasig river, which is home to some 6,000 urban poor families (Islam, 2018; Mercado, 2016; Navarra, 2016; Porio, 2019; Steinberg, 2011). Maps of Manila from the late 19th and early 20th centuries show that the area was likely to have formed as a result of sand deposits due to the creation of the port of Manila (de Gamoneda, 1898; "Map of city of Manila and vicinity," 1919).

In February 2002, BASECO Compound was declared to be a residential site by President Gloria Macapagal-Arroyo, allowing those who settled there to legally take residence, though economic opportunities in the vicinity attracted even more residents in the succeeding years (Murphy, 2012). BASECO rapidly changed in the last 20 years, with the population growing from around 6,700 in 1990 to at least 60,000 at present (PhilAtlas, 2020; Philippine Statistics Authority, 2016). Historical satellite imagery (shown in **Figure 3.1**) shows a rapid expansion of land area due to reclamation (Valenzuela et al., 2020a). Hazard data from Philippine government agencies mapped using ArcGIS 10.5 highlight the area as being prone to storm surges, tsunamis, and flooding (Blanco et al., 2015; Japan International Cooperation Agency et al., 2004; Lapidez et al., 2015; Solidum Jr., 2019).

Disaster awareness of residents in the compound have been investigated by prior studies. A vulnerability and capacity assessment study deemed that the settlements in the area are highly vulnerable to coastal hazards, with vulnerability being comprised of poverty, low education, and informality (Islam, 2018). Though residents exhibit high disaster awareness, they are mostly concerned about a potential repeat of disasters they have already experienced (Mercado, 2016). Residents cope with disasters through community effort (Navarra, 2016). None of these studies investigate the uniqueness of the community being built on reclaimed land.

There are 2 proposed reclamation projects in BASECO. The 0.4 km^2 BASECO Reclamation Project would build on the existing reclaimed land, with the total cost yet to be defined by feasibility studies (Philippine Reclamation Authority, 2018). The other is the 4.0742 km^2 New Manila Reclamation Project that aims to provide Manila City a functional land space suitable for mixed use development, which is projected to cost a total of 57.3 billion pesos (~1.15 billion USD at 2020 rates) (City Government of Manila, 2018). Both reclamation projects would have an elevation of at least +4.0 above mean lower low water (MLLW). For

disaster prevention, the reclamation projects would integrate slope protection and dredging works that consider projected sea level rise, including highest high-water level (HHWL) and wave effects during the southwest monsoon. The environmental impact study discusses storm surges but does account for any storm surge defense. It also notes that tsunamis can occur but are not expected to significantly damage the area.

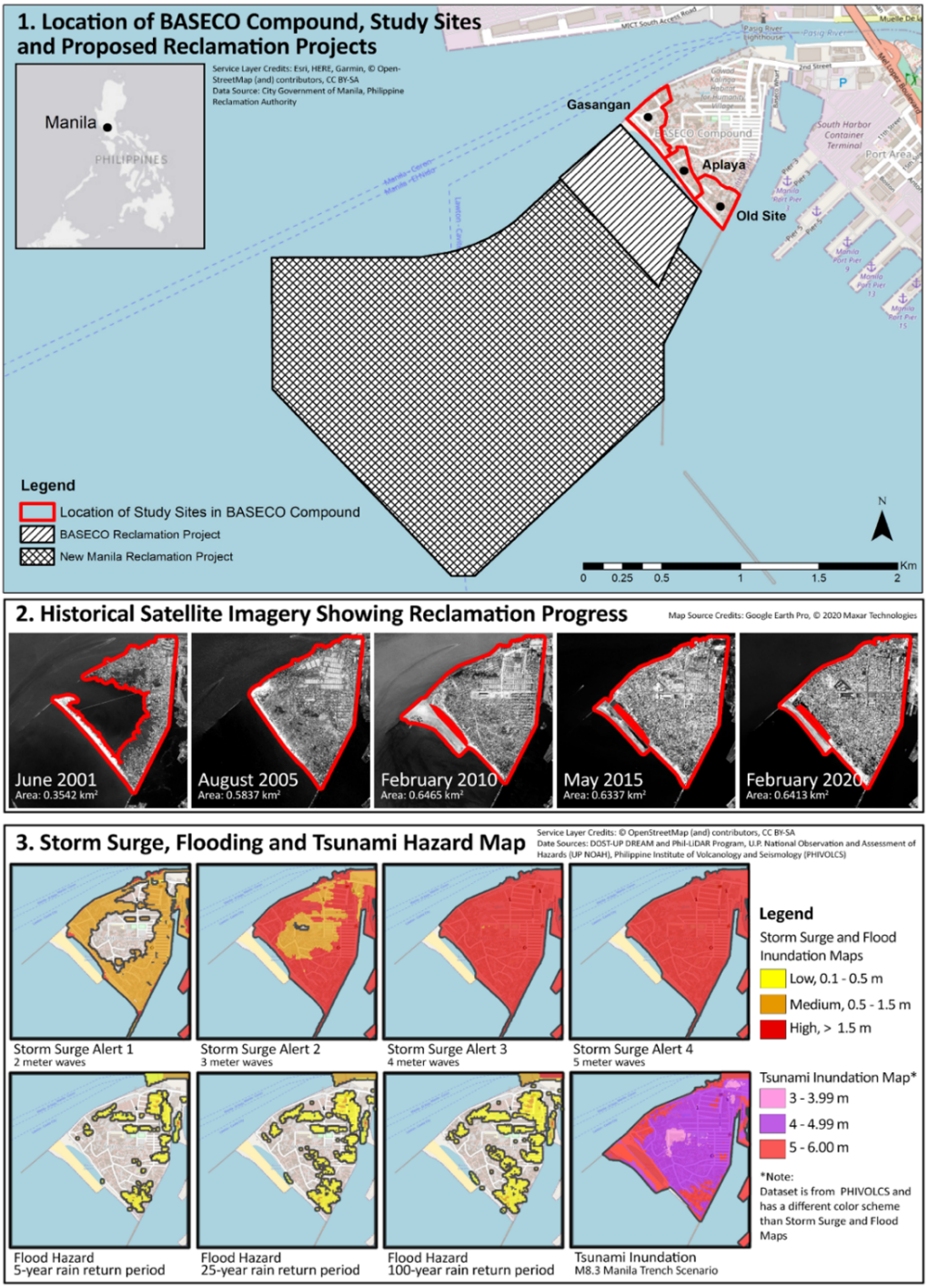

Figure 3. 1 *Overview of Disaster Risk and Reclamation Projects in BASECO Compound*

Settlements at the shorefront of the BASECO Compound, roughly encompassing a section of about 200 meters from the shoreline, were studied. These are called *"Old site", "Aplaya", and "Gasangan"*, the low income communities within BASECO that are most vulnerable to the coastal hazards (Islam, 2018). "*Old site"* was the part of BASECO that existed prior to the year 2000. "*Aplaya"* refers to the reclaimed land that is located the middle of the shorefront. Finally, *Gasangan* includes the area that is behind a beach reclaimed during the 2010s in the northeast of the compound.

3.2 Data Gathering Methods

The doctoral research employed the use of different methodologies. An online survey was used to target the urban middle-class, who are likely to be easier to access through social media. To gather data from an informal coastal settlement living on reclaimed land, a household survey and a topographic survey was used in the BASECO compound.

3.2.1 Online survey of the urban middle-class

Notice: Section 3.2.1 (pp. 34 to 36) has been removed from the abridged version of the dissertation pending its publication to an academic journal. You may request a copy of this chapter by contacting the author through his e-mail address: valenzuela.venpaolo@gmail.com.

3.2.2 BASECO Compound household questionnaire survey

The study employed two residents, who distributed the questionnaire to households living up to 200 meters away from the coastline (the questionnaire was self-administered). The questionnaire survey was designed from the BASECO Compound studies of Mercado (2016) and Navarra (2016) and that of other authors who have done similar work in in the Philippines, Indonesia and Vietnam (Mercado 2016; Anh et al. 2017; Esteban et al. 2017b; Valenzuela et al. 2020). On top of disaster and climate risk perception questions, the study included questions on the perceived relationship between reclamation and disasters, perception of future disasters, and preferred relocation options. A copy of this questionnaire survey can be found in Appendix B of this dissertation.

102 household questionnaire surveys were collected from Gasangan (34), Aplaya (37), and Old Site. These locations are measured to have a total land area of 0.14 km^2. Thus, it is estimated that these areas would have a combined population of 14,962 people living in 3,531 households. The author faced significant challenges in during the survey, particularly in navigating, identifying households, and venturing deeper into the compound due to safety concerns. BASECO compound is one of the most impoverished areas in Metro Manila and, at the time of the field work, is also one of the hotspots of President Duterte's war on drugs, with news articles noting it as the most drug-infested area in the metropolis (Roxas, 2016; Talabong, 2019). While conducting the study, residents and enumerators have also pointed out that the author could only go to certain areas within BASECO, as well as the necessity to leave the compound before sunset as a safety precaution. With this limitation, the enumerators exhausted all available respondents. Surveys were encoded using IBM SPSS Statistics 25. Chi-square tests and Kruskall Wallis one-way analysis of variance tests were used to determine statistical significance. Standard significance levels are applied ($P < 0.1$, $P < 0.05$, and $P < 0.01$)

3.3.2 Topographic survey in BASECO Compound

To locally verify flooding scenarios, a ground level validation through a topographic survey to measure the elevation of different parts of the compound was conducted, using a GPS device [GPSMAP; Garmin Ltd.], a laser range measuring instrument [TruPulse 360; Laser Technology, Inc.], and prism (Esteban et al. 2017a). 6 transects along BASECO's shoreline was measured. Each transect started by measuring the water level at the seashore, then moved to different points towards the nearest housing settlement. The data collected was corrected for tide levels using the XTIDE software. The survey was conducted on the 20 November 2019 between 14:30 and 15:37. Results shown are the corrected dataset, using Manila, Philippines tide station as a reference point. The datum point referenced to by XTide is the MLLW. The HHWL for 2019 was 1.47 m above MLLW. Photographs of flooding adaptation measures were taken along the way.

CHAPTER 4: DISASTER RISK AWARENESS OF THE MIDDLE CLASS IN METRO MANILA AND ITS IMPLICATIONS TO RISK GOVERNANCE

Notice: Chapter 4 (pp. 39 to 61) has been removed from the abridged version of the dissertation pending its publication to an academic journal. You may request a copy of this chapter by contacting the author through his e-mail address: valenzuela.venpaolo@gmail.com.

CHAPTER 5: RISK PERCEPTION OF DISASTERS AND LAND RECLAMATION IN A COASTAL INFORMAL SETTLEMENT LIVING ON RECLAIMED LAND

This chapter focuses on the case of BASECO in Manila, Philippines and explains how coastal informal settlements that live on reclaimed land view disaster risk and urban development, particularly the potential impacts of future coastal land reclamation. As discussed in Chapter 3, this case study uses a topographic survey and a household questionnaire survey.

5.1 Findings

5.1.1 Topographic Survey

Figure 5.1 provides visual evidence and environmental context to the survey areas. The elevation of the land where the houses are built ranges from +0.5 m to +1.8 m, with most of them being situated behind a sand mound or an eroded sea wall. The height of the sand mound ranges from +1.3 m to +2.8 m. Photographs taken during the topographic survey shows floors that were elevated above ground (possibly as a countermeasure to flooding), a mangrove buffer zone donated by a local politician (though mangroves are struggling to grow due to a lack of proper maintenance), and coastal defenses along Transects B and C, which are not in a good state of repair, making their effectiveness uncertain. While these provides residents with some degree of protection against 2 m to 3 m high storm surges, a combination of high tide and a relatively strong tropical cyclone would nevertheless flood the entire community. The diagrammatic representation of the transects also shows that sand or rubble mounds create another form of coastal defense, albeit visual inspection reveals it to still be ineffective against extreme hazards.

