# OF THE RIVER

## UNRAVELING IMAGINARIES OF WATER & RESILIENCE IN METRO MANILA

by
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A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Architecture (Water)

Waterloo, Ontario, Canada, 2020

## AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis including any required final revisions as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

## ABSTRACT

Metro Manila, the Philippines' capital, emerged from the river delta—bisected by an estuarine river and laced with rivulets. For a long time, the city embraced its wet geography and was adapted to the soak of torrential rains. However, now these rains don't just soak the city, they flood it, marking a profound shift in perception and intervention. While its location puts it at hydrometeorological risk, exposure to interacting factors have intensified its vulnerability. As the city has confronted its landscape, many ideas of what water management and resilience should look like have been projected onto its flood infrastructure. Positioned within the intertwined nature of design, environment, and politics, *Of the River* unravels the imaginaries that have shaped Metro Manila's waters.

This thesis uses the Pasig River, which cuts through five municipalities, as an axis for analysis. Rather than a river that strings together two coasts, the Pasig can be seen as Metro Manila's estuary—a third coast—which has the potential to reframe understandings of the city's past and future. By chronicling the coevolution of the city and its water, this thesis refutes reductive attitudes of the issue by framing Manila's waters as the product of a much longer transformation—one articulated by underlying social, political, and economic conditions. The interplay of these conditions has manifested in top-down strategic infrastructure that excludes large portions of the population, creating a hazardscape of marginalization and displacement. Contesting this inequity, people have countered with bottom-up tactics, which are numerous but underequipped. In response, this thesis reflects on a productive meso-level between macro-scale built projects and micro-scale social efforts.

The goal of this thesis is not to provide a solution to the flooding that Metro Manila experiences, but rather to probe its strategies and priorities. In unpacking how the city has characterized water and resilience, the intention is to uncover and challenge who imaginaries should serve.

# ACKNOWLEDGEMENTS

I began this thesis with a notebook full of questions and a desire to explore Filipino urbanism in the context of our changing climate. It is only through many people's ongoing encouragement that this thesis has been possible.

First and foremost, I wish to thank my thesis committee. Your collective knowledge and passion significantly enriched this process.

To Dr. Elizabeth English, as supervisor, for sharing your passion for cultural equity in the built environment, which cultivated meaning in this research.

To Jane Hutton, as committee member and TRD1 instructor, for supporting me in building a strong foundation for this thesis and continuing to ask tough yet important questions.

To Rick Andrighetti, as internal reader, and Yvonne Battista, as external reader, for sharing your time and insight at my defence.

Though my committee was limited to three faculty members, there have been many instructors at Waterloo Architecture who have taught me throughout the years and indirectly shaped this project.

I would like to acknowledge TU Delft's Planning & Design with Water summer school program and its organizer Roberto Rocco. The program not only challenged me to think about Dutch water management and its exported strategies, but also brought me together with many others thinking about the role of socio-spatial justice in climate adaptation.

I would also like to recognize the University of Waterloo's Water Institute, as the Collaborative Water Program experience was imperative in developing my interdisciplinary thinking. Conversations with faculty, lecturers, and students challenged my perspective of how water intersects and cuts across boundaries.

I am also grateful for the support of scholarships from the

Royal Bank of Canada, the University of Waterloo, and Waterloo Architecture, which allowed for my research trip and extended investigation.

Daniel, thank you for your unwavering encouragement.

To Jonas, Ammar, Leo, Aslı, Sama, and my other friends for your enthusiasm, distractions, and company.

To my TRD1 & TRD2 classmates and ARC 3002 officemates, as watching you pursue your passions in thesis and life have inspired my own. To everyone I had the opportunity to collaborate with through SWAG, BRIDGE, and teaching and research assistantships for the lessons not directly embodied in these pages.

And to my family, for your unconditional support.

Throughout my research work on Metro Manila and the Pasig River, I examined the relationships between traditional and contemporary Tagalog people and their water and land. Learning from this story of dispossession, I must also acknowledge the land on which I worked in Cambridge, Ontario—the homelands of the indigenous Neutral, Anishnabeg, and Haudenosaunee peoples. My office at Waterloo Architecture overlooked the Grand River, a traditional site of travel and healing, and was situated along the Haldimand Tract, land promised to the Six Nations of the Grand River. Despite the numerous changes this territory has experienced, I see the importance of this land and place.

In loving memory of
my *tita* Thea who taught me about resilience
& my *lola* Lita who lived with the land & water.

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# INTRODUCTION

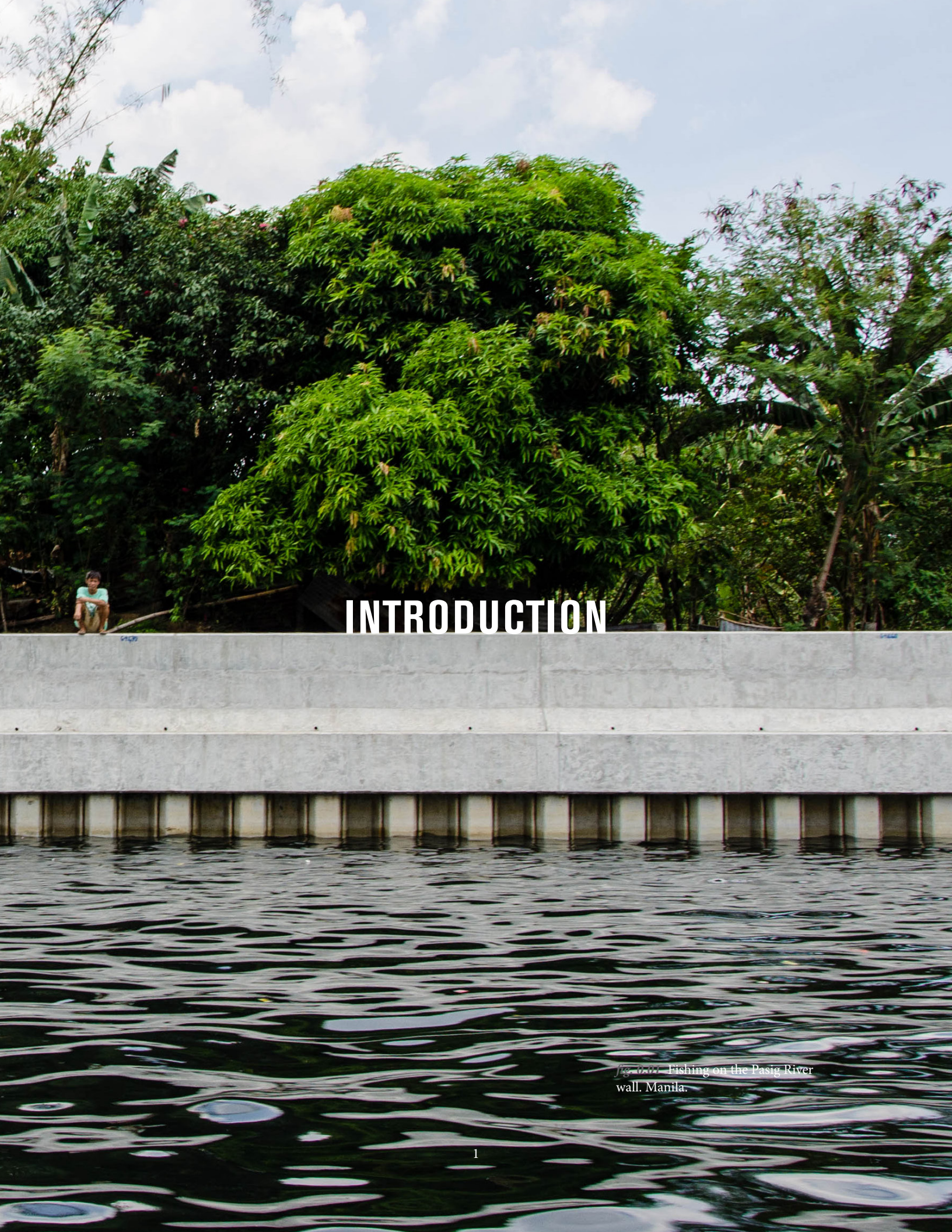
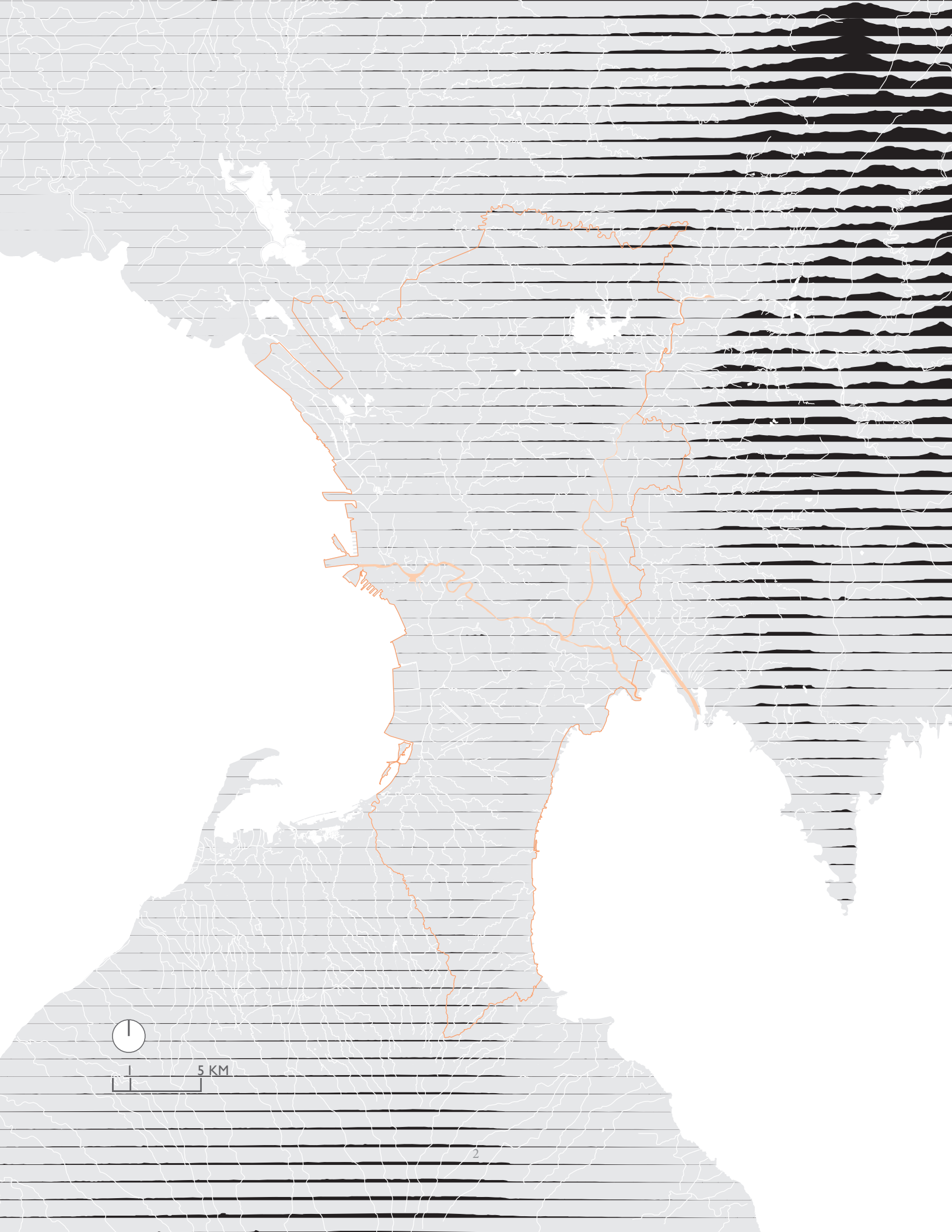


*fig. 0.01* – Fishing on the Pasig River wall. Manila.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## PREFACE

My thesis project began as a study of the relationship between Metro Manila and flooding. I was initially drawn to studying it through the same lens worn by administrators and the public—the lens of flood as a 'natural disaster.'[1] However, I found that this lens draws attention to water crossing a mapped boundary, nature stepping out of line. This lens has the de facto solution of reinforcing boundaries in ways that privilege land over water. This lens puts us in a position in which we protect ourselves from water rather than adapt to it.

My initial inclination was to design two pieces of adaptive green infrastructure. I chose two uninhabited sites—one post-industrial and one post-colonial—to work on large swaths of land without uprooting existing residents.

Knowing that existing structural flood mitigation interventions weren't necessarily reflective of local needs, I pursued other forms of precedent before jumping into the design. I looked at successful green infrastructure worldwide to understand its potentials for water management and placemaking. I also sought a deeper understanding of Metro Manila's urban landscape, particularly regarding its attitudes and strategies for approaching water. I wanted to know what drove the flood management system to be how it is—why each piece was considered fitting at the time. However, faced with a lack of comprehensive literature, it was challenging to piece together a picture of the megacity's urban water.

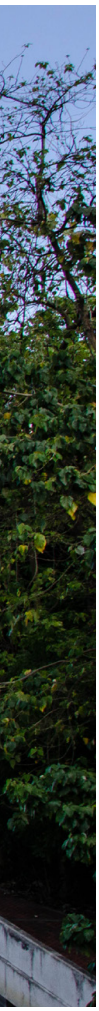
The desire for a design was replaced with a desire for answers. The goal shifted from devising a band-aid for the issue to contextualizing the root causes. I began trying to reconceptualize Metro Manila through its actions regarding water and resilience. Exploring multiple perspectives and bridging gaps in the narrative, I started creating a resource I would have wanted to read before designing an infrastructural intervention.

1 The term 'natural disaster' is a misnomer as disasters result from the combination of both natural hazards and social vulnerability, making them not 'natural.' A natural hazard can cause a disaster when its impact threatens livelihoods, meaning a hazardous event does not result in a disaster unless people are vulnerable.

***fig. 0.02*** Mega Manila's morphology.
1 : 250,000
(opposite)

***fig. 0.03*** The Pasig River as seen looking east from the Quezon Bridge. Manila.
Arroceros Forest Park, Manila's 'last lung,' on the right.

## SOAK TO FLOOD



Metro Manila floods. It floods despite efforts to control water.

Historically, Metro Manila, the Philippines' capital region, was accustomed to being soaked by the torrential rains that came along with typhoons and monsoons. However, today these rains don't just soak the city, they flood it. Over time, locals have shifted from welcoming or preparing for a soak to fearing and fighting floods. As Mathur and da Cunha expressed, "Soak to flood is a profound shift. It makes an enemy of a friend, even if it is a friend who is not always welcome."[2] During rainy season, people stockpile food or evacuate to shelters, making awaiting the rain much like preparing for a siege.

This war against urban water, which began with colonial encounters, is apparent not only in Metro Manila's built environment but is also engrained in rhetoric and education. When the city floods, are we witnessing a natural hazard or a cultural disaster? Is this the fault of too much rain or of settling in the floodplain?

The official position is generally that Metro Manila has a drainage problem that requires improvement. This attitude has driven institutions to keep water in 'its place' by building walls and installing pumps. This protectionist approach that seeks to make the city more 'flood-proof' has taken form through the colonial project and, more recently, foreign planners pushing technocratic programs. A masterplan is currently underway to further mechanize the performance of the Pasig River, a tidal estuary that cuts through five municipalities *(fig. 0.03)*.

If the rain is a seasonal opponent, the Pasig River is a perennial one. It has long been leveraged and altered for political agendas. While waterfront property in many other cities is prime real estate, Metro Manila turns its back to the Pasig. For over a century, factories along its banks dumped in waste. Formal and

2 Anuradha Mathur and Dilip Da Cunha, *Soak: Mumbai in an Estuary* (New Delhi: Rupa and Co., 2009) 3.

informal settlers disposed of garbage into the channelized *esteros*,[3] making the river a target for the blame of flooding. In the 1990's, the river was pronounced 'biologically dead' and though it has since been rehabilitated, the general public remains disengaged.

While the discourse of flooding has often been coupled with that of urban resilience, there is no shared understanding of exactly how it should be realized. Therefore, this thesis instead speaks of imaginaries of water and resilience. An imaginary can be defined as a collectively held vision of the future. While collectively held, they can be articulated by governments and institutions or can originate from individuals or small groups, gaining traction through exercises of power or coalition building.[4] In Metro Manila, multiple imaginaries have existed in tension, resulting in competing priorities, objectives, and methods. Those selected to propagated from the top-down have resulted in strategic infrastructure that excludes large portions of the population. Contesting this inequity, people have countered with bottom-up tactics, which are numerous but underequipped. Accordingly, imaginaries can be used as a framework for revealing and reflecting on otherwise backgrounded societal structures, questioning how values have transformed shared futures.

Positioned within the intertwined nature of design, environment, and politics, this thesis aims to unravel the imaginaries that have shaped Metro Manila's water and resilience, using the Pasig River as an axis for analysis. In unpacking the implicit ideologies that have been projected and how they have redounded back on people, questions are raised about who resilience benefits. In response, the thesis also reflects on a productive meso-level between macro- and micro-scale efforts.

*Part 1: The Serpent* traces a history of water in Metro Manila by examining indigenous, colonial, modern, and

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3 estuarine rivulets

4 Sheila Jasanoff and Sang-Hyun Kim, "Future Imperfect: Science, Technology, and the Imaginations of Modernity," in *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, ed. Sheila Jasanoff (Chicago: The University of Chicago Press, 2015) 4.

contemporary relationships with the Pasig River. By chronicling the co-evolution of the city and its water, this part reveals how different imaginaries and sociopolitical formations have influenced the water. *Part 2: Splintering City* unpacks the governance context to understand the interplay between climate change, urbanization, and sociospatial adaptation in order to expose links between inequity and vulnerability. *Part 3: Green & Grey* analyzes existing flood infrastructure and discusses its resulting tensions and disjunctions. By drawing attention to the social and ecological consequences of strategic flood management, this part shows the Pasig River and its hazardscape as a site of negotiation and displacement. *Part 4: River Warriors* examines different tactical social responses to inadequate high-level action on flooding. *Part 5: Revisualizing Risk* looks at the potential of mapping flood risk through crowdsourcing in hopes of elevating micro-level experience to meso-level infrastructure.


CHINA
EAST CHINA SEA
TAIWAN
PHILIPPINES
SOUTH CHINA SEA
PHILIPPINE SEA
VIETNAM
CELEBES SEA
MALAYSIA
INDONESIA
100
500 KM

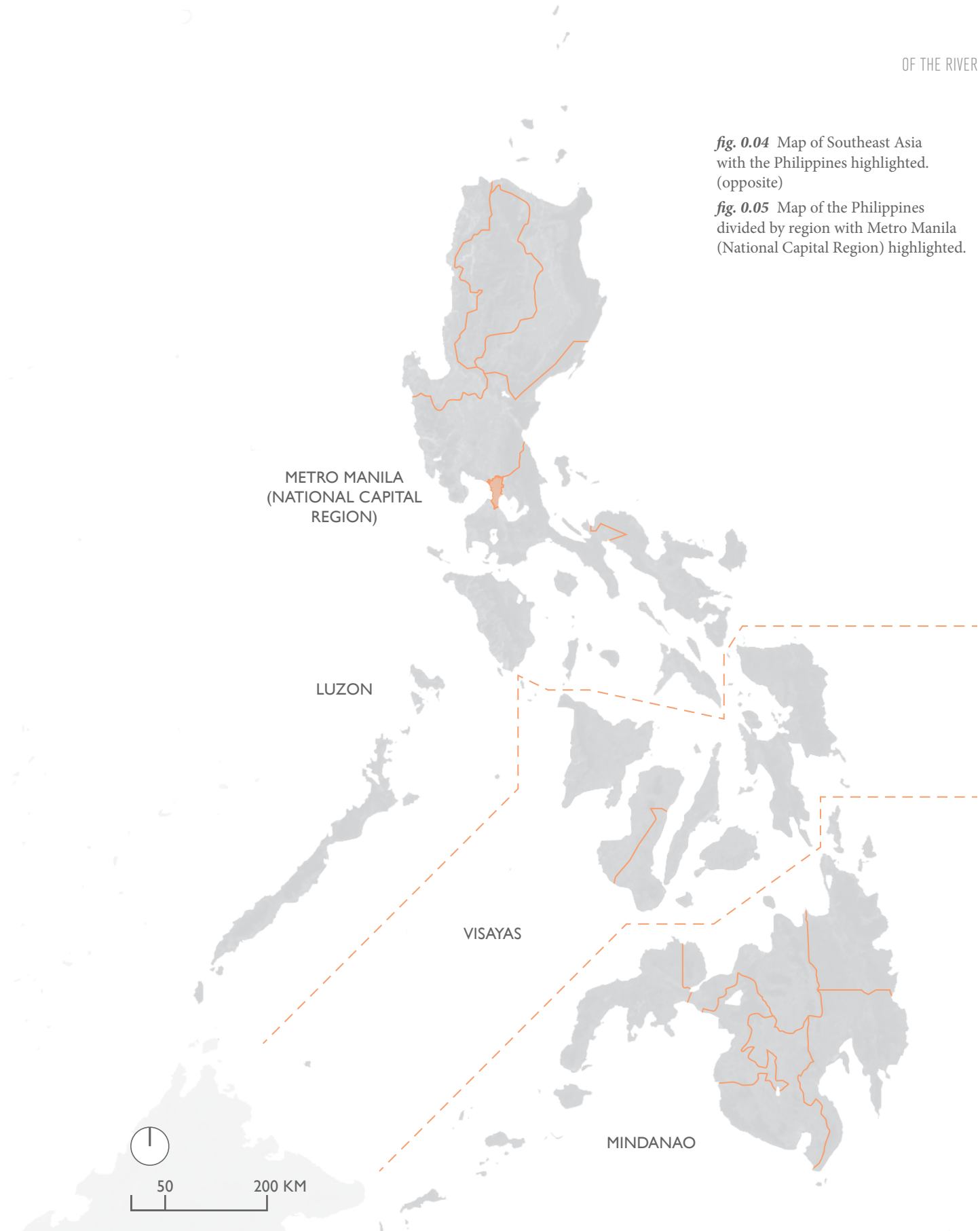



***fig. 0.04*** Map of Southeast Asia with the Philippines highlighted. (opposite)

***fig. 0.05*** Map of the Philippines divided by region with Metro Manila (National Capital Region) highlighted.

## METRO MANILA


***fig. 0.06*** Crossing the Sta. Elena Street Bridge into busy Binondo. Manila.

***fig. 0.07*** Coastal informal settlement on reclaimed land. Baseco, Manila.

Metropolitan Manila, officially known as the National Capital Region (NCR), is home to 13 million people and has a greater urban area of 24 million.[5] Manila proper is the densest city in the world,[6] giving it the reputation of being overwhelming and crowded *(fig. 0.06)*. Indigenous people have lived in the region for thousands of years, establishing a lifeline along the Pasig River. Situated off Manila Bay, bisected by the Pasig River, and laced with *esteros*, Manila's waterway linkages made it a commercial hub. However, despite the city being born of the water, it has become the back door to the metropolis.

Manila is the result of a series of settlements—repeatedly destroyed and rebuilt, but never recreated in its previous image. As a consequence of colonization and current patterns of unchecked development, large portions of the urban fabric remain privately owned by powerful families. Recent densification and expansion have been driven by job growth, creating a city for work. "The price of one square meter anywhere near the commercial centers far exceeds the annual income of any jeepney driver or security guard.[…] The logical result is widespread squatting. Virtually all gaps left open by city development are immediately filled with makeshift settlements that beat every record in population density,"[7] hosting approximately 40 percent of the population *(fig. 0.07)*.[8] This has also resulted in a city with little open space for public use and green infrastructure for ground permeability. These contrasting formations and fragments have entangled the city in a disparity between the formal and informal. The result is a dense tapestry of systemic malfunction in need of incremental, comprehensive change.

5 "QuickStat on National Capital Region," last modified Jun 2018, psa.gov.ph/quickstat/national-capital-region.

6 Ibid.

7 Erhard Berner, *Defending a Place in the City: Localities and the Struggle for Urban Land in Metro Manila* (Quezon City: Ateneo de Manila University Press, 1998) 99.

8 Gavin Shatkin, "Planning to Forget: Informal Settlements as 'Forgotten Places' in Globalising Metro Manila," *Urban Studies* 41, no. 12 (Nov 1, 2004) 2469.

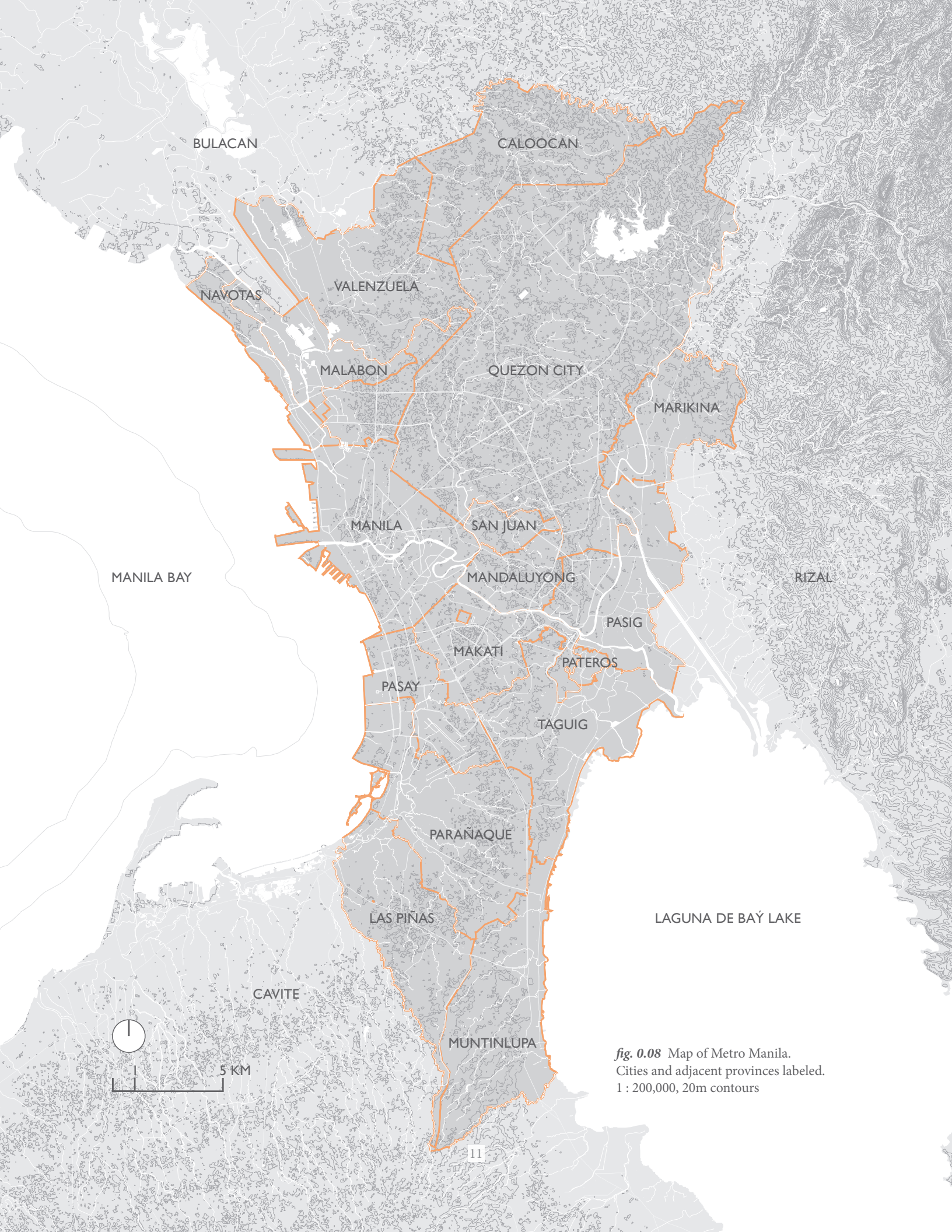



***fig. 0.08*** Map of Metro Manila.
Cities and adjacent provinces labeled.
1 : 200,000, 20m contours

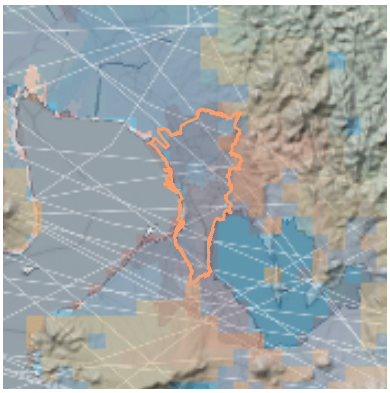


***fig. 0.09*** Interplay of natural hazards in Mega Manila.
White lines represent typhoon paths (1975-2007) and blue areas are flood occurences (2000-2013).

Metro Manila is affected by pluvial and fluvial flooding, which will be the focus of this thesis, along with coastal flooding. It is battered by several typhoons a year, one of the reasons it is considered the fourth most vulnerable city in the world *(fig. 0.09)*.[9] Despite this 'culture of disaster,' the city still ranks as having the second lowest adaptive capacity, overall leaving it as the world's fourth least resilient city.[10] While typhoons are a regular occurrence, the effects of some recent 'super storms' have been more extensive. In 2009, when Typhoon Ketsana made landfall in at 80 km/h, a month's worth of rain fell in half a day, resulting in nearly 750 deaths and over $1 billion in damage. A few years later in 2013, Super Typhoon Haiyan, one of the most powerful storms in recorded history, killed more than 6,000 across the country. The resulting coastal and more so the pluvial flooding called attention to the predicament of the city given that flooding is predicted to worsen in the coming decades. They also highlighted the metropolis' failing infrastructure and the plight of its residents, particularly those living in informal settlements along waterways. These events of recent years have brought forward the World Bank's pumping station-focused Flood Management Master Plan and the Pasig River Rehabilitation Commission's green space projects, which add to the possibilities of how Metro Manila can adapt to an uncertain future.

9 Richard Barkham and Kate Brown, Resilient Cities (London: [2014]). 12.
10 Ibid., 15.

***fig. 0.10*** Pluvial flooding in June 2018. (above)

***fig. 0.11*** Pluvial flooding in July 2018 along UN Avenue. Manila. (left)

## PASIG-MARIKINA WATERSHED

***fig. 0.12*** Dumagat tribal village in the Marikina River's upstream area. Puray, Rodriguez, Rizal.

***fig. 0.13*** Water spinach cultivated in the Marikina River's downstream urban area. Marikina.

The Pasig River flows from east to west for 25 kilometers between Laguna de Baý lake and Manila Bay. As a tidal estuarine ecosystem, it experiences great seasonal variation with fairly stagnant waters during dry season (January to April) contrasted by flooding and high flows during wet season (June to October).[11] It is part of the Pasig-Marikina Watershed, which feeds from Laguna de Baý lake and the Marikina River.

Southeast of Metro Manila are Laguna de Baý's shores, which are lined by aquaculture. As the endpoint of several tributaries' catchment areas, the shallow lake is like a bathtub with 21 faucets and only one drain—the Pasig River.

To the north is the Marikina River's headwater, which is nameless on maps. The river slips out of the Sierra Madre Mountains in Rodriguez, Rizal and is a blue meandering line until about thirty-five kilometers later in Barangay Calawis. The wild river is a dynamic force, pulling sediment and sustaining diverse ecologies. The northern area of the watershed, primarily occupied by the Upper Marikina Watershed Protection Area, is rural and dotted with small towns and tribal villages *(fig. 0.12)*. Continuing downstream, the scars of countless fluvial floods reveal themselves in the widening corridor's sculpted landscape. Further along, the river's shore has been damaged by loggers tearing into its banks. Due to deforestation, during rainy season, landslides occur throughout the watershed and water rushes downstream to Metro Manila. When the river reaches the metropolis, its natural flow is further disrupted by channelized and manmade waterways *(fig. 0.13)*. Urban life unfolds in the shadows of this infrastructure.

11 During wet season, high flows can reach 275 $m^3$/sec, flowing in its typical direction from the lake to the bay. However, during dry season, the flow reduces to an average of 12 $m^3$/sec, and during high tide the river flows backward into the lake. Even lower baseflows are possible during extended dry periods. Manila Water Company, Regional Environmental Assessment for Manila Third Sewerage Project (Manila: [2005]).

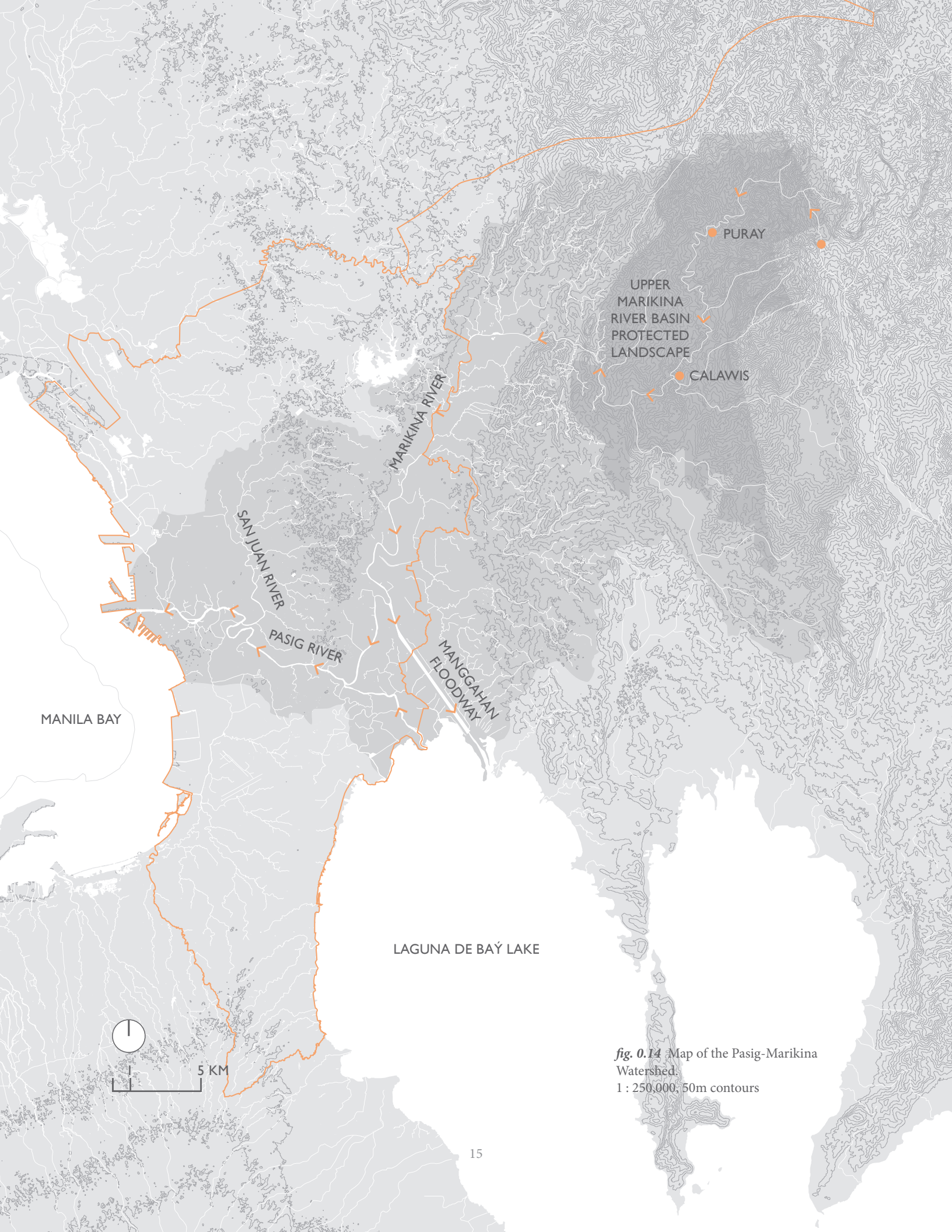



***fig. 0.14*** Map of the Pasig-Marikina Watershed.
1 : 250,000, 50m contours

## IMAGINARIES & CONTESTATION IN A CHANGING CLIMATE

Climate change poses challenges for urban design and planning, as cities around the world are under increased pressure from pluvial, fluvial, and coastal flooding. Tackling them involves reducing both the risk of and damage from hazards, however, doing so often involves knowledge of systems that play out at the global level, therefore occurring at spatial and temporal scales that are beyond the traditional scope of design. Chakrabarty remarks that "the current crisis can precipitate a sense of the present that disconnects the future from the past by putting such a future beyond the grasp of historical sensibility."[12] Despite high levels of uncertainty, we, in the present-day, must plan and pay to withstand anticipated threats. Decisions with long-term consequences must be made with incomplete information.

Triggering such transformational change requires the capacity to collectively envision and meaningfully debate possible resilient futures, making the concept of the imaginary important. In addition to being an exercise of the imagination, this visioning is a political act that informs and legitimizes decision-making. If architecture is to engage with the issue of flooding in our climate-changed world, the starting point is for designers to understand that adaptation is not only about built solutions, but also about restructuring assumptions and repositioning relationships. We must negotiate how different value systems are attached to visions and interventions, and recognize and how designers inherently bring their own imaginaries to projects, which can affect the ways they perpetuate social inequalities.

In Metro Manila's highly vulnerable environment, unequal power relationships play out spatially and temporally,[13] making socioenvironmental factors significant to design. These geographies of marginalization generate friction from the bottom-up. Exacerbated by climate change-related threats, urban challenges have unearthed new territories of contestation,

12 Chakrabarty, "The Climate of History: Four Theses," 197.
13 Mike Davis, Planet of Slums (New York: Verso, 2007) 98.

prompting tactical counterplans.

The role of design in climate change adaptation research has been neglected.[14] But design—whether it be urban, landscape, architectural, or infrastructural—is in itself a mode of contestation and can serve as a platform for realizing and questioning imaginaries. This is important because it not only plays a key role in producing the built environment as envisioned by those at the top, it can also advocate for alternate futures for those at the bottom.

14 Kian Goh, "A Political Ecology of Design" Massachusetts Institute of Technology, 2015), 37.

# 1
# THE SERPENT

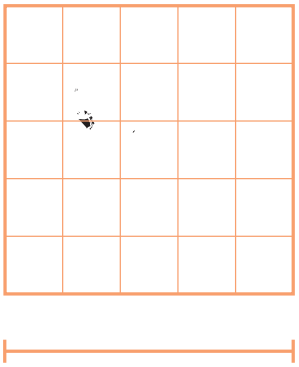
## MANILA'S HISTORY THROUGH IMAGINARIES OF WATER & RESILIENCE

*fig. 1.01* Children swimming in the Pasig River.

Manila took a long time to make. What is now its ground used to be sea. The sea reached as far as the present towns of Mandaluyong ("a place of waves") and Makati ("a place of tides").
[…]
No one knows how long it took to turn sea into land.
But we do know who built a site for Manila.
The builder was the Pasig River.[1]

Nick Joaquín

1 Nicomedes Joaquín, *Manila, My Manila: A History for the Young*, 1st ed. (Quezon City: Vera-Reyes Inc., 1990) 1.

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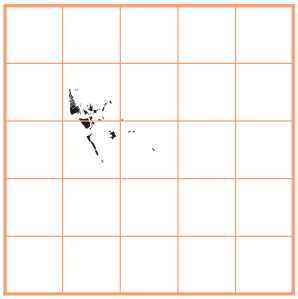

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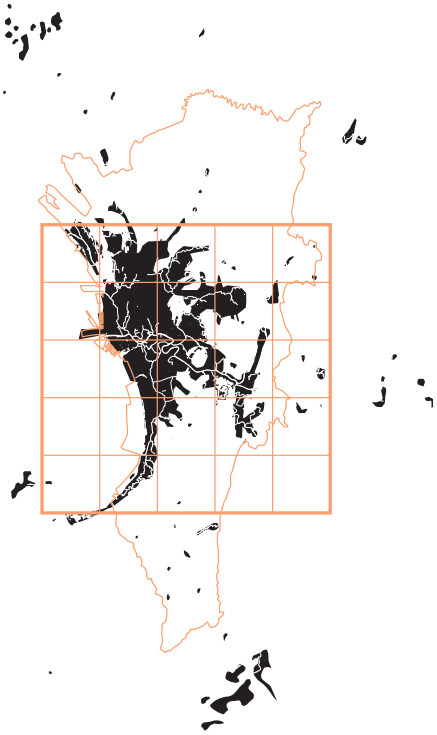

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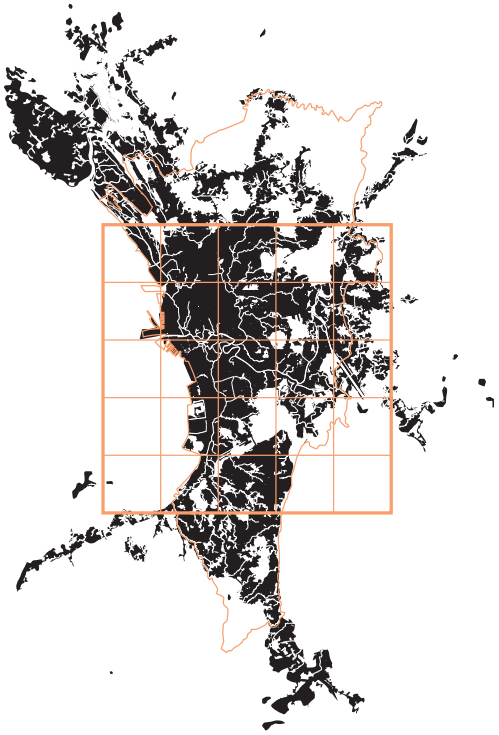

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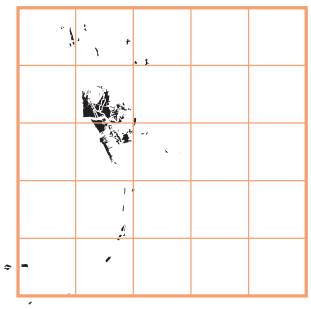

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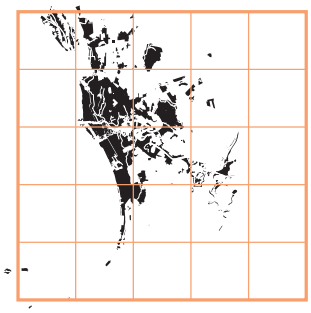

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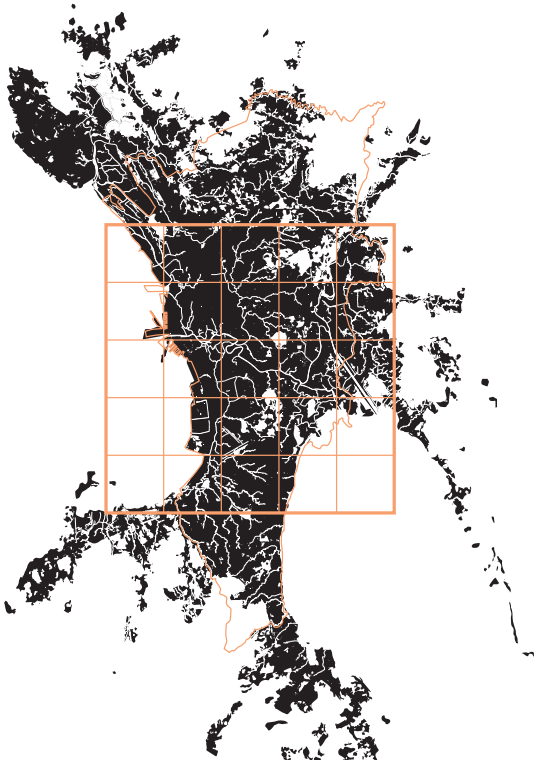

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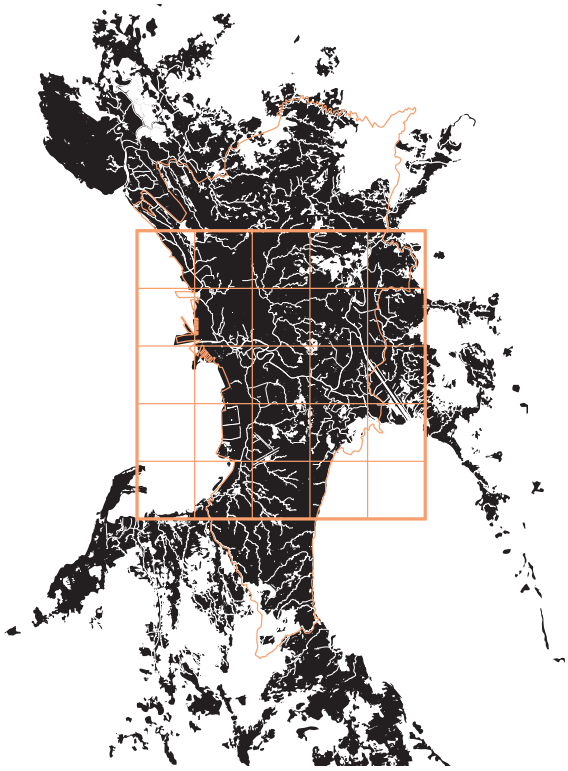


2020

***fig. 1.02*** Growth of urbanized Metro Manila.

Manila's history, in most accounts, concentrates on its political and religious transformation. However, little is said about the urban territory that was constructed through its occupiers' imaginaries of water and resilience. As will be explored, many of these imaginaries neglected the underlying landscape and a large portion of the population. To bring focus back to the terrain, this part reframes the city's history through water, using the Pasig River as an axis. Rather than a river than strings together two coasts, the Pasig can be seen as Metro Manila's estuary—a third coast—which carries the potential for a different reading of the city's past and future.