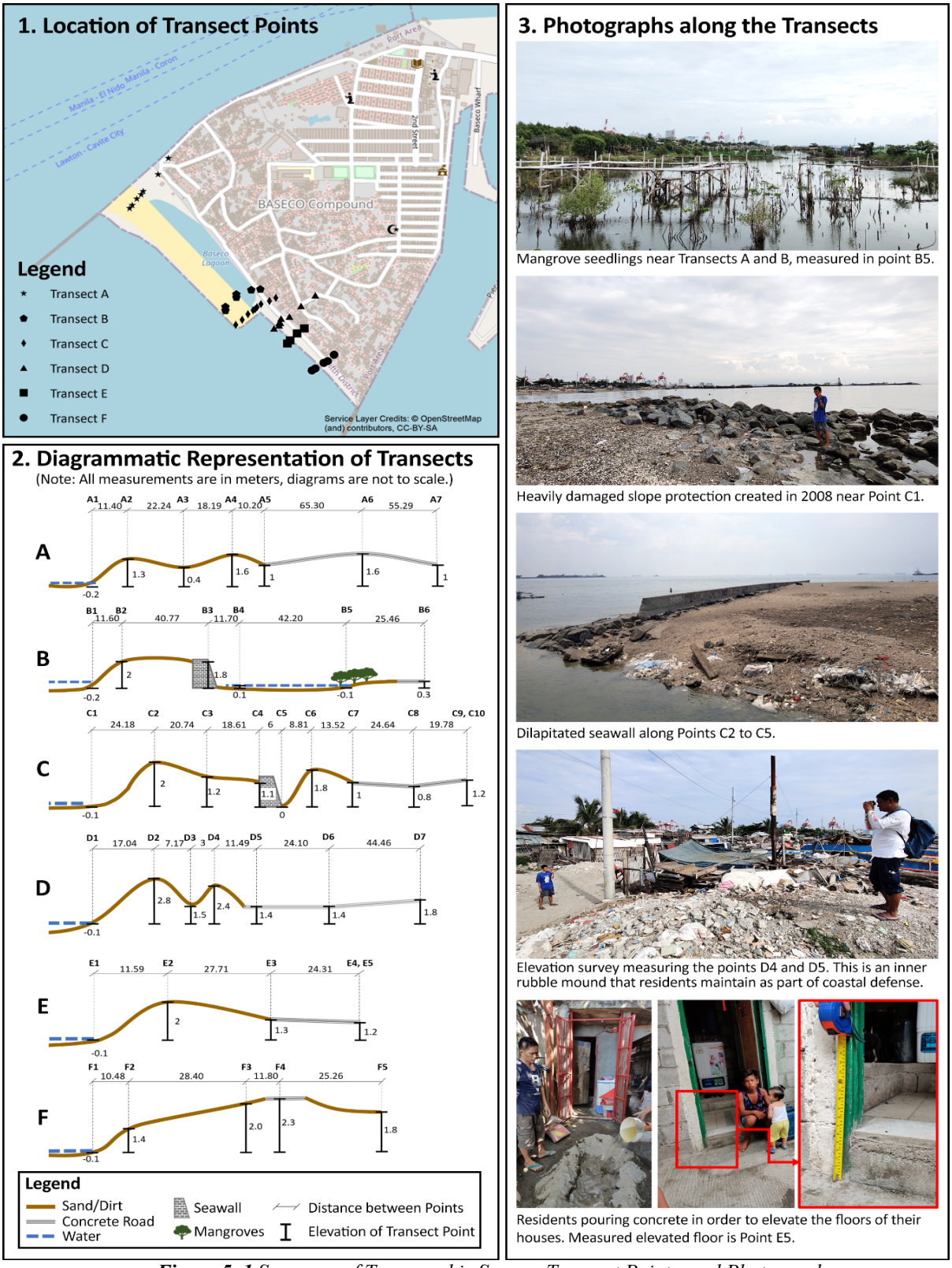

Figure 5. 1 *Summary of Topographic Survey, Transect Points, and Photographs*

5.1.2 Household Questionnaire Survey

5.1.2.1 Demographics, Residency and Migration

72.7% of the n=102 households surveyed were represented by females, 23.2% by males, and 4% did not indicate their gender. During the survey, most people who could be found were female, and even the men who were met often would ask their wives to answer. Most respondents were within the working ages of 18-35 (34.3%) and 36-50 (33.3%), with about half indicating they were either housewives (30.4%) or self-employed (20.6%). Almost all (92.2%) had a low educational level, finishing only up to high school, and 58.8% were living with an estimated monthly household income of less than PhP 12,000 pesos (around USD 235 at 2020 rates). The minimum wage per person in Metro Manila as of 2020 is PhP 500/day (USD 10) or roughly around PhP 12,000 (USD 235) (National Wages and Productivity Commission, 2018).

Almost all (83%) were born outside of the BASECO compound. Average number of years of residence significantly differed by location within the study area. The mean number of years the respondents lived in the Old Site was 21.7 years, compared to 11.41 for those in Aplaya and 11.27 for those in the Gasangan. This explains the differences in the perspective of people in the compound. People living in the Old Site, which sits on non-reclaimed land, would have experienced more changes than other areas.

5.1.2.2 Flood Experience

Flood experience provides elements to the environmental cues, the exposure and comprehension components of the pre-decision process, and threat perceptions in PADM. Around 50% of the respondents in all locations surveyed think that flooding poses a slight danger to them, and most identified that floods come from the sea (71.3%) and from rain

(62.4%). Other sources include high tides. The date of the worst flood-related disaster varies significantly by location, with most in Aplaya indicating 2009 as the worst event, and the other two location stating it happened in the past 2 years. The 2009 event is attributed to Typhoon Ketsana (locally named "Ondoy"), one of the major disasters that triggered shifts in Philippine disaster risk reduction policy and spurred relocation of informal settlements in Metro Manila (Balgos, 2015).

Most respondents in Aplaya and Old Site stated that the duration of both the worst floods and regular floods was at least 12 hours, though it can last more than a day (see **Table 5.1**). Those who stated the 2009 event said that it lasted at least 3 days. However, for those in Gasangan, which is defended by a breakwater, the worst flooding was less than 6 hours. The results of the height of the regular flood and the worst flood are the same at each location, with the highest level usually going up to the waist of respondents.

Table 5. 1 *Comparison Between Length of Time of Worst Flood And Regular Flood (N=102) (*P <0.05)*

		Location in BASECO (N=102)							
		Gasangan (n=34)		Aplaya (n=37)		Old Site (n=31)		Total (N=102)	
		F	%	F	%	F	%	F	%
Length of Time of the Worst Flood*	I don't know	1	3%	2	5%	6	19%	9	9%
	0 - 3 hours	11	32%	3	8%	1	3%	15	15%
	3 - 6 hours	5	15%	5	14%	2	6%	12	12%
	6 - 12 hours	5	15%	2	5%	2	6%	9	9%
	12 - 24 hours	5	15%	8	22%	4	13%	17	17%
	More than 24 hours	7	21%	17	46%	16	52%	40	39%
Length of Time of Regular Floods	I don't know	4	12%	6	16%	3	10%	13	13%
	0 - 3 hours	8	24%	4	11%	3	10%	15	15%
	3 - 6 hours	4	12%	7	19%	4	13%	15	15%
	6 - 12 hours	6	18%	0	0%	6	19%	12	12%
	12 - 24 hours	9	26%	10	27%	6	19%	25	25%
	More than 24 hours	3	9%	10	27%	9	29%	22	22%

The worst flood was typically caused by heavy rainfall (71.6%), tropical cyclones or storm surges (46.1%), and coastal flooding (26.5%). The causes of regular flooding are similar, and

are mainly due to rainfall (68%), tropical cyclones (40%), and coastal and river flooding (22%). Respondents stated a mixture of heavy rain, tropical cyclones, and high tides as the most typical cause of flooding.

Most respondents (71.6%) stated that they had experienced damage during their worst flooding event. 36 respondents suffered minor damages, 30 major damage, and only 8 had their houses destroyed. 55% of those who experienced minor damages were in Gasangan. Respondents who experienced damage were also asked if they had received any assistance, and 58.9% of them stated they did not receive any.

Flooding frequency significantly varies by location, with Gasangan experiencing floods less frequently. Of those who experience flooding 2-3 times a year, 23.5% are from Gasangan, 27% are in Aplaya, and 41.9% are from Old Site. 62.7% of the respondents can still go to work during regular floods, irrespective of location.

5.1.2.3 Disaster Prevention and Preparedness

On coastal hazard knowledge and evacuation (see **Table 5.2**), people in Gasangan knew significantly more about storm surges than those in the other two locations. There is high awareness about tsunamis and storm surges, and how to evacuate in the event of a storm surge. However, over half of respondents were unsure how to evacuate in the event of a tsunami.

Figure 5.2 shows the perception of danger concerning storm surges, tsunamis, and coastal or river flooding. For storm surges and tsunamis, most people perceive the danger to be strong or very strong. However, there was a significant difference in the perception of flooding, where most of those in Aplaya perceive that floods are of little to no danger to them.

Table 5. 2 *Summary of Storm Surge and Tsunami Knowledge and Evacuation by Location within the Community*

		Location in BASECO (N=102)							
		Gasangan (n=34)		Aplaya (n=37)		Old Site (n=31)		Total (N=102)	
		F	%	F	%	F	%	F	%
Storm Surge Knowledge*	Yes	26	76%	21	57%	21	68%	68	67%
	No	7	21%	16	43%	10	32%	33	32%
	No Answer	1	3%	0	0%	0	0%	1	1%
Storm Surge Evacuation	Yes	26	76%	28	76%	22	71%	76	75%
	No	7	21%	9	24%	9	29%	25	25%
	No Answer	1	3%	0	0%	0	0%	1	1%
Tsunami Knowledge	Yes	26	76%	27	73%	27	87%	80	78%
	No	6	18%	10	27%	4	13%	20	20%
	No Answer	2	6%	0	0%	0	0%	2	2%
Tsunami Evacuation	Yes	23	68%	18	49%	15	48%	56	55%
	No	10	29%	17	46%	15	48%	42	41%
	No Answer	1	3%	2	5%	1	3%	4	4%

*P<0.1

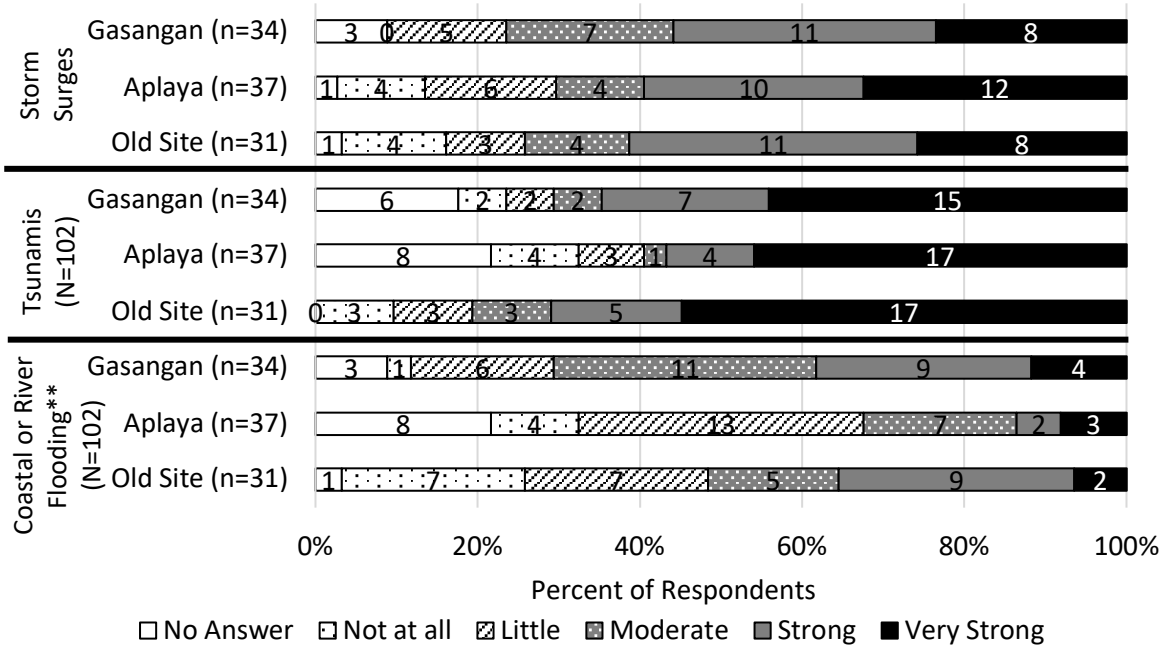

Figure 5. 2 *Perception of Danger of Coastal hazards by Location (**P < 0.05)*

On household flood prevention, 66% raised their furniture, 45% cleaned their drainage, and 42% pre-emptively evacuate. Evacuation drills (60%), cleaning of drainage (48%), and early warning towards preemptive evacuation (45%) were the community activities respondents identified the most with. 53% of the respondents had participated in an evacuation drill in the past 5 years. 50% of the total respondents stated they do have an emergency disaster

preparedness bag, 42% stated they did not have one, and 8% are unsure. 54% of those who stated they did not have any emergency bag came from Aplaya.

Residents get information through TV or Radio (93%), followed by local authorities (46%). Disaster information relayed through television or radio typically consists of typhoon signals and the suspension of work or classes. 38% of the respondents stated that there is no tsunami warning system and an additional 22% that they do not know if their area has such a measure. Manila Bay has a tsunami monitoring system in place and could provide residents warning, if/when a tsunami from the Manila trench does occur (Acosta, 2018).

5.1.2.4 Disaster Risk, Land Reclamation, and Relocation

On causes of disasters, 71% stated that a lack of drainages is a factor, followed by natural hazards and climate change effects such as sea level rise (41%), strong storms (40%), and strong rains (35%). General climate change and a lack of proper coastal defenses such seawalls or dykes tie in 5th place, at 33% each. Poor governance and population increase are not seen as a cause, nor is land reclamation or land subsidence. 47% of the respondents think that disasters will not worsen (47%) or and a further 43% had no opinion about the future. This validates Mercado's (2016) findings wherein residents are more concerned of the disasters they have already experienced. However, this significantly varies by location, with most of those who have no opinion about future disasters being from Gasangan, while those in Old Site do not think that disasters will worsen.

The respondent's perspective of ongoing reclamation projects yielded significant results, with those in Old Site being more inclined to agree with further reclamation, while those in Aplaya being strongly opposed to it (with those in Gasangan being somewhat neutral) (See **Table 5.3**). Despite the differences in perception, 56% of the respondents prefer in-city

relocation over other options, including that of relocation anywhere (11%) and no relocation at all (12%). 19% of them had no opinion on the matter.