## RIVERS & RAJAHNATES

### GEOLOGY: LAND FROM WATER

***fig. 1.03*** Triangle of estimated original land area, bisected by the Pasig River.

The Pasig River and the land it cuts through have not always existed. There was a time when the mountain ranges stood in the sea *(fig. 1.04)*, and Manila Bay and Laguna de Baý lake were one interconnected arm of the South China Sea. A pre-historic eruption of Taal Volcano covered the area in tuff and boulders of volcanic rock, forming land and splitting the body of water.[2] With time, Laguna de Baý lake became a body of freshwater. As noted by Armando Manalo:

> The river Pasig nearly never happened but for a physiographic accident[…], and since then the two separated bodies of water have maintained a tenuous liaison through the slender thread of the Pasig.[3]

Through continued uplift,[4] Luzon's central plain became dry land and a triangle of ground emerged *(fig. 1.03)*. This triangle, which became the site of the city of Manila, spanned from present-

2 George I. Adams, "Geological Reconnaissance of Southwestern Luzon," *The Philippine Journal of Science* 5, no. 2 (March 1910) 103.
3 Armando Manalo, "The River Pasig," *Philippine Quarterly* 3 (June 1971).
4 Adams, "Geological Reconnaissance of Southwestern Luzon," 71.

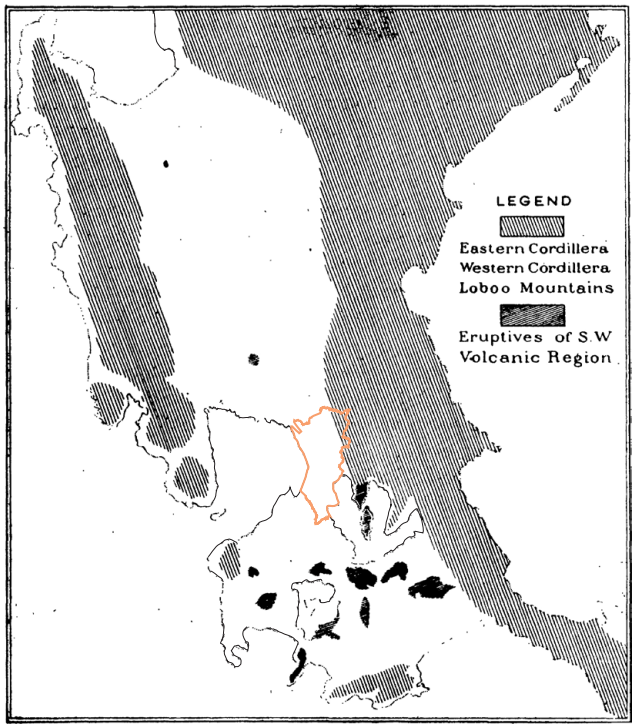
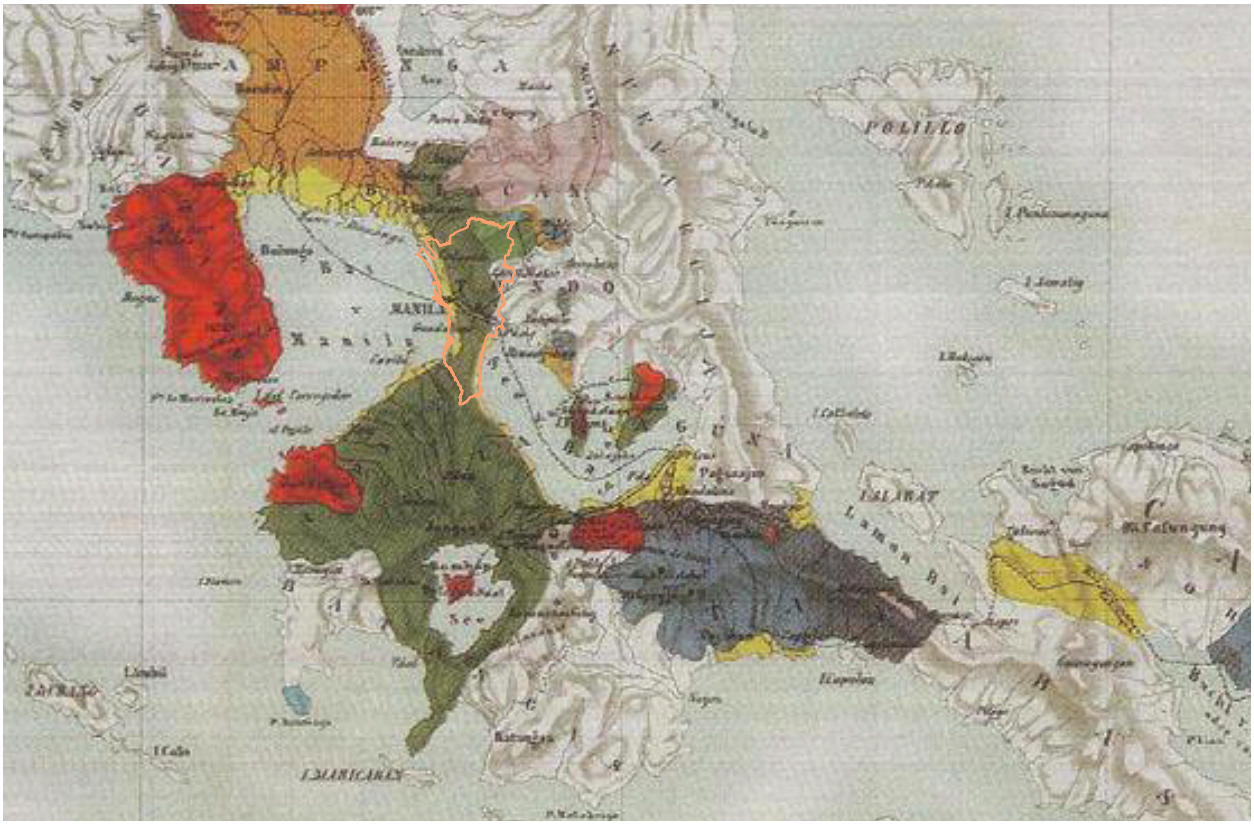



*fig. 1.04* Pre-historic land area. Outline of present-day Metro Manila overlaid.

*fig. 1.05* Surface geology. Green area is tuffaceous. Outline of present-day Metro Manila overlaid.



day Pasig City to Manila's north harbor to Pasay (refer to *fig. 0.08* for city locations).

The ridge that created the Pasig River was part of a fault block that gradually raised in elevation, cutting the river channel as land emerged.[5] The mouth of the river was originally near present-day Pasig City.[6] It carried mud and sand from the lake to the bay. Over hundreds of years these deposits layered to form land. This new land forced the Pasig River the forge a new course. Snaking through the landscape, the river divided the triangle in half, placing its mouth in the middle. The delta formed was not a singular piece of solid ground, rather a jigsaw of small islands between which ran the rivulets now called *esteros*.

These islands were barely above sea level, and would go underwater during high tide and monsoon season. Because the deltaic land hasn't risen much since then, the proximity of these waters continues to pose challenges to Manila. As historical writer Nick Joaquín said, "The site of Manila was reclaimed from the sea — and the sea is still trying to get it back!"[7]

Today, the region's tuff plain is topped with a veneer of alluvial deposit but is underlaid by strata of marine and estuarine sediments *(fig. 1.05)*. These marine beds have been encountered when drilling wells, and contain marine silts, waterworn pebbles, plant remains, shells, and fish teeth.[8] On one occasion, shark's teeth were found in a railway cut amongst waterworn pebbles.[9] These are indications that Metro Manila used to lay on the seabed.

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5 Ibid., 104.
6 Joaquín, *Manila, My Manila: A History for the Young* 1.
7 Ibid., 2.
8 Adams, "Geological Reconnaissance of Southwestern Luzon," 73.
9 Ibid., 97.

## TAGALOG: THRIVING WITH THE RIVER

The first to inhabit the delta's islands were clans of *barangay* people who came in large rowboats called *barangay* in the ninth century *(fig. 1.06)*.[10] While sailing along the western coast of Luzon, some *barangay* came across an opening in the shoreline. Rowing through this natural entryway, the clans found themselves enveloped by a round bay. Protected from the South China Sea, the water was calm and the breeze was mild. This was Manila Bay.

A prime natural harbor, the bay is 60 kilometers wide with an entrance about 19 kilometers wide that is divided into two passages by Corregidor Island. If the *barangay* entered from the northern passage, they would have rounded the tip of Bataan province's deep jungles. If they approached through the southern channel, the would have seen the "sleeping woman" hills along the hook of Cavite.[11] Beyond them, safely tucked in the eastern area of the bay, would have lain the little deltaic archipelago. This lush labyrinth of vacant islands became their home.

The settlers lived with the land and named each island. The two headlands, which jut out toward the bay, were called Tondo and Binondo, referring to their height, from *tundok* meaning 'high ground' and *binundók* meaning 'mountainous.' The neighboring swampy island was referred to as Sapa.[12] Another swampy but smaller island was used to bury chiefs and tribal heroes and was accordingly named Malacañang[13] from *ma lakán iyán*, meaning 'a place of many great ones.' The island with banks populated by *cuyapo* water cabbages became known as Quiapo. The island of Dilao was named after a common shrub used for extracting yellow dye.[14]

On the southern bank at the river's mouth was "a tongue of land" on which the *nilad* plant grew in abundance *(fig. 1.07)*.[15]

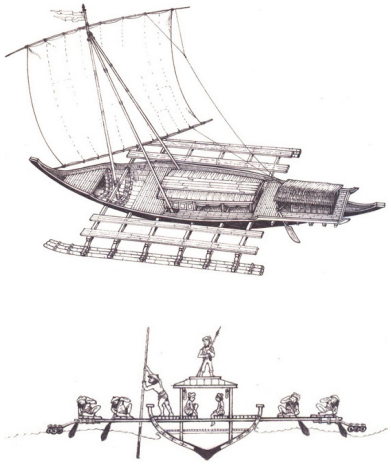

***fig. 1.06*** *Barangay* boat.

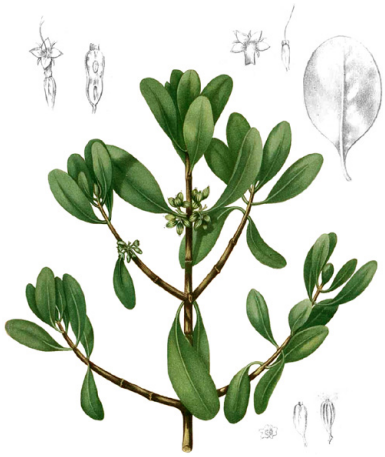

***fig. 1.07*** *Nilad* shrub, *scyphiphora hydrophyllacea*.

10 The word *barangay* is still used today to refer to the government's smallest administrative division. Filipino municipalities and cities are subdivided into *barangays*.
11 Joaquín, *Manila, My Manila: A History for the Young* 3.
12 present-day Santa Ana
13 present-day San Miguel
14 present-day Paco
15 Joaquín, *Manila, My Manila: A History for the Young* 4.

That island was referred to as Maynilad, meaning 'there is *nilad*.' In folklore, the arm-like figure of this mangrove plant welcomed and bid farewell to visitors from along the riverbanks and seashore. People picked its flowers to make garlands to offer at religious ceremonies. However, other etymological theories claim the name originates from Maynila referring to the *nila* indigo plant or from Maydila, meaning 'with a tongue,' referencing its location at the landmass' tongue.[16]

Later waves of *barangay* clans in the tenth explored further inland and sailed upstream to Laguna de Baý lake. Along its shores rose the town of Baý, where fishing was the main source of livelihood. Because many rivers emptied nutrient-rich water into the lake, it was teeming with fish, shrimp, and ducks. Trade bourgeoned between Baý and Tondo, with goods moving up and downriver.

One traditional origin story of the Pasig River states that before the creation of the river, merchants had difficulty transporting their goods by land from Baý to Manila. Hearing their pleas, a serpent appeared with the intent of striking a deal. The serpent told them that it would create a river for their use if at the end of their lives, they would surrender their souls to the serpent. The merchants agreed. The serpent began to slither—curving, twisting, and turning—forging impressions on the earth. Upon reaching Manila Bay, it dove into the water and disappeared. Water rushed through the landscape, filling the Pasig River, creating a smooth throughway for mercantile travel.

The original nomadic seafarers had become settlers but remained water-based people with the Pasig River, a pathway between the sea and freshwater, as their lifeline. Over time, the people of this region become known as the Tagalog, stemming from *tagá-ilog* meaning 'of the river' *(fig. 1.08)*. Tagalog people were further classified by the area of the Pasig River they lived along with the *tagá-laud* (downstream) near the delta, the *tagá-ilaya* (upstream) toward Baý, and the *tagá-loob* (interior) in

***fig. 1.08*** 'Tagalog' in Baybayin script.

16 Joseph Baumgartner, "Manila — Maynilad Or Maynila?" *Philippine Quarterly of Culture and Society* 3, no. 1 (March, 1975) 52.

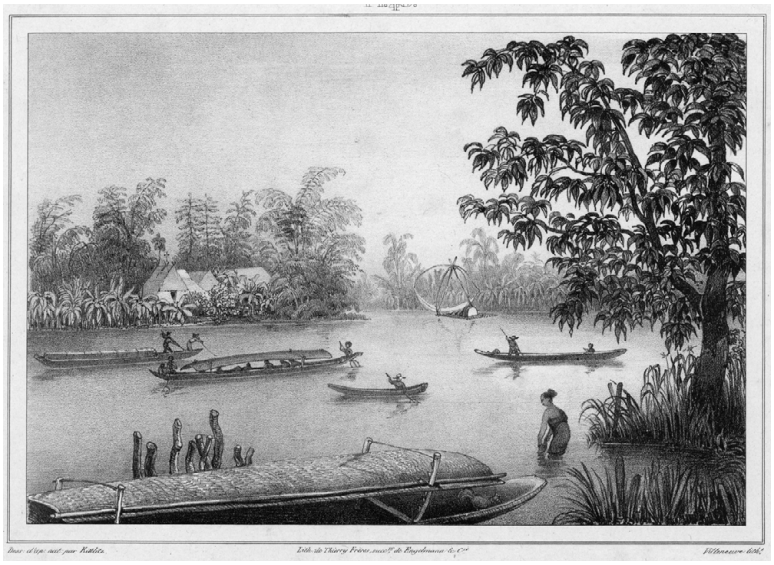

***fig. 1.09*** River-centric settlement.

between.[17] To those various groups along its banks, the waters of the Pasig were both giving and taking, sweet and salty, nourishing and parching, sacred and profane.

The Pasig River is sometimes called the cradle of Tagalog civilization because of its importance as an anchor for both social and economic structure. On Manila's delta islands, the *esteros* function as streets so homes were built along waterways *(fig. 1.09)*.[18] *Bahay kubo*, made from the swamp's bamboo and nipa, rose on posts above the water and damp ground *(fig. 1.10)*. The houses, which were primarily shelters for sleeping, were neatly aligned and considerably distanced.[19] Within, they occasionally sipped *quilang*, a wine fermented from the *nito* palm that thrived on the swampy riverbanks.

***fig. 1.10*** *Bahay kubo* along the swampy Pasig River, 1876.

The water was enjoyed as a place for bathing, swimming, and washing. It is said that newborns were immediately submerged in the Pasig River for spiritual cleansing. Children often sat neck-deep along the banks as adults "swam like fish."[20] In the river, people laundered their clothes, which were sheer during

17 *Pasig: Noon, Ngayon at Bukas* (Pasig City: Araw ng Pasig Foundation, 1994) 43.
18 Joaquín, *Manila, My Manila: A History for the Young* 7.
19 *Pasig: Noon, Ngayon at Bukas* 19.
20 Ibid.

dry season and heavier during rainy season. Additionally, basins of river water were positioned at the entrance of every home to wash their feet before entering.

The Pasig River was also a stage for judicial practice, particularly for 'trial by ordeal' methods. In ceremonies to uncover thieves, the suspects were thrown into the deepest part of the river and the first to resurface was deemed the thief.[21] Unfortunately, many drowned during their attempts to stay underwater to avoid being pronounced guilty.

Due to the water's brackish and the land's swampy nature, farming was limited and the Tagalogs primarily looked outward to trade. A 'sea lord' was positioned at the mouth of the Pasig to regulate the traffic flow and collect taxes. The river and *esteros* not only facilitated the civilization's intra-island transport, but also linked its provincial and international trade. The Pasig River's *esteros* connected it to Bulacan and Pampanga provinces along with Las Piñas and Parañaque. Marikina and Montalban were linked along the Marikina River. The connection to Laguna de Baý allowed river traffic to push onwards to various ports around the lake. This network of waterways contributed to developing the precolonial Tagalog region as a communication and trade hub.

To leverage this positive relationship with the littoral landscape, the Tagalogs had to consider its seasonal conditions *(fig. 1.11)*—the *habagat* (southwest monsoon) that brought the wet season and *amihan* (northeast monsoon) that brought the dry season. In addition to bringing the seasons, the monsoons also allowed the Tagalogs to sail to different places at different times of year. Therefore, understanding how intimately linked the monsoons were with the river's seasons, the Tagalogs were able to establish lifestyles and spiritual practices intimately linked to the water in its different forms.

This intertwined connection with the river's waters extended to a conscious symbiotic relationship with the beings within it, exemplified by their treatment of crocodiles. A colonial official noted, "They paid reverence to water-lizards called by

21 Ibid.


***fig. 1.11*** Metro Manila's climate.

them *buaya*, or crocodiles, for fear of being harmed by them. They were even in the habit of offering these animals a portion of what they carried in their boats, by throwing it into the water, or placing it upon the bank."[22] The Tagalog respected the land and water that nurtured them and reciprocated by giving back.

***fig. 1.12*** Kingdom of Namayan. Boundaries of contemporary *barangays* & LGUs part of the kingdom with capital sites highlighted.

Over time, the *barangay* colonies united into kingdoms. The first of these kingdoms, the Kingdom of Namayan, founded in the 12th century,[23] stretched from Manila to Laguna de Baý lake with the Pasig River as its spine *(fig. 1.12)*. In a way, it was the first Metro Manila. Its capital was located on high ground surrounded by an oxbow of the Pasig, in the present-day neighborhood of Santa Ana, with its highest points dedicated to a burial site and a natural healing well. Hills were revered as the domicile of powerful spirits and were also visible landmarks for ships at sea. This inland spiritscape reveals that the Tagalogs were not only in tune with the water's ebbs and flows, but also with the littoral inland archipelago. These elevated sites offer clues about the Tagalog's priorities for protection and flood adaptation.

Upon the Kingdom of Namayan's decline, the Kingdom of Tondo became the delta's entrepôt. In time, that kingdom also fell, giving rise to the Rajahnate of Maynila, the last Tagalog kingdom. Sitting at the mouth of the Pasig River, it had an ideal location.

> At the tip of the tongue of land that was Maynila, Rajah Soliman had built a fort facing the mouth of the river and the sea. A palisade of logs (the trunks of coconut trees) was meant more to deflect gunfire than to enclose, since it was easy to pass between the logs, planted in the ground about a foot from each other. The fortification proper consisted of narrow mud walls mounted with a dozen pieces of artillery, mostly small-caliber cannon.[24]
>
> Nick Joaquín

Though explorer Ferdinand Magellan began colonizing the Visayas in March 1521, it was not until June 1570 that a Spanish

22 Antonio de Morga, *Sucesos De Las Islas Filipinas* (Mexico City: Casa de Geronymo Balli, 1609).
23 Joaquín, *Manila, My Manila: A History for the Young* 9.
24 Ibid., 13.

fleet sailed into Manila Bay. Accompanied by Visayan warriors, they landed on the shores of Kawit then sent a letter to the rajah requesting "peace and friendship."[25] A royal envoy greeted the fleet, telling them that the rajah was willing to negotiate a peace agreement. As the envoy rowed back to the settlement, the foreigners followed, showing them where Maynila was. Within days, a peace treaty was sealed at the water's edge with a blood pact between the two parties' leaders.

One morning Rajah Soliman heard gunfire—war had begun. Spaniards were crossing the fort's moat on *bangka* boats commandeered from local fishermen.[26] As they poured into town, they set it ablaze. Hidden by thick smoke, the rajah managed to lead some of his people out of fallen Maynila. As the battle ended, the season's first rain smothered the flames.[27] The Tagalog hid in forests upstream until the Spaniards left and some eventually returned to the delta to rebuild Maynila. However, others permanently uprooted themselves from the delta to avoid Spanish subjugation, becoming known as Remontados.[28]

The following year, foreign sails were visible from Maynila again when three large Spanish ships led by navigator Miguel López de Legazpi anchored off Kawit.[29] As Tagalogs crowded the beach to look across the bay, panic spread. Rushing back to the town, they set fire to their own homes and fled across the river to Lakan Dula's Tondo. Abandoned by his people, the rajah swallowed his pride and made another attempt at peace with the Spanish. Legazpi promised that none of his people would land in Tondo, and they would settle and occupy the now-abandoned Maynila. Fortunately for the Spanish, Maynila was not only empty, but also more strategically positioned. The next day, May 18, 1571, Rajah Soliman and Lakan Dula acknowledged Spain's sovereignty over the delta islands. The Rajahnate of Maynila was now Legazpi's Manila.

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25 Ibid., 14.
26 Ibid., 15.
27 Ibid.
28 from the Spanish verb *remontar* meaning 'to flee to the hills' or 'to frighten away'
29 Ibid.

## COLONIAL ERA

The waves of colonization that rippled across the globe didn't miss the Philippines. The archipelago's colonial era spanned 425 years—from Magellan's 1521 landing in the central Philippines until the 1946 Philippine Independence Act. Though colonization is irrefutably a political and economic occurrence, it operates through a variety of cultural processes. For example, "social constructs of Self and Other,"[30] which distinguished the colonizer from the colonized, provided the fundamental building blocks for the hierarchical power and uneven relations that endure as undercurrents in today's Manila. These colonial spatial struggles were not simply about territorial occupation, they formed out of the cohabitation of empowered people and the meanings they attributed to places. Manila is thus constituted by the ways in which the global and the local disparately intertwined, and is saturated with colonial histories that were thrust together in unpredictable ways. These continuing struggles produce urban geographies in which binaries of self and other, here and there, and wet and dry perpetually resonate with each other.

### SPANISH (1521-1898): WATER IMAGINARIES IN SHAPING THE TERRITORIAL PROJECT

***fig. 1.13*** City of Manila, 1724.

The making of Manila represented the intersection of both material and imaginary spatialities, which were present in other areas of the colonial project, as the building of cities required the successful exploitation of local resources. The Spanish carved their way through the territory, conquering and ordering space *(fig. 1.13)*. Thus, Metro Manila exemplifies many postcolonial formations, which are "expressions and negotiations of imperialism [that] do not just occur *in* space. This is a politics of identity and power that articulates itself *through* space and is, fundamentally, about space."[31] It is easy to see these formations in

30 Jane Jacobs, *Edge of Empire: Postcolonialism and the City* (New York: Routledge, 1996) 2.

31 Ibid., 1.

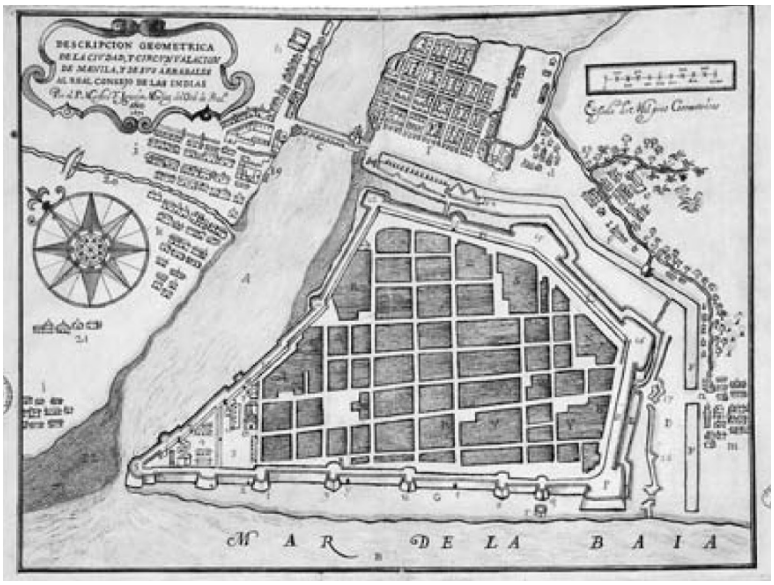


*fig. 1.14* Intramuros on Maynila, 1671.

200 M

the context of the empire's larger global territorialisation, but they are also evident in the politics associated with local-scale urban design and development:

> "Colonial cities are not simply produced by the smooth flow of imperial spatialities to colonised lands. Rather, […] colonial aspirations of territorialisation depended upon fine-grained spatial technologies of power such as town planning regulation and policing. Furthermore, it was this locally articulated spatial power that formed the focus for subversive and resistant activities by the colonised dwellers of such cities."[32]
>
> Jane Jacobs

Resonating from the quote, the role of spatial and thus water imaginaries in colonization is pervasive in the practices of planning. One of Legazpi's first proclamations was to subdivide the island of Maynila *(fig. 1.14)*. The Spaniards laid out a street grid and traced out where the city walls, cathedral, and government buildings were to rise. In delineating the city's walls, the Intramuros[33] was created, physically separating the self from the other. A new fort, at what is now the site of Fort Santiago, was planned at the mouth of the river above Rajah Soliman's former

32 Ibid., 21.

33 inside the walls, also known as the Walled City

***fig. 1.15*** Indigenous plantations, 1826. (above)

***fig. 1.16*** View of the Spanish settlement from the *extramuros*, 1826. (right)

rampart. The Spanish then allotted land inside and outside the city to members of the expedition who wished to settle there. The spatial legacy of these *haciendas*[34] is not a relic of the past, and it continues to linger in the postcolonial present and to shape the nature of urban futures. These master planning tools not only altered the built environment, but also the territory's relationship with indigenous people.

Exiled from their homes to the *extramuros* across the Pasig River, the Tagalogs attempted to resettle as the Spanish city rose. Moving to the vacant marshy seaside south of Maynila, they built Bagumbayan on what is now the site of the Luneta *(fig. 1.16)*. They laid out fields, orchards, and fishing wharves *(fig. 1.15)*.

Colonial control also extended into non-built spatial formations. While mapping is often undertaken innocently in cartographic practice, maps never simply replicate the environment they represent. They reproduce the 'known' space in the colonial project, reflecting the territorial imperatives of the political system *(fig. 1.17)*. Through mapping, the Spanish shaped the idea of the Philippines, which at the time were separate warring kingdoms, as a single entity *(fig. 1.18)*. This projected their desire to indiscriminately conquer territory and to control the entire archipelago's waters.

34 large plantation estates

To an extent, Manila's waterways made it an ideal territory to usurp. From the day of the city's 'founding' when Spanish ships fired their cannons on Manila Bay,[35] urban water has been a mechanism for asserting power:

> "Imperial expansions established specific spatial arrangements in which the imaginative geographies of desire hardened into material spatialities of political connection, economic dependency, architectural imposition and landscape transformation."[36]
>
> Jane Jacobs

Keen to impose dominance, the Spanish banned Tagalog international trade voyages in 1565. Through this monopoly, they had maritime enterprise over the majority of cargo traveling from Southeast Asia to Mexico and onward to Spain. For two centuries, the Spanish controlled the water, restricting the commerce of not only of the Tagalogs, but also of minority groups, to the Manila-Acapulco Galleon Trade. By extension, this also meant that tribal bayfront celebrations marking the departure and arrival of ships, which had been festive spiritual occasions, became geared toward colonial commerce. However, the Tagalogs were allowed

35 Joaquín, *Manila, My Manila: A History for the Young* 18.
36 Jacobs, *Edge of Empire: Postcolonialism and the City* 19.

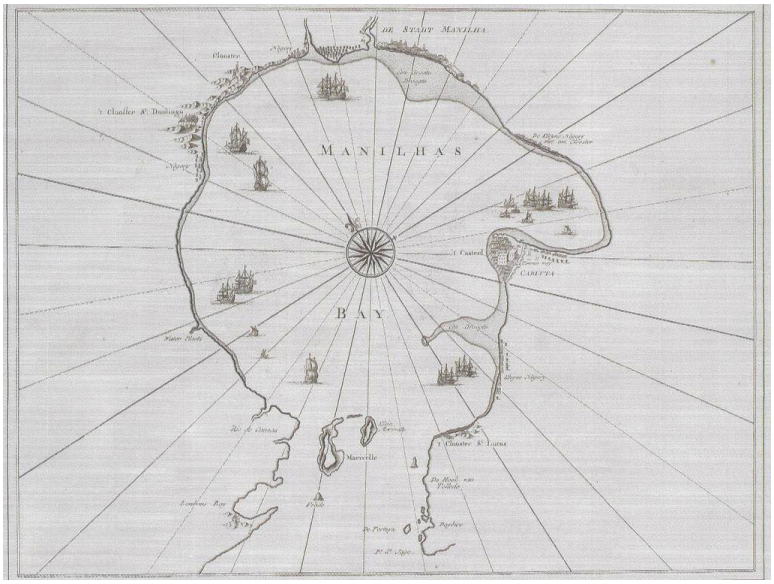


***fig. 1.17*** Manila Bay, 1724. (below left)

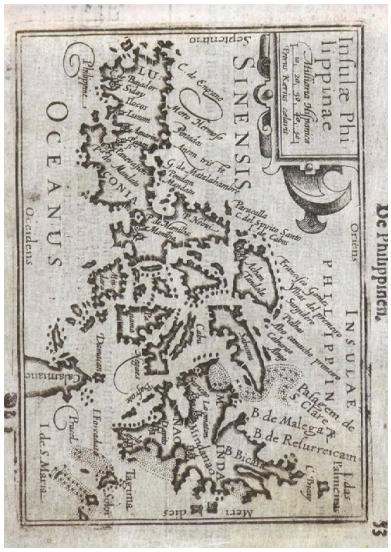


***fig. 1.18*** Early image of a united Philippine archipelago, 1598. (below)

to continue gliding along the Pasig River and *esteros* as this kept the colonial commercial engine running by ferrying workers and facilitating the movement of goods between the port and numerous merchant houses, storage facilities, and markets.

The water became a space of contestation and resistance against that power when the indigenous population attempted to retaliate against the Spanish in Manila Bay during the Battle of Bangkusay in June 1571. A fleet of cannon-equipped warboats sailed down the Pampanga River to join the Tagalog's flotilla. Off the port of Tondo, the indigenous forces attempted to ambush the Spanish by surrounding their light boats, which were fastened in pairs.[37] However, once surrounded, the Spanish fired outward, scattering the indigenous fleets with great loss. Despite producing friction, the indigenous people were unsuccessful in reducing the colonizer's imaginaries of water for the territory.

Even the Pasig River's banks were leveraged to display power. In November 1639, a group of Chinese tradesmen were hung for rising against the repressive colonial government that forced them into agricultural labor jobs. A massacre of about 23,000 Chinese immigrants followed and their parts were placed along the Pasig River,[38] turning the riverbanks into an exhibition for the consequence of rebellion. When this occurred "for more than six months, […] the rivers, they were so corrupted by the dead bodies; nor did the people eat fish in a circuit of many leagues since all these were fattened on human flesh."[39]


***fig. 1.19*** Manila, 1819.

Manila flourished during the early seventeenth century in a trade boom across the Pacific region and was constructed as a typical Spanish city *(fig. 1.19)*. In the city's expansion, the Pasig River was quarried for brittle limestone to erect structures and line the river itself. [40] The stone walls, comprised of two miles of rampart, bastion, and battlement, were bounded by water: either bay, river,

37 Joaquín, *Manila, My Manila: A History for the Young* 19.
38 *Pasig: Noon, Ngayon at Bukas* 37.
39 Translated from Spanish by author. Casimiro Díaz, *Conquistas De Las Islas Filipinas* (Valladolid: 1718) 427.
40 Joaquín, *Manila, My Manila: A History for the Young* 28.

or *estero*. However, because it was surrounded by water, Manila and its adjacent areas were usually transformed into a vast lake by monsoon rains. Geographic vulnerability was exacerbated by urbanization and commercial activity, which silted and polluted the waterways.

Despite recognizing the territory's unique characteristics, in essentializing otherness, colonial development initially transplanted people from traditional structures into preconceived foreign typologies. The Spanish's use of river stone, which was uncommon in local architectural typologies, lead to the city being reduced to ruins by earthquakes multiple times, notably in November 30, 1645. Conversely, the simple nipa *bahay kubo*, in all its localized manifestations *(fig. 1.20)*, exemplifies how vernacular architecture is telling of the human-environment relationship. This typology stands as a paradigm of man-made order constructed in response to the immediate world and natural hazards as the traditions that dictate its form and materiality have developed through an evolutionary process. Its nipa structure is lifted off the ground to allow floodwater to flow beneath it. It has proven resilient in historical terms despite its stigmatization by colonial and national governments, who have labelled it as a primitive fire hazard and attempted to dispel it. Despite scepticism of its integrity, its safety has been recognized on several occasions. On August 11, 1749, the hundreds of tremors that accompanied the eruption of Taal Volcano frightened thousands of Manileños into evacuating the Spanish city in favor of rural *bahay kubo*.[41] A later earthquake on February 5, 1889 caused minimal damage to the *extramuros* as most dwellings were built from lightweight material.[42] *Bahay kubo* have even proven resilient in the face of typhoons' high winds and rains, particularly in cases when occupants have sufficient time apply additional bracing and weigh down the roof. The *bahay kubo* is still used across the rural Philippines today.

***fig. 1.20*** *Bahay kubo* on land.

Later attempts at urban adaptation brought about a blend

41 Greg Bankoff, *Cultures of Disaster: Society and Natural Hazards in the Philippines* (London: Routledge, 2002) 164.

42 Ibid.

***fig. 1.21*** Restored *bahay na bato* of stone and nipa (reproduction) in the Casa Manila complex. Intramuros, Manila.

***fig. 1.22*** Restored *bahay na bato* of stone and wood. Intramuros, Manila.

between Spanish and indigenous building techniques, developing *bahay na bato* and the 'earthquake baroque' style *(figs 1.21 & 1.22)*. These efforts to minimize damage to public buildings involved using extensive buttressing, massive foundations, and shorter towers. Domestic architecture similarly gave way for native influence to increase structures' flexibility. Stone foundations were often substituted for bamboo posts, and stone upper storeys were replaced with lightweight materials. This style, which is often referred to as Spanish, is a hybrid typology. While these adaptations reduced vulnerability to tremors, they didn't address floodwater, which flowed into colonial buildings every summer.[43]

Looking to build churches in areas with reduced flood risk, the Spanish turned to sacred Tagalog sites, which as mentioned in the previous section, were at higher elevations, creating sites of contestation. While asserting this resilience priority, the Spanish also attempted to wean indigenous people away from paganism and into Catholicism by hybridizing old and new beliefs. For the Tagalogs, the Pasig River continued to hold spiritual power, but it started becoming more focused on land-based sacred sites, the churches that the Spaniards had built. In some ways, the *Mutya ng Pasig*, the river goddess who protected trade and travel along the Pasig, became more influential, with her power extending beyond the river system to the realm of the sea, an expansion of power that would not have been possible without the galleon trade. By blending typologies and appropriating indigenous sites, the Spanish made clear that their priorities stood in imposing their culture on the land. Their resilience imaginary elevated the 'self' and subverted the 'other.'

Colonization also imposed a shift in perception of environment and hazard. While nature and its hazards are embedded in indigenous knowledge and practice, the colonizers had less appreciation for their inherent cultural specificity. This established a new framework through which hazards were to be perceived, one which generally reflects western cultural values and imaginaries.

43 Antonio Codorniu y Nieto, "Las Islas Filipinas" (1850).

Early Spanish accounts describe the territory in almost blissful terms, frequently posing analogies between the land of abundance, lushness, and tranquillity and a paradise on earth. However, as time passed, more critical attitudes surfaced. The exoticness of the landscape became increasingly associated with more treacherous nature—unrelenting climate (flood and drought), turbulent weather (typhoons), and violent geology (earthquakes and volcanic eruptions). These intensified encounters fostered a systematically constructed paradigm "based on consistent argument and substantiated by empirical investigation that depict[ed] certain areas of the world as particularly deleterious."[44] Substantiated by statistical enumeration of mortality and a geography of hazard, this body of knowledge produced the discourse of "tropicality."[45] One of the most characteristic aspects of this discourse was the pervasive sense of otherness that the Spaniards associated with Manila's environment—from the differences in flora and fauna to the climate and topography. Beyond simply denoting distinctions in the physical space, 'tropicality' defined Manila's existing landscape and culture as alien. The wet terrain, which indigenous people had long adapted to, was now seen as a life-threatening force from which hazards emanated. In this sense, the Spanish era influenced long-term conceptualizations of Manila's geography.

With time, the villages surrounding the Intramuros developed into distinct districts with "the diversity of the peoples [… being] the greatest in the world; for these include men from all kingdoms and nations."[46] Along the bay, Tondo was home to fishermen and merchants. Binondo, the wealthiest district, with its numerous *esteros* crowded with small boats,[47] become home to native, European, and Chinese merchants *(fig. 1.23)*. San Nicolas became the center for silk, while Santa Cruz was home to jewelers and

44 Bankoff, *Cultures of Disaster: Society and Natural Hazards in the Philippines* 6.
45 Ibid., 7.
46 Translated from Spanish by author. Bartolomé de Letona, *Perfecta Religiosa*Juan de Borja, (1662).
47 Paul de la Gironière, *Vingt Années Aux Philippines*, (1853) 34.

***fig. 1.23*** Cavite Boulevard within the Luneta (now Roxas Boulevard) along Manila Bay, 1902.
(top left)

***fig. 1.24*** Looking north from the Escolta Street Bridge onto Estero de San Jacinto (now Estero de la Reina), 1915.
(top right)

***fig. 1.25*** Large home and its riverside bath house. San Miguel, Manila.
(above)

***fig. 1.26*** Bathing in the Pasig River, circa 1900.

silversmiths. Bagumbayan, the original village for exiled Tagalogs, was cleared for the Luneta, where the elite took leisurely bay-front strolls *(fig. 1.24)*.[48] San Miguel and Santa Ana became elite Spanish neighborhoods with estate homes with gardens leading down to the Pasig River. The "most elegant houses" that were built along the Pasig had landings and "little bamboo palaces" that served as bath houses *(fig. 1.25)*, which residents used multiple times a day to relieve themselves from the tropical heat.[49]

Though people bathed in and enjoyed the Pasig's waters *(fig. 1.26)*, they didn't drink from it: "In the bay it is rather salty but at the entrance of the pier and above it is fresh but is not drank by the inhabitants who generally have cisterns for rainwater. The poor inhabitants drank the water from the top of the river brought down in boats."[50]

Manila was a bustling port city *(figs. 1.27 & 1.28)*, but sailing along the Pasig River was still a leisure activity, with out-of-town trips *(fig. 1.29)*, whether for pilgrimages or hunting trips, being launched from its banks:

48 *Pasig: Noon, Ngayon at Bukas* 28.
49 de la Gironière, *Vingt Années Aux Philippines* 34.
50 Nathaniel Bowditch, "Early American-Philippine Trade: The Journal of Nathaniel Bowditch in Manila, 1796." Yale University Southeast Asian Studies, (1962). 27.

"In clear sunny weather a row in a *banca* upon the river Pasig, the aorta of Manila, which forms the communication between the city and the Lagune, together with all the various settlements along the shores of that internal sea, must be exceedingly pleasant. The banks of the river, indeed, are flat and unsightly, but the vegetation rejoices in a marvellous profusion [of the] most beautiful forms and colours.[…] Wherever the subjacent rock is visible along the banks it presents beds of an ashen-grey pumicestone, which constitutes the chief building material of Manila.

On the shores of the river, near the city, are situate[d] the various factories and iron-foundries, above which are the residences of the wealthy Mestizoes and foreign settlers, as also the country-seat of the Governor-general, whence, still ascending the stream, are Tagal villages of wretched cane huts, grouped round stately churches and parsonages, which peep picturesquely through lovely groves of bamboo."[51]

Karl Scherzer

51 Karl Scherzer, *Circumnavigation of the Globe by the Austrian Frigate Novara in the Years 1857, 1858, and 1859* (London: Saunders, Otley & Co., 1861) 327.


***fig. 1.27*** View of Manila Bridge. 1847. Formerly known as Puente de España. Current location of Jones Bridge. (below left)

***fig. 1.28*** Port at the mouth of the Pasig River, 1847. (below)

***fig. 1.29*** Fishing in the Pasig using a *salambaw*. 1847. (bottom)

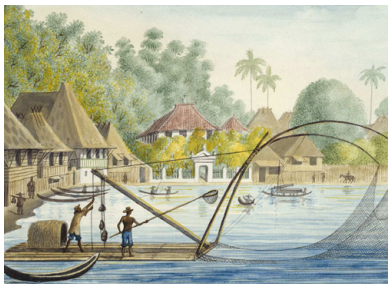

***fig. 1.30*** Cigar factory, 1899.

However, by 1850, the water quality was declining, losing its pristine quality.[52] In 1869, the first factory, a cigar facility *(fig. 1.30)*, was built along the Pasig River, which with time came to employ fifteen to twenty thousand workers.[53] Many companies followed, siting their facilities along the river for navigational convenience. This shift toward the river as an outlet for pollution showed that natural conservation wasn't a high priority in the industrializing city.

Even the national hero José Rizal was connected to the Pasig River, and wrote a one-act play called *Junto al Pasig* (*Along the Pasig*). It is interesting to note because it portrays a sort of bifurcation of the spirit of the Pasig River—one sacred, one profane. Set in the town of Pasig, the play features a young boy, who while waiting for a fluvial parade, is visited by Satan, who in the guise of a demon spirit, tempts the boy into paganism. Satan tells the young boy how much better off the Tagalogs were as pagans before being conquered by a foreign religion:

> "I am he who, with matchless power, gives laws to the hurricane, the sea, and the fire, he who flashes in the lightning and roars in the torrent.[…] At my call, strong with the power of creation, these islands rose from the waters, islands lighted by the dawn and which once were fair.[…] The fields overflowed with fragrant greenery; the golden grain sprouted without labor from the hallowed earth, then undefiled.[...] This rich land then enjoyed such a happy age that in its delights it rivalled heaven. But now, disconsolate and afflicted, it groans under the rule of alien people, and slowly dies at the impious hands of Spain."[54]

Aptly set along the banks of the Pasig, the discourse on indigenous spirituality against Catholicism is clear. While Rizal's play portrays them as oppositional, the beliefs were hybridized in practice. This does, however, show that even after 300 years of colonialism, the traces of the river goddess were still alive in Tagalog culture.

52 *Pasig: Noon, Ngayon at Bukas* 37.
53 de la Gironière, *Vingt Années Aux Philippines* 34.
54 José Rizal, "Junto Al Pasig" (1880).

The Pasig River was an instrumental throughway in the national independence movement in the late 19th century. Purposefully recruited from riverfront and bayside towns, fishermen and washerwomen could act as spies,[55] reporting the movements of Spanish troops.

The river's continued use by indigenous people for transportation made it easy for the *Katipuneros*[56] to traverse it inconspicuously, often sailing to secret meetings in *bangkas* undercover as *kakanin*[57] vendors. In one such instance, in May 1896, the *Katipuneros* leveraged a rainy day of pilgrimage to travel discreetly to a yard on the Pasig's left bank to plan their initial attacks against the Spanish. They perceived the heavy rains of the incoming monsoon as an auspicious sign, bolstering their hopes for the revolution:

> "The rain fell harder as we approached our destination; those who were ahead were only slightly wet, but those in the rear had to wring their dripping clothes.[…] Meanwhile, the rain fell in torrents and made the posting of guards unnecessary. As the Supremo [leader Andrés Bonifacio] prepared to call the meeting to order, many remarked that nature was on our side and that this kind of weather was what we needed to protect us."[58]

Upon the later discovery of the secret society, the Spanish authorities set up one cannon and two gun posts overlooking the Pasig and continuously patrolled it with boats. This surveillance hindered the *Katipunero* insurrectionists' ability to enter and retreat from Manila along the river, which continued until the end of the Spanish occupation.

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55 *Pasig: Noon, Ngayon at Bukas* 39.

56 Members of the *Katipunan*, short for the *Kataas-taasang, Kagalang-galangang Katipunan ng mga Anak ng Bayan* (KKK), translated to the 'Supreme and Venerable Association of the Children of the Nation,' an anti-colonialism movement with the goal of gaining independence from Spain through a revolution.

57 sweets made from glutinous rice and coconut milk

58 Santiago V. Álvarez, *The Katipunan and the Revolution: Memoirs of a General*, trans. Paula Carolina S. Malay (Manila: Ateneo de Manila University Press, 1992) 10.

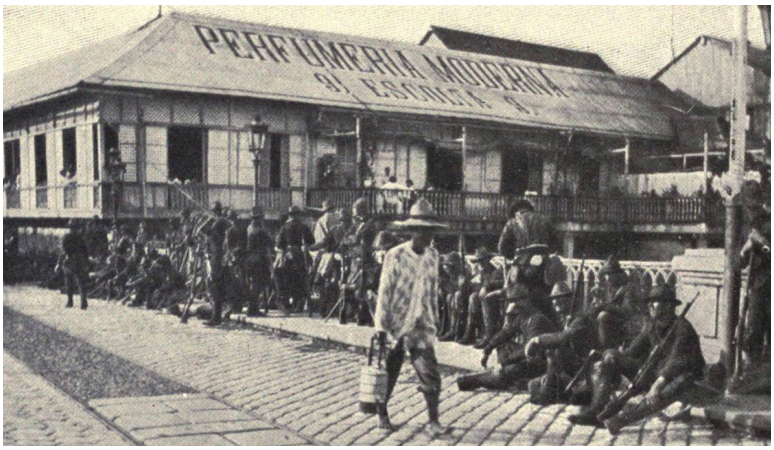



***fig. 1.31*** American troops guarding the Jones Bridge over the River Pasig on the afternoon of the surrender, 1898.

## AMERICAN (1899-1941 & 1945-1946) & JAPANESE (1942-1945): IMAGINARIES MATERIALIZING THE LAND-WATER DIVIDE

In late 1898, while the Filipino *Katipuneros* were focused on ratifying the Constitution of the Philippines,[59] Spanish and American government representatives were in Paris negotiating an end to the Spanish-American War. Their peace treaty[60] entailed Spain ceding most of its colonies, including the Philippines, to the United States in exchange for US$20 million. The U.S. government accepted the colony as it believed that Filipinos "were unfit for self-government" and needed the Americans "to take them all, and to educate the Filipinos, and uplift and civilize and Christianize them"[61] even though the Philippines had recently declared itself a sovereign nation and was already primarily Catholic. The unwelcome annexation triggered the three-year Philippine-American War, fronted along the Pasig and San Juan Rivers *(fig. 1.31)*, which ended when the republic's president was captured and pledged allegiance to the United States.

The American era brought its own attempts at territorial transformation as the Insular Government saw its role as preparing the Philippines for eventual independence. To create

59 approved unanimously by the Malolos Congress on November 29, 1898 to establish the First Philippine Republic

60 the Treaty of Paris was signed on December 10, 1898

61 James Rusling, "Interview with President William McKinley," *The Christian Advocate,* Jan 22, 1903.

distinctions from Spanish era infrastructure, the Americans launched a drive for public works projects that were to be built by forced labor. Their efforts to efficiently separate and convey water reflected the colonial ideal of the sanitary city, which looked to engineering interventions to address urban issues.

Its earliest project was modifying Manila Bay's littoral zone to create more ideal port conditions. Two breakwaters were constructed, the enclosed area was dredged, then excavated earth was used to reclaim land off Intramuros' foreshore. These deeper wharves allowed large ships to enter the harbor, where previously, steamers' cargo had to be transferred to shallower barges. Later projects included dredging the Pasig River. These projects reflected the priority of water as a means of commercial conveyance.

The Americans, like the Spanish before them, identified the lack of natural drainage as a cause of flooding and saw controlling it within the purview of their imaginary. City Engineer Owen L. Ingalls criticized the inefficient Spanish era drainage infrastructure, describing it as unsanitary and noting that it was limited to the older parts of the city.[62] Acting on his recommendations, the Manila Municipal Board built a new system that was inaugurated in 1909 that dealt with runoff and household waste separately. Deprecating the Spanish system then constructing another framed the American style of colonialism as progressive, giving way to a positive feedback loop. Even with infrastructural modifications, flooding didn't cease in the delta city. By the 1920s pluvial flooding had become so pervasive that it "wasn't unusual to go to school in a bathing suit with your clothes and your books on your head and wade waist deep."[63] Despite its intentions, American infrastructure was far from flawless.

As part of the larger initiative to realize the full potential of the United States' newest possession, American urban designer

62 Owen L. Ingalls, *Municipal Board of Manila: Report of the Municipal Board of the City of Manila for the Fiscal Year Ended June 30, 1904* (Manila: Bureau of Public Printing, [1905]).

63 Morton J. Netzorg, *Jock Netzorg: Manila Memories*, ed. Michael P. Onorato (Laguna Beach: Pacific Rim Books, 1988) 43.

***fig. 1.32*** Burnham's plan for Manila, 1905.
— *Esteros* to remain open but be channelized
- - *Esteros* to be covered

1 KM

Daniel Burnham was invited to Manila for six weeks of general site investigation to contribute his planning efforts. His resulting report and masterplan for redefining Manila were reflective of the City Beautiful movement, a turn-of-the-century reformist movement that sought to transform inner cities through monumental neoclassical buildings and landscapes *(fig. 1.32)*. His objective was ambitious—to design Manila as "the adequate expression of the destiny of the Filipino people as well an enduring witness to the efficient services of America,"[64] essentially attempting to produce a city consistent with the Insular Government's imaginaries of democratic strength and commercial efficiency. His masterplan sought to flip the Spanish planning model inside-out by repositioning public institutions' relationships to the urban fabric.

64 Daniel Burnham, "Report on Proposed Improvements at Manila" (Gibson Brothers Printers and Bookbinders, 1906). 195.

Rather than clustering government buildings in the Intramuros, his masterplan entailed positioning classical buildings in visible locations, encouraging awe of the colonial administration and, in time, the post-independence government that would replace it.

Burnham reflected on how to maximize the utility of *esteros*, which were still regularly used *(fig. 1.33)*:

> "The narrow canals or *esteros* ramifying throughout Manila, with their almost stagnant water and their unsanitary mud banks, would appear at first sight to be undesirable adjuncts of the city. Yet for transportation purposes they are of the utmost value, and in spite of the serious problems involved in properly widening, bridging, and maintaining them they should be preserved. In the coast cities of the Orient *esteros* are numerous and it is a long fixed habit of the people to transport goods upon them, their availability for the poorest boatman making them peculiarly valuable. To develop the full usefulness of the system, certain of the *esteros* should be filled up and the others widened and dredged to a practical depth; all of them should be provided with masonry banks. So treated they will offer an economical and unobjectionable means of freight handling that will greatly contribute to the prosperity of the city."[65]

***fig. 1.33*** Crossing the Estero de Binondo by ferry prior to the construction of a bridge, 1899.

He not only hoped to establish the *esteros* as a commercial transportation system, he also tried to leverage water for social life and ecological purposes. He suggested that as the city expanded that the riverbanks be left clear for public use, much like a monumental boulevard. For Burnham, planning for water was as vital as other aspects of inland development as he recognized geography's importance. Despite his proposed *estero* development system's prospect of alleviating flooding, it called for some *esteros* to be paved over and all to be channelized with masonry banks, changes that would accelerate flow and reduce infiltration of water. His proposed scope of work was quite large, but it was potentially manageable because the growing urban population was still contained to a small area.

Much like some of Burnham's other masterplans, he primarily focused on aesthetic and transportation concerns,

65 Ibid.

overlooking the needs of the working class. In the case of Manila, this exposed a contradiction inherent in the American colonial project. Undermining their own tenuous efforts at political reform, they favored opportunistic alliances with *hacienda* owners, resulting in an uneven electoral democracy dominated by the elite. Given this social inequality and faulty democracy, Burnham's design appears hollow.

Ultimately, most of the Burnham plan was not executed, but a noteworthy component of masterplan that was realized was the covering of multiple *esteros*. For example, the Esteros de la Reina and de San Miguel on the Pasig's north bank were lost, replaced by gutters, culverts, and drainage mains, which were underground and easily clogged *(fig. 1.34)*. Additionally, the Estero de Balete, a swampy system of ox-bow tributaries, was drastically

***fig. 1.34*** Changes in Estero de la Reina (left, constricted) and Estero de San Miguel (right, truncated) between 1898, 1919, and today.
(below)

***fig. 1.35*** Changes in the Estero de Balete between 1898, 1919, and today.
(bottom)

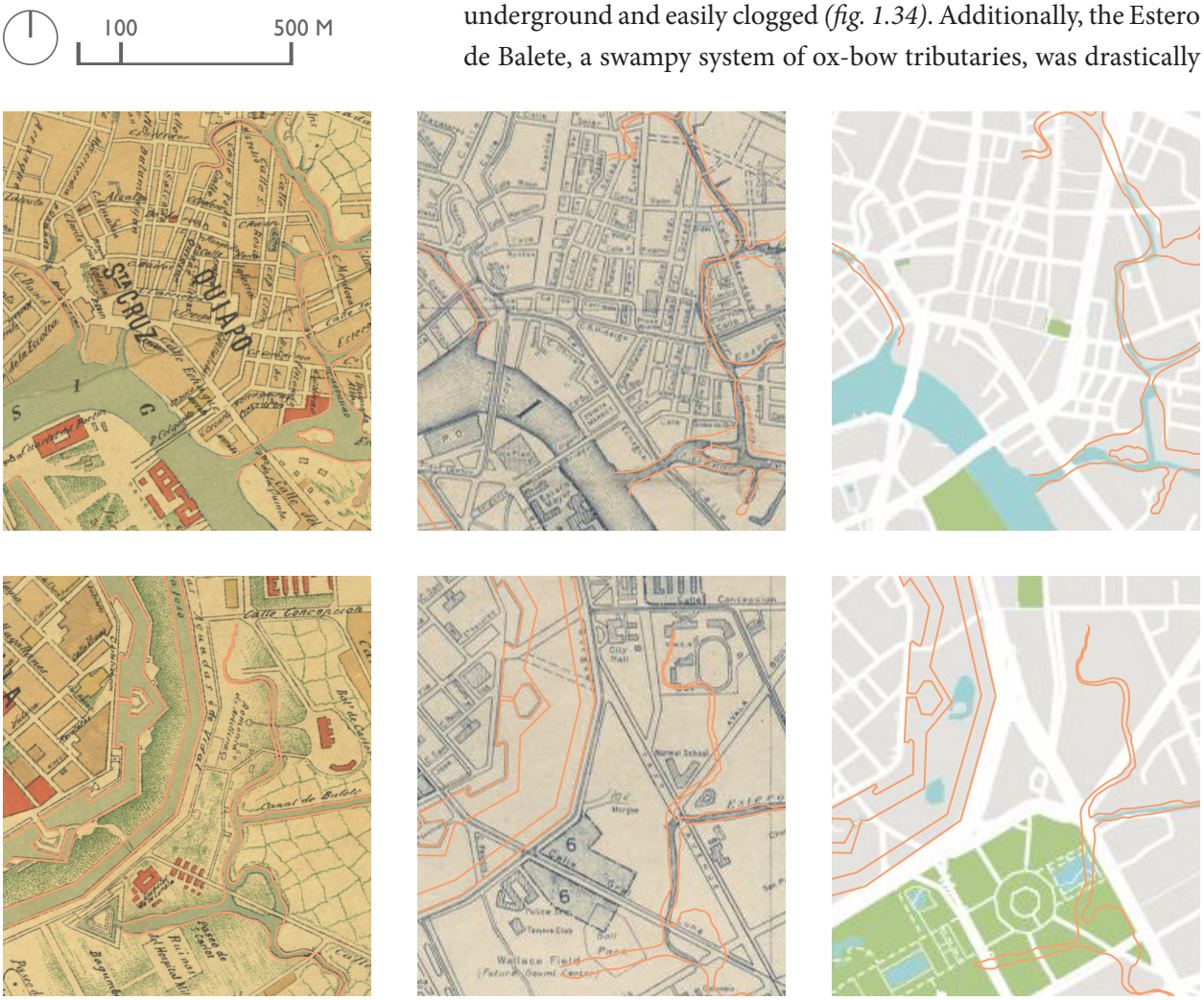


***fig. 1.36*** Aerial of Manila, 1935.

truncated, with parts concealed under roadways and others under the Luneta *(fig. 1.35)*. Despite the difficulty of using the new roads during heavy rains, the Insular Government pushed for American car-based culture, which relegated the *esteros* to falling out of maintenance.[66] Contrary to the masterplan's intention of increasing *esteros*' commercial and social value, the partially constructed reality amplified pluvial flooding and perpetuated cultural disconnection from the waterways, signalling a turning point in the priority and perception of Manila's waters.

When World War II broke out in Europe, Manila, which had gone mostly unaffected by World War I, programmed a series of 'practice blackouts.' However, even after the sirens wailed signalling for all the lights to turn off, the Pasig River still sparkled in the moonlight—the serpent was visible from above *(fig. 1.36)*.

A few hours after the attack on Pearl Harbor on December 7, 1941, Manila's skies too hummed with planes followed by explosions. With Imperial Japan launching air raids on several civilian cities and American military installations, the war had arrived in the Philippines. By the middle of the following year, Manila was declared an open city[67] and the Commonwealth

66 Alejo Aquino, *Esteros in Manila*, 166.

67 a city that is to be declared demilitarized during a war, entitling it to immunity from attack under international law; generally in the event of imminent capture to avoid destruction

***fig. 1.37*** Floating down the street in a dishpan, early 20th century.
(above)

***fig. 1.38*** Flooded street, early 20th century.
(right)

government's[68] leaders exiled themselves, making way for Japanese occupation.

With the disruptions in land-based transportation and the shortage of gasoline during the war, people returned to *esteros* as channels of passenger and freight traffic. However, due to years of neglect, they had deteriorated in condition, with their banks becoming lined with sediment and informal settlements. Even with the sudden spike in use, the Japanese occupiers did not improve or dredge them.[69] Some considered the *esteros* as its neighboring residents' social responsibility, depending on them to perform inspections and cleanings.[70] Meanwhile, others hoped that "now that the Japanese are here, perhaps they could teach us how to utilize our *esteros* to advantage […] Following the example of Japan, we could make our *esteros* the nucleus of a wonderful park system."[71] Despite these hopes, there was minimal maintenance to the American-modified *esteros* during the occupation, leaving them susceptible.

This vulnerability was exposed in November 1943 when a typhoon passed through Luzon, submerging Manila in

68 a transitional administration that governed from 1935-1942 and 1945-1946 in preparation for the country's full achievement of independence
69 Alejo Aquino, *Esteros in Manila*, 166.
70 Ibid., 167.
71 I. V. Mallari, *Our Esteros* (Manila: Office of the Mayor).

"flood heights higher than any previously recorded"[72] (creating conditions similar to *figs. 1.37 & 1.38*). Realizing the limited drainage capacity of the restricted *esteros*, the government[73] created the Flood Control Board. The crippling flood became a defining event in the Japanese occupation.

However, the devastation of 1943 flood paled in comparison to the monthlong 1945 Battle of Manila that ended Japanese rule. During the urban battle, soldiers fought block by block and building by building, leveling Manila *(fig. 1.39)*. About 100,000 lives were lost and "seventy percent of the utilities, 75 percent of the factories, 80 percent of the southern residential district, and 100 percent of the business district was razed"[74] *(fig. 1.40)*. Afterward, dead bodies were ordered to be gathered in houses to be burned or thrown into the Pasig River, positioning urban water as a place for disposal. Though American reconnaissance activities recaptured Manila, they relinquished sovereignty over the Philippines the following year in 1946.

72 Bureau of Public Works, *Plan for the Drainage of Manila and Suburbs* (Manila: [1952]). 1.

73 the Second Philippine Republic, also known as the Japanese-Sponsored Philippine Republic, was a puppet state during the Japanese occupation

74 William Manchester, *American Caesar* (New York City: Little, Brown and Company, 1978).

***fig. 1.39*** Troops approaching Intramuros, 1945. (left)

***fig. 1.40*** Children bathing in the ruins of the Battle of Manila, 1945. (below)

## POSTCOLONIAL (1946-PRESENT)

Colonial forces have withdrawn and the Filipinos once part of its reach are in a state precariously registered as postcolonial. The nature of postcolonialism asks us to challenge the traditional local-global binary and to speak of a "micro-politics of place in which the two 'cohabit.'"[75] As will be explored, postcolonialism does not always sit neatly against colonial formations, as it is not a force that calls for a return to the indigenous nor does it resist further foreign influence from globalization. The embeddedness of colonial ideologies and practices in the postcolonial is not simply an issue of culture but also, fundamentally, of place. With colonial power structures living on in a more disorganised fashion, the social and spatial demarcation of uneven politics continues to be unclear. Launching forward from the contextual points established in the previous sections, this section looks at modern and contemporary developments of the Pasig River.

### THIRD REPUBLIC (1946-1965): IMAGINARIES OF RESILIENCE FOR A NEW NATION

In addition to the physical and economic destruction caused by World War II, Manileños suffered from a drainage system that had been unimproved and loosely maintained since 1909. The government envisioned an infrastructure-driven project to control the flow of the Pasig River, which it saw as the culprit for flooding. However, since many prewar documents were destroyed in the 1945 Battle of Manila, critical data had to be recollected before moving ahead with new plans. Amid postwar budgetary constraints, ₱30,000[76] was earmarked to conduct a topographical survey from 1946 to 1948.[77] Through the study, planners realized that pluvial runoff posed a more serious and frequent threat than the Pasig's flows.[78]

75 Jacobs, *Edge of Empire: Postcolonialism and the City* 34.
76 accounting for inflation, would be equivalent to CAD 258,000
77 Department of Public Works and Communications, *Final Project Report: Manila and Suburbs Flood Control and Drainage Report*, (1972). 3.
78 Ibid., 8.

Before recommendations could be made, let alone implemented, 1948 Typhoon Gertrude submerged Manila and its suburbs for days. The storm's aftermath exposed the newly-formed government's weakness in dealing with natural hazards, forcing the different levels of government to consider their respective responsibilities moving forward.

Beyond the Americans' interventions on the *esteros*, the channeling of massive material flows of water is relatively recent. Contradictory to earlier studies that didn't attribute flooding to the Pasig River, the 1952 Plan for the Drainage of Manila and Suburbs manifested imaginaries of resilience that proposed large-scale interventions along the Pasig to convey stormwater away from the urban core. Based on nearly a decade of studies that were provoked by widespread flooding in the 1940s, the masterplan responded to flooding by considering both the growing urban environment and upstream water flows. Though the masterplan inherited the colonial concern for resolving sanitary flows through technocratic infrastructure, it learned from unsuccessful piecemeal interventions of the past and looked beyond the scale of the city. It acknowledged that controlling the Pasig River also meant controlling the upstream Marikina River. Accordingly, it rescaled the scope of flood control up from the *barangay* to the urban region and from the *estero* to the watershed.

Understanding the need to rescale governance, the holistic proposal also suggested "a special governmental agency to coordinate the financing and construction efforts of the City of Manila and the surrounding municipalities affected" but did not detail how to set it up.[79] Given the absence of that unifying organization at the time, the plan called for the federal Bureau of Public Works to be responsible for flood control. However, in practice, the agency didn't always have the necessary local knowledge while municipal governments weren't left with sufficient resources to build their own local resilience capacities. This gap reinforced the need for a unifying agency.

79 Bureau of Public Works, *Plan for the Drainage of Manila and Suburbs*, 255.

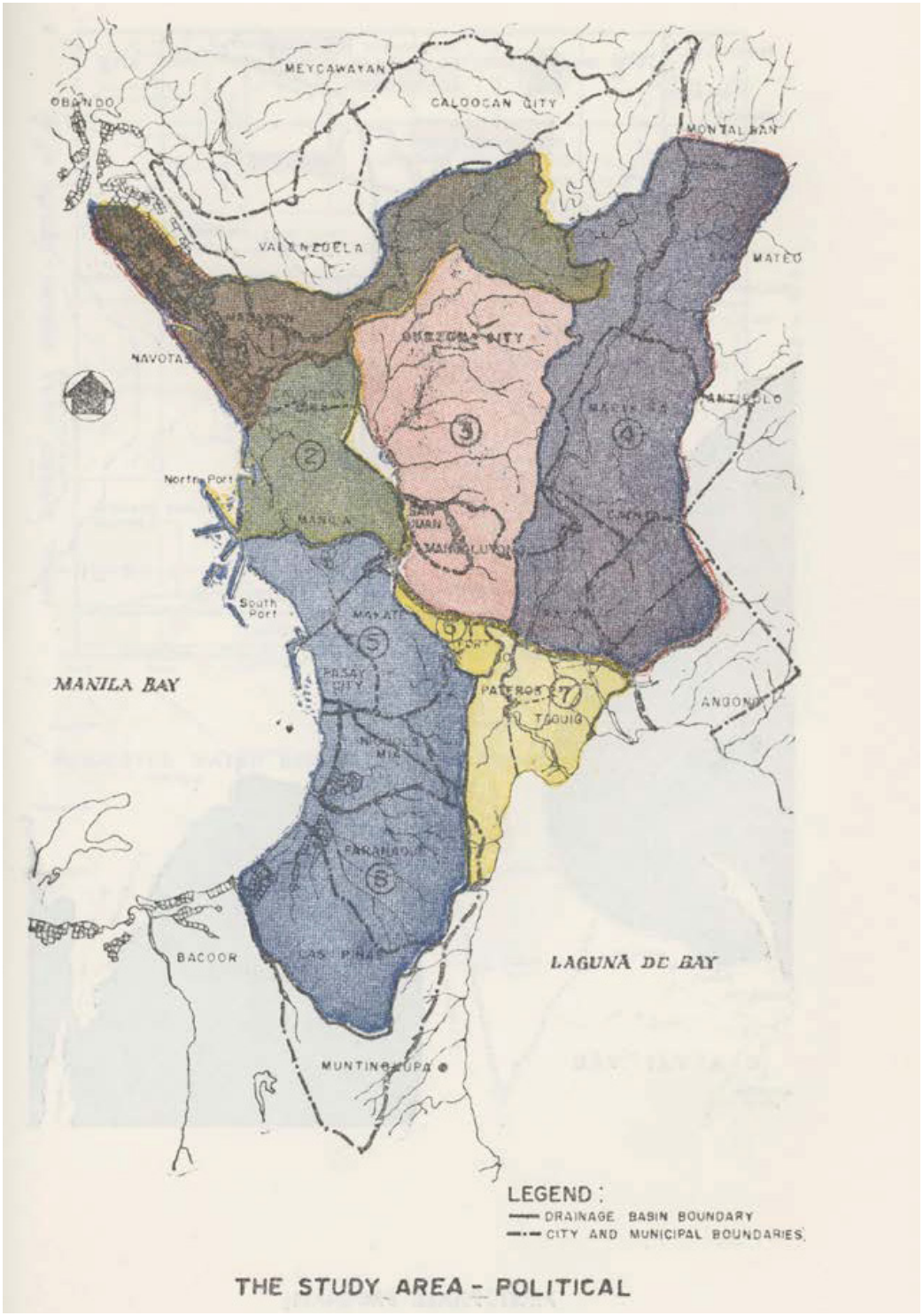



***fig. 1.41*** Metro Manila as the scale of a drainage study, 1973.

Under this administrative structure, attempts to build across jurisdictions revealed tensions between levels of governments, and consequently, the interventions built as a direct result of this plan were only able to address urban water at a local level. The plan created 8.6 kilometers of river wall and a few localized projects in older areas of Manila proper, such as the construction of *estero* floodgates in Quiapo, Sampaloc, Valencia, Paco, and Pandacan, which were supposed to have been accompanied by pumping stations.[80] Without the governance needed to propel the imaginary, much of the masterplan went mostly unrealized until the 1970s.

## DICTATORSHIP (1947-1986): IMAGINARIES FUELLED BY AUTHORITARIANISM

After two decades of finding its footings in independence, the Philippines fell under the dictatorship of President Ferdinand Marcos, twenty years marked by cronyism, economic mismanagement, and eventually martial law. During his time, imaginaries of water and resilience became contentious in the linked issues of metropolitanization and informal settlements. He exercised abused political power to formalize Metro Manila as an urban entity with First Lady Imelda Marcos as its governor, making her the face of stage managing flood control plans and selective relief efforts *(figs. 1.41 & 1.42)*. By infiltrating then blurring the different levels of government, the regime was able to propagate ideas and institute change virtually unhindered.

***fig. 1.42*** Imelda Marcos inspecting maps of Manila for evaluation, 1976.

During the Marcos years, typhoons and their accompanying floods were labeled as 'natural disasters,'[81] rhetoric that persists today. While there were calamities sparked by the onset of natural hazards, the disasters were unnatural—fueled by unsettling politics. Marcos' development patterns initially pushed for the construction of paved surfaces and riverside structures, which, coupled, reduced both the land's permeability and the waterways' drainage capacities, increasing the intensity of pluvial

80 Japan International Cooperation Agency, *Drainage Facility Plan*.

81 James F. Warren, "A Tale of Two Decades," *The Asia-Pacific Journal* 11, no. 43 (Oct 21, 2013) 1.

flooding. Due to this government negligence, hydrometeorological hazards in the 1970s and 1980s were shadowed by high death counts and extensive physical damage. Meanwhile, Marcos approved the ₱300-million[82] Calamity Fund Act,[83] a relief fund that manipulated the prospect of flood resilience for his political gain. By directing funding and aid to allied politicians and supporting provinces,[84] Marcos was ultimately the main beneficiary. Partisan disaster relief meant that flooding gave his administration opportunities to boast its political majority while contributing to his personal wealth. This vision sacrificed anti-Marcos areas for short-term political gain.

***fig. 1.43*** Imelda Marcos visiting a settlement along an *estero*, 1975.

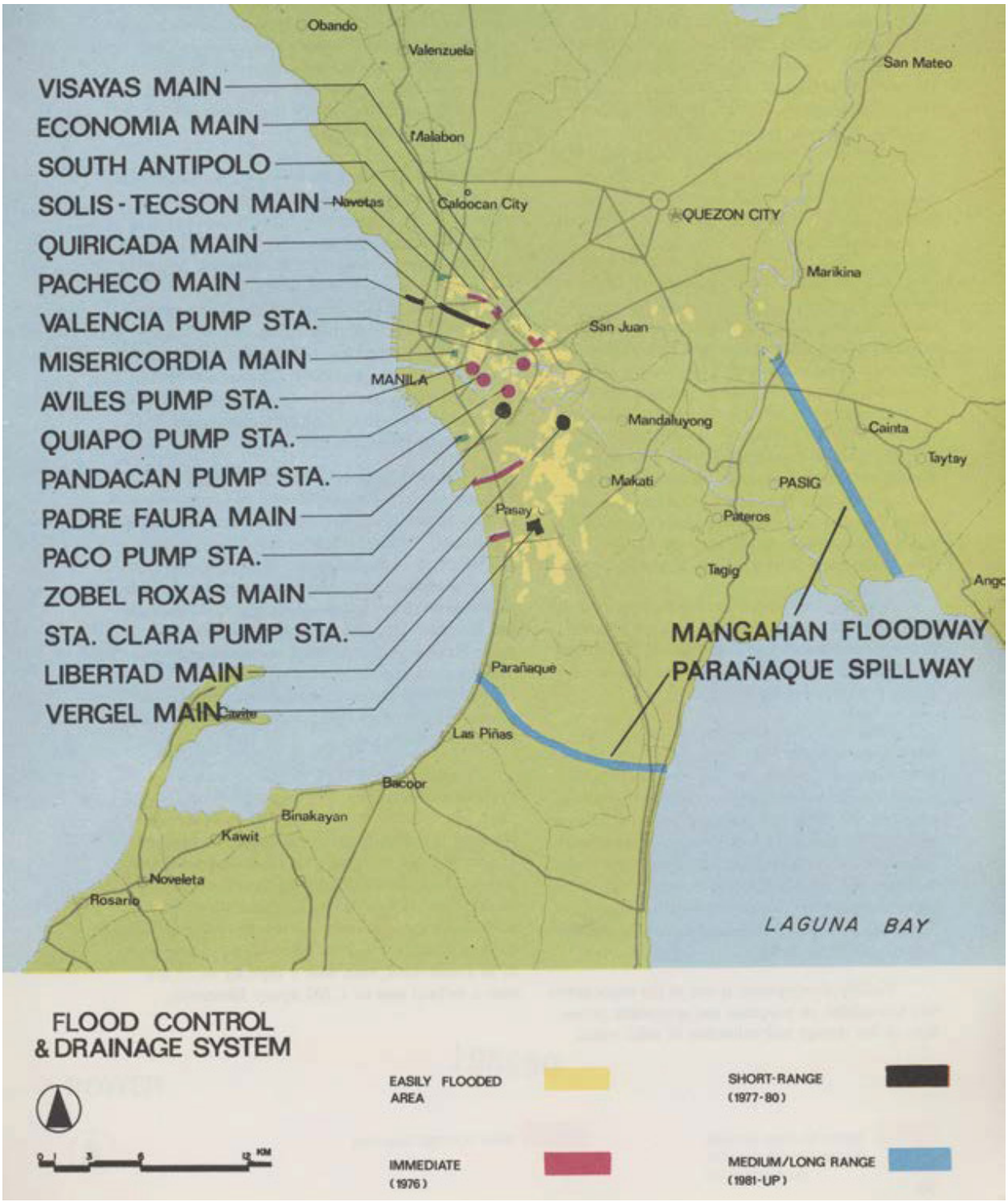
1972 Typhoon Rita and its aftermath depleted rice levels across Luzon, prompting waves of landless rural poor to migrate to Metro Manila in search of better conditions, convening and proliferating in marginal spaces such as along *esteros* and in dried creek beds *(fig. 1.43)*. This triggered the government to give discretionary eviction powers to the Bureau of Public Works and to recommended that all *estero* settlers be evicted,[85] without an outline of how to rehouse them or explore underlying inequalities. Thus, the issues that played out along the *esteros* became a microcosm of contestation. As informal settlers continued to live in the interstices, flooding endured as a convenient excuse for further evictions. The typhoon's socioenvironmental impacts were telling of a deeper systemic issue—that the burgeoning rural-urban migrant population stood contrary to Marcos' vision of Manila as a global city. People were criminalized for trying to fulfill their basic needs while the state attempted to embellish Metro Manila's face—a cloaking of poverty that continues today. Marcos' development practices were just one of many in Manila's history that did not prioritize inclusiveness in urban development.

82 accounting for inflation, would be equivalent to CAD 424.6 million

83 *Amending the Provisions of the Special Calamity Fund Act of Nineteen Seventy-Two, Appropriating Three Hundred Million Pesos for Expenditures Occasioned by Typhoons, Rains and Floods in the Months of June and July, Nineteen Seventy-Two and for Other Purposes,* (1973).

84 Warren, "A Tale of Two Decades," 2.

85 Inter-Agency Committee on Metropolitan Manila, *Metropolitan Manila Authority: A Development and Reform Strategy Proposal* (Manila: Government Printing Office, [1973]). 95.




1 5 KM

*fig. 1.44* Flood infrastructure proposed during the martial law period.


A FEW SAMPLERS OF PAF IN THE NEWS

RP develops anti-typhoon rockets

By ALBERTO ROUS

Weather rockets loaded with silver iodide crystals will soon be fired by the Philippine Air Force at storm clouds approaching the Philippines.

The project is part of the government's "Rain Stimulation and Weather Modernization Program" — an ambitious plan to precipitate rainfall in drought-stricken areas and dissipate storms before they develop into full-blown typhoons.

Col. Ramon Macatubay, chief of air staff and director of the PAF Rainmaking Project said rockets to be used in the trials are now being readied, as with the aircraft from which the rain-making missiles will be launched or fired.

Macatubay said firing the cloud-seeding rockets from a distance will protect the pilot and the aircraft from the hazards and turbulence of storm clouds.

In short, eliminate the need of flying the plane right into the teeth of the brewing typhoon.

The rockets is similar to the ground-to-air missiles used in warfare, but instead of an explosive warhead, it will have a wooden rocket head containing approximately half a pound of silver iodide.

A WEATHER plane is set to enter the eye of a cyclone in this conceptual photo of a typhoon-moderation project.

July 22—28 1973 Ang Bayani Tribune

207

*fig. 1.45* Newspaper article highligting cloud seeding rockets from Marcos' Rain Stimulation and Weather Moderation Program, 1973.

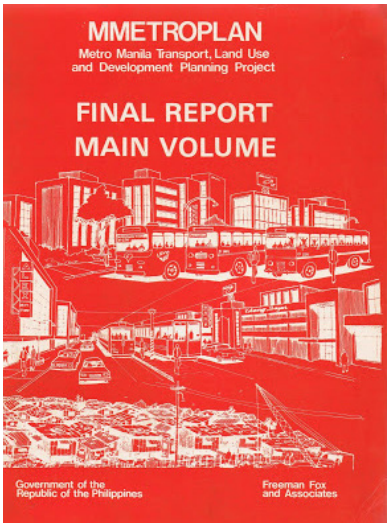



*fig. 1.46* 1977 MMETROPLAN (Metro Manila Transport, Land Use and Development Planning Project), main volume of the final report.

The reality is that informal populations were and are omitted from the urban vision, consequently becoming entangled in resilience imaginaries.

Irrespective of the 'greater good,' the Marcos administration was unwavering and defensive in its vision of development and control. At the height of the 1972 typhoon, Marcos went as far as to blame the poor for not providing themselves with adequate shelter,[86] as their visibility and vulnerability made them a convenient scapegoat. However, with time, suspicions mounted about the misappropriation of relief funds, particularly after reports of food parcels donated by Australia being relabelled as a 'gift from the President and First Lady' when handed out to victims.[87] As the administration continued to constrict aid and its perception dwindled, Ferdinand and Imelda Marcos resorted to blaming natural hazards on divine intervention. They leveraged religious beliefs about sin and punishment to guise the state's lack of social responsibility as divine wrath. Having evaded their accountability, they pushed on to develop an adaptation scheme.

Marcos sought to tame floodwater and modify typhoons to reduce economic disruptions *(fig. 1.45)*. With centralized multi-level governance for an extended period of time, he was able to plan and implement territorial-scale flood infrastructure. This spurred the 1977 Metro Manila Transport, Land Use, and Development Planning Project (MMETROPLAN), which tackled multi-jurisdictional capital-intensive flood control projects *(figs. 1.44 & 1.46)*. While the proposal wasn't substantially different from the 1952 Plan, it was distinguished by the regime that approved, funded, and built it. Despite being financed by Japanese development loans, people were impressed by the project because coordination at the scale was previously an impossible feat. The construction of MMETROPLAN's proposed structures, the Manggahan Floodway, Rosario Weir, and Napindan Hydraulic Control Structure, which will be discussed in Part 3, helped

86 Warren, "A Tale of Two Decades," 6.
87 Ibid., 14.

legitimize authoritarian rule. Underpinned by the regime's high-modernist imaginary of controlling urban nature, the interventions impose separations of wet from dry and the city from non-city.

During this time, Marcos' administration also clarified the division of responsibility for flood control. They delegated the technical design and construction aspects to the Bureau of Public Works and day-to-day upkeep (ie. policing against squatting) to municipal governments.[88] They also recognized the importance of weather, seismological, and astronomical monitoring to national development and acknowledged that such monitoring had been neglected by post-war governments. Accordingly, they dissolved the federal Weather Bureau and replaced it with the Philippine Atmospheric, Geophysical and Astronomical Services and Administration (PAGASA). The PAGASA was formed to "provide protection against natural calamities and utilize scientific knowledge as an effective instrument to insure the safety, well being and economic security of all the people, and for the promotion of national progress."[89] It developed a reliable forecasting system and expanded upon earlier topographic maps to identify flood-prone areas that spanned across the archipelago. As part of the Marcos administration's high modernist project, it also used satellite transmissions and computer models to study typhoons in hopes of taming them.

88 Inter-Agency Committee on Metropolitan Manila, *Metropolitan Manila Authority: A Development and Reform Strategy Proposal*, 81.

89 *Establishing the Philippine Atmospheric Geophysical and Astronomical Services Administration,* (1972).

## FIFTH REPUBLIC (1986-PRESENT): IMAGINARIES FOR A GLOBALIZING CITY

As a result of soaring unemployment during the Marcos era, rural-urban migration continued in the years following the dictatorship, growing Metro Manila's footprint and population *(fig. 1.02)*. During this time, the Pasig River fell further into a state of neglect, garnering its long-held reputation of being choked by garbage. Far from being a technical exercise, identifying the source and responsibility of the Pasig's plight has been a highly political act. Though much of its pollution comes from industrial point-source pollution, it is not often framed that way. In the 1990s, heavy industry was banned within 50 kilometers of Metro Manila, but despite extensive legislation, high volumes of wastewater continued to go unregulated, causing surface water quality to further deteriorate. The idea of environmental protection competed with the primary imaginary of economic growth, relegating the water to being inconsequential. In a city in which polluters are rule burdened but not rule bound, tensions over the 'trade off' between environment and development continues to be an issue, which has resulted in minimal infrastructural interventions in recent years.

The Pasig River was declared biologically dead in the 1990s, which sparked public consciousness about its condition. Task forces started solid waste removal, 'Piso Para sa Pasig' raised money for rehabilitation, and activists spread awareness *(figs. 1.47-1.49)*. However, the key formal response was the founding of the Pasig River Rehabilitation Commission (PRRC) in 1999. In theory, the PRRC was intended to be the coordinating body for the river's rehabilitation, but in practice it suffered due to its weakness to businesses and other government agencies. Before its founding, the body loosely existed as a group of young professionals lacking clear political direction, so when later put against powerful agencies such as the MMDA and Department of Environmental and Natural Resources, it failed to establish respect and consensus. This means that the PRRC's initiatives, which will be discussed in Part 3, were unable to gain significant traction, leaving the agency on the sidelines.



***fig. 1.47*** Greenpeace advocates sailing along the Pasig River, 2000.

***fig. 1.48*** Greenpeace sign on an outflow pipe that polluted the Pasig River, 2000.

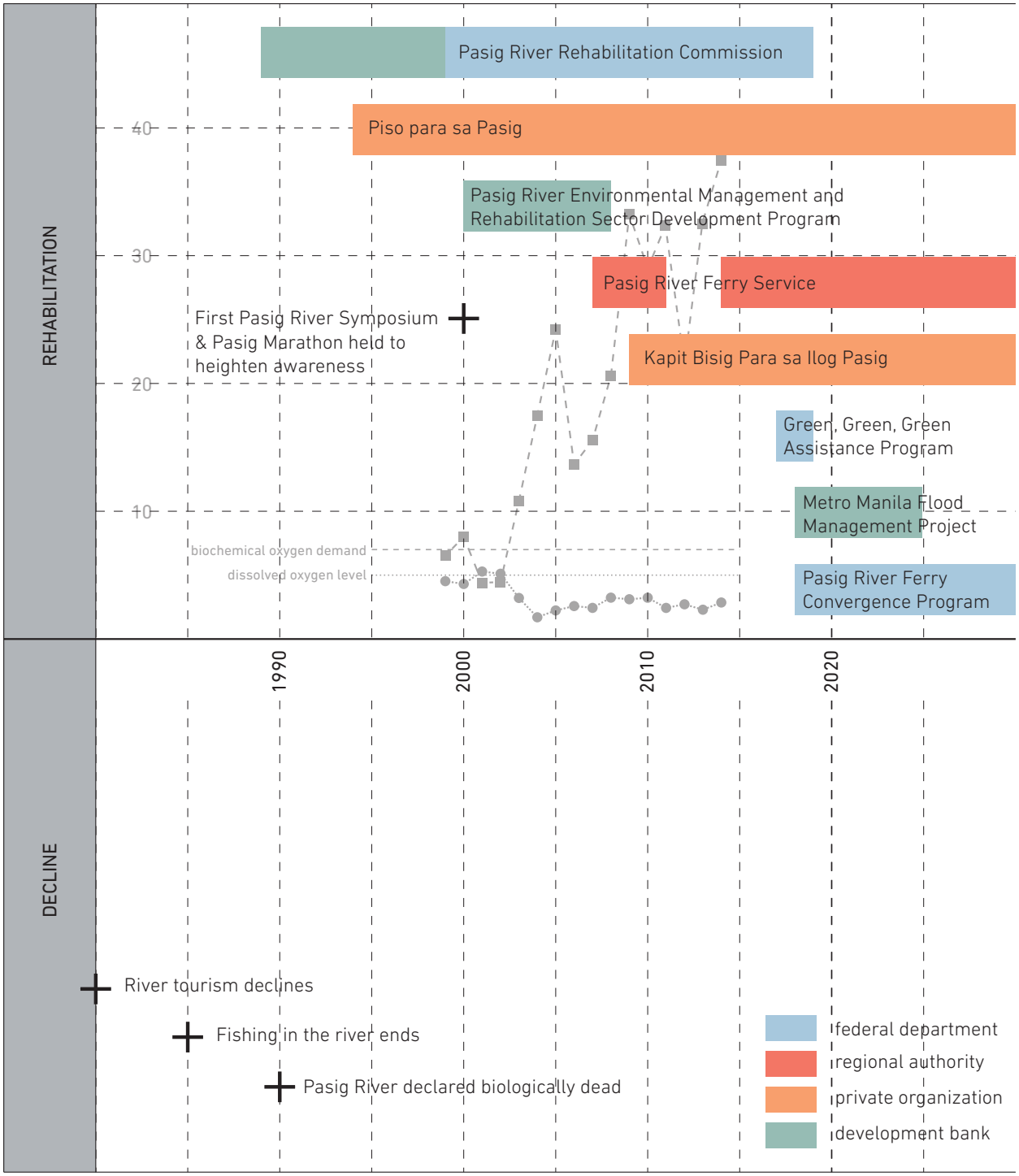



***fig. 1.49*** Programs for the Pasig River.

The Philippines has been led by 'strongman' President Duterte since mid-2016 under 'penal populism,' built on two political logics that reinforce each other—the politics of anxiety and the politics of hope. While the former foregrounds uncertainty, the latter reclaims democratic agency. Duterte's popularity stems from a frustrated middle class that felt excluded from the Philippines' economic gains during the previous administration, some of which will be unpacked in Part 2. His politics hold the promise of change and faster delivery of services and has manifested in a bloody drug war and the Build Build Build (BBB) program. He has been criticized by the international community that says his approach involves human rights abuses. Despite offshore condemnation, he remains immensely popular in the Philippines as people look for a symbol of stability in a rapidly changing world.

Award-winning clean-up efforts have brought aquatic life back to the Pasig while the ongoing drug war has brought a different kind of death. Locals and the coast guard find bodies dumped in the river, 36 in 2018,[90] which are suspected to be victims of the no-tolerance anti-drug campaign. This alarming use of the river is the result of the president encouraging citizens and the police to conduct extra-judicial killings of suspects. So, although penal populism has given voice to citizens' frustrations, it has also silenced the perspective of 'the other' for they are considered enemies that should be eradicated. This incident also demonstrates that regardless of the ecological progress made, the Pasig continues to be considered a back door of the city.

Intended to usher the country's 'Golden Age of Infrastructure,' BBB is series of almost 100 big-ticket infrastructure projects such as pumping stations, which will be discussed in Part 3, and highways. All the projects are intended to be completed within the president's six-year term and with foreign aid funds, speaking to the urgency with which people want change. Like the president's hardlined approach, the administration continues to choose concrete technocratic approaches over adaptive green

90 Howard Johnson and Virma Simonette, "Lives Lived and Lost Along Manila's Pasig River," *BBC News,* Aug 6, 2019.

infrastructure. Despite people's aspirations of adapting to a climate changed future, BBB, as it currently conceived, contradicts this by offering kilometers of cement expressways and bridges, lending itself to ever-increasing traffic and the same composition as infrastructure that has crumbled in the past. Though some of the proposed infrastructure has the potential to create opportunities across financial classes, much of the flood infrastructure will marginalize and remove low-income populations. Given that these critical actors living along the water continue to be seen as threats rather than as resources or partners, these infrastructure projects have failed to connect everyday needs to government ambitions. Ultimately, this project, fueled by politics of hope, has produced disproportionate optimism that will ultimately result in unmet expectations.