Table 5. 3 *Perception of Ongoing Land Reclamation in Manila Bay According to Location within BASECO Compound and Preferred Relocation Options (N=102)*

		Location in BASECO (N=102)							
		Gasangan (n=34)		Aplaya (n=37)		Old Site (n=31)		Total (N=102)	
		F	%	F	%	F	%	F	%
Perception of Ongoing Land Reclamation in Manila Bay*	Strongly Disagree	5	15%	15	41%	2	6%	22	22%
	Disagree	6	18%	10	27%	6	19%	22	22%
	Neutral	15	45%	7	19%	6	19%	28	28%
	Agree	7	21%	5	14%	11	35%	23	23%
	Strongly Agree	0	0%	0	0%	6	19%	6	6%
Relocation Choices of Respondents	No Answer / No Opinion	10	29%	5	14%	4	13%	19	19%
	In-city Relocation	12	35%	27	73%	18	58%	57	56%
	Off city relocation	2	6%	1	3%	0	0%	3	3%
	Relocation Anywhere	4	12%	0	0%	7	23%	11	11%
	No Relocation	6	18%	4	11%	2	6%	12	12%
	Others	0	0%	0	0%	0	0%	0	0%

*P<0.01

Respondents were asked to explain their answers and what they think will happen if reclamation does proceed. Those who agree view that further reclamation in BASECO compound would reduce flooding, reduce trash, and enhance beautification efforts in the area. These developments, together with the installation of coastal defenses, provides them with a sense of security if the project does continue.

Those who disagree think that reclamation would lead to even more flooding, and increased vulnerability to storm surges and tsunamis. They state that either sea level will rise, or that drainage will be blocked by the reclaimed land, making floodwater flow backwards towards them. This perception of reclamation is superseded by the fear of eviction, leading to a loss of their investments, jobs, and other economic opportunities.

Those who are neutral requested more information, as the costs and benefits of the project are unclear to them. Fatalistically, they state that it would be useless to resist once building commences, given their low socio-economic status and lack of ownership of the land they occupy.

Respondents were asked about what policymakers should consider. Respondents who agree on further reclamation in BASECO stated that reclamation should be done properly (including establishing evacuation routes, building coastal defenses and drainages, and beautification of the area). They stated that authorities should consider creating housing for the informal settlements that will be evicted. Those who disagree with the reclamation also share similar sentiments regarding the need to provide adequate housing and economic opportunities.

5.1.3 Protective action decision making and behavioral responses to disasters and reclamation

Adapting the PADM to investigate perception of disaster risk and reclamation in an informal settlement built on reclaimed land highlights the complexities of vulnerability in these areas. **Figure 5.3** shows how elements of the PADM previously discussed in Chapter 2 feed into the protective action decision making and behavioral response components.

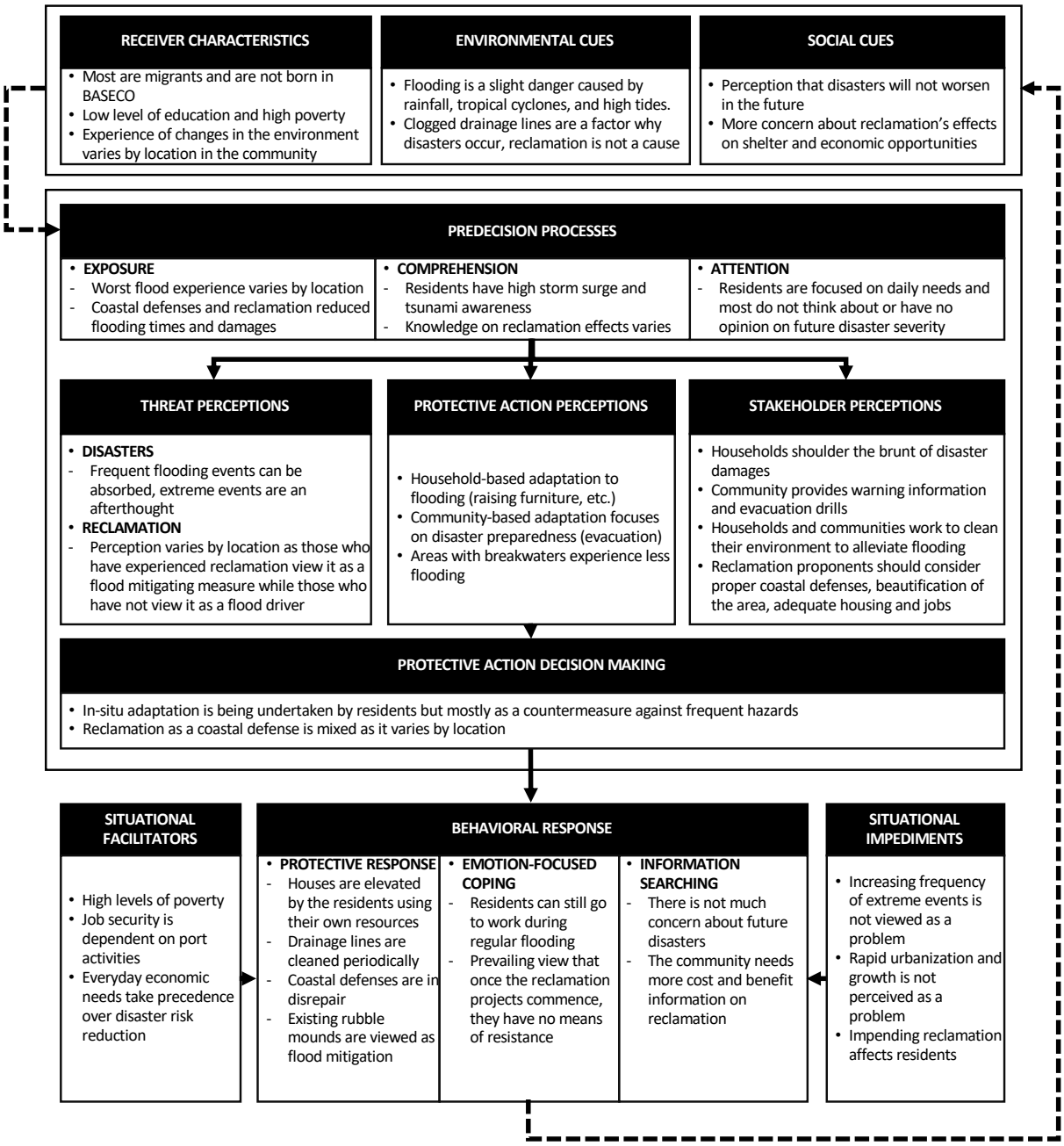

Figure 5. 3 *Protective Action Decision Model for Disaster Perception in BASECO Compound*

Poverty shifts BASECO's concerns towards present problems, rather than future disaster scenarios. Reclamation, for them, is detrimental to the job security and shelters of those that will be affected. Knowledge of both disasters and reclamation is drawn from experience and observation. Cleaning clogged drainages and raising their homes is the preferred protective action for residents. Thus, protective action decision making in the community generally favors

in-situ adaptation against frequent hazards, and the perception of reclamation as a viable countermeasure varies.

Poverty and the need to secure jobs for everyday living facilitates BASECO's behavioral response, as addressing frequent flooding events allows them to work and meet daily needs. Economic needs take precedence over disasters, and disaster preparedness revolves around allowing daily life to continue. The in-situ flood adaptation strategies the community implements allows residents to work even during regular flooding. However, the topographic survey shows that the protective responses of the community are in a state of disrepair and mismanagement and could potentially be toppled by an extreme event. However, increasing disaster awareness is impeded by the community's relative lack of concern about disasters, compounded by the poverty of the area. Reclamation, as a product of rapid urbanization, affects residents by invoking the fear of eviction and relocation. The poverty situation they are in makes them feel that resistance is impossible once the projects commence. This threat of eviction and job insecurity pushes residents to seek more information on reclamation. The lack of information on reclamation and disasters makes residents draw on their experience living on reclaimed land on the benefits and consequences of reclamation. Their observations of the changes within the community are their main basis for their position on coastal land reclamation. The lack of information on reclamation and disasters and the effects of poverty feeds again and repeats the protective action decision making cycle.

5.2 Chapter Discussions and Conclusions

The protective action decision model applied to a coastal settlement whose residents are living in reclaimed land highlights the nuances of rapid urbanization, reclamation, and disaster risk. At the root of the problem is poverty and inequality that stems from rapid unplanned urban growth. The BASECO case shows that using disaster risk as a convenient reason to relocate

informal settlements does not cover the fact that these settlements are more wary of urban development projects that may evict them than disasters that can threaten their lives.

5.2.1 Disaster risk reduction, rapid urbanization, and informal settlements

The BASECO case elucidates the problem of balancing disaster risk reduction and urbanization. Disaster risk reduction strategies that rely heavily on infrastructure fail to address the root causes of disasters in Southeast Asian countries, as they collide with immediate development needs such as economic growth and development (Miller and Douglass, 2016). The increase in number of people living of coastal informal settlements, especially in urban areas, heightens the exposure of vulnerable groups to environmental hazards as they continue to intrude into disaster-prone land (Valenzuela et al., 2020b). Reliance on awareness raising as a motivator to demand defenses from government does not capture the intricacies of vulnerability prevalent in impoverished coastal communities, such as the need to care for everyday needs (Ballinger, 2015; Chan et al., 2018; Douglass, 2016). Informal settlers live in a constant state of risk and using future potential disasters (which is another form of risk) as a reason for relocating them to a safer place cannot compete with more urgent everyday needs. BASECO compound's rapid change in the last 20 years showcases the problem local governments face when they attempt to use the threat of disasters to relocate informal settlements.

Investing in disaster prevention means going beyond disaster preparedness. However, local governments focus on emergency management. There had been multiple cases in Southeast Asia wherein governments have focused more on evacuation drills than defenses and adequate spatial solutions (Esteban *et al.* 2017b; Takagi *et al.* 2017; Valenzuela *et al.* 2020). This is repeated in BASECO compound, with evacuation drills being the more frequent activity

governments undertake. However, there is a need to invest in formal coastal defenses and proper spatial planning. Land reclamation may present an opportunity to do so, though disaster risk reduction is often an afterthought. Notwithstanding this, disasters are used by authorities as one of the main reasons to relocate informal settlements, whether they are painted as a cause of it or at risk to it (Alvarez and Cardenas, 2019), as seen in Metro Manila's integrated flood management plan (Balgos, 2015).

5.2.2 Perceptions of Risk in Coastal Settlements in Reclaimed Land

Despite authorities stating that the area is high risk, BASECO's case shows that residents in coastal informal settlements do not fear hazards. They fear the loss of economic opportunities and housing because of reclamation. Cases like those seen during the aftermath of Typhoon Haiyan demonstrate that, while it is important to move people away from hazard zones, adequate basic services and economic opportunities are needed in order for relocation to work (Ong et al., 2016). This echoes the perennial failure of relocation projects in addressing the root causes of vulnerability, such as poverty and inequality (Balgos, 2015; Nalau and Handmer, 2018). While the relocation of settlements will always face some form of resistance, informal settlers are willing to negotiate if their needs can be addressed, as seen in Tacloban City (Compton, 2018). BASECO residents are willing to discuss, if given the chance. However, the community feels that they are unable to negotiate and resist once reclamation happens.

Socio-economic and political factors play a big role in increasing the exposure of people to hazards. Rapid unplanned development, wherein risk is not considered holistically, could lead to more vulnerable communities (Fordham, 2007; Mileti et al., 1995; Wisner et al., 2004a). BASECO Compound and other informal settlements are willing to relocate if their inhabitants are provided economic opportunities and housing. However, this is not addressed by current

disaster prevention strategies (Balgos, 2015; Morin et al., 2016). Disaster risk reduction approaches that cannot cope with growing urban complexities such population dynamics, economic needs, and intensifying hazards due to human interventions repeat and compound existing vulnerability (Takagi *et al.* 2014; Miller and Douglass 2016). Evicting informal settlements with the pretext of building resilience does not address underlying societal factors that create impoverished communities in the first place (Alvarez and Cardenas, 2019). If physical infrastructure and spatial solutions are implemented but socio-economic issues are not addressed, this can result in higher levels of poverty and poor infrastructure that are unable to counteract future hazards (Douglass, 2016).

5.2.3 Chapter Conclusions

This chapter highlights a growing concern in Asian Megacities involving the marginalization of informal settlements while governments aim to balance urban growth and reduce disaster risk. Reclamation presents an opportunity to reduce the consequences of future disasters, as new developments can include coastal defenses. Though disaster risk reduction should be an essential component in land reclamation as it can mitigate coastal hazards, this is not one of the main reasons why megacities in Southeast Asia pursue this intervention. However, governments use disasters as pretext for informal settlements to be evicted from the areas they occupy. This study shows that this will generally not work, as communities have already adapted to their surroundings. Such communities will refer to their experience and adaptive capacity as a reason not to fear future disasters. Furthermore, people living in informal settlements would rather worry about how to address present needs than future hazards. To curb increasing exposure and vulnerability through land reclamation, local governments must thus first address the underlaying socio-economic problems present in informal coastal settlements. Informal settlements living in reclaimed land and at risk to both disasters and

potential eviction also show a willingness to cooperate if they are given a platform where their needs they can be heard.

This chapter only provides a glimpse on the relationship of risk perception and infrastructure developments brought to by urbanization such as reclamation and how it affects marginalized communities. The study shows how vulnerable groups such as informal settlements are caught between development priorities and concepts of disaster risk. Further research should be done on how perceptions of risk are defined by urban dwellers, how these dictate current disaster risk governance strategies, and how can these be mediated, especially in a rapidly developing region.