The imaginary of resilience at play in BBB rejects the integral role of water and is also represented in the recent decision to dissolve the PRRC and stop cleaning the Pasig River. In contradictory statements, Duterte said:

> "There is nothing to clean in the Pasig River. It is already clean […] [Regarding the] Pasig, unless we require every building, not only along the river but everybody who has the waste going down in a sewage or sewerage, nothing will happen […] We're wasting time, you're paying people for nothing. They cannot do anything."[91]
>
> President Rodrigo Duterte

This speaks the current mediocre state of river but doesn't relay optimism about its future. The limitations of past and present responses have contributed to a disaffection over who is responsible for its pollution and improvement. Unwilling to advocate for the ecosystem services that can be provided by the urban estuary, the current administration would rather spend its budget elsewhere.

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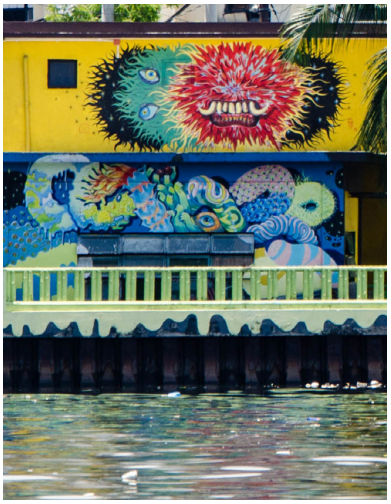
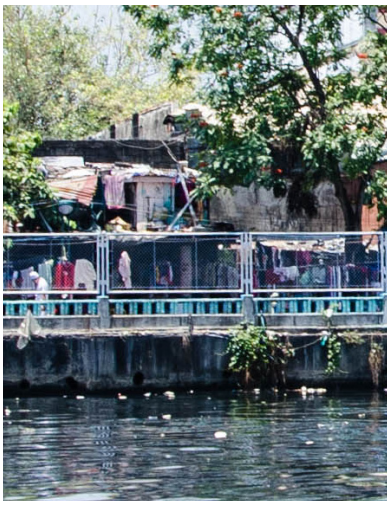
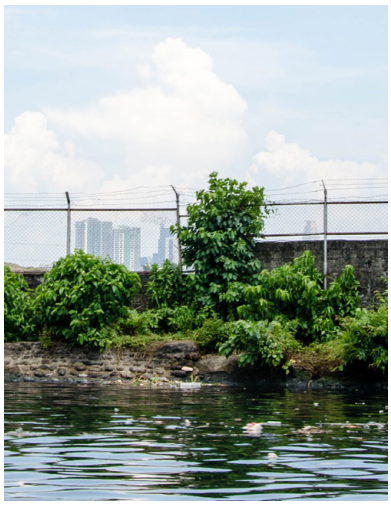
91 Stated on October 28, 2019 at an oath-taking for new federal government officials. From Pia Ranada, "Duterte Wants River Rehab Body Abolished," *Rappler,* Nov 14, 2019.

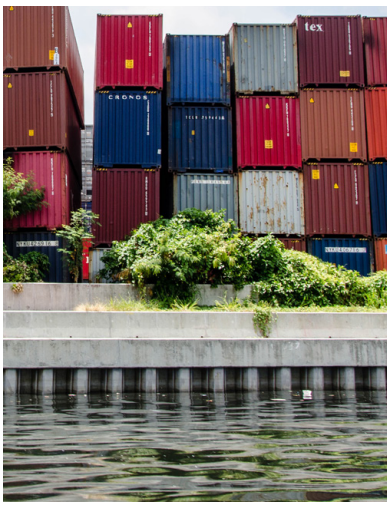
While the Pasig River is often seen as dead, the reality is that it is not as a static site but a dynamic body in the process of becoming. Its banks are lined with various ever-changing uses *(figs. 1.50-1.53)* and is full of life and potential *(figs. 1.54-1.58)*. It begs for a reimagination of the city that engages all that is along it.

***fig. 1.50*** The Pasig River's edge as seen from the Pasig River Ferry. Manila, Mandaluyong, Makati, Pasig.
(5 pages following)



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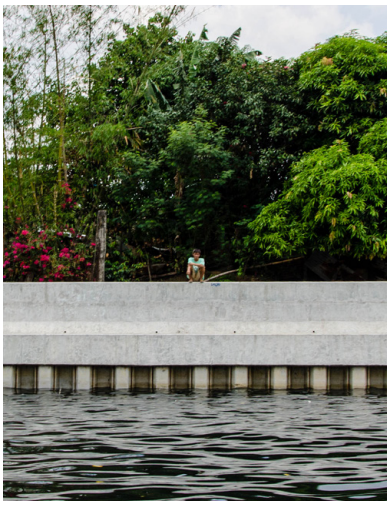


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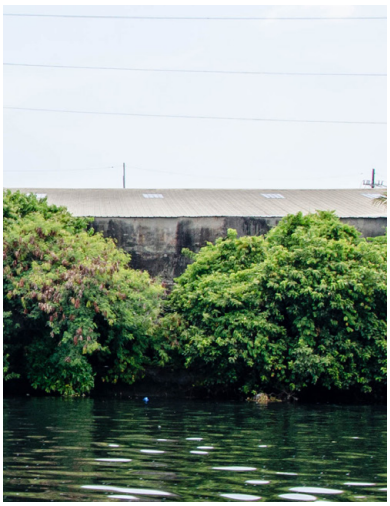


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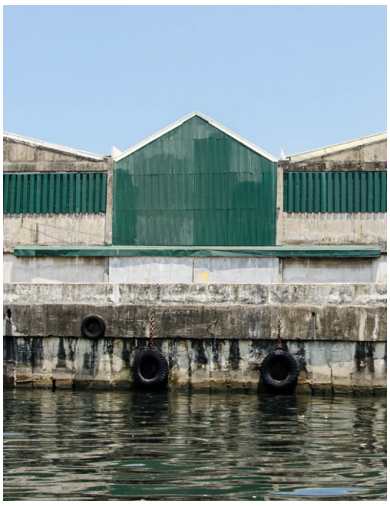
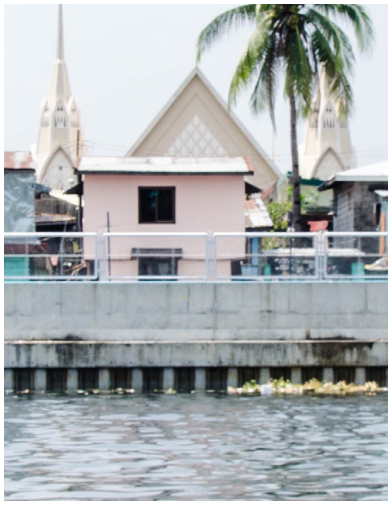
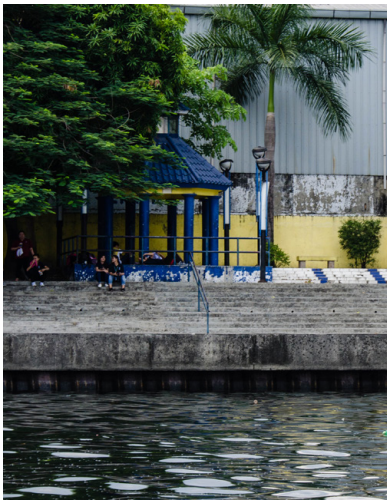
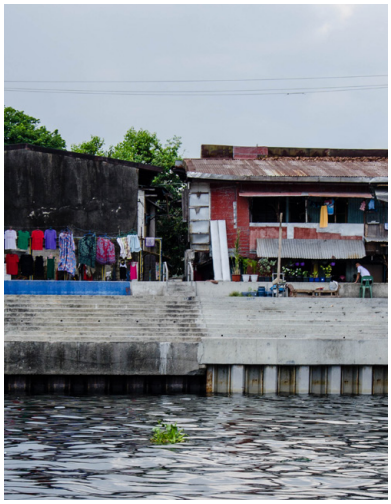
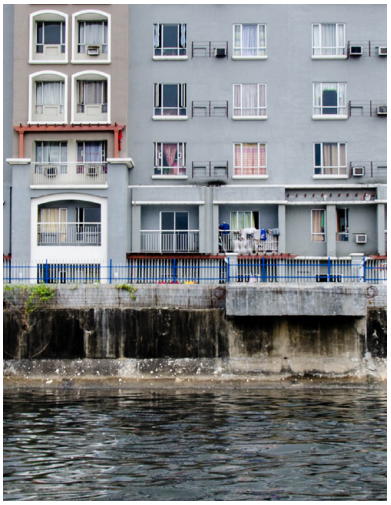
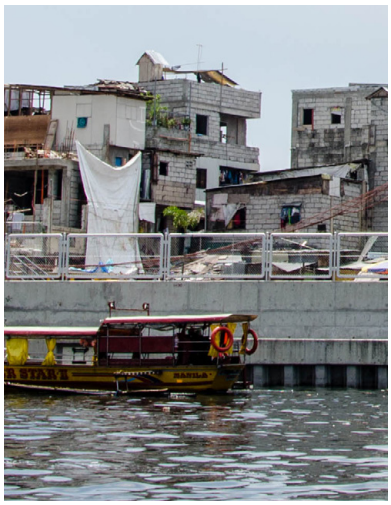




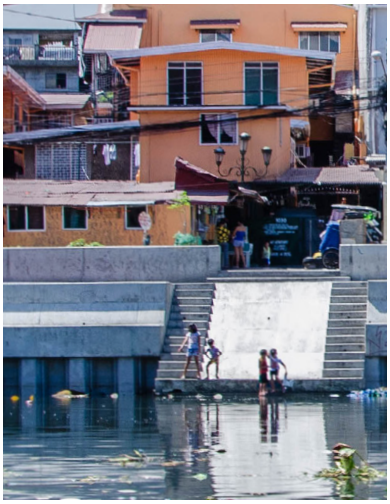


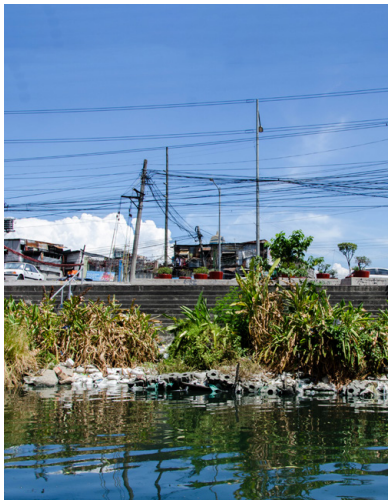
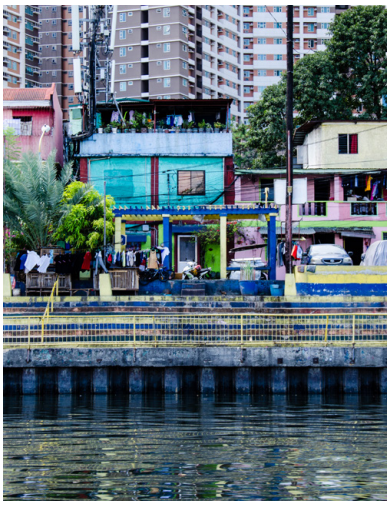
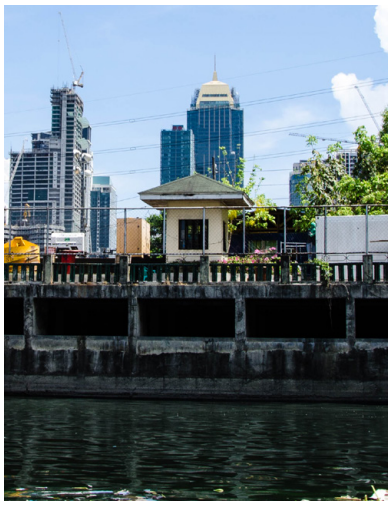
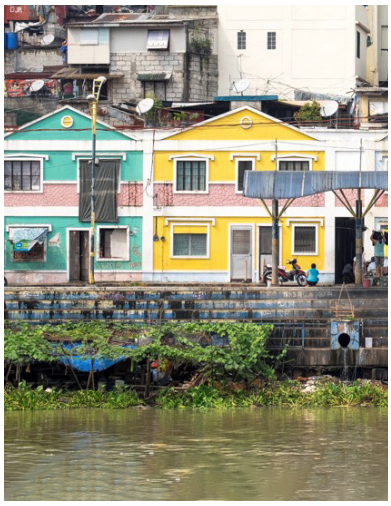


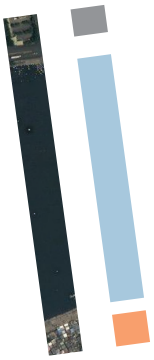






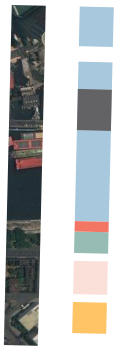




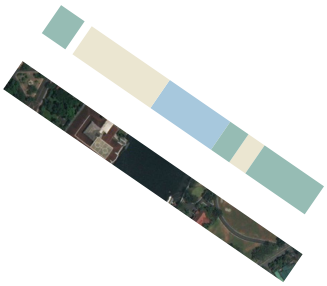





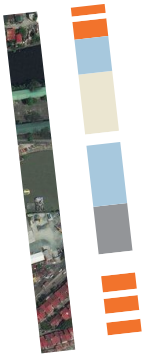
Section A: Through Manila International Container Terminal & BASECO housing compound, Manila.



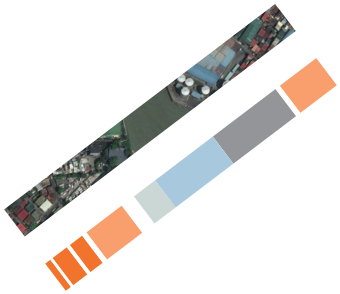
Section B: Through Binondo Pumping Station & Plaza Mexico, Manila.



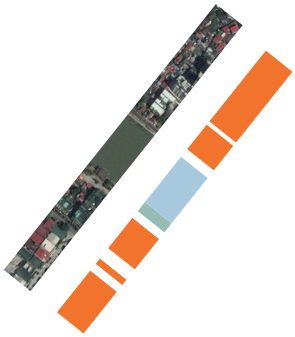
Section C: Through Malacañang Palace & Park, Manila.



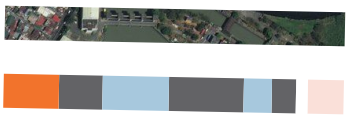
Section E: Through San Juan River and industrial area, Manila.



Section F: Through industrial area, Mandaluyong & Manila Boat Club, Makati.

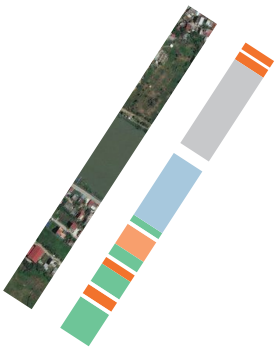


Section G: Through residential areas, Mandaluyong & Valenzuela Linear Park, Makati.



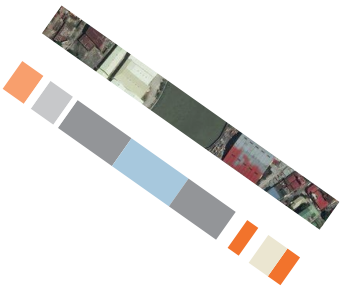
Section I: At Napindan Hydraulic Control Structure, Makati.

Section J: Through residential areas in Pasig.



Section K: Through Nagpayong Ferry Terminus, Pasig & residential area, Taguig.

***fig. 1.51*** Transect cuts along the Pasig River.

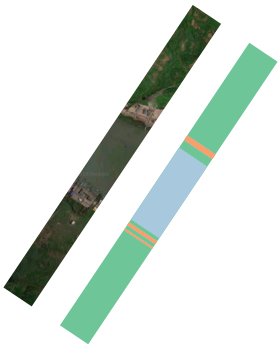


Section D: Through industrial area, Manila.


*fig. 1.52* Section key.

Section H: At Guadalupe Bridge between Mandaluyong and Makati.

land use:
- Pasig River or *estero*
- vacant
- industrial
- infrastructure
- institutional
- informal housing
- formal housing
- agricultural
- green space



Section L: Through agricultural area.

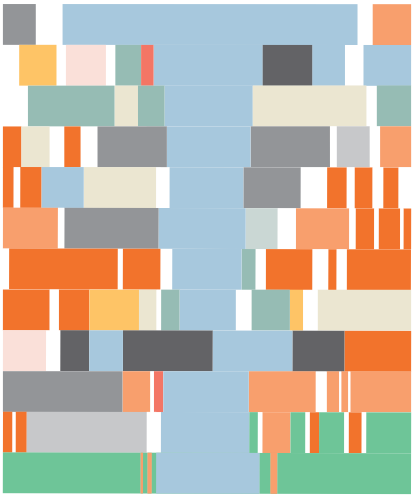


*fig. 1.53* Combination of transects forming the river's genome.


***fig. 1.54*** Cooling off under Quezon Bridge. Quiapo, Manila.

***fig. 1.55*** Children swimming in the Pasig River. Manila.

***fig. 1.56*** Child swimming. Manila.

***fig. 1.57*** Hired *bangka* boat crossing the Pasig River. Manila.

***fig. 1.58*** Iglesia Ni Cristo Lokal rising from Pineda informal settlement. Pasig.

*fig 2.01* Informal and formal skyline of Metro Manila along the Pasig River. Makati.

# 2
# SPLINTERING CITY

GOVERNANCE FOR
CLIMATE CHANGE & GLOBALIZATION

The intersection of urbanization and the environment has always been political, encompassing negotiations of space, human-nonhuman relationships, and society's imaginaries. Yet there is something about climate change, particularly as we confront crises at an existential scale and are faced with being actors in both human and nonhuman time scales.[1] "If, indeed, globalization and global warming are born of overlapping processes, the question is, How do we bring them together in our understanding of the world?"[2] This part unpacks Metro Manila's governance in terms of climate change and globalization to contextualize and position the thesis. The theoretical frameworks posed probe adaptation theory, climate change planning, and marginalization; and the potential contribution of design. In doing so, this part thinks through the forces that have undermined equity in contemporary imaginaries of resilience.

## RESILIENCE

In recent years, the popularity of the term 'resilience' has permeated academic and professional discourse. Though there are many conceptualizations of resilience, it is generally seen as a desirable attribute,[3] standing as a converse to vulnerability. It etymologically originates from the Latin word *resilire*, meaning 'to rebound.' As an academic concept, its meaning is more ambiguous. However, in a sense, the vagueness of resilience as a concept is advantageous, enabling it to function as a common denominator that appeals to multiple social groups and academic silos, therefore fostering transdisciplinary collaboration. Its meaning is malleable, allowing stakeholders to come together around a shared idea without necessarily agreeing on a precise definition.

1 Dipesh Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35, no. 2 (2009) 207.
2 Ibid., 200.
3 Richard J. T. Klein, Robert J. Nicholls and Frank Thomalla, "Resilience to Natural Hazards: How Useful is this Concept?" *Environmental Hazards* 5, no. 1 (Jan., 2003) 35.

In the past five years, particularly through the advocacy of the recently-ended Rockefeller Foundation's 100 Resilient Cities program, resilience has emerged as a framework through which global discussions on urban climate change policy, preparedness, and planning can occur. In terms of cities, resilience is often associated with robustness or the strength to withstand shocks. It can be defined as the ability of a city to avoid or bounce back from an adverse event, which stems from the interplay of its vulnerability and adaptive capacity.[4] The resilience of contemporary megacities depends on interwoven infrastructural and social networks. Developing conventional 'hard' grey infrastructure, which in the case of flood risk reduction includes floodgates and pumping stations, and 'soft' green infrastructure requires extensive, coordinated planning and substantial investment. Therefore, a city's resilience is critically shaped by not only its climate, inequality, and resources, but also its governance, wealth, and inclination to plan.[5]

In practice, the vagueness of resilience can make it difficult to realize and create metrics for. While many experts and policymakers attest that urban climate resilience is critical, there is no agreement on how to assess it. A true measurement of resilience is perhaps only possible in the wake of a climactic event.[6] Various indicators have been proposed but these require extensive data, something difficult to achieve in Manila's relatively data-scarce environment. Additionally, quantitative metrics would not necessarily be able to capture dynamic processes. Another possibility would be to study "normative characteristics of urban systems" that are thought to enhance resilience.[7]

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4 Richard Barkham and Kate Brown, *Resilient Cities* (London: [2014]). 3.
5 Ibid.
6 Sara Meerow, "Double Exposure, Infrastructure Planning, and Urban Climate Resilience in Coastal Megacities," *Environment and Planning A: Economy and Space* 49, no. 11 (Aug 21, 2017) 2663.
7 Ibid., 2663.

## ADAPTATION

The shift in attention from mitigating environmentally harmful practices such as producing greenhouse gas emissions to adapting to the effects of climate change signals the acknowledgement of the severity of our situation. Adaptation, previously seen as an "overlooked agenda" and "dirty word," has recently been brought to the forefront by three factors: the increase of climate-related disasters, inadequate global action on mitigation, and the inclusion of "loss and damage agenda" in negotiations.[8] On another level, this also changes the discussion's scale from that of climate change mitigation focused on a shared sense of risk and action (because it only works if more countries and cities participate) to that of individual responsibility (on the level of the national or municipal strategy). There is a general agreement of the role of cities as both a large part of the problem and necessary part of the solution, as well as thoughts about the sociopolitical nature and transformative potential of adaptation.

The concept of adaptation aligns well with the idea of resilience to the extent to which they are often used interchangeably. It seems desirable for cities—including their people, institutions, and systems—to adapt, grow, and bounce back from disasters. But bounce back to what? The means and modes of urban development that sparked these issues?

The "'classic' climate change adaptation literature" developed in social science research and practice tends not to focus on the spatial and physical aspects of urban adaptation.[9] This happens even though substantial research acknowledges that spatial vulnerabilities and protections are important aspects of adaptation implementation. Some of the research responds explicitly to a stated overemphasis on physical, engineered, and infrastructural solutions. Frameworks that attempt to distil a systemic understanding of urban adaptation tend to classify

8 Mizan R. Khan and J. Timmons Roberts, "Adaptation and International Climate Policy," *Wiley Interdisciplinary Reviews: Climate Change* 4, no. 3 (2013), 171-189.

9 Goh, "A Political Ecology of Design" 59.

spatial/non-spatial and physical/non-physical categories of analysis and action, whose consequences extend from concept to practice.[10] What that leaves is both a perception of, which translates into a reality of, a divide between those who work in space and those who don't. This divide in the literature and in practice is problematic because urban adaptation is sociospatial in nature.

However, initiatives to design for urban adaptation present opportunities to form integral connections between social and spatial discourse. Design, whether viewed as a process, practice, or outcome, involves the capacity to bridge competing imaginaries and priorities. But while urban, environmental, and architectural designers are certainly practicing in these spaces, it hasn't yet been co-situated with other disciplinary silos, such as the social sciences, nor is this work yet reflected in places like Metro Manila.

Design specifically for adaptation is still under-theorized, but landscape urbanism practice, which is concerned with blending natural and engineered infrastructural systems, is suited to address contemporary urban conditions and climate change adaptation.[11] This field actively engages practice and pedagogy regarding reintegrating and redefining the instrumental landscape of resources and infrastructures.[12] While the literature on ecological and sustainable urbanism has extensively investigated the intersection of building and nature, it doesn't often engage in transdisciplinary discussions regarding the complexities of climate change science and policy. Other theories of ecological urban design that do directly address climate change, conversely, often disregard sociopolitical issues. Regardless, adaptation, similar to resilience, has a fluid definition, allowing it to cut across infrastructure, governance, and design fields with loosely similar meanings.

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10 Ibid.

11 Charles Waldheim, "Landscape as Urbanism," in *The Landscape Urbanism Reader* (New York: Princeton Architectural Press, 2006) 37.

12 Pierre Bélanger, "Redefining Infrastructure," in *Ecological Urbanism*, eds. Mohsen Mostafavi and Gareth Doherty (Baden, Switzerland: Lars Müller Publishers, 2010) 348.

## DOUBLE EXPOSURE

Two interrelated conditions position the contemporary component of this research at the global scale. First, the planet is undergoing climate change along with unprecedented environmental destruction. The extent to which humans have become "geological agents,"[13] with the population and technology at a scale large enough to impact the planet, has provoked academics to propose a new epoch—the anthropocene. Climate change puts added pressure on urban capacities, as cities are both contributors to greenhouse gas emissions but are also susceptible to its effects. Second, urbanization is accelerating in both scale and scope, straining urban infrastructure and creating several environmental and socio-economic issues. While rapid urbanization is often regarded as an issue of the Global South, the intertwined relationship between local urbanization processes and global environmental impact turns this into a planetary-scale problem. Current urbanization trends suggest that there are direct relationships between processes of urbanization that are concentrated in and on urbanized areas. Additionally, more and more, urban processes are radically transforming not just the urban areas themselves but their outskirts too. Cities have certain vulnerabilities as centers of population, political power, economic transactions, culture, and built environment *(fig. 2.02)*.[14] Most of the world's megacities, including Metro Manila, are in coastal zones, leaving them vulnerable to increasingly intense storms and sea level rise. These differential impacts overlaid on distinct vulnerabilities form a "complex geography of climate change."[15,16]

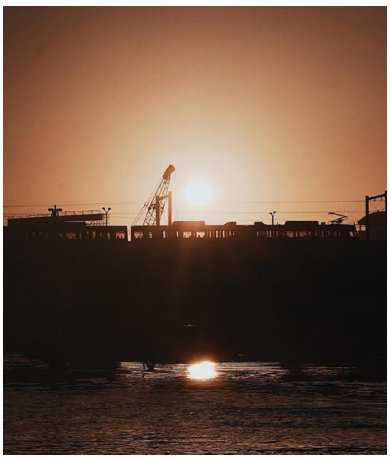


***fig. 2.02*** Sunset over construction cranes and LRT1. Manila.

Economic development and environmental efforts, which are typically at odds, are becoming increasingly intertwined.

13 Chakrabarty, "The Climate of History: Four Theses," 206.
14 Kian Goh, "A Political Ecology of Design" Massachusetts Institute of Technology, 2015), 53.
15 Klein, Nicholls and Thomalla, "Resilience to Natural Hazards: How Useful is this Concept?" 36.
16 Karen L. O'Brien and Robin M. Leichenko, "Double Exposure: Assessing the Impacts of Climate Change within the Context of Economic Globalization," *Global Environmental Change* 10, no. 3 (Oct., 2000) 221.

The World Bank links climate change to severe risks and effects on development but is hopeful that it "is possible to grow greener without necessarily growing slower."[17] The attention to environmental issues by development agencies is paralleled by a corresponding increase in marketing environmental initiatives. Strategies for urban growth increasingly intersect ecological pressures, so tropes of urban vulnerability are becoming a routine part in discourses of economic competitiveness. This link between environmental advocacy and economic vitality has significant implications for design and planning.

Cities are critical nodes in the "reproduction, reconstitution, and mutation of neoliberalism" while being concurrently shaped by it.[18] As a "multiscalar phenomenon," neoliberalism shifts relationships between institutions and economic actors.[19] While neoliberalism is a global phenomenon, Metro Manila exemplifies many of the tenets of neoliberal urbanism, which is part of a long-term trend related to the Philippines' past of colonialism and dictatorship. Although urban governance has shifted throughout the country's various eras, for the most part, urban development has been shaped by the private sector, with substantial influence from elite land-owning families and transnational organizations. Over time, this has attracted global capital and market-oriented policies, making the megacity a hub of several international corporations, regional headquarters, and business processing outsourcing (BPO, eg. call center) companies.

The consequences of economic globalization co-occurring with climate change interconnect to exacerbate patterns of disparate vulnerability, undermining equitable urban resilience. The interactions between the impacts of these two transformative global processes can be examined through geographers O'Brien and Leichenko's 'double exposure' framework. 'Double exposure'

17 World Bank Group, *Turn Down the Heat : Confronting the New Climate Normal* (Washington, DC: [2014]).

18 Jamie Peck, Nik Theodore and Neil Brenner, "Neoliberal Urbanism: Models, Moments, Mutations," *SAIS Review* 29, no. 1 (Jan., 2009) 50.

19 Ibid., 51.

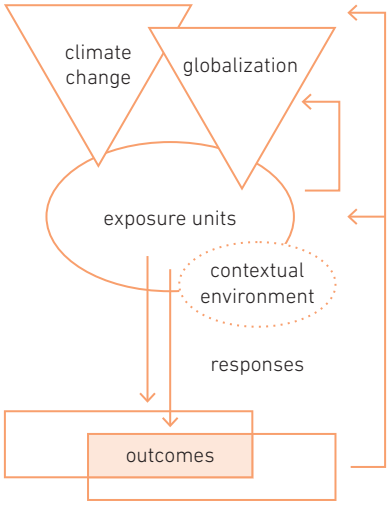



***fig. 2.03*** Pathway of outcome double exposure.

refers to the idea that certain regions, sectors, ecosystems, and social groups will be confronted by the consequences of both climate change and globalization *(fig. 2.03)*.[20] It recognizes that climate impacts are influenced not only by geography but also by economic activities at the global scale. The double exposure concept calls attention to the idea that there are 'winners' and 'losers' accompanying both climate change and economic globalization. Winners include regions or social groups that are likely to benefit from the global processes, while losers are those that are harmed by them. In some cases, the consequences of globalization outweigh the impacts of climate change, or vice versa. However, in others, exposure to both globalization and climate change results in "double winners" or "double losers," meaning the negative impacts of environmental change frequently affect people and areas hardest hit by globalization, and conversely those that are positively affected by climate change are often also likely to accrue the benefits of globalization.[21] The outcomes of globalization and climate change are frequently undesirable because climate change puts added pressure on urban capacities, creating a tendency to "increase the vulnerability of some individuals and groups while decreasing resilience of urban systems to future change."[22] Since double exposure affects overall resilience, the authors suggest that there are important policy implications for those likely to experience the negative consequences of both.[23]

Metro Manila typifies many of the social, ecological, economic, and political challenges that other rapidly developing megacities experience. Some of the megacity's resilience challenges can be analyzed through its double exposure to climate change and globalization as it embodies both environmental

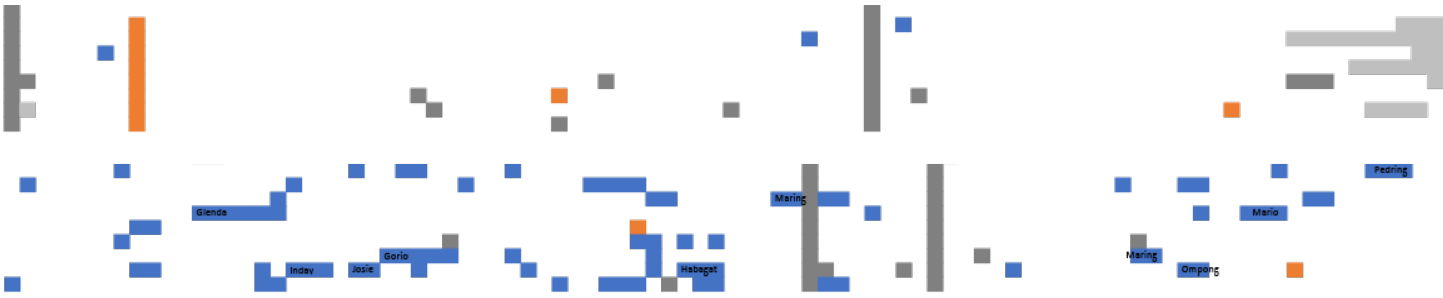
20 O'Brien and Leichenko, "Double Exposure: Assessing the Impacts of Climate Change within the Context of Economic Globalization," 222.
21 Ibid., 227.
22 Robin Leichenko and Karen O'Brien, *Environmental Change and Globalization: Double Exposures* (New York: Oxford University Press, 2008) 83.
23 O'Brien and Leichenko, "Double Exposure: Assessing the Impacts of Climate Change within the Context of Economic Globalization," 222.

vulnerability and neoliberalization. The effects of globalization and neoliberal restructuring that result from pushing to be a 'global city' have been "uneven" and "destructive,"[24,25] meaning that Metro Manila's imaginary of economic growth has made it an increasingly polarized city. It is in this context that cities have taken on particular prominence in environmental struggles. As an example, in Metro Manila, informal housing is frequently cleared under the banner of flood mitigation only to be replaced by new developments, revealing groups of 'double losers' and 'double winners.' This unchecked urban development adds to ground impermeability and runoff, increasing the effects of pluvial flooding. Building infrastructure can be challenging for megacities, particularly those in the Global South, which already struggle to provide basic infrastructure for their large, growing populations. Since specific populations suffer disproportionately from natural hazards and climate change, income inequality and informal settlements further complicate resilience planning in Metro Manila.[26] Efforts to improve urban infrastructure will play a key role in the metro-wide response to urban water, but it is important to realize that this issue is shaped not only by exposure to climate, but also by economic globalization and colonial legacy.

24 Ibid., 225.

25 Peck, Theodore and Brenner, "Neoliberal Urbanism: Models, Moments, Mutations," 51.

26 O'Brien and Leichenko, "Double Exposure: Assessing the Impacts of Climate Change within the Context of Economic Globalization," 229.



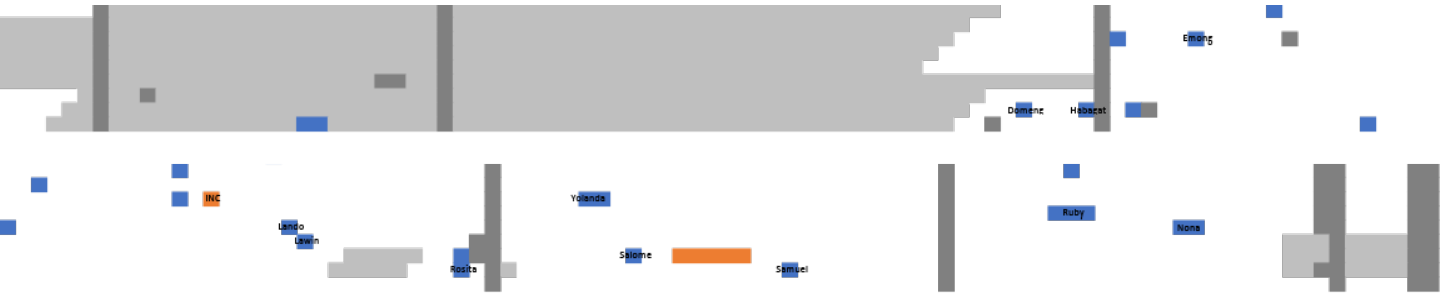

## FRAGMENTED PLANNING

***fig. 2.04*** #WalangPasok 'days off' 2011-2019
First row January-June, second row July-December
- flooding or heavy rain
- national holiday
- event or demonstration
- school break

Traditional networked infrastructures such as water, energy, and transport systems can shape and solve urban challenges,[27] making them critical in the discussion of resilience. Water infrastructure resilience is crucial for coastal megacities because local economic disruptions can have larger regional impacts *(fig. 2.04)*. Softer green and blue-green infrastructure, which build resilience with nature, have recently been recognized for the public goods and ecosystem services they provide. In all types of infrastructure, the robustness of the system plays a role in a city's ability to cope with climate change. Consequently, planning and developing infrastructure can be seen as adaptation efforts. However, as demonstrated in Part 1, the ability to build largely hinges on politicians' imaginaries and willpower.

At the national level, the Philippines has taken steps toward disaster risk reduction. For example, the Climate Change Act of 2009 requires all local government units (LGUs)[28] to develop a Local Climate Change Action Plan in accordance with their local vulnerabilities.[29] So while a legal framework for boosting urban resilience exists, it only creates plans and policies for individual LGUs. In this non-regionalized system, some LGUs have moved

27 Jochen Monstadt, "Conceptualizing the Political Ecology of Urban Infrastructures: Insights from Technology and Urban Studies," *Environment and Planning A* 41 (Apr 28, 2009) 1924.
28 cities and municipalities (towns)
29 *Republic Act no. 9729: An Act Mainstreaming Climate Change into Government Policy Formulations,* (2009).




ahead with initiatives while others lag behind.

The past three decades have brought about a fragmentation of access and control of networked infrastructure in Metro Manila. Some scholars argue that this "splintering" occurring in both the Global North and South is embedded in globalization-related changes in financial flows, technological innovation, social attitudes, and governance.[30] However, others argue that the fragmentation pervasive in cities of the Global South was systematically inscribed during their colonial development.[31] In the case of Metro Manila, as discussed in Part 1, urban fragmentation is a colonial legacy but the splintering has increased in recent years. Nevertheless, networked infrastructures "constitute a—if not the—central interface between nature and society."[32] Despite their importance for economic development and social justice, they remain the most vulnerable systems of many contemporary cities:[33]

> "I think Metro Manila is not very resilient as a metropolis. Our energy infrastructure is very exposed and very sensitive, has a very high sensitivity, our transport infrastructure grounds to a halt if we have rains that are average for the season, classes are suspended, work stops, and transportation is compromised. All these things affect the nation, it's not just traffic that is costing us billions it's actually the kind of development that you see all around Manila. We don't have zoning laws, at least not zoning laws you would

30 Michelle Kooy and Karen Bakker, "Splintered Networks: The Colonial and Contemporary Waters of Jakarta," *Geoforum* 39, no. 6 (June 4, 2008) 1844.
31 Ibid., 1843.
32 Monstadt, "Conceptualizing the Political Ecology of Urban Infrastructures: Insights from Technology and Urban Studies," 1935.
33 Ibid.

> really want to have, and resilience is about good planning, planned development, and not a shotgun approach to development, and that's the difficulty that a metropolis like Manila [has], where each component city would have a plan of its own. […] So everything is, I would say, designed on a very thin thread, and you see what happened in 2009 when the big rains came."[34]
>
> Official in the Climate Change Commission

Metro Manila's infrastructure planning is shaped by global processes and contextual factors, with two significant features being decentralization and privatization. Individual LGUs have the authority to develop land use plans, regulations, and taxes within their jurisdictions. Each with their own capacities, some LGUs are more active than others, exacerbating inequalities. Since much urban development is driven by aspirations to be perceived as a 'global city' and attract investment, Metro Manila is consequently splintered and polycentric. As individual LGUs compete for investment, they separate themselves from the rest of the megacity's failures. This is amplified by how the private section seeks "opportunities for profit by cutting through the congested and decaying spaces of the 'public city' to allow for freer flow of people and capital, and to implant spaces for new forms of production and consumption into the urban fabric."[35]

Despite being a federal agency, the Metropolitan Manila Development Authority (MMDA) lacks the power to overrule the self-interests of LGUs and the private sector. In a recent MMDA report, the agency encouraged private developers to create "world class" environments rather than acknowledging it as a public responsibility.[36] With little oversight, LGUs have allowed for-profit developers not only to plan housing subdivisions but entire business districts with their own privileged infrastructure.[37] Ayala

34 Meerow, "Double Exposure, Infrastructure Planning, and Urban Climate Resilience in Coastal Megacities," 2663

35 Gavin Shatkin, "The City and the Bottom Line: Urban Megaprojects and the Privatization of Planning in Southeast Asia," *Environment and Planning A* 40 (2008) 384.

36 Metropolitan Manila Development Authority and World Bank, *The Metro Manila Greenprint 2030: Building a Vision* (Makati: ,[2014]).

37 Ben D. Kritz, "Disorder is the Rule," *The Manila Times*May 19, 2014. www.manilatimes.net/disorder-is-the-rule/97861/.

Corporation's Bonifacio Global City, a prime example of this, is a contemporary and sanitized district designed to appeal to wealthy residents and international firms that has its own flood management system *(fig. 2.05)*. The public sector is minimally involved in planning this type of community, which has led to uneven development.

> "The fact that there is nobody in the Philippines who regulates urban planning has been great for Ayala Land, because we are probably the only company there that has the scale financially to take on large plots of land. […] By developing big tracts of land, we become the government; we control and manage everything. We are the mayors and the governors of the communities that we develop and we do not relinquish this responsibility to the government."[38]
>
> Thomas F. Mirasol
> Chief Operating Officer and Head of Real Estate Division, Ayala Land

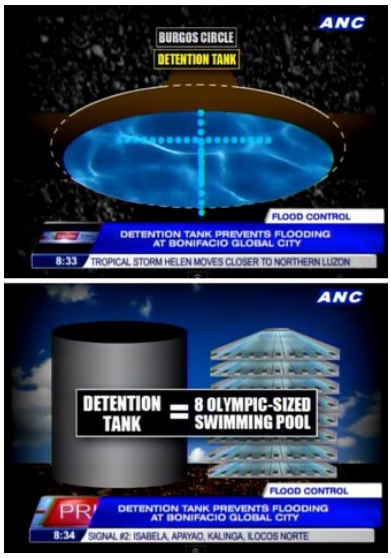



***fig. 2.05*** Diagrams of Bonifacio Global City's stormwater detention tank under Burgos Circle.

This influence and dependence on the private-sector for infrastructure development has problematic implications on transparency and accountability, which has reduced the government's ability and flexibility in decision making. Even where when there are metro-wide infrastructure improvements, the lack of equity and inclusivity remains a concern. Ineffective planning and administrative fragmentation are Manila's biggest obstacles to improving its infrastructure, resilience, and ability to cope with climate impacts. Urban management specialist Roberts argues that "the failure of the planning and development control system to manage development risks has resulted in Metro Manila putting itself at even greater risk of future catastrophe."[39]

Planning in Metro Manila challenges the widespread desirability of decentralization, which is often cited as a characteristic of resilient systems. Literature generally suggests that decentralized

38 Ibid.

39 Brian Roberts and Dean Forbes, "Manila: Metropolitan Vulnerability, Local Resilience," in *Planning Asian Cities: Risks and Resilience*, ed. Stephen Hamnett (New York: Routledge, 2011) 317.

systems are less vulnerable than highly centralized ones because in a decentralized system, a disruption only affects a portion of the whole. However, in this case, in terms of governance, a decentralized approach has created challenges of integration, coordination, and data availability, making planning for water more difficult *(fig. 2.06)*. In general, subjecting water infrastructure to jurisdictional, territorial, and scalar fragmentation, creates a series of governance gaps, overlaps, and challenges. It appears that 'splintering urbanism' is an obstacle for Metro Manila, as, even though distributing power has helped combat centralized corruption, the current decentralized governance structure does not align itself with fostering inclusive adaptation.

Despite national level policy and LGUs' moves toward risk reduction, enforced metro-wide integration is lacking. The MMDA seems like the appropriate meso-level agency to bridge this gap as it benefits from LGU-scale insights and diversified federal resources—a dynamic position between the commons and the government that could support micro-macro links. This reflexive relationship could liaise between top-down and bottom-up imaginaries. It could feed field-based learning into policy-making while mediating contestation, enhancing community outcomes. However, in its currently unempowered state, it cannot translate information to metro-level planning, let alone watershed-scale planning. As both lawmakers and Manileños increasingly recognize the need to foster urban resilience, it will be interesting to see if it or another actor can emerge to coordinate and lead metro-wide efforts to balance the sociopolitical processes and spatial interactions that are currently reinforcing existing inequalities and leading to uneven urban resilience.

This existing dysfunctional 'splintering' and decentralization will be further questioned in Parts 3 and 4, which discuss physical and social infrastructure respectively, by analyzing existing top-down strategic and bottom-up tactical approaches to infrastructure. Working between strategies and tactics may be effective for approaching the multiscalar nature of water.