CHAPTER 6: COMPARISON AND DISCUSSION OF THE RISK PERCEPTIONS OF MIDDLE-CLASS AND THE POOR AND ITS IMPLICATIONS TO URBAN GROWTH AND DEVELOPMENT

Notice: Chapter 6 (pp. 78 to 91) has been removed from the abridged version of the dissertation pending its publication to an academic journal. You may request a copy of this chapter by contacting the author through his e-mail address: valenzuela.venpaolo@gmail.com.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

Rapidly developing Asian countries are allured by physical defense infrastructure and relocation projects that are aimed to reduce disaster risk, despite such measures being too rigid to adapt to the challenges of socio-economic complexity and uncertainty brought about by rapid urban growth (Miller and Douglass, 2016; Revi et al., 2014). In the most at-risk yet rapidly developing cities in Southeast Asia such as Bangkok, Jakarta, and Manila, coastal land reclamation is seen as a potential strategy to reduce future disaster risks and maximize economic growth (Martín-Antón et al., 2016; Sengupta et al., 2018). However, some studies have already highlighted that such costly large scale infrastructure projects do not address the root causes that are increasing the risk to future hazards. For example, the Garuda Seawall in Jakarta has often been trumped by proponents as a solution to sea level rise, though much research has shown that the cause of flooding is land subsidence (Colven, 2017; Garschagen et al., 2018; Takagi et al., 2016). Beyond this mismatch in addressing the right causes of disasters, disaster risk reduction through infrastructure-based and relocation-focused strategies have been used by elites to instate policies that evict the poor outside of the city (Alvarez and Cardenas, 2019; Yee, 2018). The middle-class plays a role in this dynamic, as they may impact pro-poor policies in the city (Desai and Kharas, 2017).

This doctoral dissertation provides a deeper understanding on how the middle-class could potentially influence policies on disaster risk reduction and climate change adaptation in megacities, a topic that has not been investigated directly prior to this. Moreover, the dissertation also looked at the realities of coastal informal settlements that live on or around areas that are reclaimed due to urban growth. The study also used coastal land reclamation as

a tangible and visible form of urbanization unto which the perceptions of the middle-class and poor are directed at, particularly on how reclaiming land will affect disaster risks.

7.1 Conclusions

This doctoral research elucidated the interaction of the disaster risk perception of urban dwellers with other urban development concerns in Metro Manila, Philippines, a rapidly developing megacity that is increasingly at-risk to hazards and climate change impacts. This was done through an online questionnaire survey that targeted the middle-class in the Greater Metro Manila Area, and a household survey as well as a topographical survey in BASECO Compound, an informal settlement living on reclaimed land.

This dissertation finds that the middle-class perception of risks that surround disasters and urban development potentially enables the policies of eviction under the guise of disaster risk reduction. This is seen in the findings of the online questionnaire survey that was answered by the middle-class residents of GMMA. Furthermore, the middle-class' perception of risks in the city is centered on their heightened environmental consciousness, which affects their views regarding potential adaptation strategies such as coastal land reclamation. This contrasts with the views of the coastal informal settlements who live along coastal areas and reclaimed land in the city. BASECO compound's perception of disasters and coastal land reclamation is reflective of their immediate priorities, such as securing everyday needs and access to the port and coastal areas that provide them with different opportunities to do so. Thus, this makes them fear possible relocation due to land reclamation and other urban development projects more than that of extreme events that may affect their community in the future.

While elucidating the interaction of the perceptions of disaster risk and urban development in a megacity, the doctoral dissertation specifically investigated views of the middle-class and

the poor regarding disasters and urban development, and its potential implications. This research finds that both the middle-class and the poor have a high understanding of the hazards and risks that the city and their community face. It has also found that both social classes have a higher level of participation in evacuation drills than those in other neighboring Southeast Asian countries (though it should also be understood that all such studies are highly location and time dependent). Comparing both social classes shows that the middle-class is more active in participating in drills but is less knowledgeable on evacuation procedures for extreme events such as storm surges and tsunamis (which could be due to them generally living in areas that are less prone to such events).

The middle-class' views disasters are caused primarily by the lack of care for the environment. On the other hand, BASECO compound residents believe that one of the roots of flooding disasters are clogged drainage within their surroundings. Finally, the middle-class and the poor are both wary of urban development projects such as land reclamation. The middle-class views land reclamation negatively, as they see it as an intrusion on the environment that can lead to disasters. For the poor, their perception on the influence of future coastal land reclamation on disaster risk varies according to area and time of residence. Households in BASECO compound who have lived longer in the area are generally more positive than others, as they view it as a coastal defense. This is seen in the residents who live in Old Site, which is a non-reclaimed area in BASECO compound. Those who are not given provided protection from coastal hazards view it negatively, as seen in the responses of those who live in Aplaya, an area in the middle of the shorefront of BASECO that is exposed to the sea. On the other hand, those who live in Gasangan, a reclaimed area that is defended by a man-made beach and seawalls, have no opinion or are neutral on how they view future reclamation affecting disaster risk in BASECO. Overall, BASECO compound residents are more fearful of relocation and displacement due to CLR than potential future disaster events.

The concept of the risk society and the theory of reflexive modernity best captures the interaction of the perspectives of the middle-class and the poor regarding disasters, climate change, and urbanization. The middle-class, as seen in their perception of disasters and urban development, best represents the members of a risk society. They have achieved a sense of economic security, denoted by high educational attainment and comparative higher income (when compared to poor sections of society). As a result, they also have the privilege to concern themselves on how the city should grow and address development challenges. In this study, they are characterized as a social class that is concerned of threats towards the natural environment and one that is fearful of the future. On the other hand, the coastal informal settlements, as represented by BASECO compound, are at the outskirts of the risk society as, while they are aware of the potential for future disasters, they concern themselves with the present. Essentially, they are yet to achieve enough economic security and social welfare to have the privilege to be concerned about the future.

The finding of dissertation shows the potential implications of the risk perception of disasters of a growing middle-class on the poor, especially in megacities. One possibility is that governments may shift their policies to appease the calls from this growing section of society. There has been strong negative public opinion regarding land reclamation, which has made authorities temporarily halt and review (or to some cases, cancel) such pending reclamation projects (Chavez and Agbayani, 2020; Esguerra, 2020; Strangio, 2021). The middle-class, as seen in this dissertation, are mistrustful of potential land reclamation due to environmental concerns, rather than the possibility that the poor who live along these zones would be evicted.

Disaster risk reduction policies in Metro Manila are geared towards the removal of structures that obstruct waterways and coastal zones (Balgos, 2015; Singson, 2013; World Bank, 2017). These structures are often the houses of informal settlements, which are painted by many policy makers as a being both the cause of disasters and the most affected by hazards

(Balgos, 2015; Castelo, 2019; Porio, 2011b; United Nations University et al., 2014). These informal settlements are seen by the middle-class respondents of this research as a hindrance to disaster risk reduction and a growing problem of congestion in an already dense megacity. Thus, this research finds that the middle-class perception of disasters and urbanization enables the eviction of the poor away from the city (and away from their sources of their income).

Finally, the concept of relocation as a form of resilience building that is central to Metro Manila's flood management plan is not reflective of the needs of the informal settlements who migrate to the cities to access the services and opportunities of an urban area (Alvarez and Cardenas, 2019; Ancheta et al., 2019; Davis, 2004; Delica-Willison and Willison, 2013; Porio, 2019; Valenzuela et al., 2020a, 2020b).

7.2 Limitations and Recommendations for Further Studies

This PhD research has been impacted by the COVID-19 travel restrictions. The middle-class could be better investigated by conducting interviews on the different groups that compose it such as academics, private sector businesses or the media. This could have provided a cross-sectional analysis of the middle-class' perceptions of risk. Another recommendation is to further explore how livelihood risk management coalesces with disaster risk reduction and climate change adaptation. Engaging more at-risk communities living on coastal areas in and around megacities would add more insights to the realities of those who depend on livelihoods that are at-risk to coastal development.

In terms of methodology, both questionnaire surveys were distributed purposively and thus are very prone to bias. Statistically, it is challenging to assume that the results are representative of the population. However, the results are nevertheless important as they show patterns and associations that future research can validate with a more robust sampling method.

While the questionnaire surveys have commonalities, the middle-class questionnaire survey, being the more recent version, added queries on the risk perception of the respondents to earthquakes and liquefaction which is not present in the BASECO compound survey. It generated interesting results that could have been compared to the knowledge and perception of informal settlements to these risks. Adding hazards such as ground shaking, liquefaction, (and even pandemics) and then querying people's perception to these would allow a deeper comparison amongst risks, as well as between different types of social groups and communities.

The surveys were conducted before the pandemic but also conducted before Typhoon Ulysses, a tropical cyclone like Typhoon Ketsana in 2009 which is noted by most respondents as the most devastating disaster they experienced. The compounding effects of a new hazard and a returning event could potentially amplify perceptions of risk. Thus, it would be interesting to conduct a follow-up study that compares the views of people before and after this event. Moreover, given the repeat cycle of disaster events that may result in a heightened perception of risk to future disasters, how the middle-class views risk insurance can be a potential future research.

Repeating disasters, compounding impacts, ongoing stresses, and unaddressed risks elucidate notions of fear and anxiety within the risk society. In this dissertation, the middle-class fears that future disasters will worsen while the poor fear the potential eviction that can happen when the proposed reclamation activities take place. Further research can investigate whether urban dwellers from different social groups feel anxious because of these issues and how are they coping to address anxiety. Moreover, it would be interesting to understand the psychosocial and cultural context of the different groups of urban dwellers. For example, this dissertation did not investigate religious influences on the urban dweller's perception of risk, despite the Philippines being a predominantly Christian country. Religion, and other cultural

cues, may provide a deeper understanding on how risk perceptions amongst social classes are formed and can also provide avenues unto which notions of empathy and trust can be formed.

Finally, this dissertation assumed that the middle-class are those that are economically secure, have high educational attainment, and have a sense of urgency to control the future. However, the research did not investigate whether the respondents identify themselves as being part of the middle class. Thus, future research could critically assess the determinants that create a sense of belonging to the middle-class and their perception of their roles in policy and decision making. Future research could also investigate the relationships between the middle-class and policymakers.

7.3 Reflections, implications, and potential policy recommendations of this dissertation to the discussion of sustainability and resilience of megacities

The findings of this dissertation highlight the need for academics, policymakers, and other stakeholders to further investigate the cascading and unintended effects of the solutions designed to achieve sustainable development. This can be particularly observed in two different ways: 1) the potential implications of the growing middle-class towards development, as seen in disaster risk reduction, and 2) the role of risk perception in influencing the preferred adaptive strategies to combat climate change and future risks.

The Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, and the Paris Agreement emphasize the need to eradicate poverty to address the global problems the world faces (Kelman, 2017). What it did not consider are the consequences of the solutions implemented, as countries around the world attempt to achieve the development goals. More specifically, poverty reduction and economic development initiatives have led to a growing middle-class that now constitutes around half of the world's population (UNDP, 2013).

Investigation of the implications of a growing middle-class on other development priorities is needed, as the rapid growth of this social class could influence governments to shift social policies to appease their needs (Albert et al., 2015; Desai and Kharas, 2017; Never and Albert, 2021). This dissertation contributes to the discussion of the potential implications of a growing middle-class to achieve the eradication of poverty, especially in the case of disaster risk reduction and climate change adaptation. Beyond this, this research implores other scholars to investigate the perception of the middle-class regarding other development issues such as, but not limited to, their views on governance, lifestyles, consumption, and production.

Despite the ongoing discussion in academia (and the negative perception of the middle-class), many coastal land reclamation projects are currently in the planning or implementation phases. How to change the risk perception of costly large development projects should be investigated further. Furthermore, disaster recovery, especially in coastal zones, is now being approached by developing countries such as the Philippines through a multilayer safety strategy that combines physical defenses, spatial solutions, and emergency management (City of Tacloban, 2014; Philippine Reclamation Authority, 2016; Valenzuela et al., 2019). The implementation of these strategies should also investigate power relations within society to alleviate the concerns of different social classes.

Finally, this dissertation ends with a call for researchers, practitioners, and stakeholders to consider whether the solutions they are creating, formulating, or implementing to achieve sustainability led to new vulnerabilities or further deepening old ones. This essentially represents the core ethical debate that is central to this dissertation. While there is definite progress in development, such as the growth of the middle class, there can be unintended consequences such as the shift away from pro-poor policies that is central to sustainable development. Thus, researchers, advocates, and practitioners that aim to progress sustainable

development should always consider a core question in sustainability science: for whom is sustainability for?

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APPENDICES

Appendix A: Middle-class Online Questionnaire Survey Form

Note: this is a printed version of the middle-class online questionnaire survey form. The actual form can be accessed through this link: https://forms.gle/2uSe5h39mTytKNzv5

Questionnaire Survey on Coastal Disaster Awareness and Land Reclamation in the Greater Metro Manila Area

Hello and good day!

I am Ven Paolo B. Valenzuela, a PhD Candidate at the University of Tokyo in Japan. I am currently studying coastal disaster awareness and land reclamation, particularly in Manila Bay. This survey is aimed towards people who live in or work in the Greater Metro Manila area. The aim of this questionnaire is to gather their perception of disaster risk and the effects of land reclamation on future disasters.

This survey takes about 15 minutes to complete. As this study aims to understand perception, please note that there are no right or wrong answers to this questionnaire survey.

This form collects your email address to ensure that there will be no duplicate respondents. It will also be used to inform you about any updates on this research. All information collected are to be treated with utmost confidentiality and will only be used for research purposes.

Thank you very much!

Yours sincerely,
Ven Paolo B. Valenzuela

Magandang araw!

Ako po si Ven Paolo B. Valenzuela, isang PhD Candidate na nag-aaral sa University of Tokyo sa Japan. Ako po ay kasalukuyang nananaliksik tungkol sa kaalaman ng mga tao hinggil sa mga bantang panganib na nagmumula sa karagatan at ang koneksyon nito sa land reclamation, lalong lalo na sa look ng Maynila. Itong palatanungan na ito ay para sa mga taong nakatira o nagtratrabaho sa loob ng Metro Manila. Ang layunin nito ay makakalap ng mga pananaw hinggil sa kaalaman ng mga tao tungkol sa mga bantang panganib at ang kanilang pananaw tungkol sa posibleng kuneksyon nito sa mga disaster.

Itong survey na ito ay tinatayang aabot ng 15 minuto para masagutan. Sapagkat ang survey na ito ay naglalayong kumalap ng mga pananaw ng tao, wala po tama o maling sagot dito.

Kinokolekta rin po ng survey na ito ang inyong e-mail address upang mapaniguro na walang madodobleng kasagutan at para na rin mabalitaan kayo tungkol sa pananaliksik na ito. Lahat po ng impormasyong makakalap ay mahigpit po naming itituring kompidensyal at gagamitin lamang sa pag-aaral.

Maraming salamat po!

Lubos na sumasainyo,
Ven Paolo B. Valenzuela

* Required

1. Email *

2. Are you a resident of or currently living in Metro Manila? *
Ikaw po ba ay residente ng o kasalukuyang nakatira sa Metro Manila?

Mark only one oval.

- Yes (Oo)
- No (Hindi) *Skip to question 6*

For Metro Manila residents

Para sa mga naninirahan sa Metro Manila

3. Which city do you currently live? *
Sa aling lungsod po kayo kasalukuyang nakatira?

Mark only one oval.

- Caloocan
- Las Piñas
- Makati
- Malabon
- Mandaluyong
- Manila
- Marikina
- Muntinlupa
- Navotas
- Parañaque
- Pasay
- Pasig
- Pateros
- Quezon City
- San Juan
- Taguig
- Valenzuela

4. Where do you spend most of your time in? (For work or school, whichever takes up more time) (Before COVID-19 ECQ) *

Sa aling lungsod po kayo madalas namamalagi?

Mark only one oval.

- ◯ Caloocan
- ◯ Las Piñas
- ◯ Makati
- ◯ Malabon
- ◯ Mandaluyong
- ◯ Manila
- ◯ Marikina
- ◯ Muntinlupa
- ◯ Navotas
- ◯ Parañaque
- ◯ Pasay
- ◯ Pasig
- ◯ Pateros
- ◯ Quezon City
- ◯ San Juan
- ◯ Taguig
- ◯ Valenzuela
- ◯ Bulacan
- ◯ Cavite
- ◯ Laguna
- ◯ Rizal
- ◯ Others

5. How long have you been living or residing in Metro Manila? *

Gaano po kayo katagal naninirahan sa Metro Manila?

Mark only one oval.

- ◯ Since birth
- ◯ Less than 3 years
- ◯ 3 - 5 years
- ◯ 5 - 10 years
- ◯ 10 - 15 years
- ◯ More than 15 years

Skip to question 10

For non-Metro Manila residents working in NCR

Para sa mga hindi naninirahan sa Metro Manila ngunit nagtratrabaho sa loob ng NCR

6. Where do you currently live? *

Saan po kayo naninirahan?

Mark only one oval.

- ◯ Bulacan
- ◯ Cavite
- ◯ Laguna
- ◯ Rizal
- ◯ Other: _____

7. Where do you spend most of your time in when you are in Metro Manila and neighboring regions? (For work or school, whichever takes up more time) (Before COVID-19 ECQ) *

Sa aling lugar po kayo madalas namamalagi?

Mark only one oval.

- ◯ Caloocan
- ◯ Las Piñas
- ◯ Makati
- ◯ Malabon
- ◯ Mandaluyong
- ◯ Manila
- ◯ Marikina
- ◯ Muntinlupa
- ◯ Navotas
- ◯ Parañaque
- ◯ Pasay
- ◯ Pasig
- ◯ Pateros
- ◯ Quezon City
- ◯ San Juan
- ◯ Taguig
- ◯ Valenzuela
- ◯ Bulacan
- ◯ Cavite
- ◯ Laguna
- ◯ Rizal
- ◯ Others

8. Are you currently working in Metro Manila? *

Kayo po ba ay kasalukuyang nagtratrabaho sa Metro Manila?

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 10*

9. How long have you been working in Metro Manila? *

Gaano na po kayo katagal nagtratrabaho sa Metro Manila?

Mark only one oval.

- ◯ Less than 3 years
- ◯ 3 - 5 years
- ◯ 5 - 10 years
- ◯ 10 - 15 years
- ◯ More than 15 years

Flood Risk Perception

10. Please evaluate how you perceive the Flood Risk in the following places: *

Maaari po bang pakitala kung gaano kalala ang banta ng pagbabaha sa inyong bahay (home), trabaho o eskwelahan (School/Work), mga lugar malapit sa Manila Bay (Areas along Manila Bay) at mga lugar sa Manila Bay na natambakan na ng lupa (Reclaimed land along Manila Bay):

Mark only one oval per row.

	No risk	Low risk	Moderate risk	High risk	Very high risk
Home	◯	◯	◯	◯	◯
School/Work	◯	◯	◯	◯	◯
Areas along Manila Bay (in general) (examples: Manila City, Pasay, Navotas, Pasay, Las Piñas, Cavite, Bulacan, Malabon, etc.)	◯	◯	◯	◯	◯
Reclaimed land along Manila Bay (specific) (example: Mall of Asia area, Roxas Boulevard, Macapagal Ave., CCP Complex, etc.)	◯	◯	◯	◯	◯

11. Please elaborate why did you give these scores for these places (optional)

Bakit niyo po naibigay ang mga marka na ito sa mga lugar na nabanggit?

12. What are the potential flood sources for the following places? *

Maaari po bang pakimarka kung ano ang mga posibleng dahilan ng pagbaha sa inyong bahay (home), trabaho o eskwelahan (School/Work), mga lugar malapit sa Manila Bay (Areas along Manila Bay) at mga lugar sa Manila Bay na natambakan na ng lupa (Reclaimed land along Manila Bay):

Check all that apply.

	From the sea	From the river	From rainfall	During high tide	During typhoons	In the event of a tsunami	No flooding in the area	Other
Home	☐	☐	☐	☐	☐	☐	☐	☐
School/Work	☐	☐	☐	☐	☐	☐	☐	☐
Areas along Manila Bay (in general) (examples: Manila City, Pasay, Navotas, Pasay, Las Piñas, Cavite, Bulacan, Malabon, etc.)	☐	☐	☐	☐	☐	☐	☐	☐
Reclaimed land along Manila Bay (specific) (example: Mall of Asia area, Roxas Boulevard, Macapagal Ave., CCP Complex, etc.)	☐	☐	☐	☐	☐	☐	☐	☐

13. If you selected "other" in the options above, please indicate it here

Kung pinili niyo po ang "other", maaari po lamang na isulat dito ang inyong sagot

_____

14. Can you go to school or work in the event of flooding in Metro Manila? *

Kayo po ba ay nakakapasok pa sa paaralan o trabaho kapag nagbabaha sa Metro Manila?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Sometimes

15. Please elaborate why (optional)

Bakit po ninyo na isagot ito?

16. Are you familiar with the term "storm surge"? *

Kayo po ba ay pamilyar sa katagang "storm surge" o "daluyong"?

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 20*

Storm Surge Risk Perception

Mga pananaw tungkol sa banta ng Storm Surge o Daluyong

17. Please evaluate how you perceive the Storm Surge Risk in the following places: *

Maaari po bang pakitala kung gaano kalala ang banta ng Storm Surge o Daluyong sa inyong bahay (home), trabaho o eskwelahan (School/Work), mga lugar malapit sa Manila Bay (Areas along Manila Bay) at mga lugar sa Manila Bay na natambakan na ng lupa (Reclaimed land along Manila Bay):

Mark only one oval per row.

	No risk	Low risk	Moderate risk	High risk	Very high risk
Your Home	◯	◯	◯	◯	◯
Your School/Workplace	◯	◯	◯	◯	◯
Areas along Manila Bay (in general)	◯	◯	◯	◯	◯
Reclaimed land along Manila Bay (specific) (example: Mall of Asia area, Roxas Boulevard, Macapagal Ave., CCP Complex, etc.)	◯	◯	◯	◯	◯

18. Please elaborate why did you give these scores for these places (optional)

Bakit niyo po naibigay ang mga marka na ito sa mga lugar na nabanggit?

19. Do you know how to evacuate in the event of a storm surge? *

Alam niyo po ba kung paano lumikas kung sakaling magkaroon ng storm surge o daluyong?

Mark only one oval.

- ◯ Yes
- ◯ No

Earthquake Risk Perception

Mga pananaw tungkol sa pagbanta ng lindol

20. Have you experienced an intensity VI* or above earthquake? (Naranasan niyo na po ba ang isang intensity VI* o higit pa na lindol?) *

*Intensity VI is defined by PHIVOLCS as Very Strong Earthquake. In the event of an intensity VI earthquake, furniture and other heavy objects are displaced.Wall plaster may crack.People may lose balance.Small church bells may ring.If on the road, it may feel like driving with flat tires.Very old or poorly built houses and man-made structures are slightly damaged though well-built structures are not affected.Limited rockfalls and rolling boulders occur in hilly to mountainous areas and escarpments.Trees shake.

_____*Intensity VI ay isang napakalas na lindol ayon sa PHIVOLCS. Sa isang intensity VI na lindol, ang mga mabibigat na gamit sa bahay ay maaaring tumumba, mga dingding at pader ay maaaring masira, ang mga tao ay maaaring hindi makatayo, mga kampana ay maaring tumunog, at mahirap magmaneho na tila nasiraan ng gulong. Mga luma o hindi maayos na pagkagawang bahay ay maaaring makatamo ng pinsalo ngunit ang maaayos ay hindi maapektohan. Maaaring may mahulog na mga bato sa mga kabundukan. Ang mga puno ay yayanig.

Mark only one oval.

- ◯ Yes
- ◯ No

21. Please evaluate how you perceive the Earthquake Risk in the following places: *

Maaari po bang pakitala kung gaano kalala ang banta ng lindol sa inyong bahay (home), trabaho o eskwelahan (School/Work):

Mark only one oval per row.

	No risk	Low risk	Moderate risk	High risk	Very high risk
Home	◯	◯	◯	◯	◯
School/Work	◯	◯	◯	◯	◯

22. Please elaborate why did you give these scores for these places (optional)

Bakit niyo po naibigay ang mga marka na ito sa mga lugar na nabanggit?

23. Do you know where to evacuate in the event of an earthquake? *

Alam niyo po ba kung saan lilikas kung sakaling magkaroon ng lindol?

Mark only one oval.

- ◯ Yes
- ◯ No

24. Are you familiar with the term "Tsunami"? *

Kayo po ba ay pamilyar sa katagang "Tsunami"?

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 29*

Tsunami Risk Perception

Mga pananaw sa banta ng tsunami

25. Please evaluate the Tsunami Risk in the following places: *

Maaari po bang pakitala kung gaano kalala ang banta ng Tsunami sa inyong bahay (home), trabaho o eskwelahan (School/Work), mga lugar malapit sa Manila Bay (Areas along Manila Bay) at mga lugar sa Manila Bay na natambakan na ng lupa (Reclaimed land along Manila Bay):

Mark only one oval per row.

	No risk	Low risk	Moderate risk	High risk	Very high risk
Home	◯	◯	◯	◯	◯
School/Work	◯	◯	◯	◯	◯
Areas along Manila Bay (in general) (examples: Manila City, Pasay, Navotas, Pasay, Las Piñas, Cavite, Bulacan, Malabon, etc.)	◯	◯	◯	◯	◯
Reclaimed land along Manila Bay (specific) (example: Mall of Asia area, Roxas Boulevard, Macapagal Ave., CCP Complex, etc.)	◯	◯	◯	◯	◯

26. Please elaborate why did you give these scores for these places (optional)

Bakit niyo po naibigay ang mga marka na ito sa mga lugar na nabanggit?

27. Do you know if there is a tsunami warning system in Manila Bay? *

Alam niyo po ba kung mayroong sistemang babala para sa tsunami sa look ng Maynila?

Mark only one oval.

- ◯ Yes
- ◯ No

28. Do you know where to evacuate in the event of a tsunami? *

Alam niyo po ba kung saan lilikas kung sakaling magkakatsunami?

Mark only one oval.

- ◯ Yes
- ◯ No

29. Are you familiar with the term "liquefaction"? *

Pamilyar po ba kayo sa katagang "liquefaction"? (mala-paglusaw ng lupa)

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 33*

Liquefaction Risk Perception

Pananaw sa banta ng Liquefaction (malapaglusaw ng lupa)

30. Please evaluate how you perceive the Liquefaction Risk in the following places: *

Maaari po bang pakitala kung gaano kalala ang banta ng liquefaction sa inyong bahay (home), trabaho o eskwelahan (School/Work), mga lugar malapit sa Manila Bay (Areas along Manila Bay) at mga lugar sa Manila Bay na natambakan na ng lupa (Reclaimed land along Manila Bay):

Mark only one oval per row.