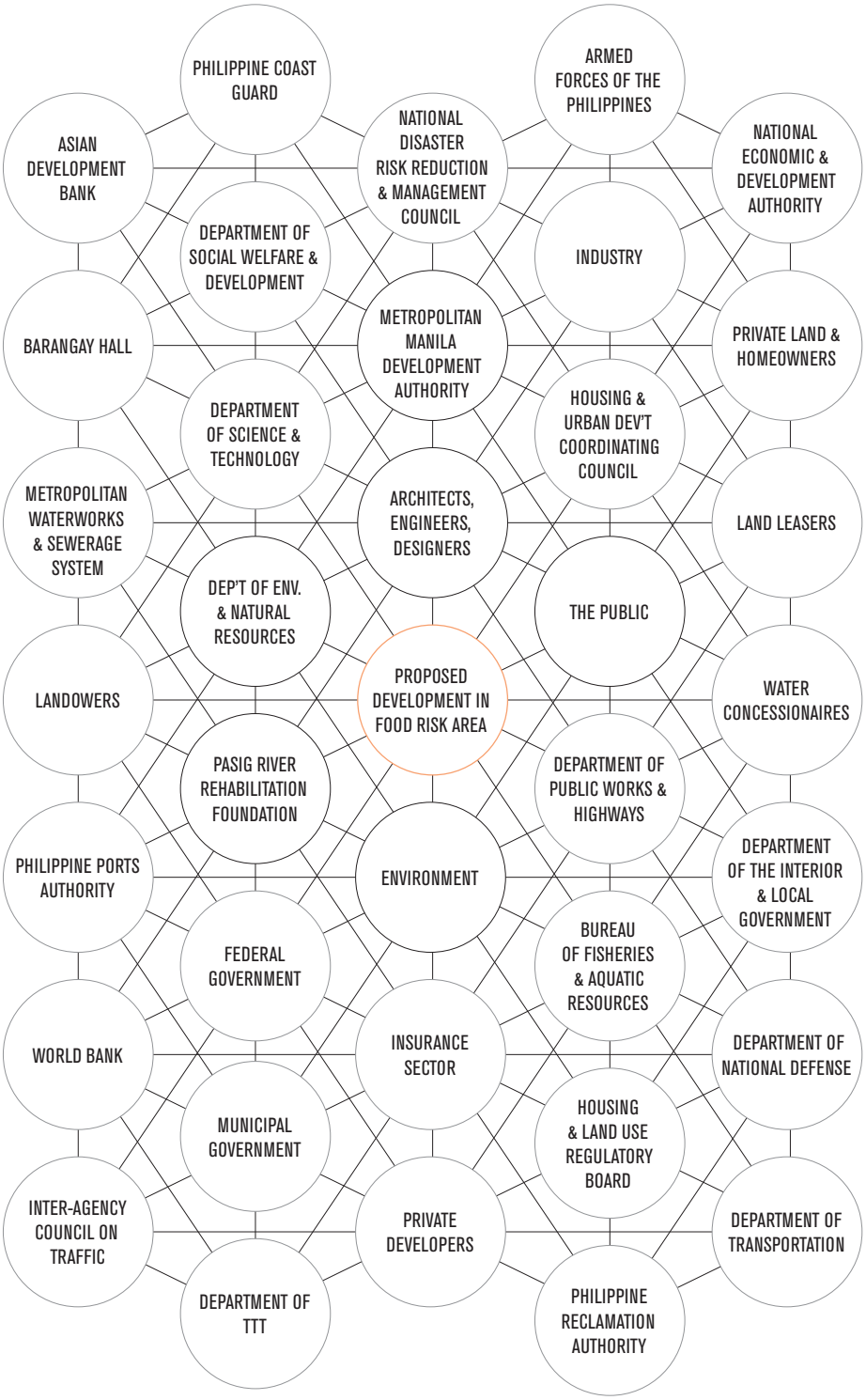



***fig. 2.06*** Potential stakeholders in planning processes.

# 3
# GREY & GREEN

## IMAGINARIES OF RESILIENCE EMBODIED IN STRATEGIC INFRASTRUCTURE

Napindan Hydraulic Control Structure. Makati.

"The spirit of the Island City is separation prior to connection, divides before thresholds. Here the war against the monsoon and the sea is an effort to maintain firm lines of separation. The divide between land and sea is only a beginning."[1]

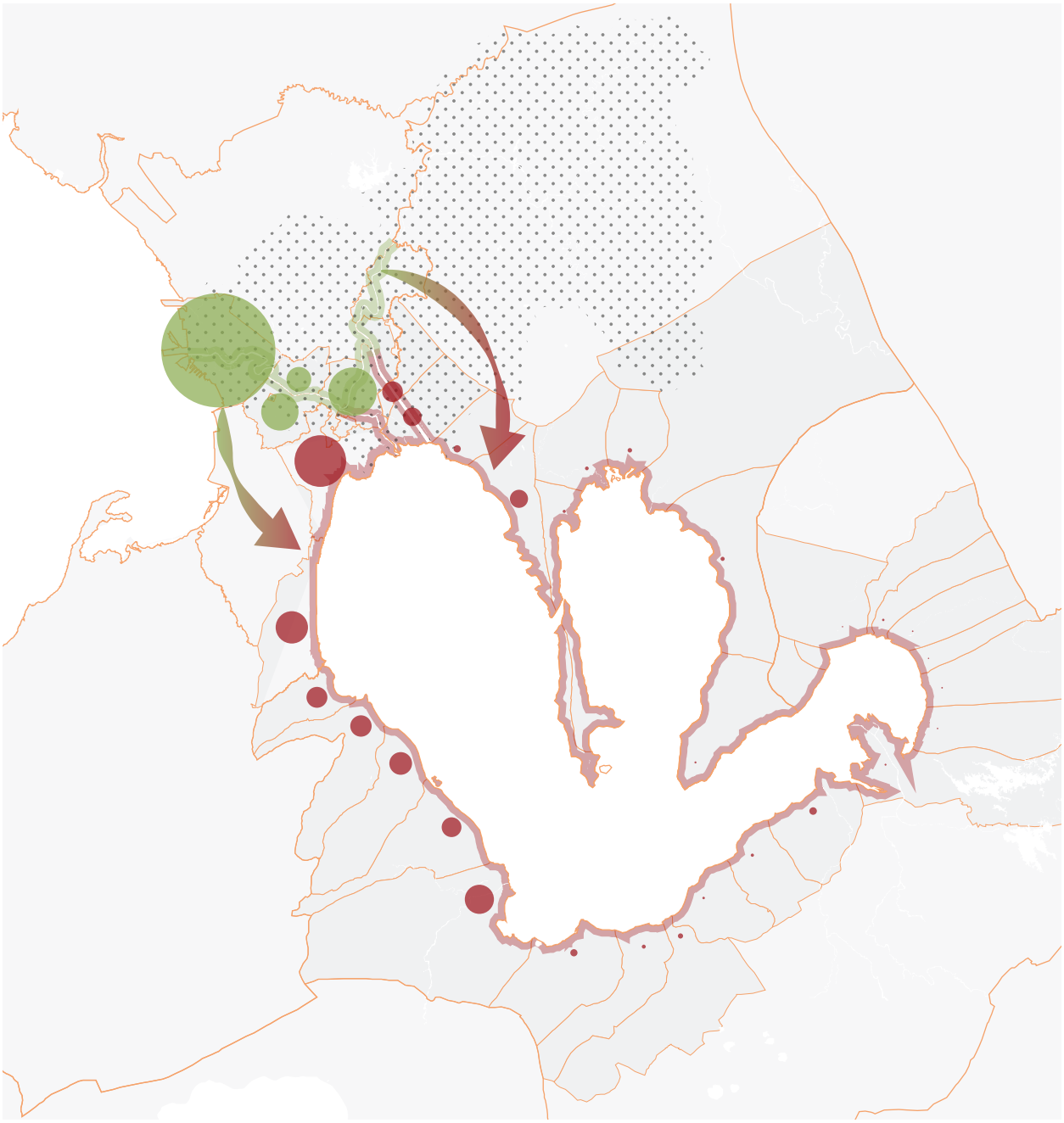
1 Anuradha Mathur and Dilip Da Cunha, *Soak: Mumbai in an Estuary* (New Delhi: Rupa and Co., 2009) 7.

During the 2012 Hagupít ng Habagat 'wrath of the monsoon,' torrential rains poured on Metro Manila for eight days. All eight gates of the Rosario Weir were opened to divert water from the Marikina River through the Manggahan Floodway into Laguna de Baý lake, doubling the lake's volume.[2] The capital region was spared from the worst by displacing floodwaters to outlying provinces then closing the gates. As a result, lakeside dwellers were left with submerged houses and damaged aquaculture structures. This prompted them to demand that the Napindan Hydraulic Control Structure's floodgates be reopened, but their pleas went unanswered and the inundated sacrifice zones did not return to average conditions until four months later.[3] Metro Manila continues to depend on Laguna de Baý to mitigate urban flooding and continue functioning *(fig. 3.02)*.

This demonstrates a dark truth in resilience imaginaries. As discussed in Part 2, the decisions about which areas will be protected are not only about guaranteeing people's safety, they are also entrenched in transnational concerns such as business productivity and supply chains. This is both a rational decision and a disturbing reality of our climate-changed world, where there is an unequal distribution of environmental risk when it comes to government-administered "transference of flood risk."[4]

Building off Part 2, which discussed the uneven governance structures at play, this part will examine Metro Manila's built strategic flood infrastructure and how its effects have redounded back on the very people it should serve. Reaching beyond simply presenting physical objects, this part will position the infrastructure within its macro-scale context. Looking at infrastructure through this lens will demonstrate how 'protection from' water while simultaneously balancing the pressures and opportunities of globalization has led to sociospatial marginalization and, in some cases, increased threats. Thereby, it shows how designed objects stemming from imaginaries create the city's material landscape and hazardscape.

2 Kristian Saguin, "Producing an Urban Hazardscape Beyond the City," *Environment and Planning A* 49, no. 9 (2017) 1969.
3 Ibid.
4 Ibid.



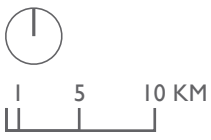



***fig. 3.02*** Transfer of risk from Metro Manila to Laguna de Baý lake's surroundings.
1 : 500,000
- Relative populations of LGUs 'protected' by MMETROPLAN structures
- Populations disserviced


***fig. 3.03*** Flood infrastructure along the Pasig River.
1 : 6,000
PS = pumping station
FG = floodgate


ROSARIO WEIR
1986
MANGGAHAN
FLOODWAY
1986
NAPINDAN
HYDRAULIC
CONTROL
STRUCTURE
1983
SAN AGUSTIN PS
LAGUNA DE BAÝ LAKE

## GREY INFRASTRUCTURE: HARDLINED PROTECTION

As discussed in Part 1, major efforts to manage Metro Manila's floods through engineering projects date back to the Marcos era *(fig. 3.03)*. The city was designed around the colonial ideal of the sanitary city, which depended on scientific knowledge and engineering interventions to address urban problems. Despite the city persevering through numerous severe natural hazards, infrastructure systems need to continue to be strengthened. The economic disruption, infrastructure failures, and loss of life caused by even comparatively minor hydrometeorological events suggest that robustness still needs to be improved.

### WALL

***fig. 3.04*** Riverwall in Manila.

Most of the 25-kilometer length of the Pasig River is lined by concrete walls that have been fixtures in Manila's landscape since the Spanish occupation *(figs. 3.04 & 3.05)*. In evident defiance of nature, this structure creates a clear divide between land and water. It is often thought that a river wall reduces flooding, however, this is only the case with fluvial flooding. In Metro Manila, which also experiences pluvial flooding, the river walls pool water that attempts to run-off into the river, worsening the flooding. This creates a scenario in which street drains and pumps become necessary for lowering water levels after heavy rains.

> "An estuary demands gradients not walls, fluid occupancies not defined land uses, negotiated moments not hard edges."[5]
>
> Anuradha Mathur and Dilip da Cunha

Channelizing walls have several ecological consequences as the complexities of a natural river become homogenized. They are typically built to control water's path through a developed area and increase flow capacity, but this is coupled with increased speed. When a river's natural irregularities that provided much-needed friction are removed, it carries fluvial floodwater faster,

5 Mathur and Da Cunha, *Soak: Mumbai in an Estuary* 4.

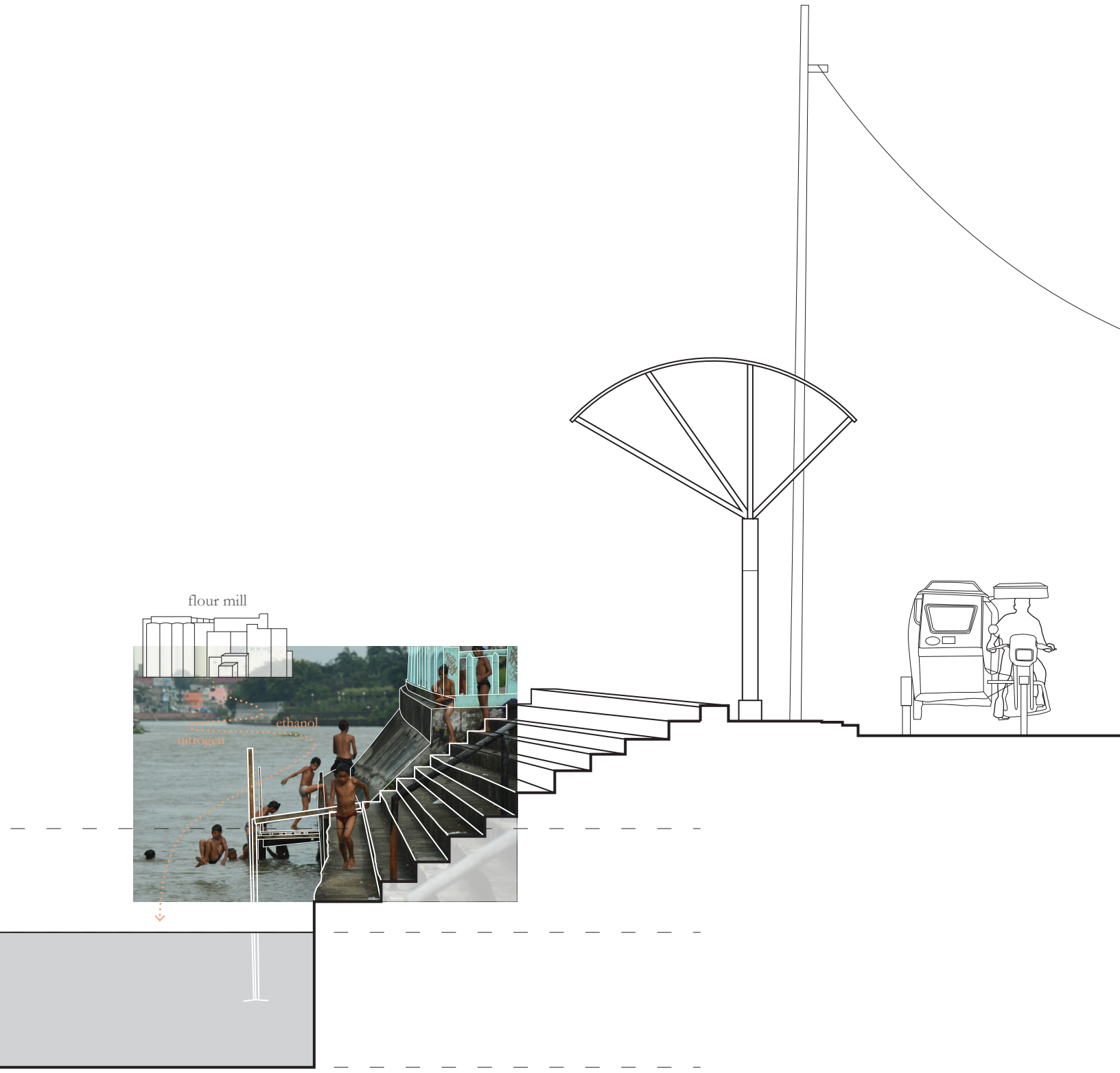



***fig. 3.05*** Riverwall in the Pineda neighborhood. Pasig.

increasing risk. Introducing walls also produces a channel devoid of pool-riffle sequences and vegetation, which are important for several aquatic organisms. Organisms that have specific water velocity requirements can also be affected by increased flow-carrying capacity. This is one of the reasons why, over time, fish populations declined in the Pasig River. This loss in aquatic habitat in turn affected those who depended on fishing for their livelihoods.

## MMETROPLAN STRUCTURES

Today, engineers are able to divert stormwater destined for Metro Manila's downstream urban cores to Laguna de Baý lake because of the Manggahan Floodway, Rosario Weir, Napindan Hydraulic Control Structure, and pumping stations. Much of this infrastructure is the result of the 1977 Metro Manila Transport, Land Use, and Development Planning Project (MMETROPLAN) discussed in Part 1. As was common at the time, the proposed flood control infrastructure projects imbued elements of high modernist thinking and called for grey infrastructure, including the construction of two new waterways *(fig. 3.06)*.

***fig. 3.06*** 1976 Flood Control Plan including the unbuilt Parañaque Spillway.

## MANGGAHAN FLOODWAY & ROSARIO WEIR

Carved from marshy suburban land, the nine kilometer-long Manggahan Floodway was designed to channel stormwater flows from the upper Marikina River basin, through the Rosario Weir's floodgates, then away from Metro Manila during rain events *(figs. 3.07-3.11)*. It was funded by a loan from the Overseas Economic Cooperation Fund, a Japanese agency. Completed in 1986, it was deemed the most cost-effective solution to downstream Pasig River fluvial flooding.[6] However, not only did its construction force the relocation of many households, the design of the Manggahan Floodway was divisive in how flood control infrastructure differentiates between the city as space that requires protection while relegating the non-city for stormwater retention *(figs. 3.12-3.16)*.

6 Department of Public Works and Communications, *Final Project Report: Manila and Suburbs Flood Control and Drainage Report*,[1972]).

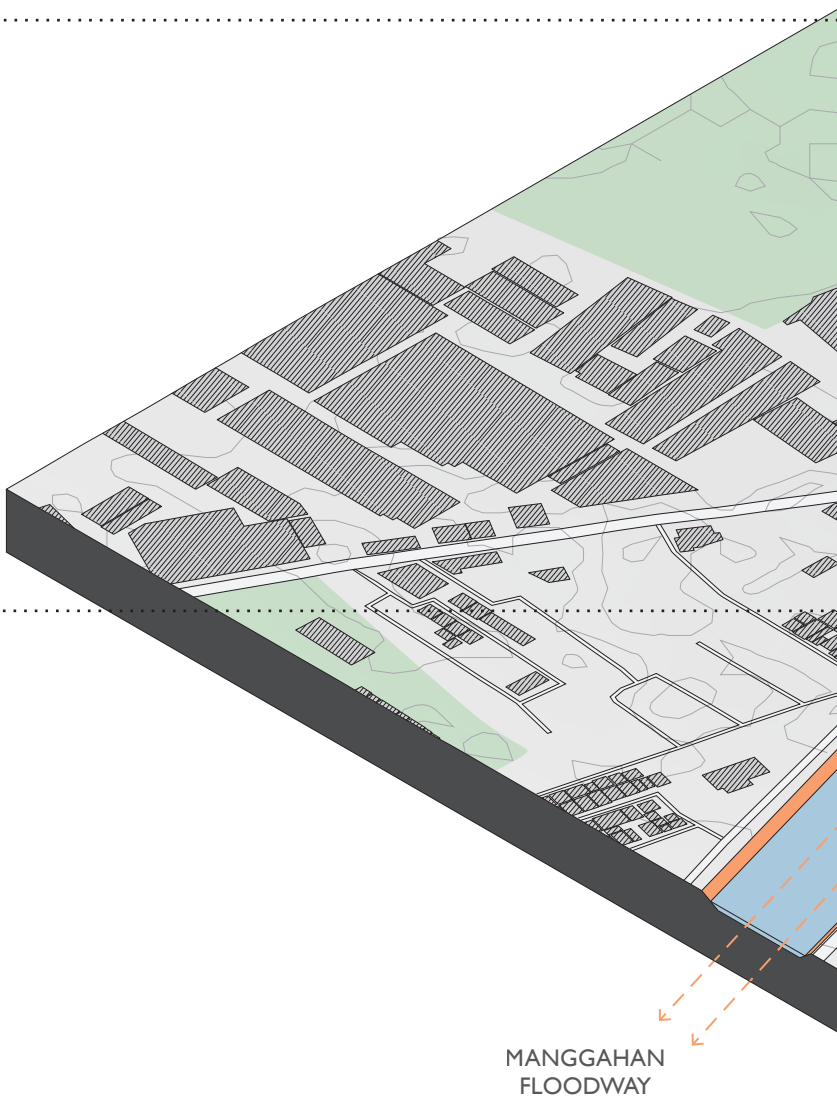
***fig. 3.07*** Floodway wall with urban informal settlement. Pasig.

N

*fig. 3.08* Rosario Weir. Pasig.

***fig. 3.09*** Floodgate at the Rosario Weir. Pasig.

***fig. 3.10*** Manggahan Floodway's structural wall. Pasig.



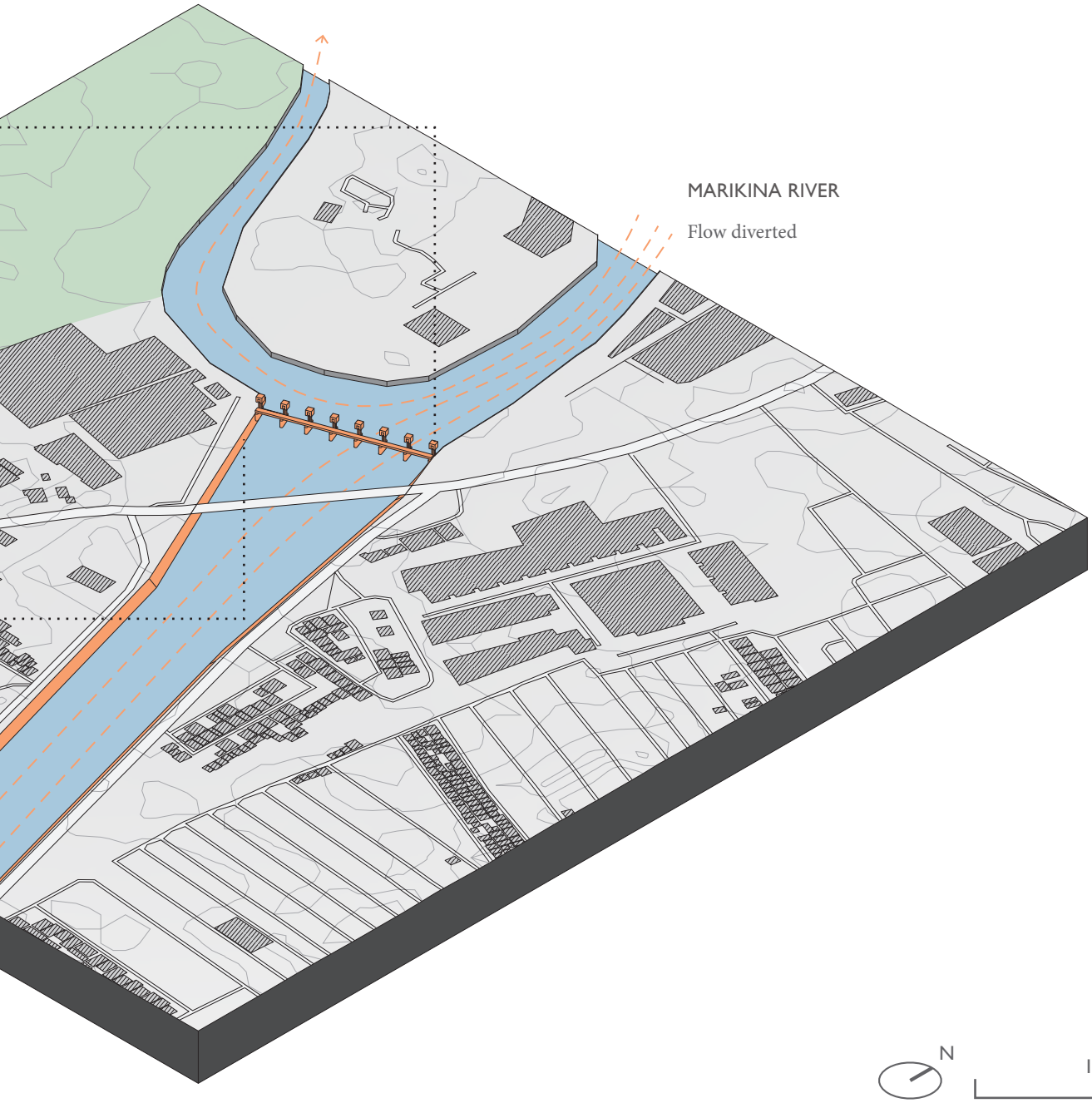




***fig. 3.11*** Axo of Rosario Weir & Manggahan Floodway when open (typical and flood-time position). Pasig. 1km$^2$, 1 : 500, 0.5m contours

***fig. 3.12*** Floodway wall covered by agricultural informal settlement. Taytay.

***fig. 3.13*** Agriculture on the edge of Laguna de Baý lake. Taytay.

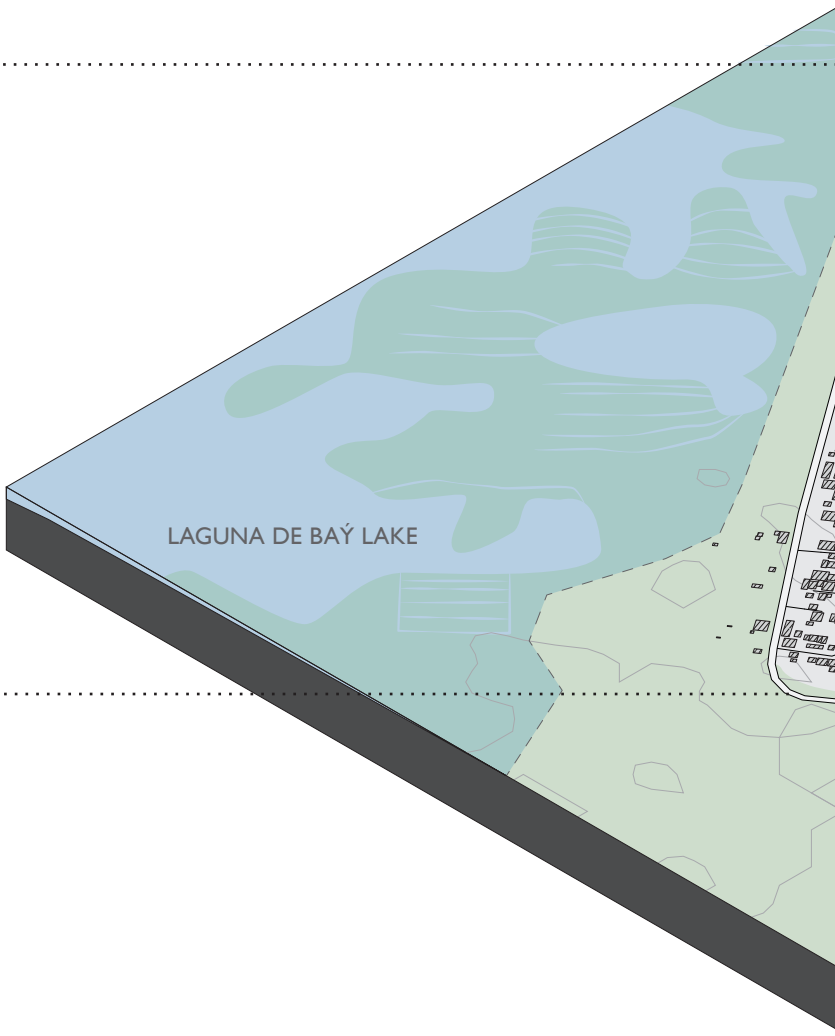



***fig. 3.14*** Axo of Manggahan Floodway.
Taytay, Rizal.
1km$^2$, 1 : 500, 0.5m contours

***fig. 3.15*** Hyacinth overgrowth in the Manggahan Floodway, looking south from Javier Bridge. Pasig.

*fig. 3.16* Removing hyacinths from the floodway. Taytay.

## NAPINDAN HYDRAULIC CONTROL STRUCTURE

The Napindan Hydraulic Control Structure (NHCS) was built in 1983 at the confluence of the Pasig and Marikina Rivers *(fig. 3.17)*. This structure's gates were intended to close during flood season to keep discharged water into Laguna de Baý lake and prevent it from re-entering Metro Manila *(figs. 3.18-3.21)*. It also doubled to control the perceived problem of saline intrusion into the lake, which occurred during dry season when the level of the lake was lower than that of Manila Bay, effectively reversing the flow of the Pasig River. Foreign experts advocated for the idea of controlling the brackish water's movement because decreased salinity and eutrophication would enable other gainful uses of the lake such as urban domestic water supply and irrigation.

Drawing from traditional knowledge of aquaculture and ecology, lakeside producers opposed the NHCS. They argued that it would magnify, rather than mitigate, risk in their area. This opposition showed not only contestation between local knowledge and technocratic imaginaries, also resistance to the idea of the non-city as a resource frontier.

N

*fig. 3.17* Napindan Hydraulic Control Structure. Makati.

*fig. 3.18* MMDA Flood Control Center.

*fig. 3.19* Tower on the main Napindan Hydraulic Control Structure. Makati.

*fig. 3.20* Under an open lock of the Napindan Hydraulic Control Structure. Makati.

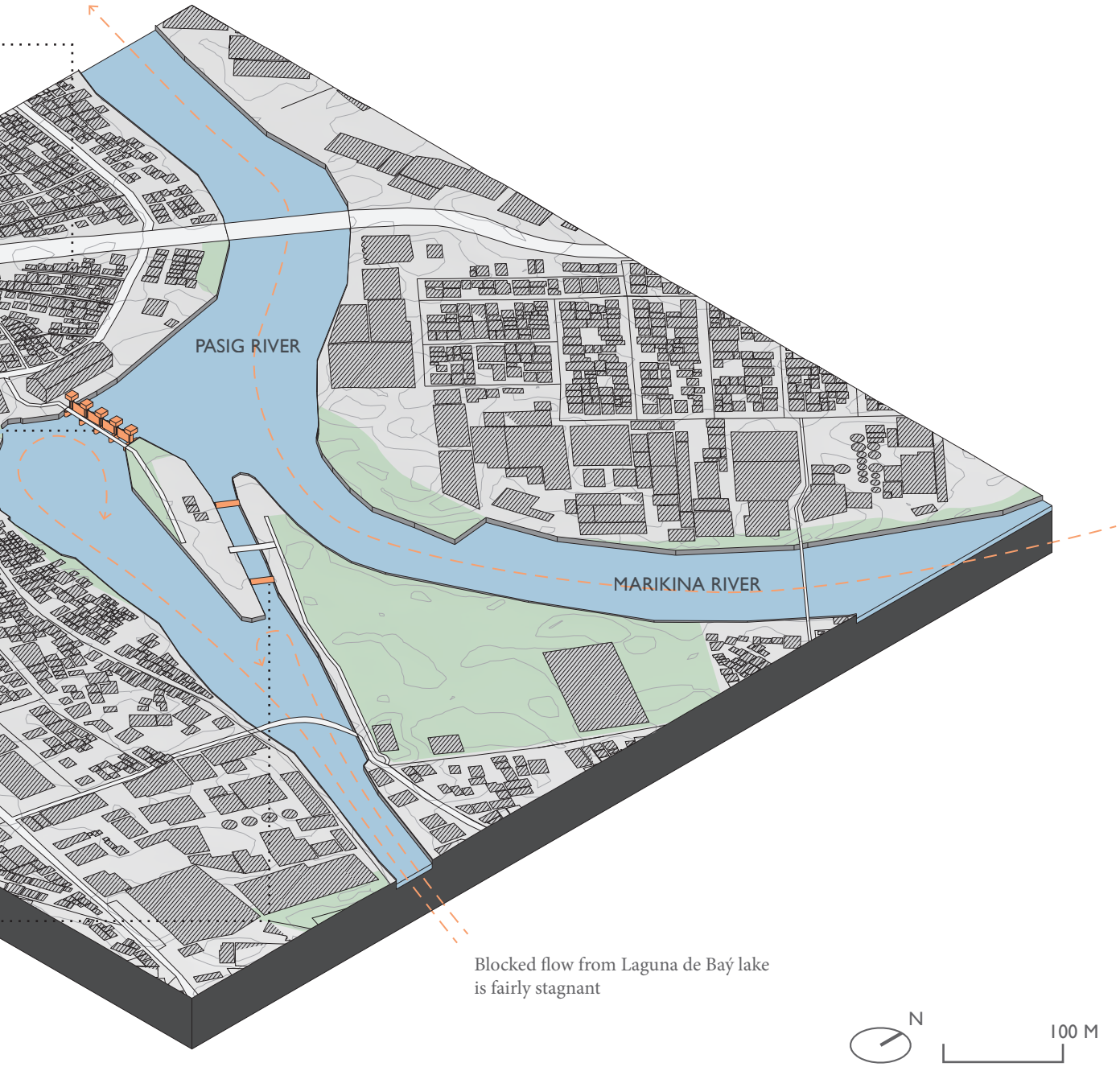



***fig. 3.21*** Axo of Napindan Hydraulic Control Structure when closed (post-flood position). Makati.
1km$^2$, 1 : 500, 0.5m contours

## PARAÑAQUE SPILLWAY

To relieve the volume of stormwater flowing into Laguna de Baý lake, the Parañaque Spillway was also proposed *(fig. 3.06)*. It would have channeled water from the lake into Manila Bay, instead of having it flood lakeshore towns. However, due to budget priorities, it was never built. The proposed spillway would have reduced the flooding around the lake's perimeter, but it would have also distributed some risk to Parañaque City. After the 2009 flooding that came with Typhoon Ketsana, the Arroyo administration, supported by prominent local planners, considered reviving the project.[7] But the 1970s idea was infeasible in the 2010s as cutting through densely populated Parañaque would have required intensive displacement. Building the spillway as-proposed would have cost ₱18 billion, while raising the land around the lake, thought to be a more effective solution, would cost ₱7.1 billion.[8] The construction of the Manggahan Floodway without the spillway was unwise, but it is no longer practical to realize out-dated add-ons.

7 Felino A. Palafox Jr., "Reviving the Parañaque Spillway Project," *The Manila Times,* June 15, 2017.

8 amounts are equivalent to CAD 456 million and CAD 180 million, respectively

***fig. 3.22*** Aquaculture pen structure in Laguna de Baý. Taguig.
(left)

***fig. 3.23*** Agriculture on the Laguna de Baý shoreline. Taguig.
(above)

## HAZARDSCAPE

In the topological space perpetuated by MMETROPLAN, material flows were envisioned to be channeled through the river and manmade waterways as efficiently as possible, displacing undesired volumes to the non-city. Laguna de Baý lake, in this scenario the non-city *(figs. 3.22 & 3.23)*, was critical to the MMETROPLAN's overall flood control design as 70% of the discharge flow from the Marikina River was intended to be trapped in the lake and floodway by the floodgates for temporary retention.[9] Controlling metabolic flows has become key in the ongoing function of the city, leaving the lake as a resource to be utilized for flood management. At the peak of the 2009 and 2012 flood events, engineers channeled around 4000m/s of flow to the lake, resulting in it swelling to the largest it had been in almost three decades.[10] While large grey infrastructural solutions may be effective in reducing flooding in one area, they often transfer risk or convey hazards upstream or downstream.

9 Saguin, "Producing an Urban Hazardscape Beyond the City," 1974.
10 Leonardo Q. Liongson, "Flood Mitigation in Metro Manila," *Philippine Engineering Journal* 29, no. 1 (2008).

Urban political ecologists argue that risk and vulnerability are not spatiotemporally static conditions but instead evolve. The production of Laguna de Baý lake as a hazardscape sits within a longer history of imaginaries that have distributed risks and produced vulnerabilities unevenly over space and across populations. Knowing their connection to the city through infrastructural flows and recognizing their position within the hazardscape, lake dwellers have confronted and adapted to changing risks. Accordingly, due to the consequences of MMETROPLAN, they have met other proposed infrastructure projects with resistance.

Even as lake dwellers are told the land they live on is too wet, in 2012, the federal government proposed the Laguna Lakeshore Expressway Dike (LLED), which will entail raising entirely new ground from the lake *(fig. 3.24)*. The intent is to clear existing land then reclaim a 700-hectare zone adjacent to the private expressway-dike for new development. As the process of creating land for the elite requires taking from the poor, this proposal speaks to the insidious nature of the technocratic language of climate adaptation rationalizing mass displacement. This current struggle between the lake dwellers and the government parallels the mobilization against the MMETROPLAN NHCS *(fig. 3.25)*:

> "We held a rally, a motorcade. We went to Malacañang riding boats but we were not allowed inside to talk to the president. This is what I want to happen again to show the government that we are against this road dike [LLED]. What happened back then was that we contributed one peso each so that we could try to blast the Napindan channel [NHCS]. […] If some of the people I know back then were still alive today, [they would oppose this road dike]. The grandfather of one of my friends once told him that there will come time someday when the lake will turn red. Maybe this is the time. The construction of the road dike is a sign of that. Lives might be shed."[11]
>
> Older Laguna fisher


***fig. 3.24*** Phases of the Laguna Lakeshore Expressway Dike project.


***fig. 3.25*** Protest against the Laguna Lakeshore Expressway Dike.

11 August 2015 interview in Saguin, "Producing an Urban Hazardscape Beyond the City," 1980.

This dike, a strategy that has been imposed from the top down, again burdens Laguna de Baý lake's ecology and populations to make a drier city possible. However, while the elevated land will help defend the city from the water funnelled into the lake by the existing floodway, it will also prevent inland rainfall from draining. As such, like MMETROPLAN, moving forward with this technocratic fix will create disparate social vulnerability.

## PUMPING STATIONS

The pumping stations positioned along the Pasig River constrict the natural exchange of brackish water between the river and *esteros*. When open, water flows beneath its floodgates. When closed, they pump water out from their respective *estero* and into the river, acting as a control point for land drainage *(figs. 3.27 & 3.29)*.

***fig. 3.26*** Jones North, a smaller pumping station. Manila.

The majority of the existing pumping stations were built between 1976 and 1985, so, similar to other MMETROPLAN components, these structures tie back to the notion of the sanitary city. All the large pumping stations were funded through Overseas Economic Cooperation Fund *(figs. 3.28, 3.30, & 3.31)*, while the smaller ones were financed by domestic funds *(fig. 3.26)*.

> "We discovered that the average age of all of our pumping stations was 30 years. They were operating but they were no longer effective. And the drainage system was only designed for 10 years and is now clogged. […] In New York, a truck could fit in [a stormwater pipe]. But with ours, maybe only a dog could enter."[12]
>
> Patrick Gatan
> Director of the Unified Project Management Office on Flood Control, Department of Public Works and Highways

Despite the overdependence on pumping stations as a mechanism for draining the urban landscape, due to the lack of maintenance over their lifespan, they have become inefficient and "underperforming."[13] Currently, this system is not sufficiently reliable in that it is 'safe to fail' when inevitable disruptions occur. For example, in 2013, five major power generation plants in Luzon failed and caused blackouts across the island, resulting in power interruptions at the city's pumping stations. This indicates a lack of redundancy in the overburdened infrastructural system. This incident also points to a consequence of the privatization of both utilities and planning, which has led to an inconsistent quality

12 Translated from Filipino by author. Interview in: Annie Ruth Sabangan, "Don't (Just) Blame it on the Rain," *Kilusang Bagong Lipunan,* Sept 26, 2014.

13 The World Bank, *Project Appraisal Document on a Proposed Loan to the Republic of the Philippines for a Metro Manila Flood Management Project*, (2017).

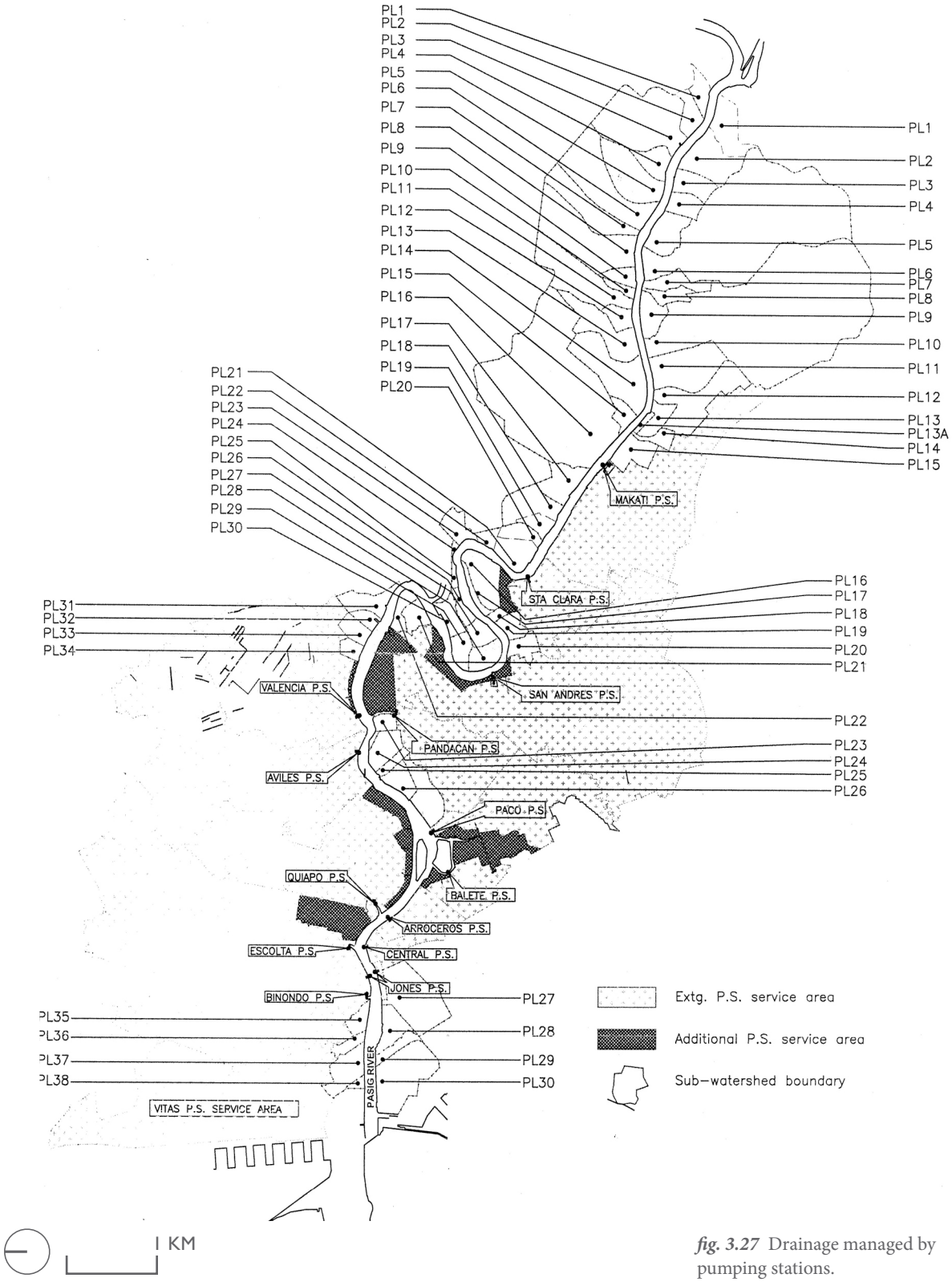



*fig. 3.27* Drainage managed by pumping stations.