	No risk	Low risk	Moderate risk	High risk	Very high risk
Home	◯	◯	◯	◯	◯
School/Work	◯	◯	◯	◯	◯
Areas along Manila Bay (in general) (examples: Manila City, Pasay, Navotas, Pasay, Las Piñas, Cavite, Bulacan, Malabon, etc.)	◯	◯	◯	◯	◯
Reclaimed land along Manila Bay (specific) (example: Mall of Asia area, Roxas Boulevard, Macapagal Ave., CCP Complex, etc.)	◯	◯	◯	◯	◯

31. Please elaborate why did you give these scores for these places (optional)

Bakit niyo po naibigay ang mga marka na ito sa mga lugar na nabanggit?

32. Do you know how to evacuate in the event of liquefaction? *

Alam niyo po ba kung paano lilikas kung sakaling magkakaroon ng liquefaction?

Mark only one oval.

- ◯ Yes
- ◯ No

Disaster Experience

Karanasan sa disaster

33. Have you experienced some sort of damage to your house or to your immediate vicinity from a previous disaster (i.e., flooding, typhoons, storm surges, earthquakes, tsunamis, or liquefaction)? *

Nakaranas at napinsalaan na po ba kayo sa isang nakalipas na disaster (tulad ng pagbaha, bagyo, daluyong, tsunami, lindol, liqeufaction, atbp?)

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 41*

35. What was the extent of the damage to your property or to your surroundings? *

Gaano kalala ang pagkasira sa inyong ari-arian o kapaligiran?

_____Maliit na pinsala (Minor damage) - kaunti mga sira sa dingding, kaunting pagkasira ng bubong, mga nahulog o natumbang puno

_____Malaking pinsala (Major damage) - malalaking mga sira sa dingding, pagkatanggal ng tuluyan ng bubong, sirang sasakyan

_____Lubusang pagkasira (Totally destroyed) - nasira ng buo ang bahay, hindi na maipagawa ang sasakyan, atbp.

Mark only one oval.

- ◯ Minor damage (small cracks, slightly damaged roofs, fallen trees, etc.)
- ◯ Major damage (large cracks, torn roofs, damaged walls, cars need extensive repair, etc.)
- ◯ Totally destroyed (whole house destroyed, cars are irreparable, etc.)

36. Were you given assistance to repair your house or property? *

Nakatanggap po ba kayo ng tulong sa pagpapaayos ng inyong bahay o ari-arian?

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 41*

37. Who provided assistance? (check all that apply) *

Sino ang nagbigay ng tulong?

Check all that apply.

- [ ] National Government
- [ ] Local Government (City and or Barangay)
- [ ] Civil Society and Non-Government Organizations
- [ ] Religious Institutions and Organizations
- [ ] Private Companies, Organizations, or Individuals (Business or Media)
- [ ] Academic Institutions (Schools and or Universities)
- [ ] Families, Relatives, and or Friends
- [ ] Other: _____

38. Do you have insurance for disasters? *

May insurance po ba kayo para sa sakuna?

Mark only one oval.

- ◯ Yes, all assets have insurance
- ◯ Yes, but only partial
- ◯ No
- ◯ I don't know

39. How much of the damages were covered in total by the assistance given to you? (including insurance)? *

Gaano po kasapat ang tulong na naiabot sa iyo, kasama na ang insurance?

Mark only one oval.

- ◯ 0 - 25%
- ◯ 26 - 50%
- ◯ 51 - 75%
- ◯ 76 - 100%
- ◯ I don't know

40. Please elaborate why did you give this score? (Optional)

Bakit niyo po naibigay ang markang ito?

_____

_____

_____

_____

_____

Disaster Preparedness

Kahandaan sa disaster

41. Where do you get your disaster information? (check all that apply) *

Sa alin niyo po nakukuha ang mga impormasyong tungkol sa disaster? (maaaring pumili ng higit sa isa)

Check all that apply.

- [ ] TV and or Radio
- [ ] Newspapers and other print media
- [ ] The internet and or through social media
- [ ] Official text messages or mobile phone alerts
- [ ] From local authorities
- [ ] From installed or roving loudspeakers
- [ ] Family or friends
- [ ] Neighbors
- [ ] From Civil Society (NGOs, Religious Organizations, etc.)
- [ ] Observing the environment

Other: [ ] _____

42. Do you think the amount of information you receive is enough? *

Sa tingin niyo po ba sapat na ang impormasyon na inyong natatanggap?

Mark only one oval.

	1	2	3	4	
Very little / Sobrang kulang	◯	◯	◯	◯	More than enough / Sobra

43. Please elaborate why did you give this score (optional)

Bakit niyo po napili ang sagot na ito?

_____

_____

_____

_____

_____

44. Do you or your family have a disaster preparedness emergency bag? *

Mayroon po ba kayong disaster preparedness emergency bag?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

45. Have you participated in evacuation drills in the last 5 years? *

Kayo po ba ay nakasali sa isang evacuation drill sa nakalipas na 5 taon?

Mark only one oval.

- ◯ Yes, at least once
- ◯ Yes, 2-3 times
- ◯ Yes, more than 4 times
- ◯ No, but I know where to evacuate
- ◯ Never *Skip to question 49*

46. What type of building or structure is the nearest evacuation shelter to the following places: *

Ano po ang klase ng evacuation center ang pinakamalapit sa mga sumusunod na lugar?

Mark only one oval per row.

	Dedicated evacuation center	School Building	Church	Multi-story building	Open field	Others (Please elaborate below)	I don't know
Home	◯	◯	◯	◯	◯	◯	◯
School/Workplace	◯	◯	◯	◯	◯	◯	◯

47. If you chose [others] in the previous question, please indicate it below:

Kung pinili niyo po ang [others], ano po ito?

_____

48. How far is the nearest evacuation center from these places? *

Gaano kalapit ang evacuation center sa mga sumusunod na lugar:

Mark only one oval per row.

	Less than 1 km (around 15 minutes walk)	1 - 2 km (15 - 30 minutes walk)	2 - 4 km (30 mins to 1 hr walk)	More than 4 km (at least 1 hr walk)	I don't know
Home	◯	◯	◯	◯	◯
School/Workplace	◯	◯	◯	◯	◯

Perceptions on Disaster and Climate Risk

Mga pananaw tungkol sa banta ng disaster at klima

49. Do you think the following would lead to disasters? *

Sa tingin niyo po ba na ang mga sumusunod ay maaaring maging sanhi ng disaster?

Mark only one oval per row.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Rapid urbanization (mabilisang o biglaang urbanisasyon)	◯	◯	◯	◯	◯
Population increase (pagdami ng mga tao)	◯	◯	◯	◯	◯
Increasing poverty (pagtaas ng antas ng kahirapan)	◯	◯	◯	◯	◯
Poor governance and leadership (hindi maaayos na pamamahala)	◯	◯	◯	◯	◯
Environmental Degradation (pagkasira ng kapaligiran)	◯	◯	◯	◯	◯
Intensifying Tropical Cyclones or Storms (paglala ng mga bagyo)	◯	◯	◯	◯	◯
Lack of infrastructure-based coastal defenses (seawalls or dykes) (Kakulangan ng pisikal na depensa laban sa mga bantang panganib mula sa dagat)	◯	◯	◯	◯	◯
Lack of nature-based coastal defenses (coral reefs, mangroves, etc) (Kakulanang ng mga natural na depensa laban sa mga bantang panganib mula sa dagat)	◯	◯	◯	◯	◯
Increase in frequency of strong rains (paglakas at pagdalas ng mga lubhang pagulan)	◯	◯	◯	◯	◯
Sea level rise (pagtaas ng dagat)	◯	◯	◯	◯	◯
Land subsidence (pagbaba ng lupa)	◯	◯	◯	◯	◯
Land reclamation (pagtambak ng lupa sa karagatan)	◯	◯	◯	◯	◯
Lack of wastewater management (kawalan ng maayos na pamamaala sa wastewater)	◯	◯	◯	◯	◯

Unclear or clogged drainages and riverways (baradong mga imburnal, kanal, at ilog)					
Global Climate Change (pagbago ng klima sa buong mundo)					

50. Do you think disasters will worsen in the future? *

Sa tingin niyo po ba ay lalala pa ang mga disaster?

1 - Will not worsen at all (hindi lalala)

2- Will slightly worsen (may bahagyang paglala)

3 - Will moderately worsen (may paglala)

4 - Will severely worsen (malalang paglala)

5 - Will very severely worsen (Very severe increase)

Mark only one oval.

	1	2	3	4	5	
Will not worsen at all (Hindi lalala)						Will very severely worsen (Sobra ang paglala)

51. Please elaborate why you gave this score to your view of future disasters (optional)

Bakit niyo po naisagot ito?

52. What activities do you think enables disaster and climate risk reduction? (check all that apply) *

Ano po sa tingin ninyo ang mga gawain na nakakababa ng banta ng disaster? (maaaring pumili ng higit sa isa)

Check all that apply.

- [ ] Evacuation drills (Pagsasagawa ng evacuation drill)
- [ ] Community-based disaster risk management
- [ ] Installation of seawalls and dykes (paglagay ng mga seawall at dyke)
- [ ] Elevation of roads and highways (pag-angat sa mga kalsada)
- [ ] Cleaning of drainages (paglinis ng mga daluyan ng tubig)
- [ ] Installation of flood pumps (paglagay ng mga flood pump)
- [ ] Good governance (maayos na pamamahala)
- [ ] Land reclamation (pagtambak ng lupa sa karagatan)
- [ ] Installation of Early Warning Systems (paglagay ng sistemang babala)
- [ ] Discipline (disiplina)
- [ ] Other: _____

Perceptions on Land Reclamation

53. How do you feel about the proposed land reclamation projects in Manila Bay? *

Ano po ang inyong pananaw tungkol sa mga proyekto na naglalayong magdagdag ng lupa sa Manila Bay?

Mark only one oval.

- ◯ Strongly disagree (Labis na pagtutol)
- ◯ Disagree (Tutol)
- ◯ Neutral (Walang pananaw)
- ◯ Agree (Sang-ayon)
- ◯ Strongly agree (Labis na Pagsang-ayon)

54. Why? (Optional)

Bakit?

_____

_____

_____

_____

_____

55. Do you agree or disagree that the following would happen when land reclamation is done in Manila Bay? *

Kayo po ba ay sumasang-ayon o hindi sumasang ayon sa mga sumusunod na posibleng epekto ng pagtambak ng lupa sa karagatan?

Mark only one oval per row.

	Strongly Disagree (Labis na hindi sumasang-ayon)	Disagree (hindi sumasang-ayon)	Neutral (Walang pananaw)	Agree (Sumasang-ayon)	Strongly Agree (Labis na sumasang-ayon)
Decrease flooding in Metro Manila and nearby coastal zones (pagbaba ng pagbaha sa mga lugar sa Metro Manila)	◯	◯	◯	◯	◯
Increased land subsidence (higit na pagbaba ng lupa)	◯	◯	◯	◯	◯
Increased protection from coastal disasters (proteksyon mula sa mga bantang panganib sa karagatan)	◯	◯	◯	◯	◯
Relocation of coastal communities (paglipat ng mga komunidad malapit sa karagatan)	◯	◯	◯	◯	◯
Destruction of coastal environment (mangroves, coastal habitats, etc.) (Pagkasira ng mga kapaligiran sa karagatan)	◯	◯	◯	◯	◯
Increased tourism activities	◯	◯	◯	◯	◯

(pagdami ng mga tourist activities)					
Increased economic growth (paglago ng ekonomiya)	◯	◯	◯	◯	◯

56. If ever coastal communities along Manila Bay would be relocated, which is the most suitable option? *

Kung ang mga komunidad sa look ng Maynila ay kinakailangan ilipat ng lugar, saan ang pinakamainam sa mga sumusunod?

Mark only one oval.

- ◯ In-city relocation (sa loob ng lungsod)
- ◯ Off-city relocation (sa labas ng lungsod)
- ◯ Relocation anywhere (kahit saan)
- ◯ No relocation (walang paglipat)
- ◯ No opinion (walang pananaw)
- ◯ Other: _____

57. Why? (Optional)

Bakit?

_____

_____

_____

_____

_____

Disaster Risk Reduction and Climate Change Work Experience

The following section is for respondents who have experience in disaster risk reduction or climate change issues

Karanasan hingil sa Disaster Risk Reduction at Climate Change

Ang susunod ay para lamang sa mga may karanasan magtrabaho tungkol sa Disaster Risk Reduction o Climate Change.

58. Do you have any experience working or researching in disaster risk reduction and climate change issues? *

Kayo po ba ay may karanasang magtrabaho sa disaster risk reduction o climate change?

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 61*

Disaster Risk Reduction and Climate Change Work Experience

59. Which sectors did you work for in disaster risk reduction and climate change issues? *

Check all that apply.

- ☐ Academe
- ☐ Civil Society Organizations and Non-Government Organizations
- ☐ Local Government
- ☐ National Government
- ☐ International Organizations and Development Partners
- ☐ Private Sector
- ☐ Media
- ☐ Independent

Other: ☐ _____

60. How long have you worked with disaster or climate change issues? *

Mark only one oval.

- ◯ Less than 1 year
- ◯ 1 - 3 years
- ◯ 3 to 5 years
- ◯ 5 to 10 years
- ◯ More than 10 years

Demographics

For statistical purposes, please answer the following (Para po sa aming pagtatala ng datos, pakisagot ang mga susunod na tanong):

61. Sex (Kasarian) *

Mark only one oval.

- ◯ Female (Babae)
- ◯ Male (Lalaki)
- ◯ Prefer not to say (mas gustong hindi sabihin)
- ◯ Other: _____

62. Age (Edad) *

_____

63. Occupation (Choose Sector)/ Trabaho (Mamili ng pinakamainam na sektor) *

Mark only one oval.

- ◯ National Government
- ◯ Local Government
- ◯ Private Sector
- ◯ Civil Society, NGOs, and Religious Institutions
- ◯ Media
- ◯ Academe
- ◯ Student
- ◯ Self-employed
- ◯ Unemployed
- ◯ Retired
- ◯ Other: _____

64. Highest educational attainment / Pinakamataas na antas ng pag-aaral *

Mark only one oval.

- ◯ None
- ◯ Elementary
- ◯ High School (Grades 7-12 for those who attended K-12)
- ◯ College or University
- ◯ Graduate School

65. Estimated monthly income / Tinatantyang Buwanang Kita *

Mark only one oval.

- ◯ Less than ₱ 12,000
- ◯ ₱ 12,001 - ₱25,000
- ◯ ₱ 25,001 - ₱50,000
- ◯ ₱ 50,001 - ₱100,000
- ◯ ₱ 100,001 - ₱ 200,000
- ◯ More than ₱ 200,000
- ◯ Prefer not to say

66. Who do you live with? / Sino ang kasama ninyo sa bahay? *

Mark only one oval.

- ◯ Alone
- ◯ Friends
- ◯ Family and Relatives
- ◯ Other: _____

67. Are you living with the following? / May nakitira po ba sa inyo na sa mga sumusunod? *

Mark only one oval per row.

	Yes, at least 1	Yes, 2-3	Yes, 4 or more	No
Children 17 years old and below	◯	◯	◯	◯
Elderly aged 65 and above	◯	◯	◯	◯
Persons with special needs	◯	◯	◯	◯

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Appendix B: BASECO Compound Questionnaire Survey

Enumerator:	Location Code:	Control Number:

PALATANUNGAN O *QUESTIONNAIRE SURVEY* TUNGKOL SA KAALAMAN SA DISASTER SA MGA KOMUNIDAD SA LOOK NG MAYNILA

Questionnaire Survey on Disaster Knowledge of Communities Along Manila Bay

LAYUNIN

Upang mapigilan ang mga disaster tulad ng pagbaha, bagyo, at tsunami, kailangan ng tamang kaalaman upang mapigilan ang mga pinsalang maidudulot nito. Ang mga komunidad at local na pamahalaan ay kailangan magbigay at maglaan ng tamang aksyon na nakabase sa tamang siyensya at ebidensya upang mabawasan ang peligro. Higit sa lahat, ang mga aksyon ay nararapat din nakalaan para sa ikabubuti ng mga tao sa komunidad na nagbibigay respeto sa kanilang mga pangangailangan. Itong palatanungan o *questionnaire survey* na ito ay isinasagawa ng mga mananaliksik mula sa *University of Tokyo* at *Waseda University* sa Japan para masukat ang kaalaman at kahandaan ng mga tao sa komunidad hingil sa mga disaster. Ang resulta ng pag-aaral na ito ay makakatulong sa pagbawas ng peligro sa mga dalampasigan sa buong mundo. Ang mga sagot po ninyo ay para lamang sa layunin na ito. Kami po ay humihingi ng inyong lubos na kooperasyon. Maraming salamat po!

PURPOSE

To prevent coastal disasters such as storm surges and tsunamis, knowledge, awareness, and practice of disaster prevention is needed. Communities and local governments need to provide different measures for efficient reduction of disaster risk. Moreover, actions done by stakeholders should be for the benefit of the communities at risk while taking into consideration their everyday needs. The aim of this questionnaire is to assess citizen's knowledge, awareness, and practice on coastal disaster prevention. This study is conducted by researchers from the University of Tokyo and Waseda University and its results would be used for worldwide typhoon and tsunami disaster prevention. We will only use your answers for this purpose. We kindly ask for your cooperation. Thank you very much!

Ito ay isang maikling palatanungan na may 23 tanong lamang.
Humigit-kumulang na 15 minuto po lamang ang iyong itatagal sa pagsagot nito.
This is a short questionnaire with 23 questions.
Completing this questionnaire should take you only about 15 minutes.

Lahat po ng impormasyon na inyong ibibigay ay mahigpit po naming ililihim
All information provided will be kept strictly confidential.

1. **Kayo po ba ay naninirahan sa lugar na ito?**
   Are you a local resident of this area?

   ☐ **Oo** *Yes* ☐ **Hindi** *No*

---

2. **Kayo po ba ay ipinanganak sa lugar na ito?**
   Were you born in this area?

   ☐ **Oo** *Yes* ☐ **Hindi** *No*

   Kung hindi, maaari po bang pakisagot ang sumusunod:
   If No, please answer the following:

   Lugar ng Pinanggalingan:
   Place of Origin : _____

   Ilang taon ang tagal ng pamumuhay sa lugar na ito?
   Years residing in the area: _____

---

3. **Ang lugar po ba kung saan kayo naninirahan ay may banta ng pagbabaha? (Mamili po ng isang sagot at markahan ito)**
   Is the place where you reside in danger of being flooded? (Please choose one answer)

○	○	○	○	○
Hindi Mapanganib *Not at all*	**May Kaunting Panganib** *Slight Danger*	**Medyo Mapanganib** *Moderate Danger*	**Mapanganib** *High Danger*	**Lubhang Mapanganib** *Very High Danger*

---

4. **Sa inyong pananaw, saan madalas nanggagaling ang pagbabaha sa inyong lugar? (Maaaring pumili ng higit sa isa)**
   In your perspective, where does the flood usually come from? (Tick all that apply)

   ☐ **Mula sa dagat** *From the sea*
   ☐ **Mula sa ilog** *From the rivers*
   ☐ **Mula sa ulan** *From rains*
   ☐ **Mula sa iba** *From other sources:*_____
   ☐ **Hindi ko alam** *I don't know*

---

5. Detalye Hingil sa Pinakamalalang Pagbaha
Worst Flood Details

5A. Gaano po ang pinakamataas na pagbaha?
How high was the worst flood?

☐ **Hanggang Kalingkingan**
(mas mababa sa 1 talampakan)
Up to the ankles (less than 1 feet)

☐ **Hanggang Tuhod**
(higit-kumulang 2 talampakan)
Up to the knees (about 2 feet)

☐ **Hanggang baywang**
(higit-kumulang 3 talampakan)
Up to the waist (about 3 feet)

☐ **Hanggang Leeg**
(higit-kumulang 4 na talampakan)
Up to the neck (about 4 feet)

☐ **Lampas tao**
(mga 5 talampakan o higit pa)
About a person's height or beyond (5 feet and above)

☐ **Hindi ko alam**
I don't know

5B. Kailan po nangyari ang pagbahang ito?
When did this flood happen?

_____

5C. Ano ang sanhi ng pagbahang ito? (Pumili lamang ng pinamainam na rason sa pagbaha)
What was the cause of the flood? Choose one that best describes the source of the flood

☐ **Storm Surge at Bagyo**
Storm Surge or Typhoons

☐ **Malakas na Pag-ulan o Habagat**
Heavy Rainfall or Southwest Monsoon

☐ **Tsunami**
Tsunamis

☐ **Pag-apaw ng ilog o dagat**
Coastal or River Flooding

☐ **Iba: _____**
Others

☐ **Hindi ko alam**
I don't know

5D. Gaano katagal ang pagbahang ito?
How long did the flood last?

☐ **0 – 3 oras** *0 – 3 hrs*

☐ **3 – 6 oras** *3 - 6 hrs.*

☐ **6 – 12 oras** *6 - 12 hrs.*

☐ **12 – 24 oras** *12 – 24 hrs*

☐ **24+ oras** *24+ hrs*

☐ **Hindi ko alam** *I don't know*

5E. Napinsalaan po ba kayo sa disaster na ito?
Have you experienced some sort of damage from this disaster?

☐ **Oo** *Yes*

☐ **Hindi** *No*

Kapag <u>OO</u> ang iyong sagot, maaari po bang sagutin ang nasa susunod na pahina:
If you answered YES, please answer the following questions on the next page:

5E1. Gaano kalaki ang pinsalang naidulot sa iyong kabahayan o kapaligiran?
What was the extent of the damage to your property or to your surroundings?

☐ **Maliit ang pinsala *(maliliit na mga pagkasira sa dingding, maliit na pagkasira sa bubong, atbp.)***
Minor (small cracks, slightly damaged roof, mold, etc.) /

☐ **Malaki ang pinsala *(malaki na pagkasira sa dingding, malaki na pagkasira sa bubong, atbp.)***
Major (large cracks, damaged walls, etc.)

☐ **Lubos na Nawasak**
Total damage

5E2. **Kayo po ba ay nabigyan ng tulong para ipagawa ang iyong bahay o ari-ariaan?**
Were you given assistance to repair your house or property?

☐ **Buong pagtulong (Sapat o lubos para sa pagpagawa ng bahay at iba pa**
Total assistance (Enough to cover repairs and other needs)

☐ **Bahagyang pagtulong (bahagyang pagtulong ngunit hindi sapat para maisapaayos ang bahay at iba pa)**
Partial assistance (Some sort of assistance was given but not enough to cover repairs)

☐ **Walang tulong na natanggap**
No assistance

5E3. **Sino ang nagbigay ng tulong? (Maaaring pumili ng higit sa isa)**
Who were the benefactors of this aid? (Tick all that apply)

☐ **Pambansang Pamahalaan**
National Government

☐ **Mga NGO**
Non-Government Organizations

☐ **Mga kamag-anak at mga kaibigan**
Relatives and Friends

☐ **Ang media (TV, Radio, etc.)**
Media (TV, Radio, etc.)

☐ **Hindi ko alam**
I don't know

☐ **Lokal na Pamahalaan o Barangay**
Local Government or the Barangay

☐ **Simbahan at iba pang pangrelihiyon na organisasyon**
Church and Religious Institutions

☐ **Mga Paaralan at iba pang grupong pang-edukasyon**
Schools and other educational institutions

☐ **Iba pa**
Others
_____

6. Detalye Hingil sa Madalas na Nararanasang Pagbaha
Regular Flood Details

6A. Gaano po ang katas ang madalas na pagbaha?
How high are the usual floods?

☐ **Hanggang Kalingkingan**
(mas mababa sa 1 talampakan)
Up to the ankles (less than 1 feet)

☐ **Hanggang Tuhod**
(higit-kumulang 2 talampakan)
Up to the knees (about 2 feet)

☐ **Hanggang baywang**
(higit-kumulang 3 talampakan)
Up to the waist (about 3 feet)

☐ **Hanggang Leeg**
(higit-kumulang 4 na talampakan)
Up to the neck (about 4 feet)

☐ **Lampas tao**
(mga 5 talampakan o higit pa)
About a person's height or beyond (5 feet and above)

☐ **Hindi ko alam**
I don't know

6B. Gaano kadalas nangyari ang pagbaha?
How often do floods happen?

☐ **Isang beses kada ilang taon**
Once every few years

☐ **Kada taon**
Once every few years

☐ **2-3 beses sa isang taon**
2-3 times a year

☐ **Higit sa 3 beses sa isang taon**
More than 3 times a year

☐ **Hindi ko alam**
I don't know

6C. Tuwing kailan madalas nangyayari ang pagbahang ito? (Pumili lamang ng pinamainam na rason sa pagbaha)
When does this flood usually happen? Choose one that best describes the source of the flood

☐ **Storm Surge at Bagyo**
Storm Surge or Typhoons

☐ **Malakas na Pag-ulan o Habagat**
Heavy Rainfall or Southwest Moonsoon

☐ **Tsunami**
Tsunamis

☐ **Pag-apaw ng ilog o dagat**
Coastal or River Flooding

☐ **Iba: _____**
Others

☐ **Hindi ko alam**
I don't know

6D. Gaano katagal ang pagbahang ito?
How long did the flood last?

☐ **0 – 3 oras** *0 – 3 hrs*
☐ **3 – 6 oras** *3 - 6 hrs.*
☐ **6 – 12 oras** *6 - 12 hrs.*
☐ **12 – 24 oras** *12 – 24 hrs*
☐ **24+ oras** *24+ hrs*
☐ **Hindi ko alam** *I don't know*

6E. Nakakapagtrabaho po ba kayo kapag may baha?
Are you able to go to school or work during these regular floods?