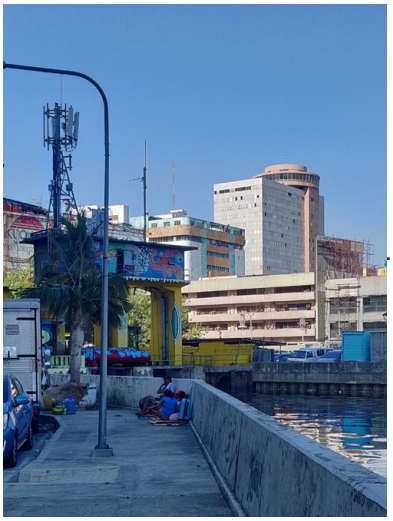
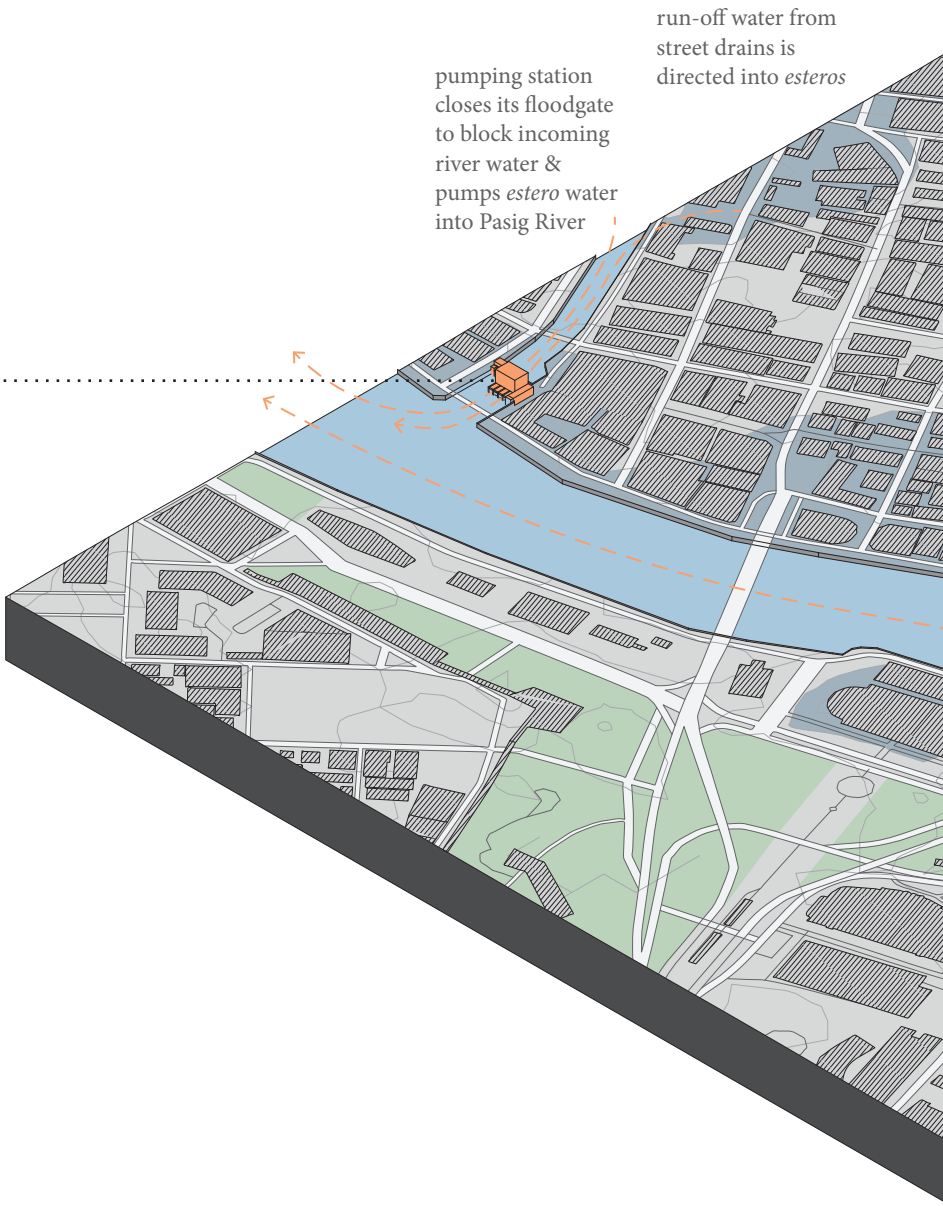


***fig. 3.28*** Escolta Pumping Station. Manila.



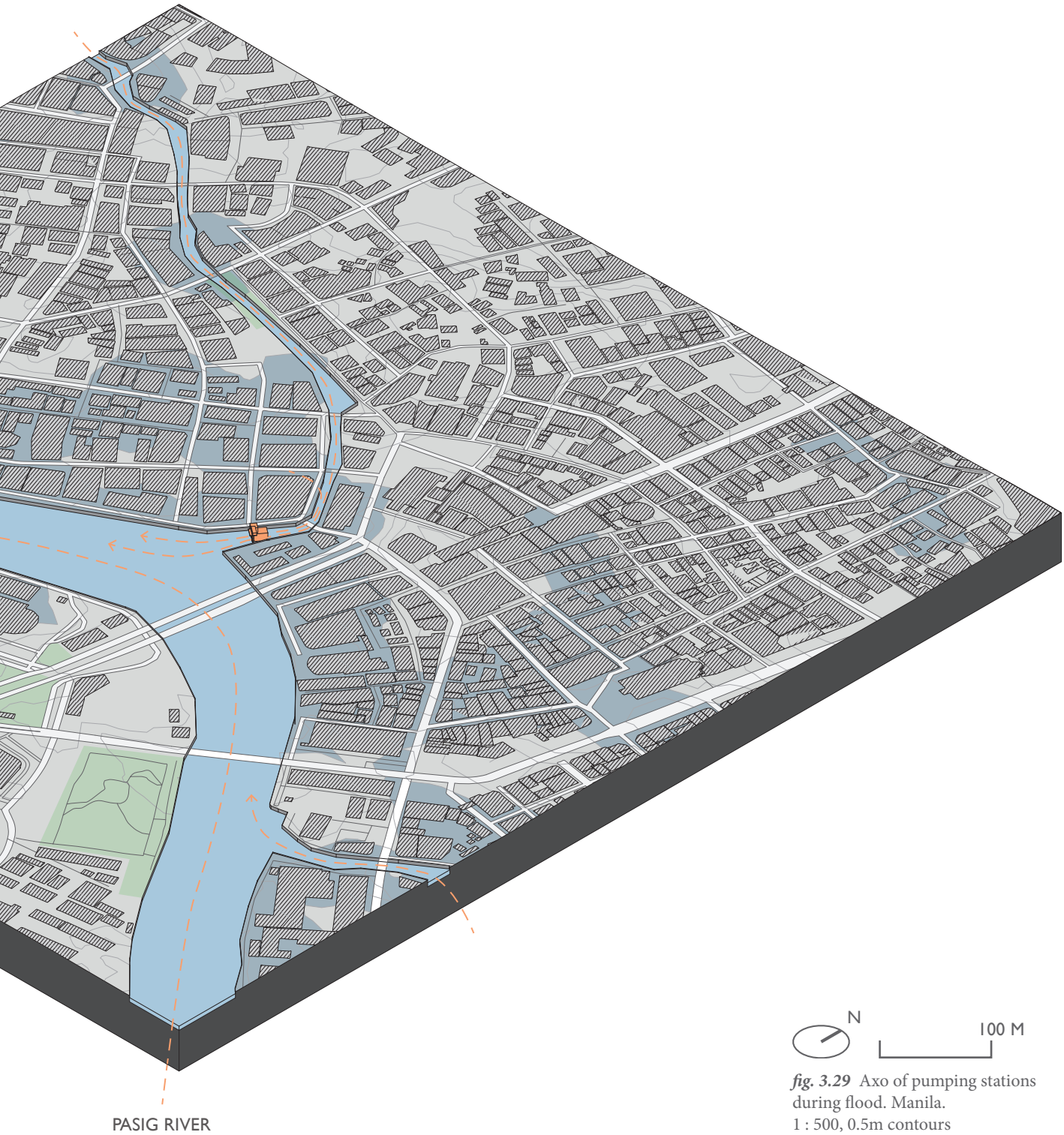



***fig. 3.29*** Axo of pumping stations during flood. Manila.
1 : 500, 0.5m contours


***fig. 3.30*** Makati Pumping Station.
Makati.


***fig. 3.31*** Beata Floodgate. Pandacan, Manila.

of networked electricity infrastructure across Metro Manila. In privately developed areas (eg. Bonifacio Global City), developers work directly with utility companies to get better infrastructure, which improves the relative resilience of their already wealthy residents.[14] In the public city beyond these exclusive pockets, the electricity infrastructure is less reliable, making low-income residents more vulnerable, particularly when natural hazards hit. This illustrates the double exposure feedbacks between climate change and globalization exposure that reinforce existing inequalities.

Their main purpose is to relieve *esteros* from run-off. This regulation of water alters flows. When the pumping station's floodgate is closed and run-off is pumped out, the volume puts pressure the riverbed *(fig. 3.33)*, which can hurt species living the in sediment. Conversely, they also render *esteros*' water quite stagnant when pumps are non-operational, which can influence the timing and speed of fish movement. Since delayed passage can increase risk of predation and disease, fish entrainment over pumping stations must be considered as populations increase as the Pasig's water quality improves.

Their façades have been recently used to promote urban change. Nine pumping stations along the Pasig River were painted in 2017 in the Pasig River Art for Urban Change platform in a partnership between the MMDA and the British Council *(fig. 3.32)*. The project aims to create a more liveable and inclusive city by inviting artists to use the façades of pumping stations as blank canvases. It has enabled the access of publicly visible spaces for creative use while raising awareness of the importance of the river.

14 Sara Meerow, "Double Exposure, Infrastructure Planning, and Urban Climate Resilience in Coastal Megacities," *Environment and Planning A: Economy and Space* 49, no. 11 (Aug 21, 2017) 2661.

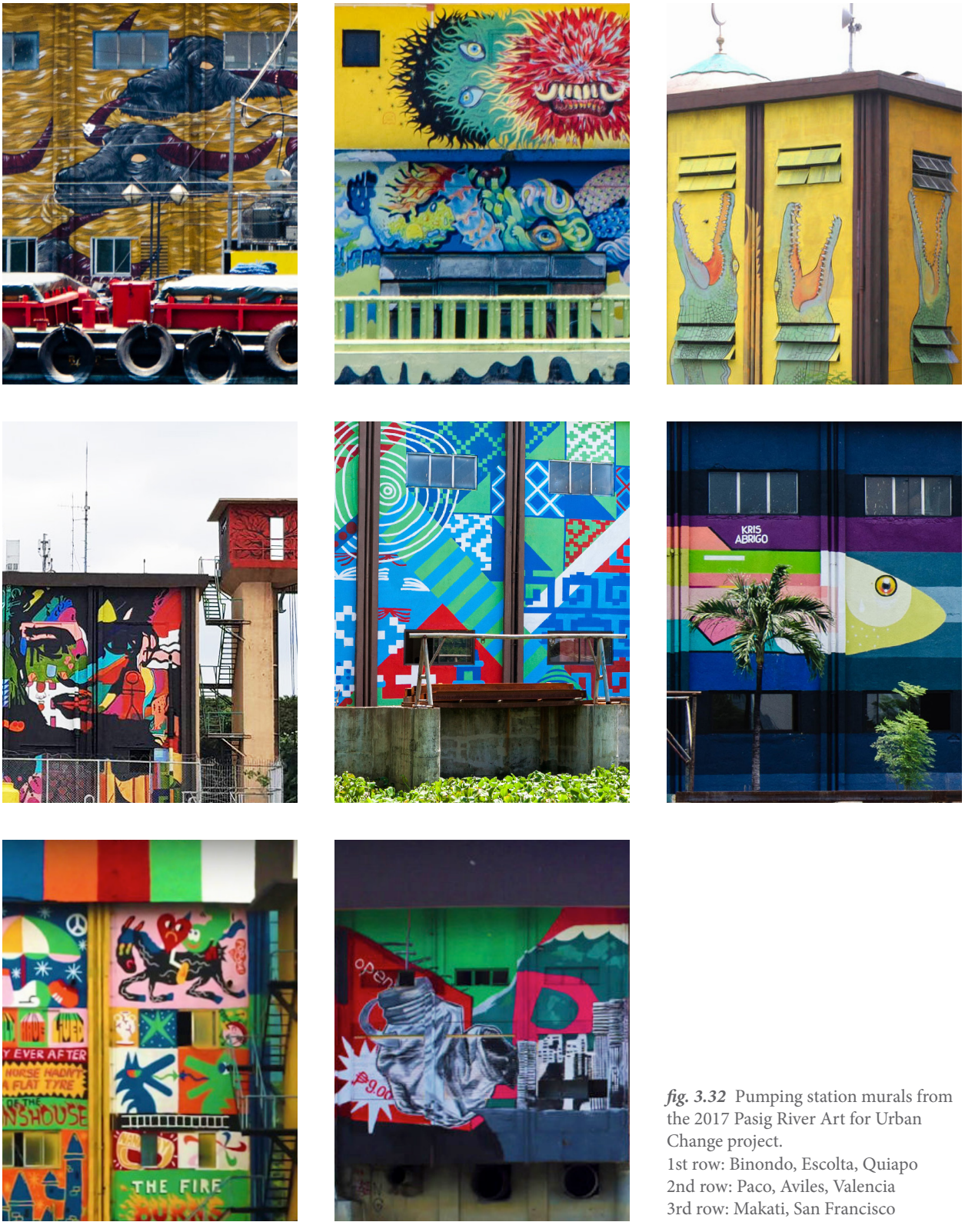



*fig. 3.32* Pumping station murals from the 2017 Pasig River Art for Urban Change project.
1st row: Binondo, Escolta, Quiapo
2nd row: Paco, Aviles, Valencia
3rd row: Makati, San Francisco

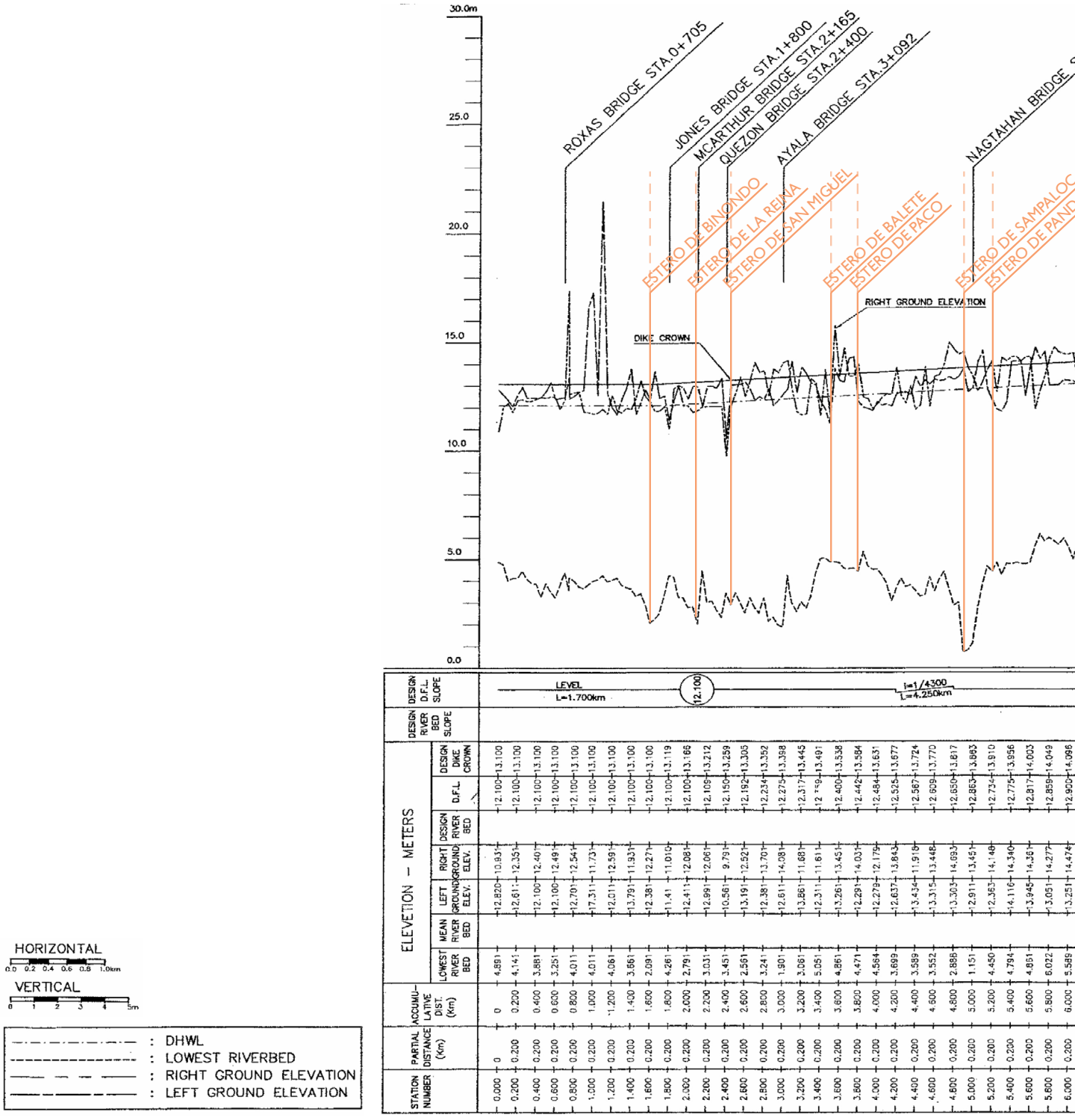
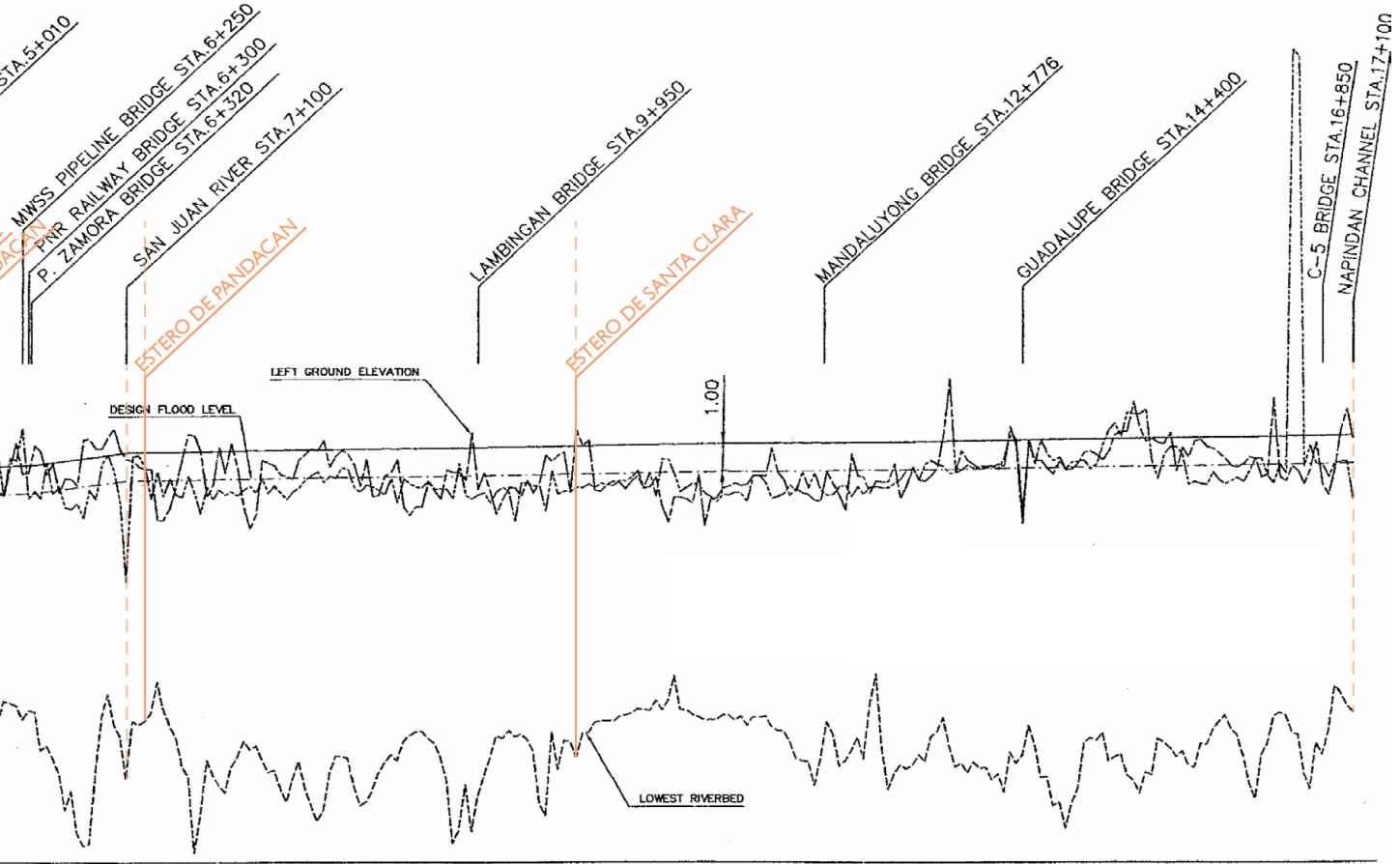
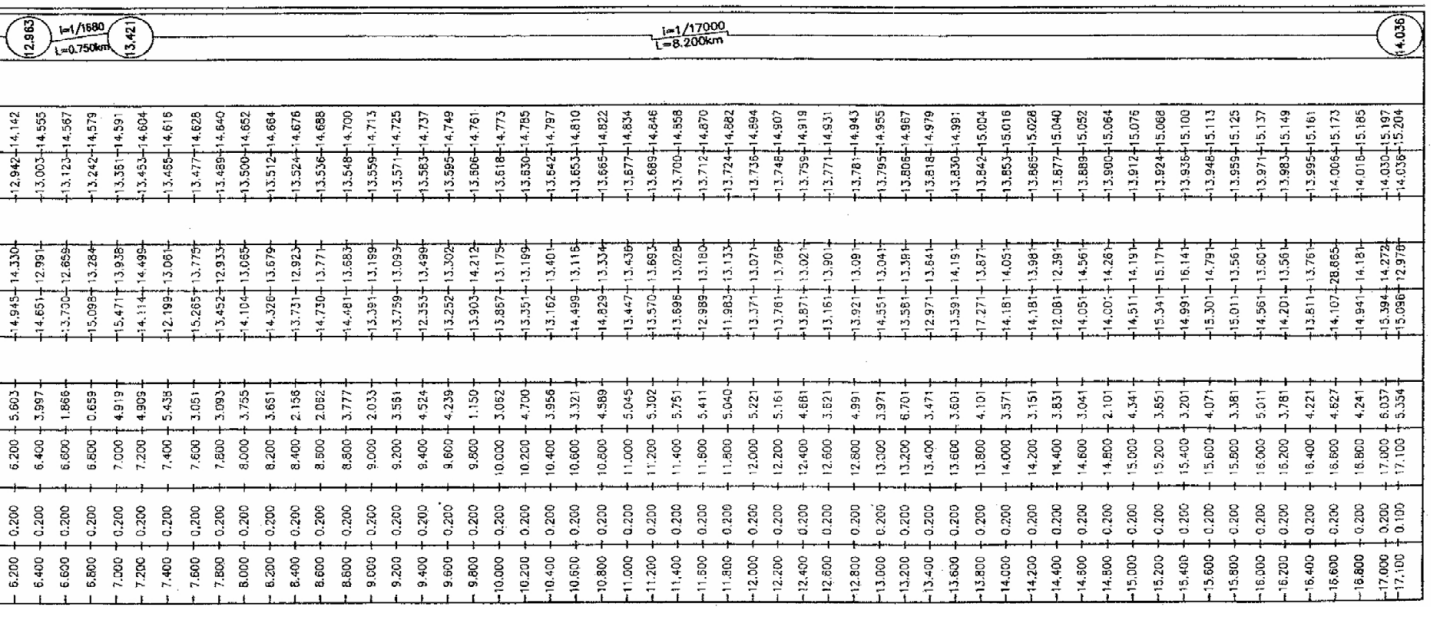



*fig. 3.33* Longitudinal profile of the Pasig River.


STA.5+010
MWSS PIPELINE BRIDGE STA.6+250
PNR RAILWAY BRIDGE STA.6+300
P. ZAMORA BRIDGE STA.6+320
SAN JUAN RIVER STA.7+100
ESTERO DE PANDACAN
LAMBINGAN BRIDGE STA.9+950
ESTERO DE SANTA CLARA
MANDALUYONG BRIDGE STA.12+776
GUADALUPE BRIDGE STA.14+400
C-5 BRIDGE STA.16+850
NAPINDAN CHANNEL STA.17+100
LEFT GROUND ELEVATION
DESIGN FLOOD LEVEL
1.00
LOWEST RIVERBED


i=1/1680
L=0.750km
i=1/17000
L=8.200km

## METRO MANILA FLOOD MANAGEMENT PROJECT

Approved in September 2017, the Metro Manila Flood Management Project is a US$200 million infrastructure project in conjunction with The World Bank aimed to "improve flood management in selected areas of Metro Manila" by constructing new and modernizing existing pumping stations, improving solid waste management practices, and supporting resettlement.[15] While not explicitly an adaptation plan, one of its objectives is "increased resilience to natural disaster and climate change impacts."[16] The push for this major project was the result of 2009 Typhoon Ketsana as a tipping point, which spurred discussions of climate change and flood resilience. To date, the implementation progress has been rated as "moderately unsatisfactory" with none of the 36 existing pumping stations yet rehabilitated nor the proposed 20 built *(fig. 3.35)*.[17]

Directed toward pumping and draining infrastructure, this plan does not involve other infrastructural approaches. It is easy to visualize the benefits of a machine or a wall, or in this case modernizing waning pumping stations *(figs. 3.34)*, whereas it is more challenging to convey the impact of dredging rivers and green infrastructure. It is interesting to note that some project documents reference 'room for the river,'[18] a Dutch strategy that involves moving back dikes and digging new channels to expand the floodplain. In Metro Manila's context, it is not feasible to create more 'room for the river' due to existing development so people are instead relocated away from the water, demonstrating that this rhetoric and imaginary of resilience are being leveraged selectively.

In terms of imaginaries, this project presents another case of discriminatory development in which the line between

15 The World Bank, *Project Appraisal Document on a Proposed Loan to the Republic of the Philippines for a Metro Manila Flood Management Project*, 8.

16 Ibid., 7.

17 "Projects and Operations: Metro Manila Flood Management Project," last modified Nov 30, 2019. projects.worldbank.org/en/projects-operations/project-detail/P153814.

18 Joop Stoutjesdijk, *Implementation Completion Memorandum* (Washington, D.C. [2015]).

***fig. 3.34*** Current condition of Vitas Pumping Station. Tondo, Manila.

alleviating flooding and protecting assets is blurred. World Bank reports use depoliticized language such as 'project affected people' to obscure the fact that most of the displaced to create the "technical footprints" for these new pumping stations will be from informal settlements,[19] while wealthier neighborhoods in the floodplain will remain intact. The project initially targeted voluntary relocation to seven in-city sites, where residents could maintain social and economic ties, but with minimal affordable urban land, the program shifted toward involuntary resettlement.

19 The World Bank, *Project Appraisal Document on a Proposed Loan to the Republic of the Philippines for a Metro Manila Flood Management Project*, 9.

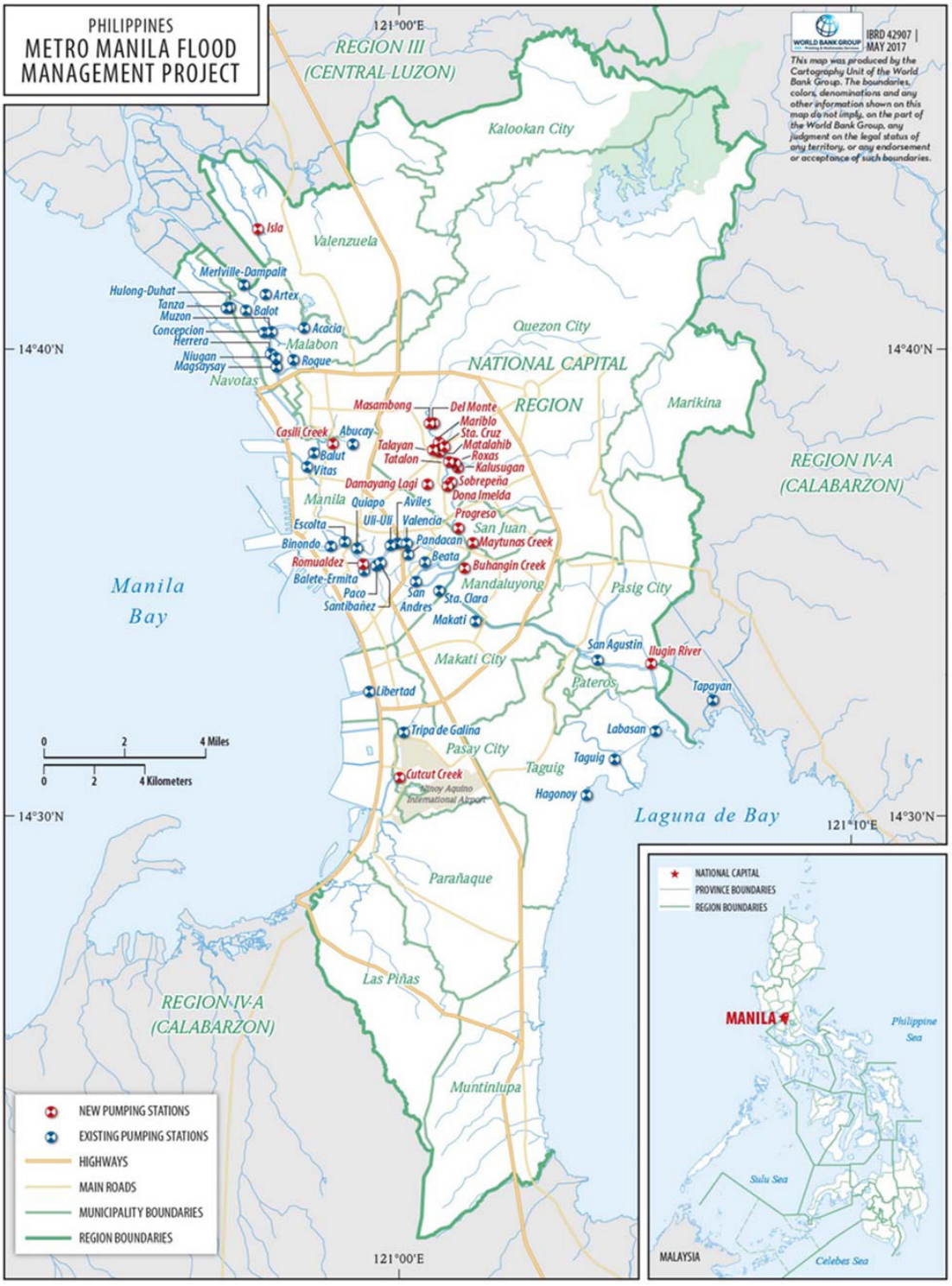



***fig. 3.35*** Metro Manila Flood Management Project.

## GREEN INFRASTRUCTURE

Environmental assets are considered important components of urban resilience, yet few ecological areas remain in Metro Manila *(fig. 3.36)*. Globalization, which has spurred rapid urban growth across Asia, drove massive rural-urban migration to Metro Manila. This urbanization has led to an increase in impervious surfaces, development in environmentally sensitive areas, groundwater extraction, and other factors that increase flooding during natural hazards.

Mangrove species *(fig. 3.37)*, including the endemic *nilad* from which Manila takes its name, once proliferated along Manila's Bay coastline and at the Pasig River delta's mouth. Despite providing coastal protection, they have been mostly eradicated. Many of the remaining larger green spaces in the megacity are often exclusive, such as golf clubs and tree-lined streets of gated villages. Meanwhile, several open green spaces are guarded and part of commercial developments *(fig. 3.38)*, rendering them unwelcoming to lower income populations. In the globalization of Metro Manila, "government is playing a reduced role in city building and space has been bifurcated between the privately planned 'global city' for the middle and upper classes and the neglected and marginalized spaces belonging to the rest of the population."[20] The green spaces that remain open to the public are heavily hardscaped *(fig. 3.39)*.

20 Gavin Shatkin, "Colonial Capital, Modernist Capital, Global Capital," *Pacific Affairs* 78, no. 4 (Dec, 2005) 600.

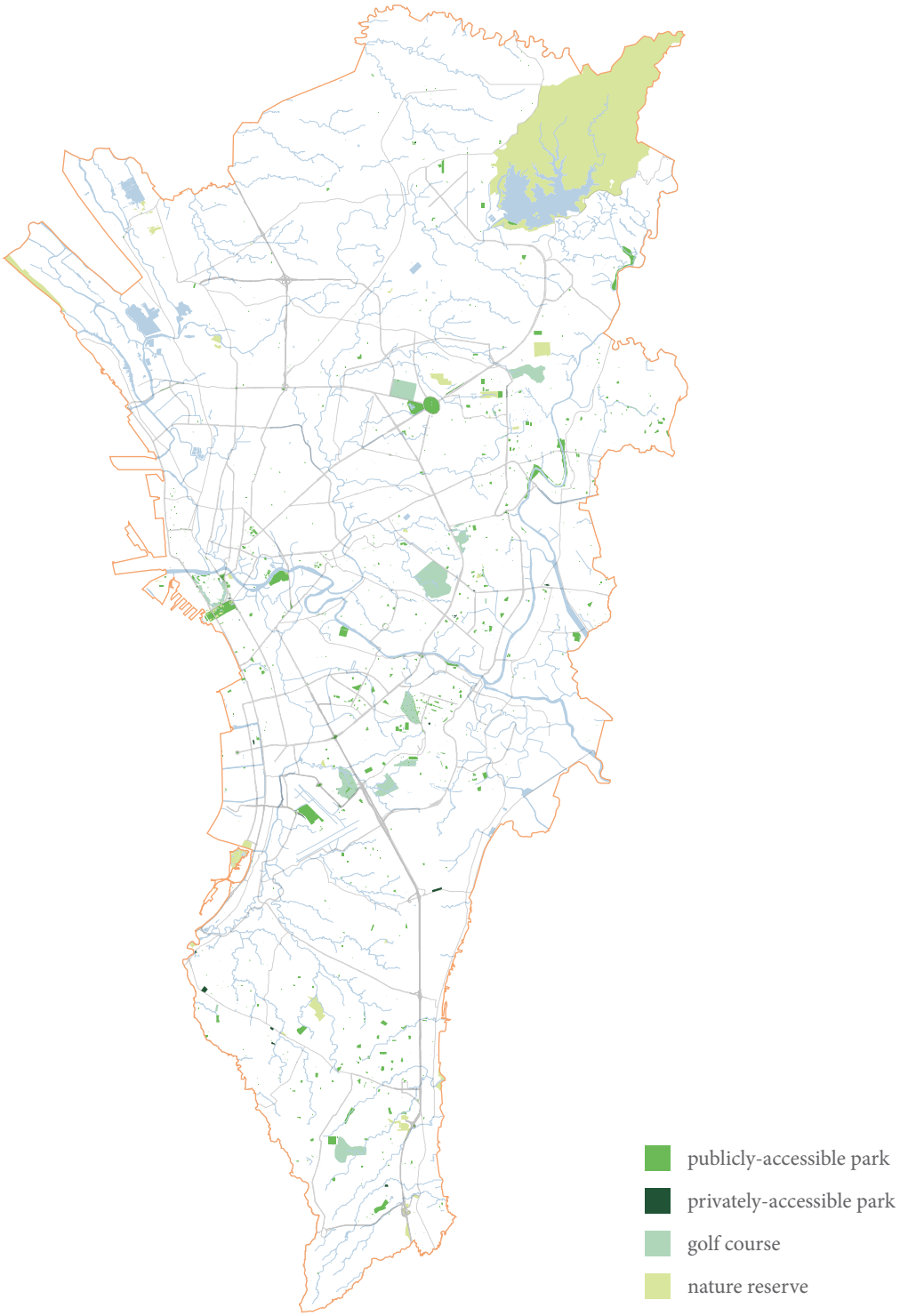



***fig. 3.36*** Green space in Metro Manila.
1 : 250,000

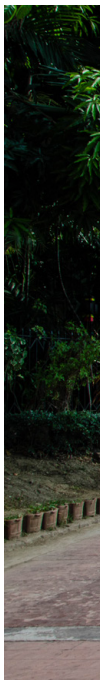


***fig. 3.37*** Mangrove sanctuary on Freedom Island. Parañaque. The Las Piñas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA) is home to Metro Manila's only remaining mangroves.

***fig. 3.38*** Santiago & Libertad Cua Park. Makati.
The park is part of a commercial development and has little foot traffic.

***fig. 3.39*** Rizal Park. Manila.
This historical urban park is primarily hardscaped.

## ESTERO PARKS

The former Pasig River Rehabilitation Commission (PRRC) created several small parks along Manila's *esteros* in which they reshaped the banks *(figs. 3.40 & 3.41)*, built walkways *(fig. 3.41)*, cleared space *(fig. 3.43)*, cleaned the water, and planted vegetation. The federal government described this as a modern and ecological approach to managing waterways even though it defined the easement distances zone in terms of fixed measurements instead of ecological parameters:

> "The banks of rivers and streams and the shores of the seas and lakes throughout their entire length and within a zone of three (3) meters in urban areas, twenty (20) meters in agricultural areas and forty (40) meters in forest areas, along their margins are subject to the easement of public use in the interest of recreation, navigation, floatage, fishing and salvage. No person shall be allowed to stay in this zone longer than what is necessary for recreation, navigation, floatage, fishing or salvage or to build structures of any kind."[21]
>
> Article 51, A Decree Instituting a Water Code

These parks are successful within the purview of the PRRC's imaginary of providing an image of resilience. Embedded in this is the fact that despite its intentions in placemaking, the

21 *A Decree Instituting a Water Code,* Presidential Decree 1067, (1976).

***fig. 3.40*** Adding hard edges to *Estero* de San Miguel's bank. Manila. (right)

***fig. 3.41*** Existing edge condition of *Estero* de San Miguel. Manila. (below)

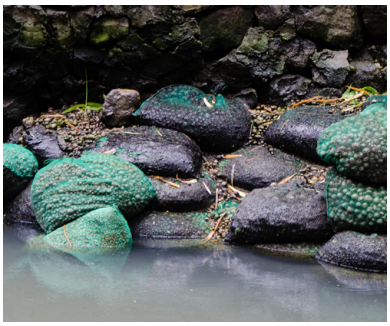


***fig. 3.42*** *Estero* de San Miguel. Manila.
Approximately 3 meters reclaimed.

***fig. 3.43*** Casa Hacienda Park on the Pasig River. Makati.
Approximately 8 meters reclaimed.

commission actively cleared informal settlements to create space for its projects. Those who lived within the aforementioned zones were deemed as living in "danger areas" as per the 1992 Urban Development and Housing Act, giving the National Housing Authority (NHA) the power to evict them. The 1992 law distinguished between 'informal dwellers' and 'squatters,' with those who comply with resettlement deemed as neutral 'informal dwellers' and those who resist criminalized as 'squatters.' This rhetoric of 'danger areas' has proven effective in generating compliance to the PRRC's objectives. However, in the southern area of the *Estero* de San Miguel revitalization, only part of the community submitted and the rest retaliated, resulting in a partially-built project *(fig. 3.45)*. Conversely, in the northern scope the *Estero* de San Miguel project, which is flanked by private universities, the PRRC and NHA did not enforce that the institutions also conform with the easement zone laws *(fig. 3.44)*. The costs and benefits of these parks are distributed unequally.

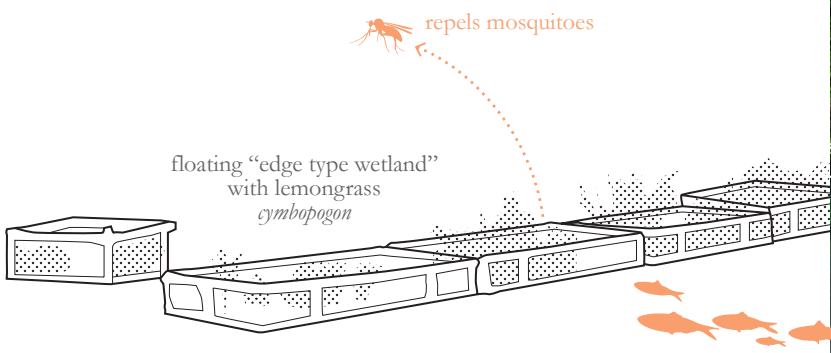


***fig. 3.44*** *Estero* de San Miguel behind Centro Escolar University. Manila. The PRRC was unsuccessful in reclaiming the easement zone from the university so they leveraged space on the water.
(left)

***fig. 3.45*** Techniques used in the *Estero* de San Miguel revitalization. Manila.
(below)

## GREEN FUTURES

There is currently no coordinated plan to create an interconnected network of green space across Metro Manila. Creating green infrastructure is left to individual municipalities and private developers, meaning it is only built if its value is recognized. As pressure on both urban and suburban development increases, publicly and privately-owned green spaces are converted to more lucrative functions. Consequently, there is virtually no park system *(fig. 3.47)*. The few existing public parks in Metro Manila are dominated by hardscaping or inaccessible green space.

Metro Manila's decentralized planning is problematic because connectivity is a critical element in planning green infrastructure. Green infrastructure within the same megacity, watershed, and floodplain needs to be coordinated. Similar to in nature, ecological systems transgress political boundaries, thus effective coordination is essential to its management and success.

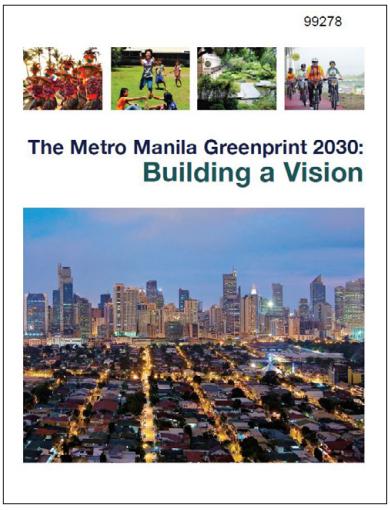


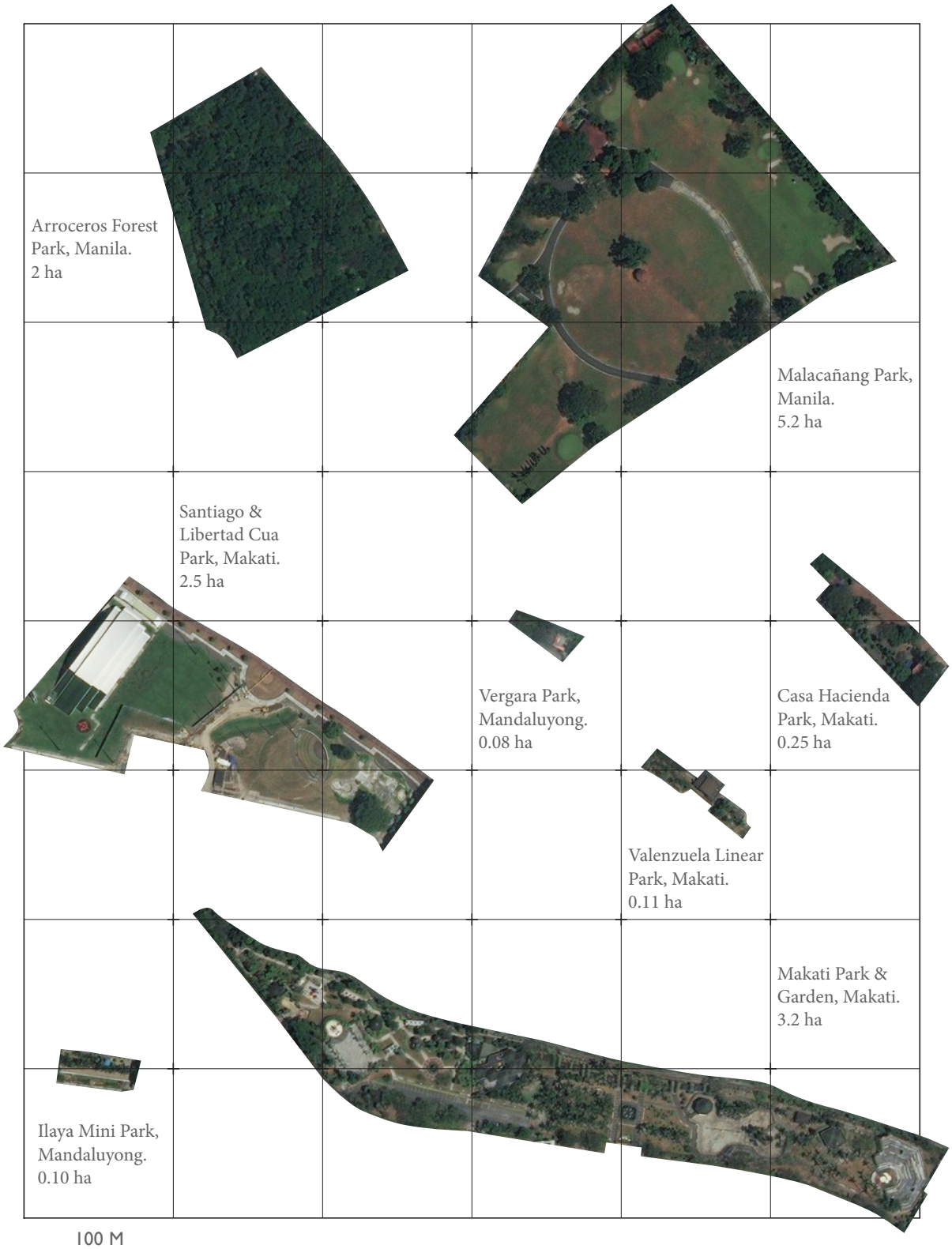

***fig. 3.46*** Greenprint 2030 cover.

In the face of mounting pressures, the Greenprint 2030 plan was a "resolute attempt" on the part of the MMDA to engage in "a process to create a common vision for the region's future" *(fig. 3.46)*.[22] With support from The World Bank, it calls on LGUs to think of Metro Manila as a collective region and sets up a strategic framework and direction to inform future comprehensive plans. While the introductory report does acknowledge the region's fragmentation and hazard vulnerability, it primarily promotes urban resilience in the interest of furthering the business process outsourcing (BPO) industry.[23] This plan hasn't been implemented yet, but it does raise questions about who benefits from resilient and green infrastructure. If the plan goes through, it will be interesting to see if the proposed "resilient metropolis for all" actually benefits all socio-economic classes.[24]

Another new nationwide program attempting to tackle the lack of green infrastructure is the Department of Budget and

***fig. 3.47*** Existing parks along the Pasig River.
1 : 4,000 (opposite)

22 Metropolitan Manila Development Authority and World Bank, *The Metro Manila Greenprint 2030: Building a Vision* (Makati [2014]). 2.
23 Ibid., 14.
24 Ibid., 8.