☐ **Oo** *Yes*
☐ **Hindi** *No*

---

7. **Kayo po ba ay sumali sa mga evacuation drill sa nakaraang 5 taon? (Mamili po lamang ng isa)**
Have you participated in evacuation drills in the last 5 years? (Choose one)

☐ **Oo** (_____ **Beses**) *Yes (How many times?)*
☐ **Hindi, pero alam ko kung saan lilikas** *No, but I know where to evacuate*
☐ **Hindi** *No*

Kapag OO, sino ang nagorganisa ng evacuation drill? (Maaaring pumili ng higit sa isa)
If yes, who organized the evacuation drill? (Tick all that apply)

☐ **Pambansang Pamahalaan** *National Government*
☐ **Lokal na Pamahalaan o Barangay** *Local Government or the Barangay*
☐ **Mga NGO** *Non-Government Organizations*
☐ **Simbahan at iba pang pangrelihiyon na organisasyon** *Church and Religious Institutions*
☐ **Mga kamag-anak at mga kaibigan** *Relatives and Friends*
☐ **Mga Paaralan at iba pang grupong pang-edukasyon** *Schools and other educational institutions*
☐ **Ang media (TV, Radio, etc.)** *Media*
☐ **Iba pa:**_____ *Others*
☐ **Hindi ko alam** *I don't know*

---

8. **Alam niyo po ba ang storm surge o daluyong na dulot ng isang bagyo?**
Do you know what a typhoon storm surge is?

☐ **Oo, alam ko** *Yes, I know*
☐ **Hindi ko alam** *No, I do not know*

---

9. **Alam niyo po ba magevacuate kung kayo po ay makakaranas ng bagyo na may kasabay na storm surge o daluyong?**
Do you know how to evacuate in the event of a typhoon and or a storm surge?

☐ **Oo, alam ko** *Yes, I know*
☐ **Hindi ko alam** *No, I do not know*

---

10. **Alam niyo po ba kung ano ang isang tsunami?**
Do you know what a tsunami is?

☐ **Oo, alam ko** *Yes, I know*
☐ **Hindi ko alam** *No, I do not know*

---

11. **Alam niyo po ba magevacuate kung mayroong isang tsunami?**
Do you know how to evacuate in the event of a tsunami?

☐ **Oo, alam ko**
Yes, I know

☐ **Hindi ko alam**
No, I do not know

---

12. Kung kayo po ang tatanungin, ano po ang inyong pagsusuri sa banta ng tsunami o storm surge sa lugar na ito?
How do you evaluate storm surge, tsunami, and flood risk in this area?

	Hindi Mapanganib *Not at all*	**May Kaunting Panganib** *Slight Danger*	**Medyo Mapanganib** *Moderate Danger*	**Mapanganib** *Dangerous*	**Lubhang Mapanganib** *Very Dangerous*
Bagyo at Storm Surge *Typhoons and Storm Surges*	◯	◯	◯	◯	◯
Tsunami *Tsunami*	◯	◯	◯	◯	◯
Pagbaha mula sa Ulan o Ilog *Fluvial or Pluvial Flooding*	◯	◯	◯	◯	◯

---

13. Paano ninyo inaaksyunan ang mga pagbaha mula sa dagat o ilog? Maaari po pumili ng higit sa isa
How do you personally address the coastal or river flooding situation? (Tick all that apply)

☐ **Iniaangat ang bahay**
Raise our houses

☐ **Iniaangat ang mga kagamitan**
Raising our furniture

☐ **Nililinis ang mga estero at kanal**
Clean the drainage

☐ **Lumilikas ng maaga**
Preemptive Evacuation

☐ **Iba pa (pakisaad lang po)**
Others
_____

☐ **Wala**
None

Sa inyong palagay, mabisa po ba itong mga aksyon ninyo laban sa pagbaha?
In your opinion, are these measures enough to address the flooding situation?

◯	◯	◯	◯	◯
Hindi *Not at all*	**May kaunting bisa** *Somewhat effective*	**Medyo mabisa** *Moderately Effective*	**Napakabisa** *Highly Effective*	**Lubhang napakabisa** *Very Highly Effective*

---

14. May disaster preparedness kit o go-bag po ba kayo o ang pamilya ninyo?
Do you or your family have an emergency preparedness go-bag?

☐ **Oo, mayroon** *Yes, we have*
☐ **Wala** *No, we don't have*
☐ **Hindi ko alam** *I don't know*

---

15. Anu-ano ang ginagawa ng inyong lokal na pamahalaan para solusyonan ang pagbaha?
Does the local government install measures to address flooding in your area?

☐ **Pagsasagawa ng mga evacuation drill** *Conduct of evacuation drills*
☐ **Paglalagay ng mga seawall** *Installing seawalls*
☐ **Paglilinis ng mga estero at kanal** *Clean the drainage*
☐ **Paglalagay ng mga sirena or loudspeaker para sa babala** *Preemptive Evacuation*
☐ **Paglalagay ng mga flood pump** *Raising our furniture*
☐ **Pag-angat sa mga kalsada** *Elevating roads*
☐ **Pagtatambak ng lupa sa dagat** *Land reclamation*
☐ **Iba pa (pakisaad lang po) :_____** *Others*
☐ **Wala** *None*

Sa inyo palagay, mabisa po ba itong mga aksyon ninyo laban sa pagbaha?
In your opinion, are these measures enough to address the flooding situation?

◯	◯	◯	◯	◯
Hindi *Not at all*	**May kaunting bisa** *Somewhat effective*	**Medyo mabisa** *Moderately Effective*	**Napakabisa** *Highly Effective*	**Lubhang napakabisa** *Very Highly Effective*

---

16. Mayroon po bang sistemang pambabala para sa Tsunami sa lugar na ito?
Do you know if there is a tsunami warning system in this area?

☐ **Oo, mayroon** *Yes, we have*
☐ **Wala** *No, we don't have*
☐ **Hindi ko alam** *I don't know*

---

17. Sa kayo nakakakuha ng impormasyon tungkol sa storm surge at bagyo? (Maaaring pumili ng higit sa isa)
From where did you obtain information about floods, storm surges and typhoons? (Multiple choice)

☐ **TV o Radyo** *TV or Radio*	☐ **Mga Diyaryo o Pamplet** *Newspapers or Pamphlets*	☐ **Mga Loudspeaker** *Loudspeakers*
☐ **Mula sa Internet o Social Media** *Internet or Social Media*	☐ **Babala na natatanggap mula sa selpon o text** *Mobile Phone Alerts*	☐ **Mula sa Baranggay o Lokal na Pamahalaan** *From local authorities*
☐ **Mula sa mga kapitbahay** *From neighbors*	☐ **Mula sa mga kamag-anak at kapamilya** *From family or relatives*	☐ **Mula sa NGO, simbahan, at iba pang organisasyons** *From NGOs, clergy, or other organizations*
☐ **Pagmamasid sa kapaligiran** *Observing the environment*	☐ **Iba pa (pakisaad):** *Others (please specify)* _____	☐ **Wala akong natatanggap na impormasyon** *I don't receive any information*

Sa tingin mo, sapat ba ang natatanggap mong impormasyon?
Is the amount of early warning information you receive adequate?

○	○	○	○	○
Wala	**Kulang**	**Medyo sapat**	**Sapat**	**Sobra**
None	*Little*	*Somewhat Adequate*	*Adequate*	*Too much*

Bakit? *Why?*

18. Anu-ano sa tingin ninyo ang kadahilanan kung bakit nagkakadisaster? (Maaaring pumili ng higit sa isa)
What do you think are the reasons behind these disasters? (Tick all that apply)

☐ **Pagdami ng tao** *Population Increase*	☐ **Walang maayos na daluyan ng tubig-baha** *Lack of proper wastewater drainage*	☐ **Walang maayos na mga seawall o dyke** *No proper seawalls or dykes*	☐ **Hindi maayos na pamamahala** *Poor Governance*
☐ **Pagdami ng malalakas na mga bagyo** *Increase in strong typhoons*	☐ **Pagdalas ng malalakas na ulan** *Increase in frequency of strong rains*	☐ **Pagbago ng klima** *Climate Change*	☐ **Pagtaas ng lebel ng dagat** *Sea level rise*
☐ **Paglubog ng lupa** *Land Subsidence*	☐ **Pagtambak ng lupa sa karagatan** *Land Reclamation*	☐ **Iba pa (pakisaad):** *Others (please specify)* _____	☐ **Hindi ko alam o wala akong opinyon** *I don't know or I don't have an opinion*

---

19. Sa tingin niyo po ba lalala ang mga pagbaha o mga disaster sa mga susunod na taon?
Do you think that the flooding or disasters would worsen in the future?

☐ **Oo, lalala** *Yes, it will worsen*	☐ **Hindi lalala** *No, it will not worsen*	☐ **Hindi ko alam** *I don't know*

Kung <u>OO</u> ang inyong sagot, gaano lalala ang mga disaster?
If you answered <u>YES,</u> how severe would the disasters be?

◯ **Kaunting Paglala** *Little Increase*	◯ **May Paglalala** *Some Increase*	◯ **Medyo Malala** *Moderate Increase*	◯ **Malala** *Definite Increase*	◯ **Sobrang Paglala** *Severe Increase*

Bakit? *Why?*

---

20. Ano ang inyong palagay hingil sa pagtambak ng lupa sa Manila Bay?
How do you feel about the ongoing land reclamation project in Metro Manila Bay?

◯	◯	◯	◯	◯
Labis na Pagtutol *Strongly Disagree*	**Tutol** *Disasgree*	**Walang Pananaw** *Neutral*	**Sang-ayon** *Agree*	**Labis na Pag-sang-ayon** *Strongly Agree*

Bakit? *Why?*

---

21. Kung magkaaroon ng pagtambak o pagreklama ng lupa sa Manila Bay, ano sa tingin ninyo ang mangyayari?
If land reclamation would happen in Manila Bay, in your opinion, what do you think would happen?

---

22. Kung kayo ang pipiliin, ano ang pinakamainam sa mga sumusunod?
If you were to choose, what would be the best from the following?

☐ **Relokasyon sa loob ng lungsod**
In-city Relocation

☐ **Relokasyon sa labas ng lungsod**
Off city relocation

☐ **Relokasyon kahit saan**
Relocation anywhere

☐ **Walang relokasyon**
No relocation

☐ **Iba pa (pakisaad):**
Others (please specify)

_____

☐ **Walang akong opinyon**
I have no opinion

---

23. Mayroon po ba kayong nais iparating sa mga lokal na opisyal o sa pamahalaan hingil sa pagreklama o pagtambak ng lupa sa Manila Bay?
Do you have anything you want to say to local officials or to the government when it comes to land reclamation along Manila Bay?

■ **Para po sa aming pagtatala ng datos, pakisagot ang mga susunod na tanong:**
For statistical purposes, please answer the following:

A. Kasarian
Gender

☐ **Lalake** *Male* ☐ **Babae** *Female*
☐ **Iba pa** *Others* ☐ **Walang Sagot**
_____ *No Answer*

B. Edad
Age

☐ **0-17** ☐ **18-35** ☐ **36-50** ☐ **51-65**
☐ **65+** ☐ **Walang sagot** *No Answer*

C. Trabaho
Occupation

☐ **Pangingisda**
Fisheries

☐ **Maybahay**
Housewife

☐ **Pulis o Bumbero, atbp**
Police, Firefighter, etc.

☐ **Opisina**
Office Worker

☐ **Karpintero, Mekaninko at iba pang Skilled worker**
Carpenter, Mechanic, or other skilled worker

☐ **Estudyante**
Student

☐ **Walang trabaho**
Unemployed

☐ **Pagtitinda o Pangangalakal, May sariling trabaho o tindahan**
Self-employed, small business, or trade

☐ **Trabahador o Kargador sa Pier**
Laborer or Dockworker

☐ **Kasambahay**
Domestic Worker

☐ **Retirado**
Retired

☐ **Guro**
Teacher

☐ **Iba** _____
Others

☐ **Walang sagot**
No Answer

D. Pinakamataas na antas ng pagaaral
Highest educational attainment:

☐ **Wala** *None* ☐ **Elementarya** *Elementary* ☐ **Hayskul** *High School*
☐ ***Kolehiyo*** *College* ☐ **Postgrad** *Postgraduate* ☐ **Walang sagot** *No Answer*

E. Tantya ng Kita ng Sambahayan sa Isang Buwan
Estimated Monthly Household Income

☐ **Mas maliit sa PhP 12,000** *(<PhP12,000)*
☐ **PhP 25,001 – PhP 50,000**
☐ **Higit sa Php 100,000** *(> PhP 100,000)*
☐ **PhP 12,001 – 25,000**
☐ **PhP 50,001 – Php 100,000**
☐ **Walang Sagot** *No Answer*

F. Mga Kasama Sa Bahay
Household Structure

F1. Sino ang kasama mo sa iyong tirahan?
Who are you living with?

☐ **Pamilya at Kamag-anak** *Family/Relatives*
☐ **Mag-isa** *Alone*
☐ **Mga Kaibigan** *Friends*
☐ **Iba pa** *Others* **(_____)**

F2. May nakatira ba sa inyo na 17 taon gulang pababa o lampas 70 taon gulang?
Are you living with anyone under 17 or over 65 years old?

Mas bata sa 17 taon gulang *Under 17 years old* ☐ **Oo, mayroon** **(Ilan?** *How many?*_____**)** ☐ **Wala** *None*	**Mas matanda sa 65 taon gulang** *Over 65 years old* ☐ **Oo, mayroon** **(Ilan?** *How many?*_____**)** ☐ **Wala** *None*

F3) May kasama po ba kayo sa inyong sambahayan na may kapansanan?
Are you living with anyone who has a disability?

☐ **Oo, mayroon**
(Ilan? *How many?* _____**) at (Anong kapansanan**? *What disability?* _____**)**

☐ **Wala** *None*

Maraming Salamat Po!
Thank you very much!