Arroceros Forest Park, Manila.
2 ha
Malacañang Park, Manila.
5.2 ha
Santiago & Libertad Cua Park, Makati.
2.5 ha
Vergara Park, Mandaluyong.
0.08 ha
Casa Hacienda Park, Makati.
0.25 ha
Valenzuela Linear Park, Makati.
0.11 ha
Makati Park & Garden, Makati.
3.2 ha
Ilaya Mini Park, Mandaluyong.
0.10 ha
100 M

Management's Green Green Green drive, a financial assistance program established in 2018 that aims to develop public open spaces. With its name echoing the Build Build Build drive, this program recognizes the richness that open, green space can offer to a city's story. The application process encouraged proposals to envision their role in the urban fabric while also emphasizing increasing softscaping, accessibility, and biodiversity. In its first year, 143 cities expressed interest in securing support from the ₱2.589 billion fund.[25,26] While this program will address the lacking quantity of green space, it won't necessarily create infrastructural connectivity as each city can only finance one space per year.

At a 2018 workshop on urban biodiversity,[27] it seemed that public officials and private-sector participants varied in terms of their knowledge of and experience with greening. Many LGUs did not have greening or sustainability master plans. Pasig City emerged as a leader in the discussion, with a representative from its City Environment and Natural Resources Office emphasizing that 2009 Typhoon Ketsana was a call to action. The Pasig Green City Program has since softscaped existing hardscaped parks, developed a greenway, planted 90,000 trees, and created urban gardens.[28] However, in many LGUs, including Pasig City, tens of thousands of informal settlers have been displaced to create green space and reduce flood risk. If informal settler relocation is regarded as gentrification,[29] then green infrastructure development is lending itself to eco-gentrification, generating perpetual inequity.

25 Kris Crismundo, "143 Cities Seek Funding for Green Green Green Projects," *Philippine News Agency,* June 27, 2018. www.pna.gov.ph/articles/1039637.

26 equivalent to CAD 63.9 million

27 attended by author in Quezon City, Metro Manila on May 29, 2018

28 Aaron Acedillo, "Pasig Green City Initiatives: Biodiversity Conservation Efforts" Department of Environment and Natural Resources, May 29, 2018.

29 Narae Choi, "Disparities in Urban Planning and Displacement Risks," *Urban Studies* 53, no. 3 (2016) 579.

## CONFRONTING INFORMALITY

In the context of Metro Manila's fragmented urban governance and planning, development still happens—often haphazardly, often bending the rules—through both private companies and informal settlements. Within this development pattern, the nature of subaltern sites and the urban poor has become a major predicament in discussions about the city's future. Informality, and the removal of it, goes hand in hand with resilience and flood infrastructure development. Rather than acknowledging how government-propelled imaginaries have failed these communities, local rhetoric about the poor has often been relentless, from, as mentioned in Part 1, the Marcos regime assigning blame, to a senator recently stating that informal settlers' "mere presence put at risk the well-being of Metro Manila residents."[30] On the contrary, residents of the informal city are crucial for the function of several formal socioeconomic networks. This section will unpack the challenges informal communities have faced in response to built proposals.

Informal settlements, better locally known as *iskwater* or slum dwellers, straddle or sit outside typical governance. They have existed since colonial times to host indigenous populations, but have increased in proliferation, size, and density in recent decades. Approximately 40 percent of the population lives in informal settlements, a reality that doesn't align with leaders' and developers' aspirations for a resilient global city.[31] Continuous rural-urban migration coupled with the pressures of private development have resulted in increasingly physically and socially precarious conditions. Many at-risk informal settlements are situated in low-lying conditions or in susceptible areas, such as overhanging *esteros*. In the case of the Manggahan Floodway, informal settlers line the edges *(fig. 3.48)*, reducing the infrastructure's effective width from 260 to 220 meters.

30 "Recto Wants Metro Manila's P351-B Anti-Flood Master Plan Scrutinized," last modified July 19, 2013.

31 Gavin Shatkin, "Planning to Forget: Informal Settlements as 'Forgotten Places' in Globalising Metro Manila," *Urban Studies* 41, no. 12 (Nov 1, 2004) 2469.

***fig. 3.48*** Informal housing overhanging the Manggahan Floodway. Pasig.

These marginalized sites are constantly under threat of dispossession as slum clearance is common in Metro Manila. While each of the aforementioned projects has involved relocation, it is difficult to trace how many people are affected by each. For example, the ongoing World Bank plan proposes to relocate 100,000 informal households (almost half a million people) away from waterways, while ignoring formal riverside developments.[32,33] Both demolition operations and rehousing projects have involved private contractors and investors as key players, prompting critics to draw links between the flood management plan and major public-private partnership (PPP) infrastructure projects.

Despite efforts to prioritize in-metro relocation, most resettlement housing is built in adjacent provinces due to

32 assuming an average household size of 4.6 people

33 Isabelle Anguelovski et al., "Equity Impacts of Urban Land use Planning for Climate Adaptation," *Journal of Planning Education and Research* 36, no. 3 (2016) 338.

expensive, scarce urban land and the limited national budget for social housing *(fig. 3.49)*. These population influxes put pressure on suburban and rural LGUs to rapidly expand their education, health, and public facilities as many relocation sites are built from a tabula rasa.

Forced relocation or 'involuntary resettlement' disrupts the social networks and economies people have built their lives around and can send people upwards of three hours on transit away *(fig. 3.51)*. A study found that 72% of the surveyed households resettled out of the city reported income losses as much as a 43%.[34] Cut off from jobs, friends, and family, 35% those resettled outside of the city reported difficulties in finding assistance and day-to-day support.[35] As a result, half of the relocated people abandon their resettlement housing and return to Metro Manila.[36] Given that sending informal settlers to distant sites does not benefit them, one approach to maintaining community cohesion and economic livelihoods would be to relocate people to high-density urban 'vertical housing units' instead of low-density rural housing.

***fig. 3.49*** Relocation site. Pandi Heights, Bulacan.

When moved away from waterways, people are not always moved to safer places. In terms of flood risk, in some instances, the new housing isn't safer than the old. In 2012, nearly 2,000 homes at the Kasiglahan Village resettlement site were flooded in a storm *(fig. 3.50)*. It was revealed that the site was in a floodplain and geohazard zone. A report found that "by choosing and approving the area as a relocation site, authorities have put an unnecessary risk to the residents. This risk was increased by the disaster-prone design of the relocation homes."[37] It continued by mentioning that residences were not structurally designed or even positioned or correctly.[38]

34 Department of Public Works and Highways and Metro Manila Development Authority, *Resettlement Policy Framework* (2017), 12.
35 Ibid.
36 Ibid., 14.
37 Advocates of Science & Technology for the People, *Structural Integrity and Flood Risk in Kasiglahan Village, Montalban, Rizal: A Report*, (2015). 3.
38 Ibid., 2.

***fig. 3.50*** Kasiglahan Village relocation site flooded. Rodriguez, Rizal.

> "We did not die from fire [when our house in Isla Puting Bato burned] but we might get drowned here. […] If the government wants to relocate us, we should be transferred to a place that is really safe. Besides, the house is not for free and the government asks us to pay for it. We should not be living in a place where we would be carried by the flood water."[39]
>
> Gemma Lasala
> Relocated from Manila to National Housing Authority housing in Kasiglahan Village

In response, settlers have mobilized their collective resources in defence of their informal commons, which has added layers of complexity to the geographies of fear, dispossession, and contestation. These acts of everyday resistance that shape the urban landscape also provide new counter-histories and counter-cartographies of the city. In some cases, residents' resistance efforts are aided by local community organizations such as the Urban Poor Associates. Occasionally, they have succeeded in partially resisting or delaying eviction or demolition by putting together coalitions, proposing community-led alternatives, and maintaining communication with authorities. This resistance is based at least in part on the shared struggles, constituted spatially and socially, faced by informal residents.

39 Janess Ann J. Ellao and Ronalyn Olea V., "Relocation Site at Kasiglahan Village Submerged in Floods," *Bulatlat,* Aug 17, 2012.

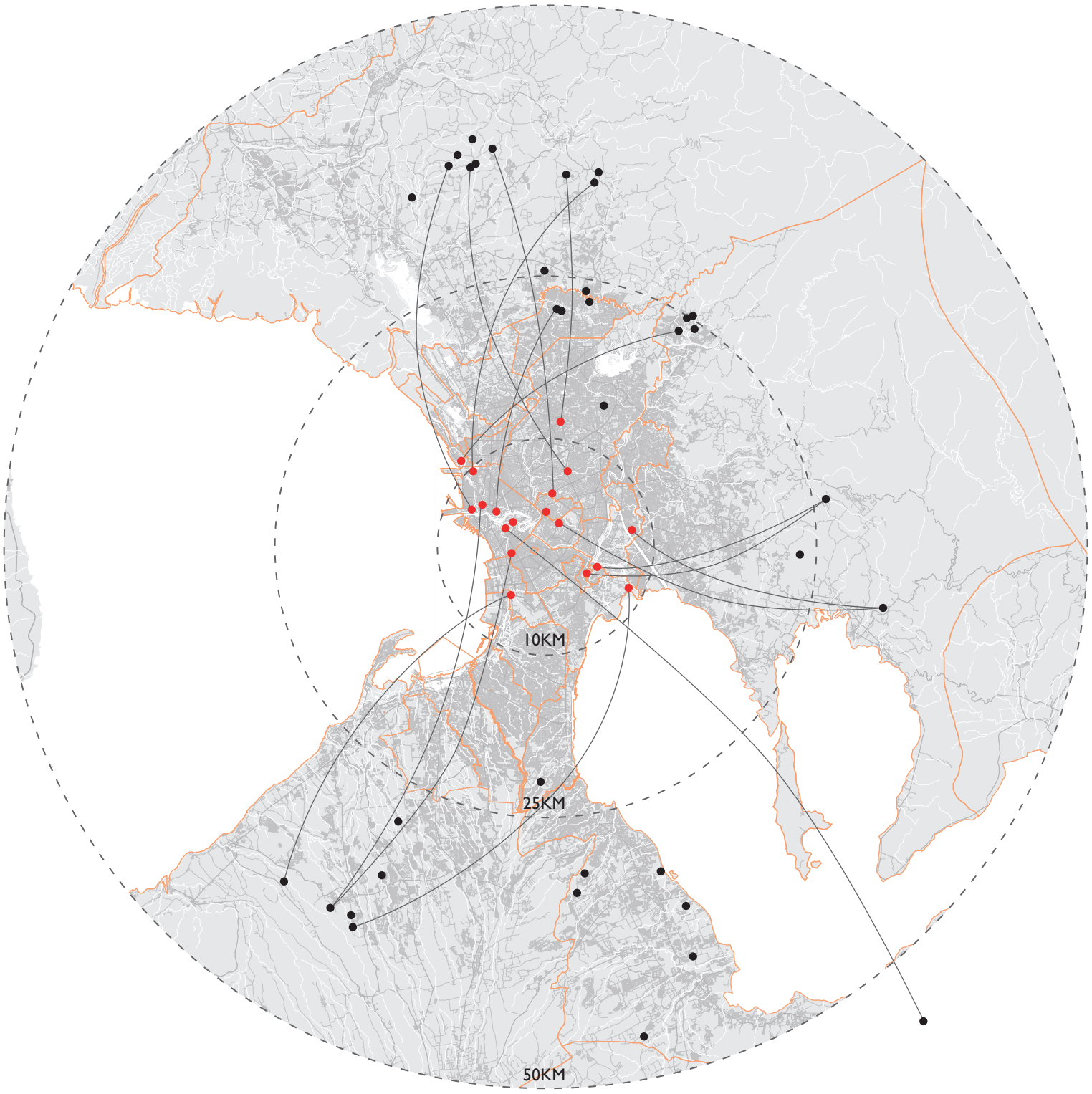



*fig. 3.51* Relocation sites for informal settlers along Metro Manila waterways. 1 : 500,000

Fig. 4.8 A PRRC River Warrior and a reporter on the Estero de San Miguel.

# 4
# RIVER WARRIORS

## CONTESTATION THROUGH SOCIAL TACTICS

> "Our people have repeatedly been touted as resilient, ever-happy, and even bulletproof. It isn't unusual to see smiling people wading through waist-deep flood waters as if it were a day at the beach. Even in the poorest typhoon-hit areas, it only takes a day or two for people to start rebuilding their homes from scrap pieces of wood. We don't wait for help. We help ourselves.
>
> I'm proud that we're a happy people. I'm proud that we are self-sufficient. But I don't like that we're immune to disasters. I am bothered that we're used to the worst conditions. I am disturbed that the reason we help ourselves is that we know nobody is coming to help us."[1]
>
> Shakira Sison
> Award-winning essayist

Stories of destruction and loss follow disasters and flooding. However, as people recover, victims become survivors, but without changes to improve the situation, vulnerability continues to exist. If the urban condition remains as-is, all that is built is community and individual resilience. This part explores people's adaptations including social capital (the relationships between people) and local knowledge (the relationships between people and their place). These bottom-up individual and community-led tactics are often created in response to the top-down strategies, such as those mentioned in Part 3, which may neglect the needs of marginalized people. Stepping up to create their own social networks to contest and counter inadequate action, these networks extend from people rebuilding their homes *(fig. 4.02)* and non-governmental organizations creating risk maps.

1 Shakira Sison, "The Problem with Filipino Resilience," *Rappler,* Oct 30, 2014.

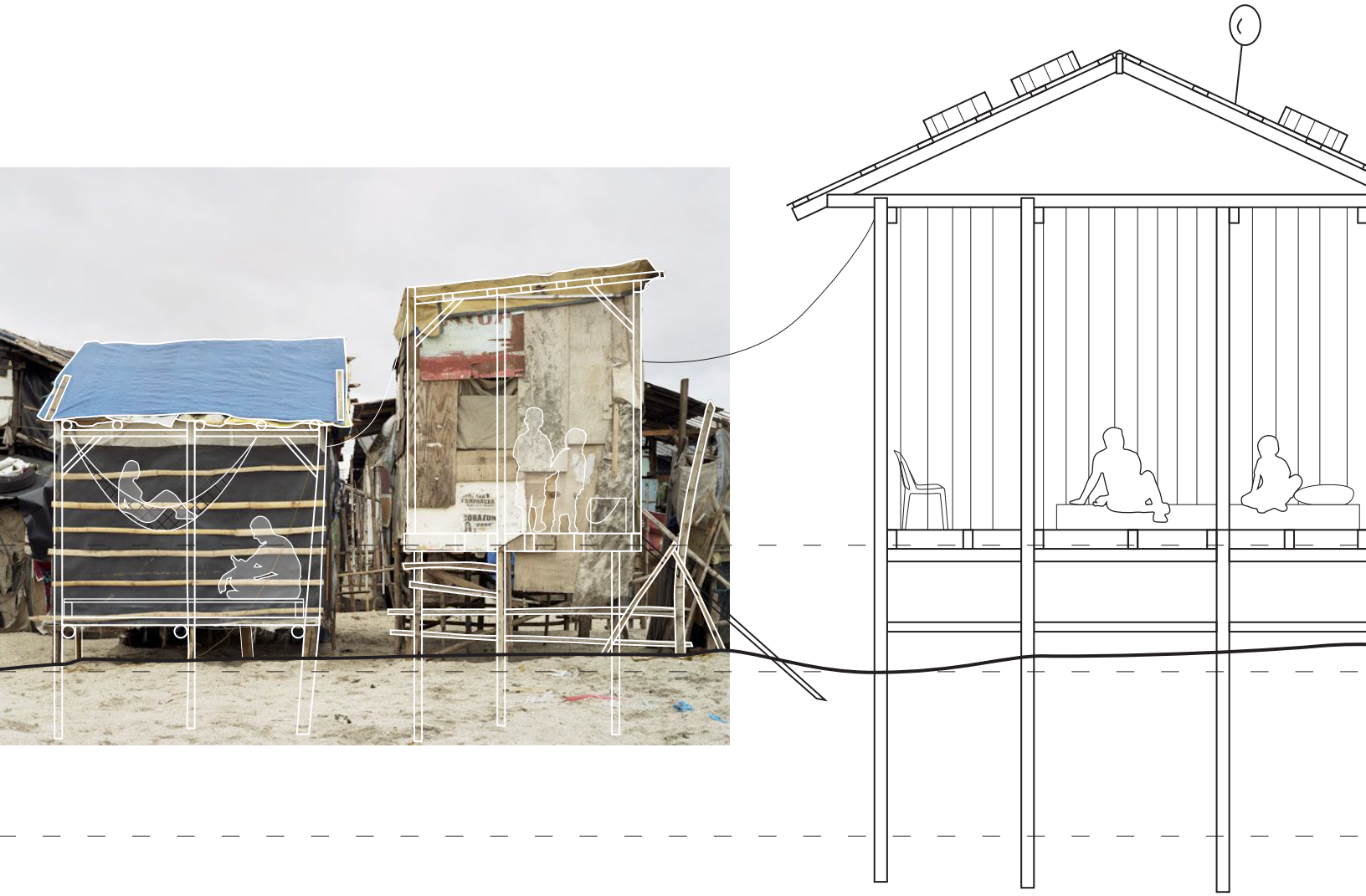


*fig. 4.02* Informal settlement in Baseco, Manila.

## SOCIAL CAPITAL

In addition to the physical infrastructure that exists to shield people from the water, there is also a rich social infrastructure that exists amongst people that allows them to work together and bounce back. Though the concept of social capital, like resilience, has been criticized for being over-used and ambiguous, it is important in relation to water and hazards as it explains how an individual or group leverages their relationships to others.

From the grassroots level, the PRRC used the River Warriors, a band of volunteers, to 'defend' the Pasig River. These volunteers, who recognize the water's value because they often live or have lived along it, act as caretakers, monitoring *esteros* and doing clean-ups *(figs. 4.03 & 4.04)*. While there were several groups under PRRC, the River Warriors were the only one tasked to clean the waterways, spending days, weeks, or even months on a clean-up operation for seven hours a day. Once an *estero* area was clean, the responsibility of maintenance was then passed to the respective *barangays*. However, as pollution often finds its way back into *esteros*, the Warriors often find themselves returning to the water to do additional work. Despite the hazards involved, the Warriors persevere in their work, not motivated by financial gain

***fig. 4.03*** River Warriors at work. Manila.

***fig. 4.04*** River Warrior in training. Manila.

but a sense of duty—to their environment, to the people, and to the generations to come. It will be important to see how this work lives on moving forward without the umbrella of the PRRC.

In terms of marginalized groups, social capital also speaks to how they try to find belonging in the city. The ties of an informal community vary throughout the years—reduced during times of little threat and strengthened during eviction attempts. An example of social capital reaching beyond the community is evident in the work of some Estero de San Miguel settlers and the Urban Poor Associates. Faced with eviction after 2009 Typhoon Ketsana, the settlers who were seeking on-site rehousing, land tenure security, and the appointment of pro-poor government representatives, joined a federation of urban poor advocacy organizations with similar objectives. Teaming together to supporting then-senator Ninoy Aquino in his presidency bid, the federation managed to garner the president's support for their agenda. In 2010, President Aquino publicly discouraged distant relocation of informal settlers, instead limiting relocation to either near-city or in-city sites with the intention being they would then be able to maintain their livelihoods by commuting within Metro Manila. This federation can be considered a form of bridged social capital in which the urban poor communities pooled their social capital to gain more influence in order to overcome hierarchical differences. In this case, their social capital was successful in empowering and stabilizing the community.

## LOCAL KNOWLEDGE

Natural hazards have always occurred, which have required indigenous people to develop knowledge and practices to cope with them. As mentioned in the Tagalog section of Part 1, these are embedded in their culture and traditions and are expressed in their relationship with the environment. However, today, natural hazards are often conceptualized as out-of-the-ordinary events that require scientific solutions, thereby positioning them separate from human-nature relationships. Some argue that natural hazards are a problem between the "forces of nature and 'advanced' institutional and technical counterforce,"[2] meaning that the more 'advanced' a resilience approach is, the higher the chance it can stand up to the 'forces of nature.' This paradigm promotes the binary between indigenous and scientific knowledge in resilience practices, however, indigenous and scientific knowledge and practices can work alongside each other to increase communities' outcomes. This reflexivity needs to be reflected upon when positioning design and research.

Daily processes were and are important spaces for indigenous people to produce knowledge and approaches to the natural world, and it should be noted that their knowledge is ever-evolving. However, the differentiation between indigenous knowledge and scientific knowledge that pervades literature and practice disregards the significance of these processes.[3] This binary frames these two ways of knowing in opposition, in which knowledge should be derived from objective evidence and a scientific perspective. Marginalizing indigenous knowledge and positioning scientific knowledge as superior overlooks the opportunities that indigenous knowledge can offer to practice of resilience.

The historical and ongoing environmental degradation promoted by western-style development disenfranchises

2 Kenneth Hewitt, "The Idea of Calamity in a Technocratic Age," in *Interpretations of Calamity: From the Viewpoint of Human Ecology*, ed. Kenneth Hewitt (London: Allen & Unwin, 1983) 6.

3 Ibid.

indigenous knowledge even though time has tested it. This is often reflected in how strategic top-down processes tend to neglect the importance of mobilizing cultural participation and traditional capacities. Deconstructing ways that indigenous people approach natural hazards can reveal the agendas of power behind the constructed binary. By understanding that power and knowledge are intrinsically connected and mutually supported, one can begin to propose ways by which indigenous and scientific knowledges can be meaningfully integrated.

Despite having ancient origins, a common explanation for community-driven self-recovery efforts is the principle of *bayanihan*. *Bayanihan*, which translates to 'being a *bayan*,' with *bayan* meaning nation or community, is the Filipino custom of group work. Local scholars argue that this system of mutual help and concern is a "backbone of family and village life through the Philippines."[4] Originally, *bayanihan* referred to the tradition of the able-bodied men of a community lifting a locally-made house to help relocate a family *(fig. 4.05)*. As such, *bayanihan* stems from the collective sharing of labor. While its traditional conceptualization is distinctly at the community scale, focusing on group action and service, more contemporary definitions embrace a smaller scope, extending the definition to include collective help, volunteerism, and simply helping one another. Focusing on *bayanihan* as a general term for collective cooperation allows for versatility in terms of scale and form while recognizing its application to both traditional as well as contemporary understandings and practices. While this indigenous principle has endured and evolved over time, can it actually serve to foster flood resilience today?

***fig. 4.05*** Tradition of *bayanihan*.

> "There is no storm that can make the Filipino people get down on their knees as long as there is *bayanihan*."[5]
>
> Former President Benigno Aquino III

4 Gertrudes R. Ang, "The Bayanihan Spirit: Dead Or Alive?" *Philippine Quarterly of Culture and Society* 7, no. 1/2 (Mar 1, 1979).

5 Bea Cupin, "Yolanda 'Serious Threat,' Don't Take Chances," *Rappler,* Nov 7, 2013.

*Bayanihan* is commonly evoked by the government and media after natural hazards to encourage resilience as it can act as a coping mechanism, speeding up community-scale recovery. Occasionally communities collectively rebuild houses, complete rehabilitation and clean-up tasks, and share food at evacuation centers. This process makes sense in the Philippines' collectivist society as many communities are poorer and have limited access to external resources, and consequently have to deploy their own human capital, working together and sharing labor.

Conversely, while positive examples exist, there are many post-flood situations in which dependence on *bayanihan* spirit is detrimental. A recent study on indigenous coping mechanisms in rural communities found that affected people only experienced *bayanihan* immediately after the disaster because the collective cooperation could not be sustained as competition for aid set in. Evacuees and victims can become hostile and sometimes violent when competing for limited relief resources and assistance. And while *bayanihan* can seem like a logical response in poorer and rural communities, it can be perceived as outdated when compared to modern cultural practices. As people become more independent and reduce dependence on their neighbors, *bayanihan* diminishes.

While *bayanihan* was once a community-scale principle, its contemporary expression is often only from neighbor-to-neighbor and for a brief period during crises. Despite its potential use after a flood, the government calling on communities to evoke *bayanihan* is often an inadequate answer to the scale of collective action needed, making its coping capacity limited. While *bayanihan* can be leveraged, it should not be over-relied on or romanticized as a primary source for post-flood resilience, particularly when doing so directs pressure away from institutions with formal responsibilities. All actors, including the government, need to be part of 'collective cooperation' for it to be effective.

In addition to considering indigenous knowledge, local knowledge also needs to be accounted for. Many citizens are currently unable to understand their flood risk because existing

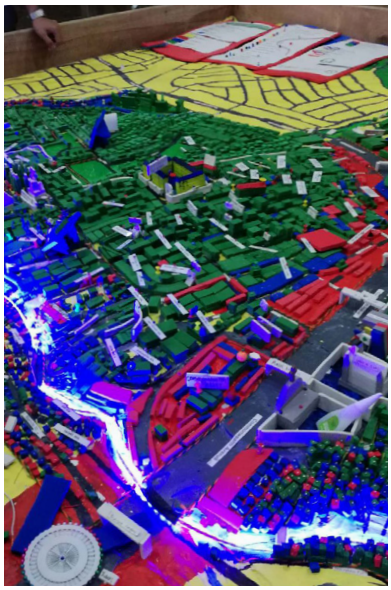


***fig. 4.06*** Cutting foam for the topographic base of the P3DM of *Barangay* Commonwealth. (left)

***fig. 4.07*** P3DM completed after 3 days. (above)

flood maps for Metro Manila do not accurately reflect areas of potential inundation. Leveraging local knowledge to bridge the gap, the Philippine Disaster Resilience Foundation, a private-sector disaster management agency, developed a participatory 3D mapping (P3DM) program. P3DM is a community-centered mapping method in which local informants collaborate to create topographic scaled maquettes that plot their spatial knowledge, with information ranging from houses and community buildings to vulnerable people (eg. elderly) and assets (eg. boats). Overlain with pins (points), string (lines), and paint (polygons), the map then becomes a platform for discussion that focuses on community-specific risk reduction measures *(figs. 4.06 & 4.07)*. By enabling residents to draw from their experiences, this engaging practice can elevate marginalized groups whose needs may be unaccounted for in static, outdated flood maps. Visualizing sometimes-intangible things makes local knowledge more credible to officials, thus promoting a combination of local and scientific knowledge.

# 5
# REVISUALIZING RISK
## MAPPING IN THE DIGITAL AGE

*fig. 5.01* Truckload of stranded commuters. Manila.


NO
JAYWALKING

As highlighted in the previous section, there are many rich bottom-up social tactics at play in Metro Manila, which, unfortunately, no matter how numerous, are underequipped to deal with the realities of the changing climate and the scale of urban water. Founded on their underlying strengths, this part reflects on a method for scaling up these collective efforts to elevate everyday perspectives so that they can eventually influence imaginaries of water and resilience.

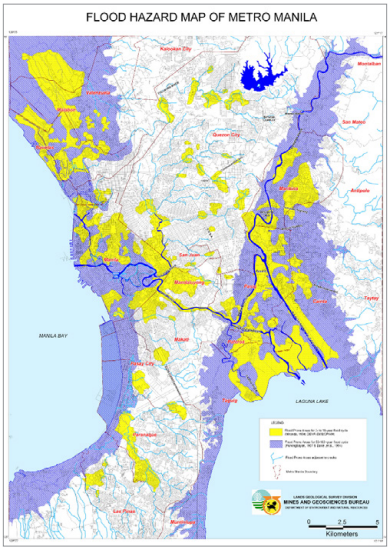
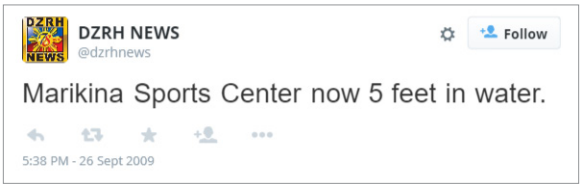


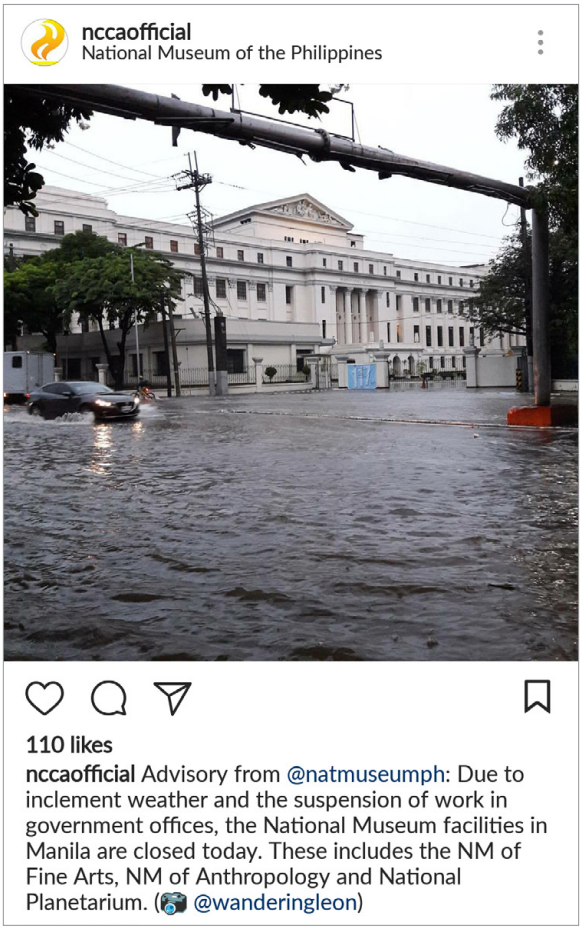

***fig. 5.02*** Official flood map.
prone in 2-10 year flood cycle
prone in 50-100 year flood cycle

As a foundation for equitable resilience, people need to be able to geographically position their risk. As mentioned in the previous section, the flood maps for Metro Manila are outdated *(fig. 5.02)*, resulting in organizations trying to localize knowledge of vulnerability through participatory 3D mapping. This part explores a potentially less time-intensive application of *bayanihan* for mapping in the digital age. With the proliferation of mobile devices, social media—Twitter micro blogs, Facebook posts, and Instagram images—has become a popular platform for sharing information during the onset of hazardous events as it can broadcast the perspectives of not only news outlets and government agencies but also ordinary netizens. While each user group has a different target audience and reach, the aggregated data can create a digital depiction of the reality on the ground *(fig. 5.03)*. Mobilizing the plethora of data publicly available on social media, this proposal seeks to create a crowdsourced visualization to compare to the existing flood map. Building off this enhanced understanding of the distribution of metro-scale risk, it also offers a revised flood map.



Manila insane flood



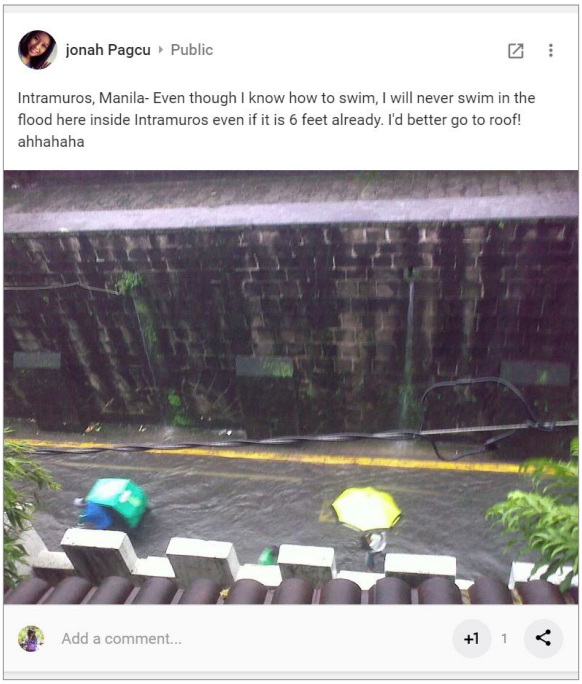
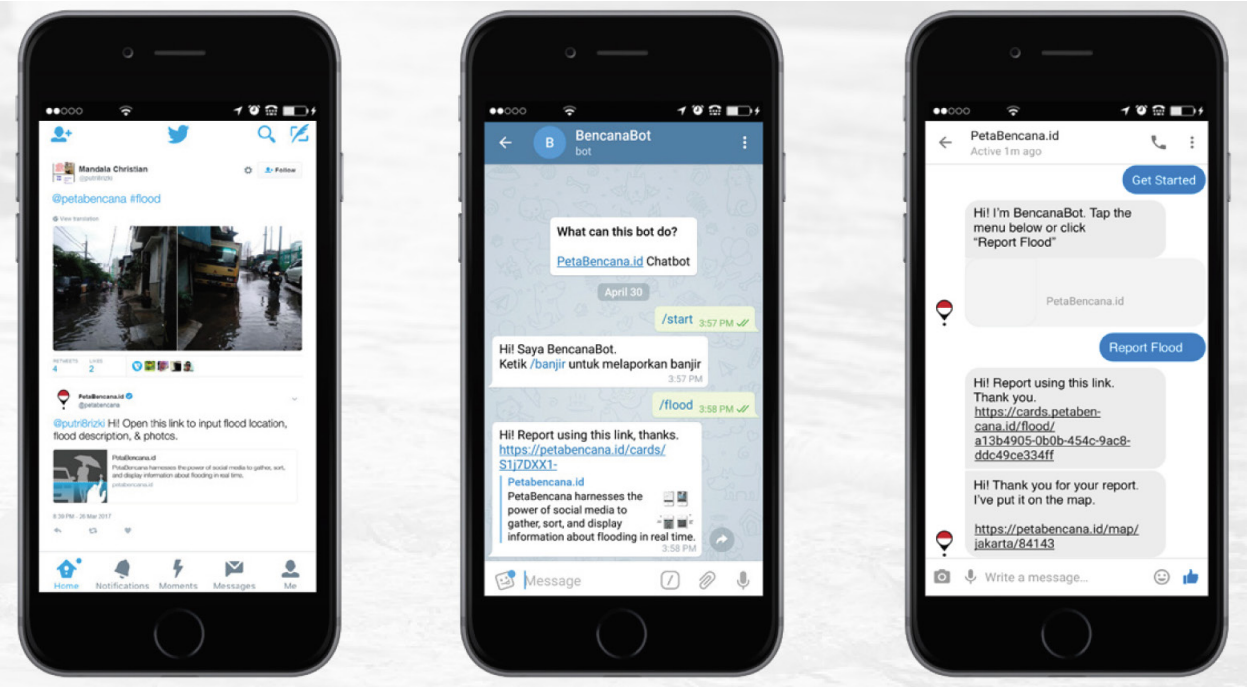




*fig. 5.03* Flooding reported on social media by everyday users.



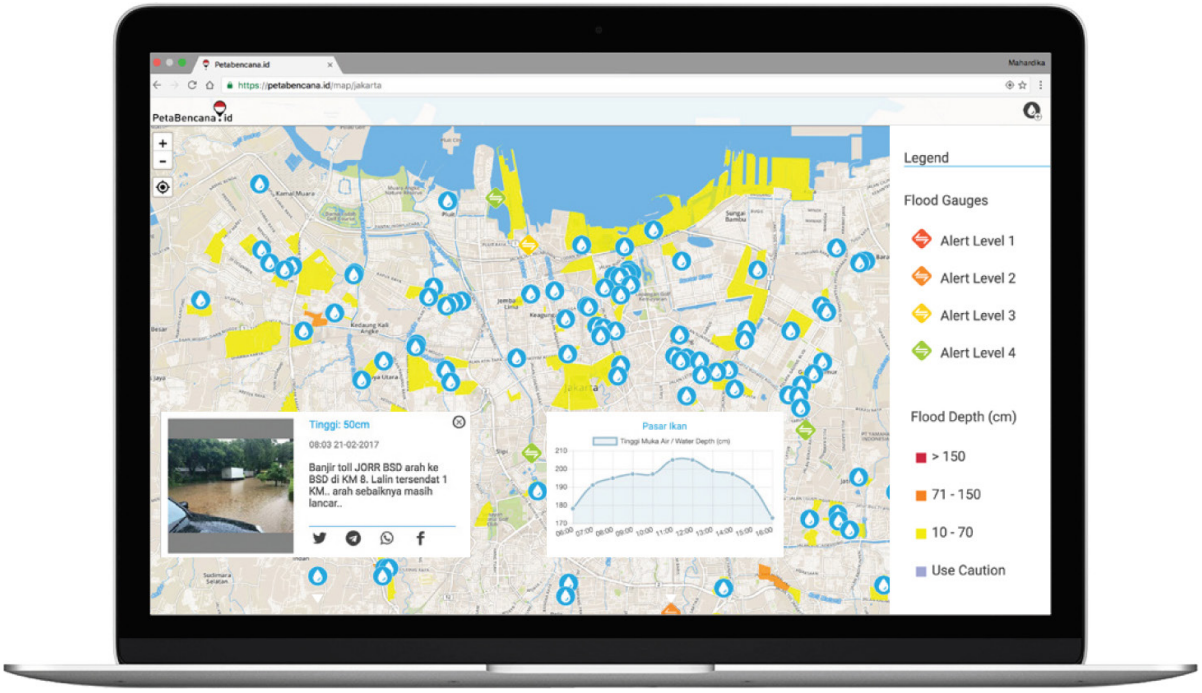




***fig. 5.04*** Engagement with PetaBencana 'report card' on Twitter, Telegraph, and Messenger applications.

***fig. 5.05*** PetaBencana platform.

## PRECEDENT

This exercise looks to PetaBencana, formerly PetaJakarta, an Indonesia-based organization born out of the MIT Risk Lab, and its crowdsourced mapping as a precedent. Like the proposed exercise, this existing project leverages heightened social media use during hazardous events to depict risk. Their overarching question has been how open data can help residents adapt to climate change, with their focus being on allowing netizens to contribute toward locating inundated areas. The project initially worked by aggregating flood reports sent to the @petajkt Twitter account.[1] Today, it uses a more engagement-based platform to gather and filter confirmed situational updates. The platform facilitates the reporting process by programmatically sending tweets to netizens who use the hashtag 'flood' or '*banjir*,' inviting them to verify their situation by completing a "report card"[2] *(fig. 5.04)*. These report cards are then translated onto an interactive map *(fig. 5.05)*. As much as being a part of the solution, the project also presents a natural experiment with a unique set of lessons about harnessing social media for understanding hazardous events.

1 PetaBencana, *About PetaBencana Summary* (Jakarta: 2019), 7.
2 Ibid., 13.

## DATA COLLECTION

To create the crowdsourced visualization, data related to urban flood incidences was collected from posts shared publicly on Twitter and Facebook during typhoons and monsoons between 2009 and 2016 *(figs. 5.07-5.14)*. Applicable posts were identified using their metadata, which had to contain a specified timestamp, a geotag within Metro Manila, and a relevant hashtag[3] along with information about the flood depth in the post itself.

It should be noted that these stringent requirements significantly reduced the quantity of data points considered. However, it was necessary for this exercise as it would be difficult to locate an incident without a geotag and the flood height would be unknown if it wasn't in the description. Fortunately, these parameters reduced the amount of 'noise' in the data, which aided in visualizing only reported flood incidences. Examples of 'noise' include retweets and posts by overseas relatives *(fig. 5.06)*.

One restraint of crowdsourcing in this way is the discontinuity of data. The first year explored, 2009, had the most public social media data that met the search parameters. One possible reason is that Typhoon Ketsana, which occurred that September, was a landmark event for Metro Manila, compelling people to share information. Comparatively, subsequent storms

3 examples of hashtags scanned are #floodPH, #rescuePH, #bahaPH (floodPH translated to Filipino), and #[storm name]PH

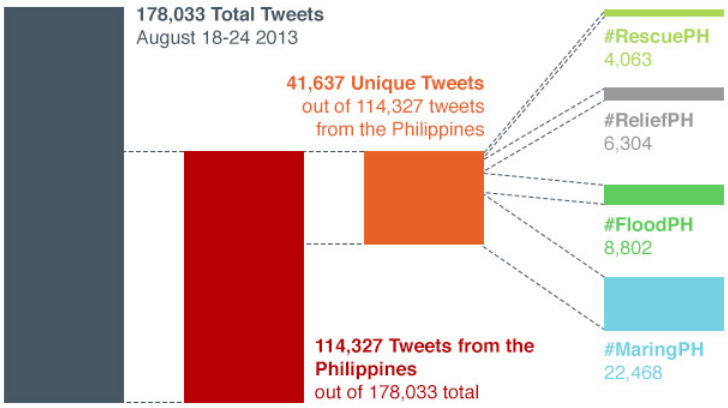


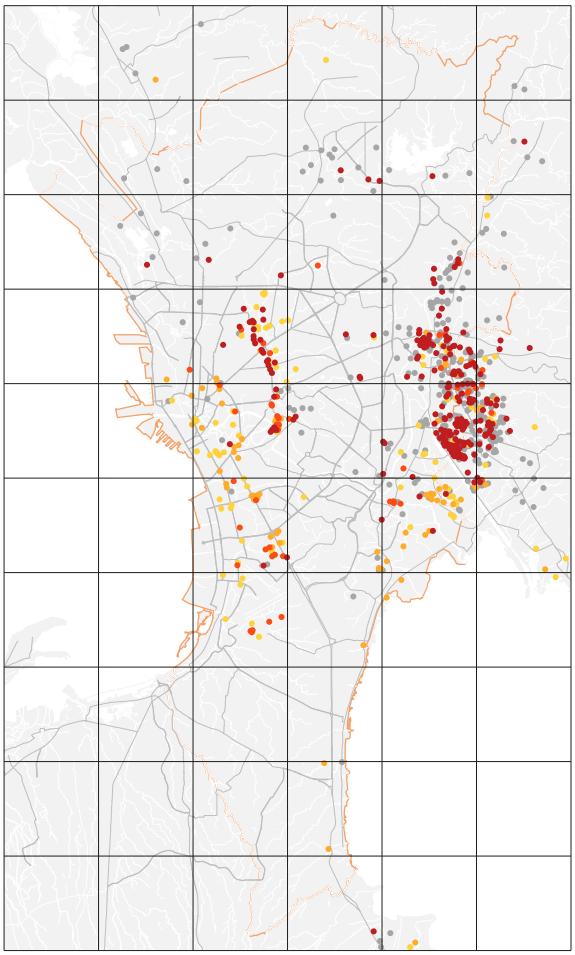

***fig. 5.06*** Social media 'noise' during Tropical Storm Maring.
Many tweets from August 18-24, 2013 were duplicates or not even from the Philippines.

have been less severe with people often not reporting flooding until it surpasses knee-level. Another reason for the declining amount of data over the past decade is that the majority of earlier data is sourced from Twitter, a platform on which most posts are public, which has dwindled in popularity in the Philippines. In more recent years, people have shifted to using Facebook and Instagram, on which posts are generally only shared with pre-approved friends, reducing the amount of data publicly accessible for this mapping exercise.

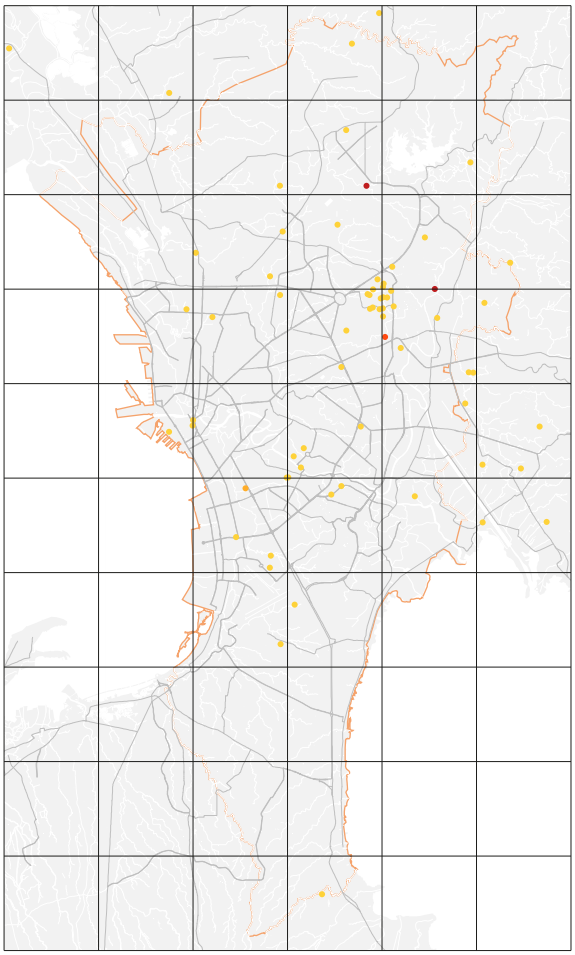
Another limitation of this method is inadequate report verification. The reports are geolocated based on where the Twitter post was uploaded, which does not necessarily correspond with where the flooding occurred. Without a trust management mechanism in place, it is difficult to verify the accuracy and quality of each data point.

Each year's data was sorted by flood depth then placed on a map, and eventually combined and overlaid on the existing flood map *(figs. 5.15-5.19)*. Despite the lack of continuity in data, the crowdsourced visualization is still able to reveal discrepancies in the existing flood map. There are several areas across Metro Manila that have experienced flooding, some quite severe, that are not represented in the official map.

2009



2010



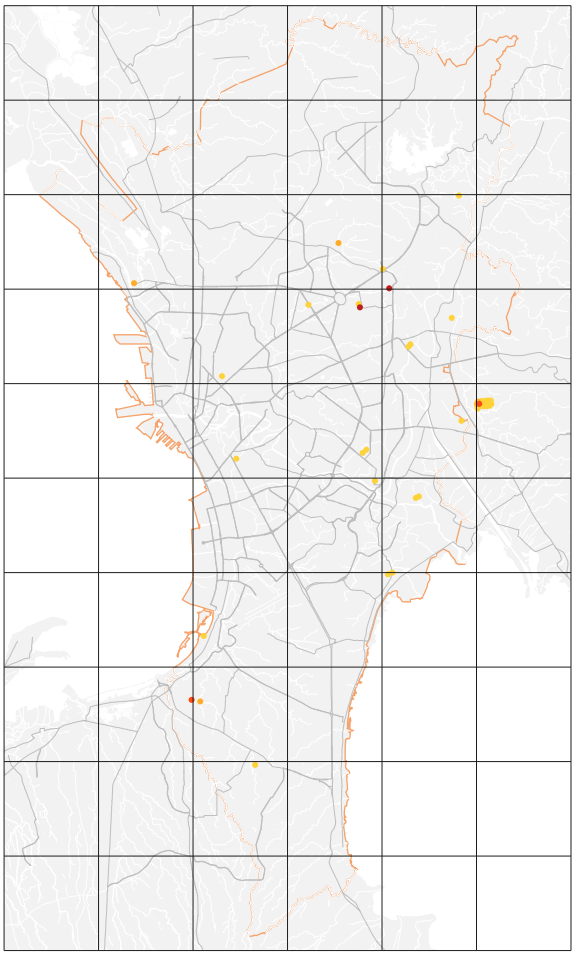
knee-deep
waist-deep
neck-deep
over 1 storey
reported but depth unknown

1 5 KM

***fig. 5.07*** Flooding reported on social media during Super Typhoon Yolanda (September 26 - October 4, 2009). Based on 1009 geolocated incidences.

***fig. 5.08*** Flooding reported on social media during Habagat 2010 (October 12-24), monsoon enhanced by Typhoon Megi. Based on 70 geolocated incidences. 1 : 400,000

2011



2012

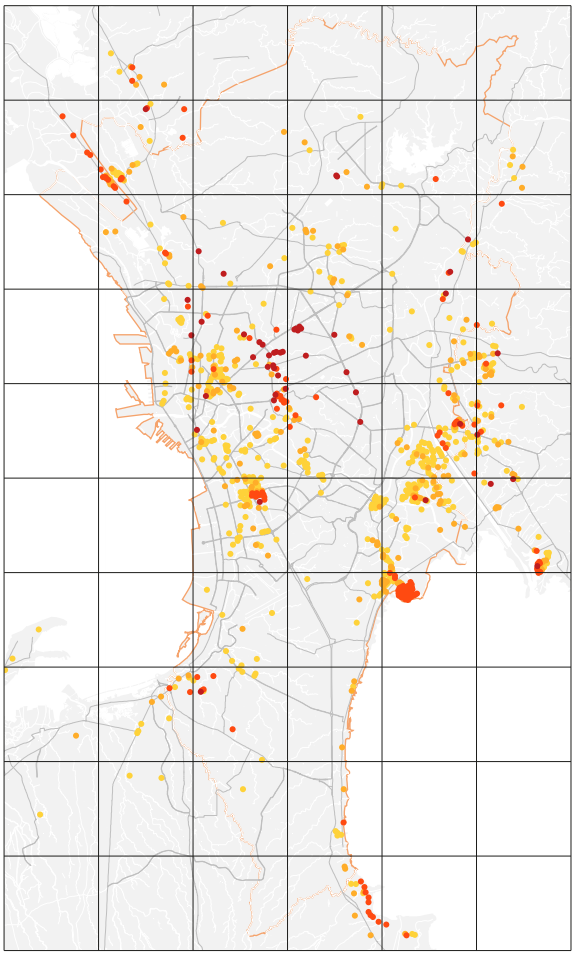
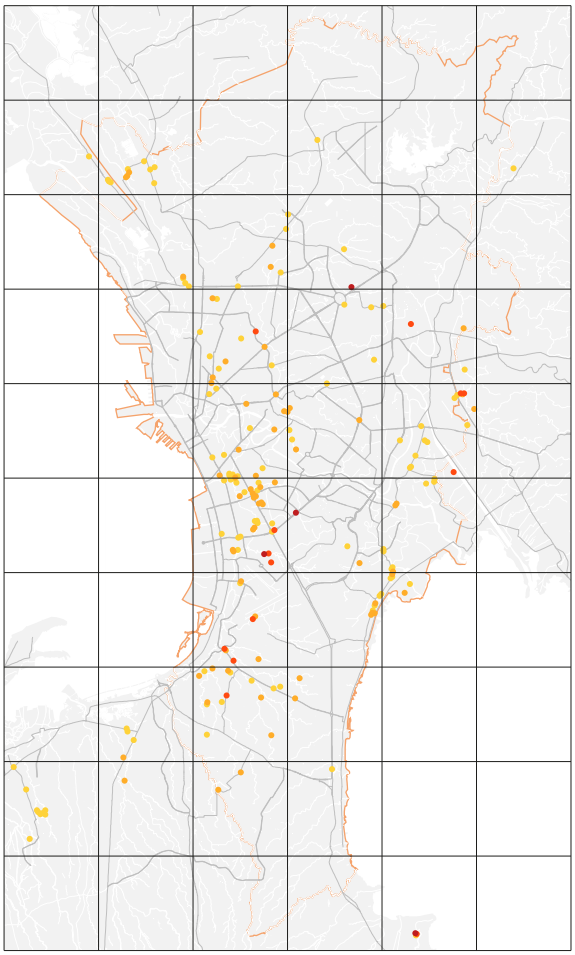


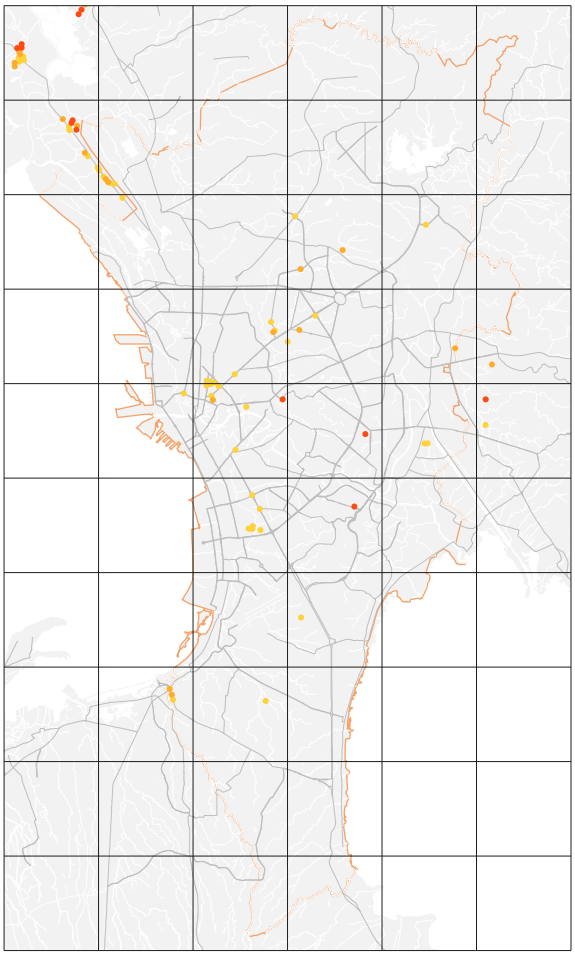
***fig. 5.10*** Flooding reported on social media during Habagat 2011.
Based on 43 geolocated incidences.

***fig. 5.09*** Flooding reported on social media during Hagupít ng Habagat 2012 (August 1-8), monsoon enhanced by Typhoon Haikui.
Based on 885 geolocated incidences.
1 : 400,000

2013



2014



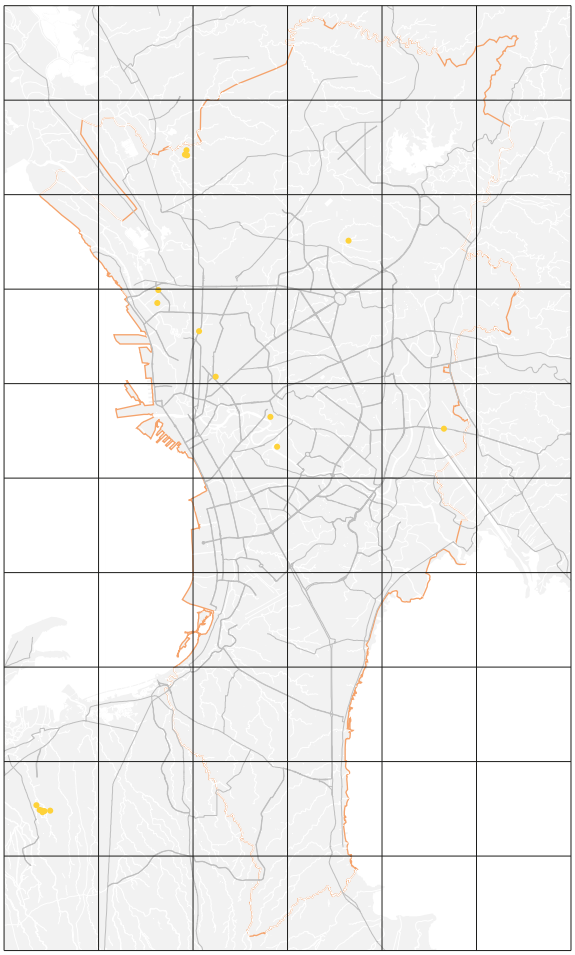
knee-deep
waist-deep
neck-deep
over 1 storey
reported but depth unknown

1 5 KM

***fig. 5.11*** Flooding reported on social media during Habagat 2013 (August 17-21), monsoon enhanced by Tropical Storm Trami.
Based on 198 geolocated incidences.

***fig. 5.12*** Flooding reported on social media during Tropical Storm Mario & Habagat 2014 (September 19 - October 1).
Based on 76 geolocated incidences.
1 : 400,000

2015



2016

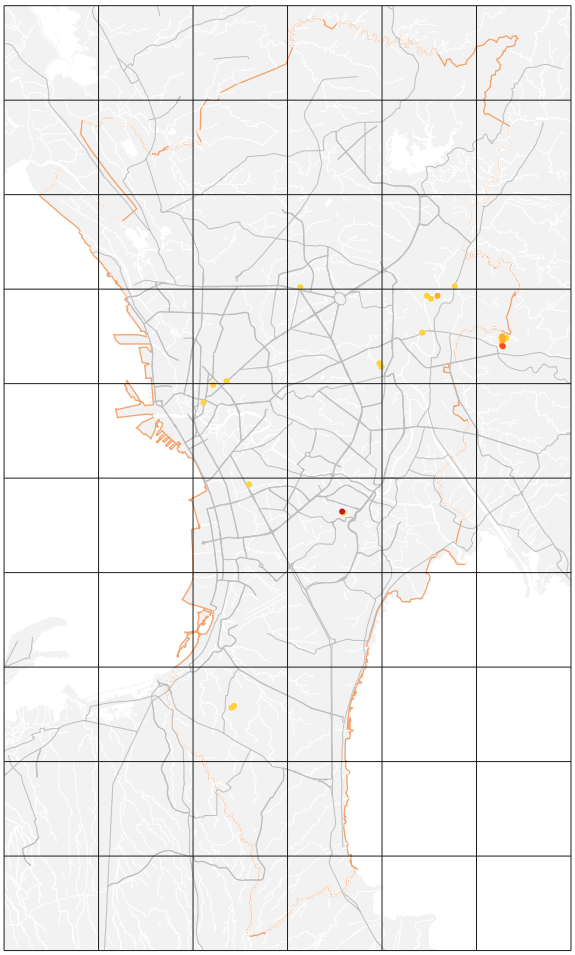


***fig. 5.13*** Flooding reported on social media during Habagat 2015.
Based on 17 geolocated incidences.

***fig. 5.14*** Flooding reported on social media during Habagat 2016 (August 8-14).
Based on 22 geolocated incidences.
1 : 400,000

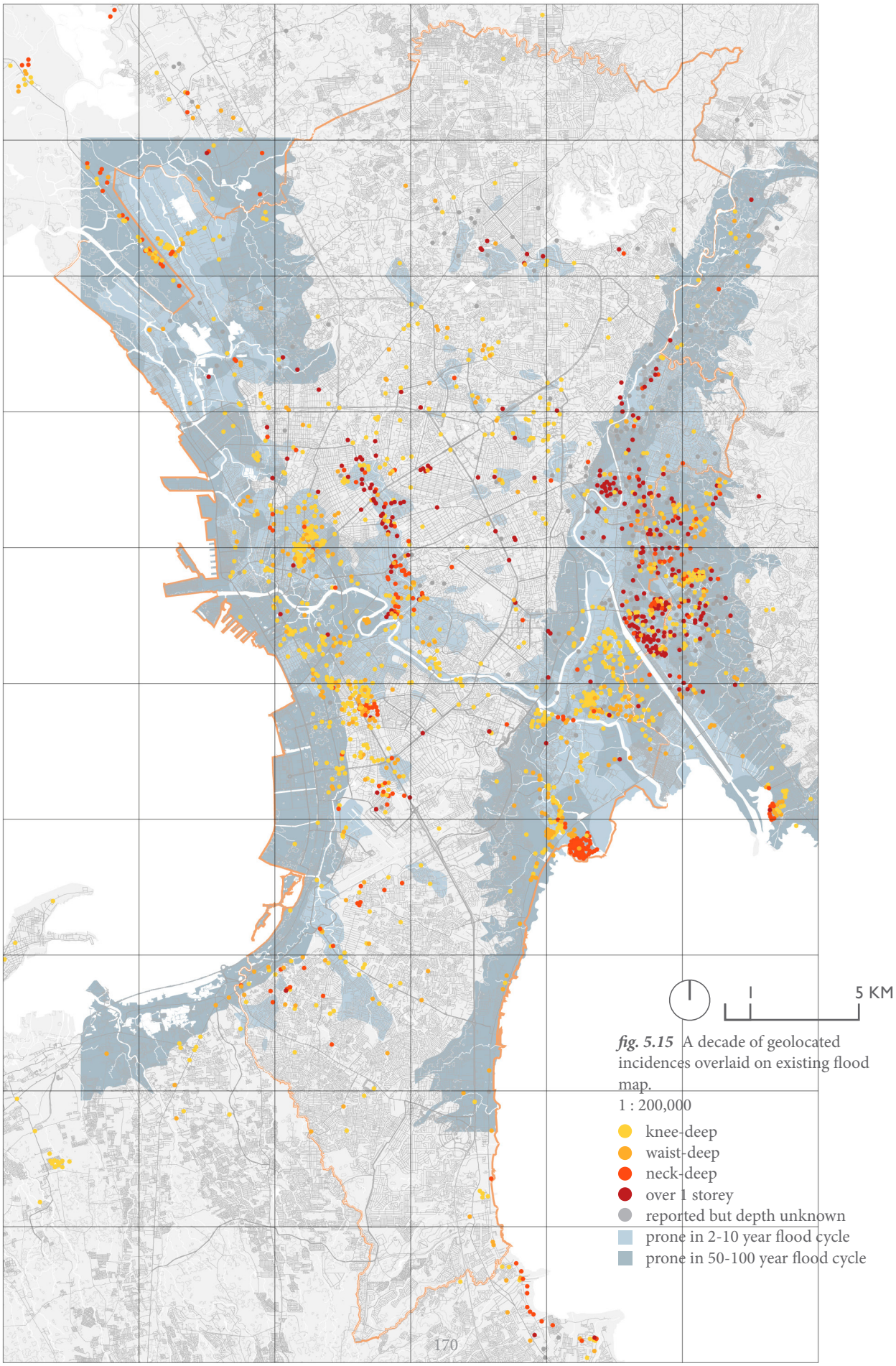



***fig. 5.15*** A decade of geolocated incidences overlaid on existing flood map.
1 : 200,000


***fig. 5.16*** Geolocated incidences overlaid on existing flood map, focused on Barangay Commonwealth, Quezon City.
(the area from the P3DM in Part 4)
1 : 50,000

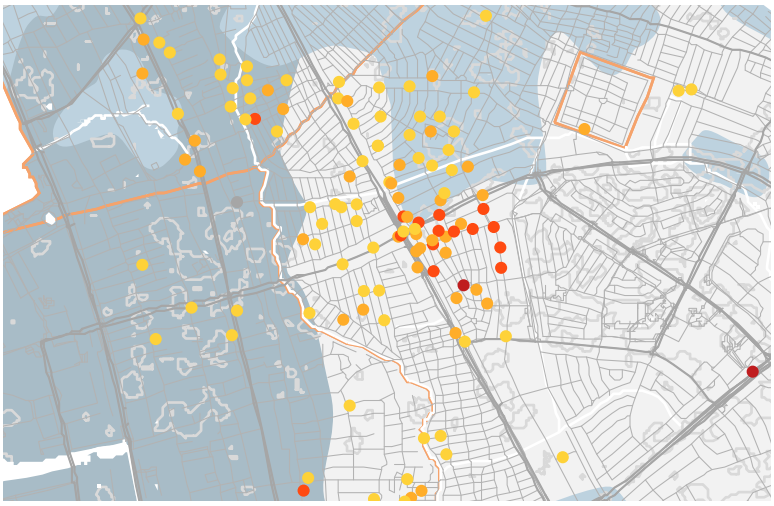


***fig. 5.17*** Geolocated incidences overlaid on existing flood map, focused on the Buendia area, on the border between Pasay and Makati cities.
1 : 50,000

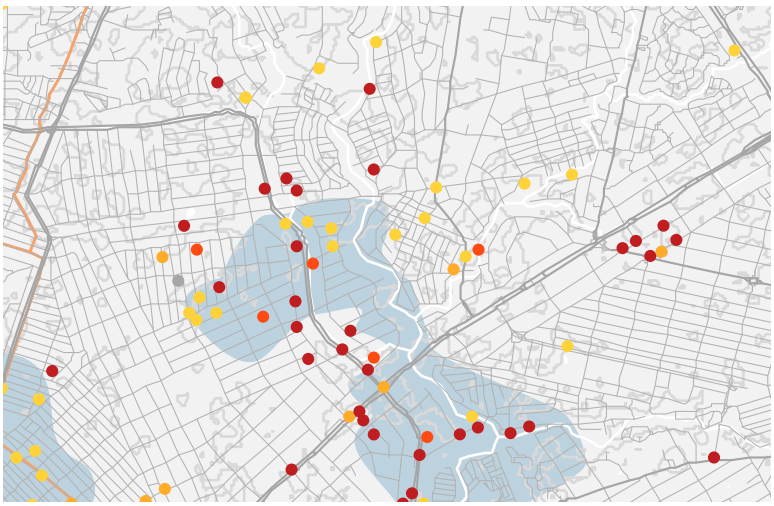


***fig. 5.18*** Geolocated incidences overlaid on existing flood map, focused on Quezon City.
1 : 50,000

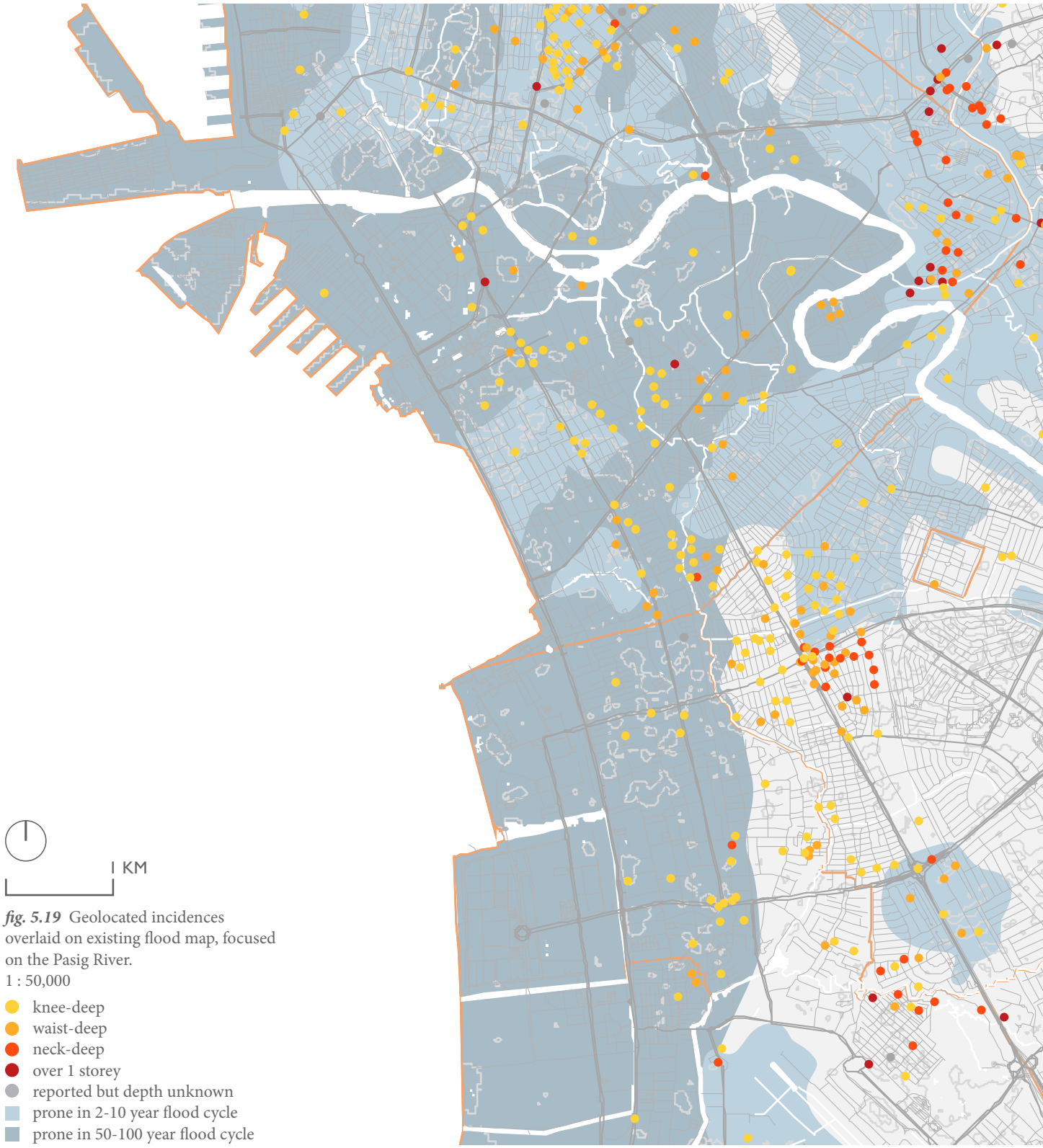
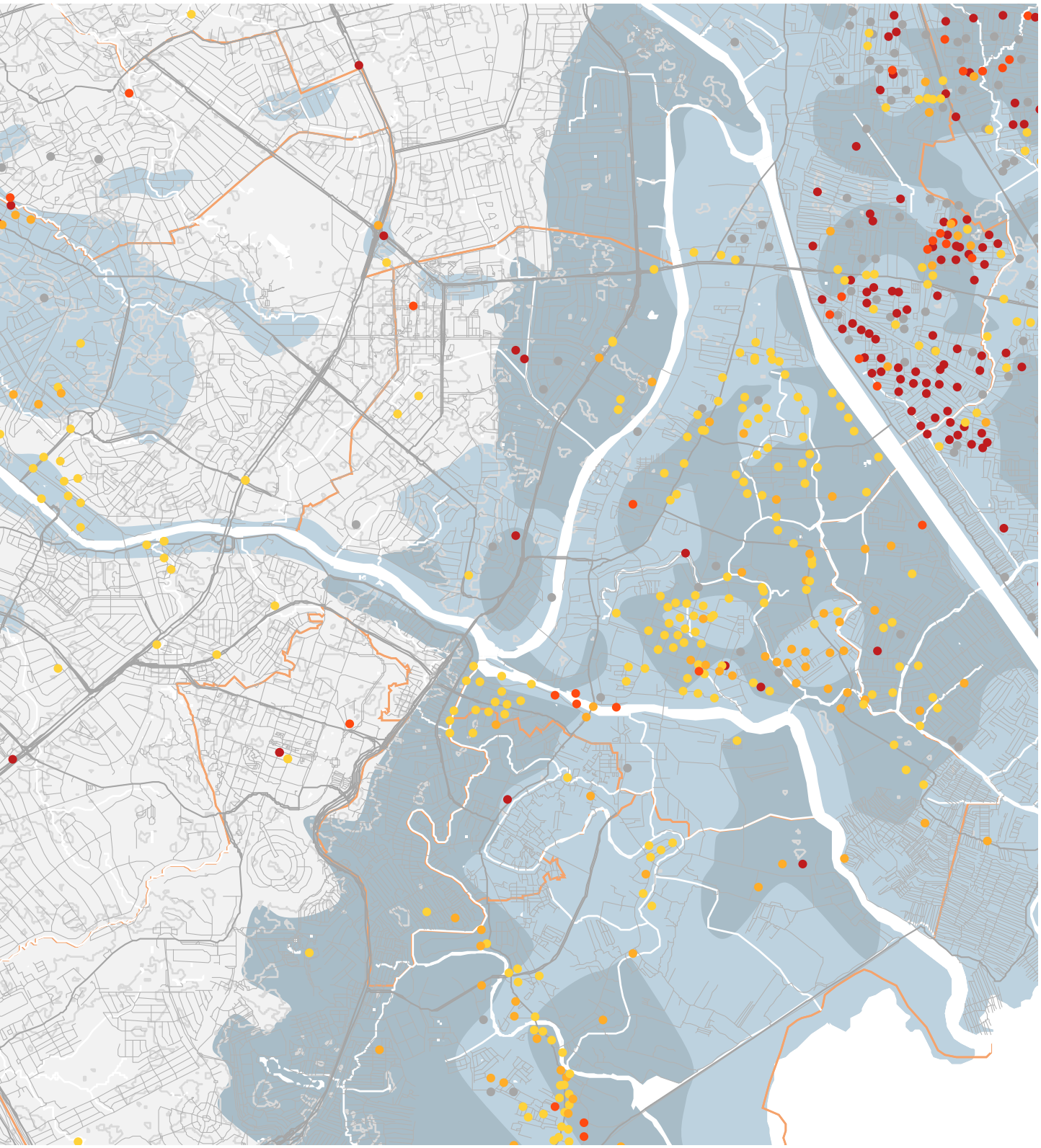



***fig. 5.19*** Geolocated incidences overlaid on existing flood map, focused on the Pasig River.
1 : 50,000

- knee-deep
- waist-deep
- neck-deep
- over 1 storey
- reported but depth unknown
- prone in 2-10 year flood cycle
- prone in 50-100 year flood cycle



## MAP: BRIDGING GAPS

Knowing where there are discrepancies in identifying flood prone areas on the existing map, the crowdsourced data is then used to draft a revised flood map *(figs. 5.20)*. The intention is not to create a new accurate map, as much more data would be needed, but to suggest where the flood map can realign with the reality as experienced. This map is limited in that it does not indicate flood cycles, as only 10 years of crowdsourced data was used, or flood heights. However, this contribution can be used to move forward with a clearer understanding of where water flows and collects in the city. It can be used as a launching point for creating a new one since areas now identified as having flood risk could be zoomed in on during investigations and field work *(fig. 5.21)*.

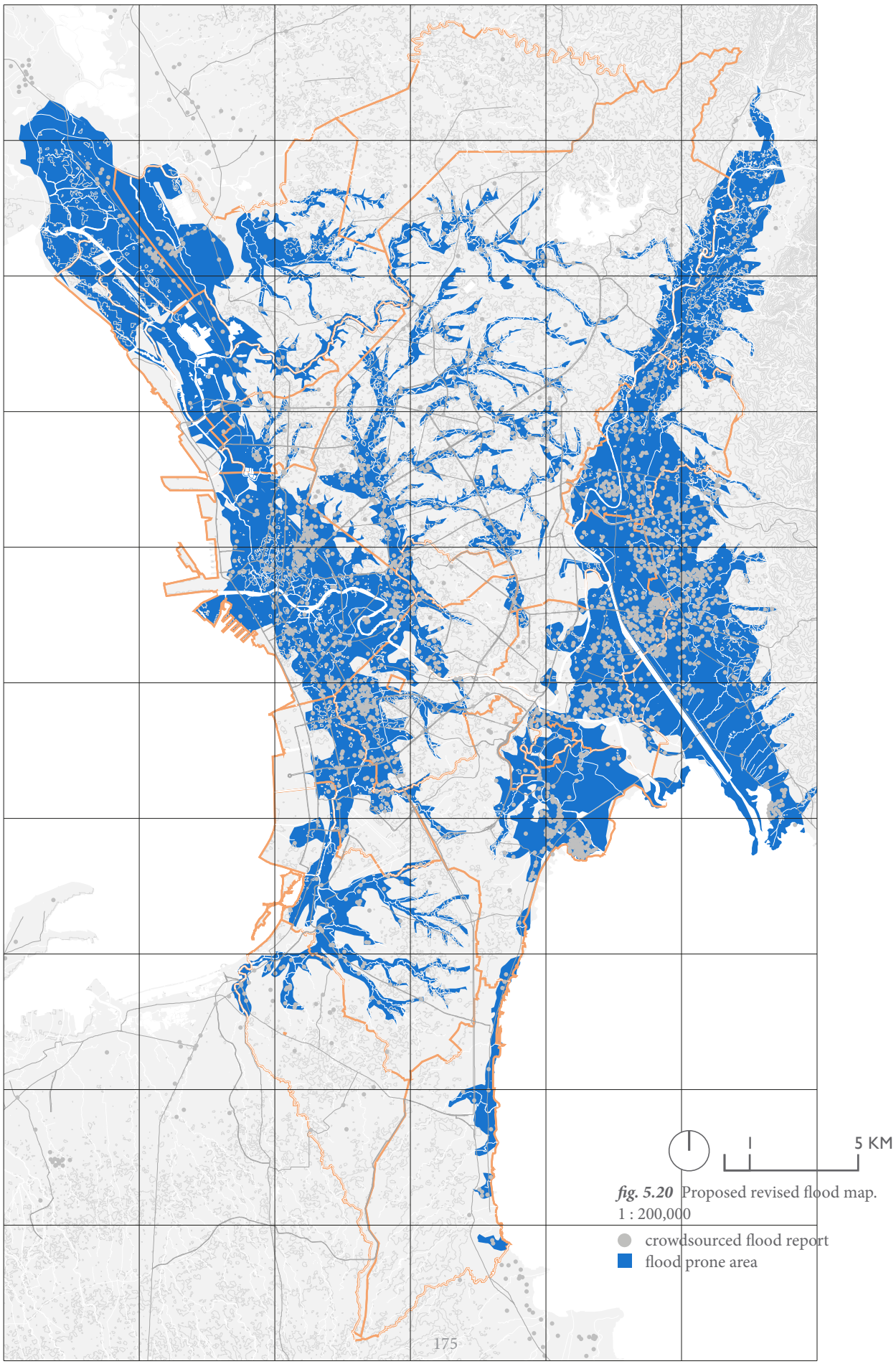



***fig. 5.20*** Proposed revised flood map.
1 : 200,000

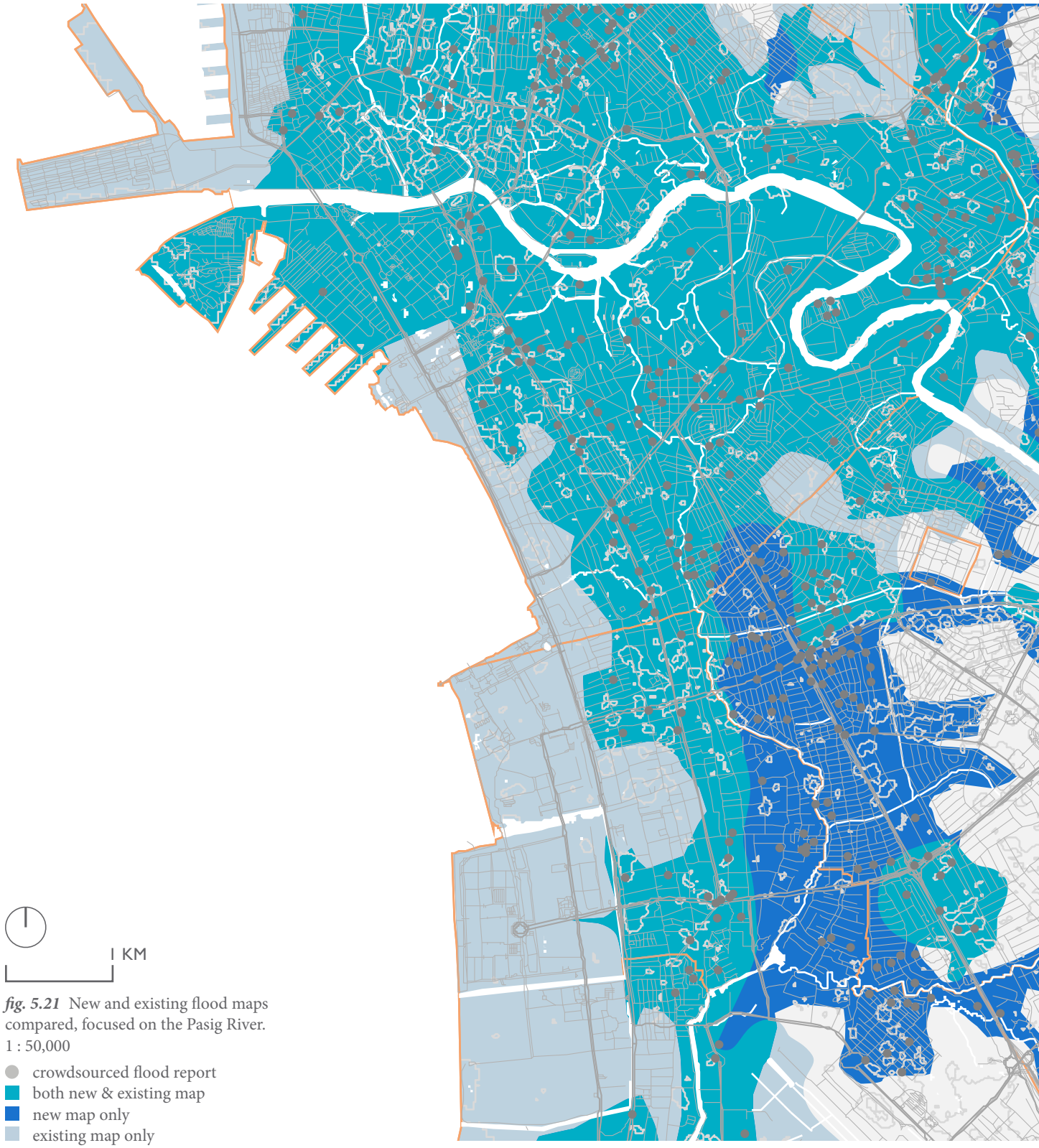
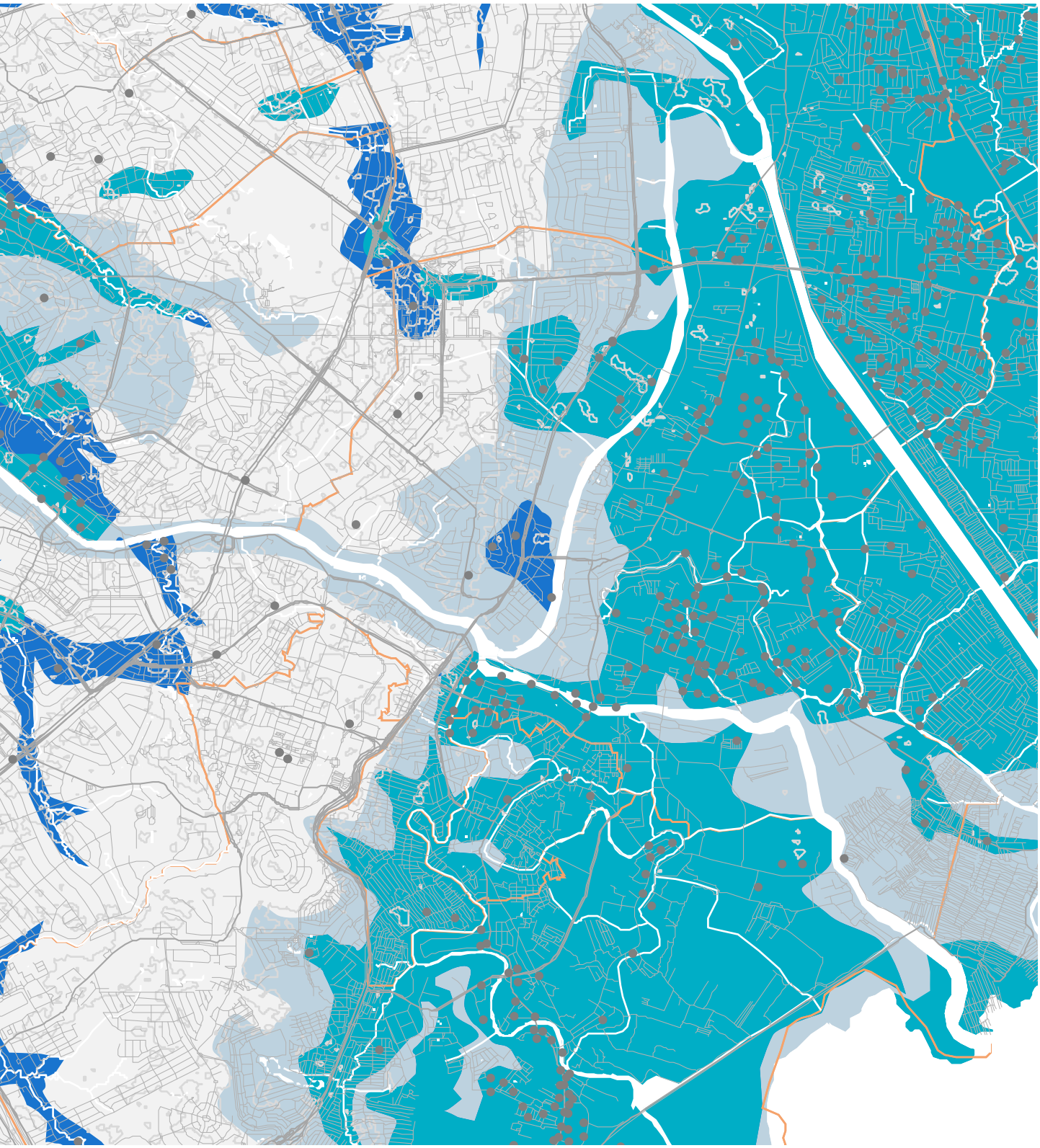



***fig. 5.21*** New and existing flood maps compared, focused on the Pasig River. 1 : 50,000



## APPLICATION: DIGITAL BAYANIHAN

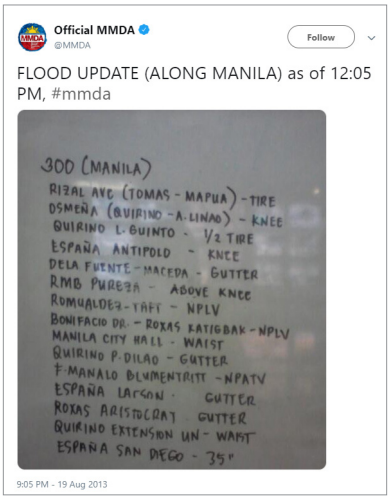



***fig. 5.22*** MMDA conveying flood information on social media. Lists like this are ineffective for conveying spatial information.

Looking beyond the scope of this exercise, crowdsourced mapping has several potential applications. Given Metro Manila's data scarcity in terms of traditional geospatial data, this method offers a new channel for accessing and collecting a wealth of information.

To combat the decreasing amount of publicly-available data, a mobile- and web-based application could be created specifically for collecting and broadcasting information. Such an application would allow users to upload reports in real-time, which could be displayed alongside relevant data from government agencies. By integrating localized knowledge from multiple sources in a single platform, the application would be able to provide a live overview of flooding, empowering stakeholders to make informed time-critical decisions. This would be a significant improvement on the ways some agencies currently share information during the onset of a hazardous event *(fig. 5.22)*.

For the application to be effective, there would need to be awareness and penetration at the community level, which could be leveraged by integrating it with existing social media platforms. To counter issues of report verification, in addition to developers continuously confirming reports, there could also be a crowdsourced self-checking mechanism in which users would be able to verify reports posted by other users. While this approach depends on altruistic users acting as report verifiers, this could increase the speed of verification and increase community presence. Though this crowdsourcing method would require active crowd participation with the platform, the application would scale up micro-level stories to a meso-level tool for collective cooperation *(fig. 5.23)*. It would allow users to contribute their *bayanihan* efforts toward molding a tactical infrastructure for visualizing their own risks, vulnerabilities, and exposure.

***fig. 5.23*** Potential use of reporting flooding through cellphone application.

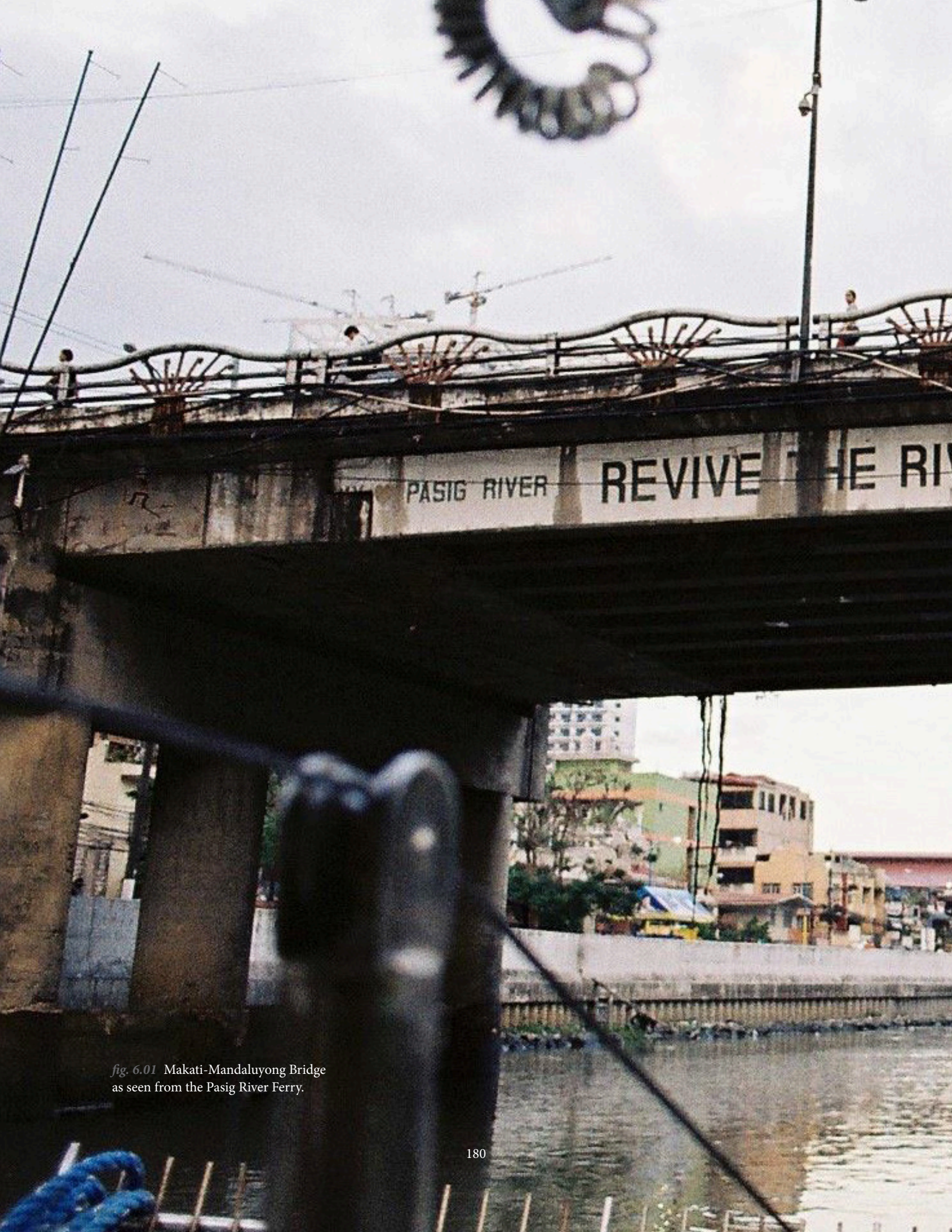
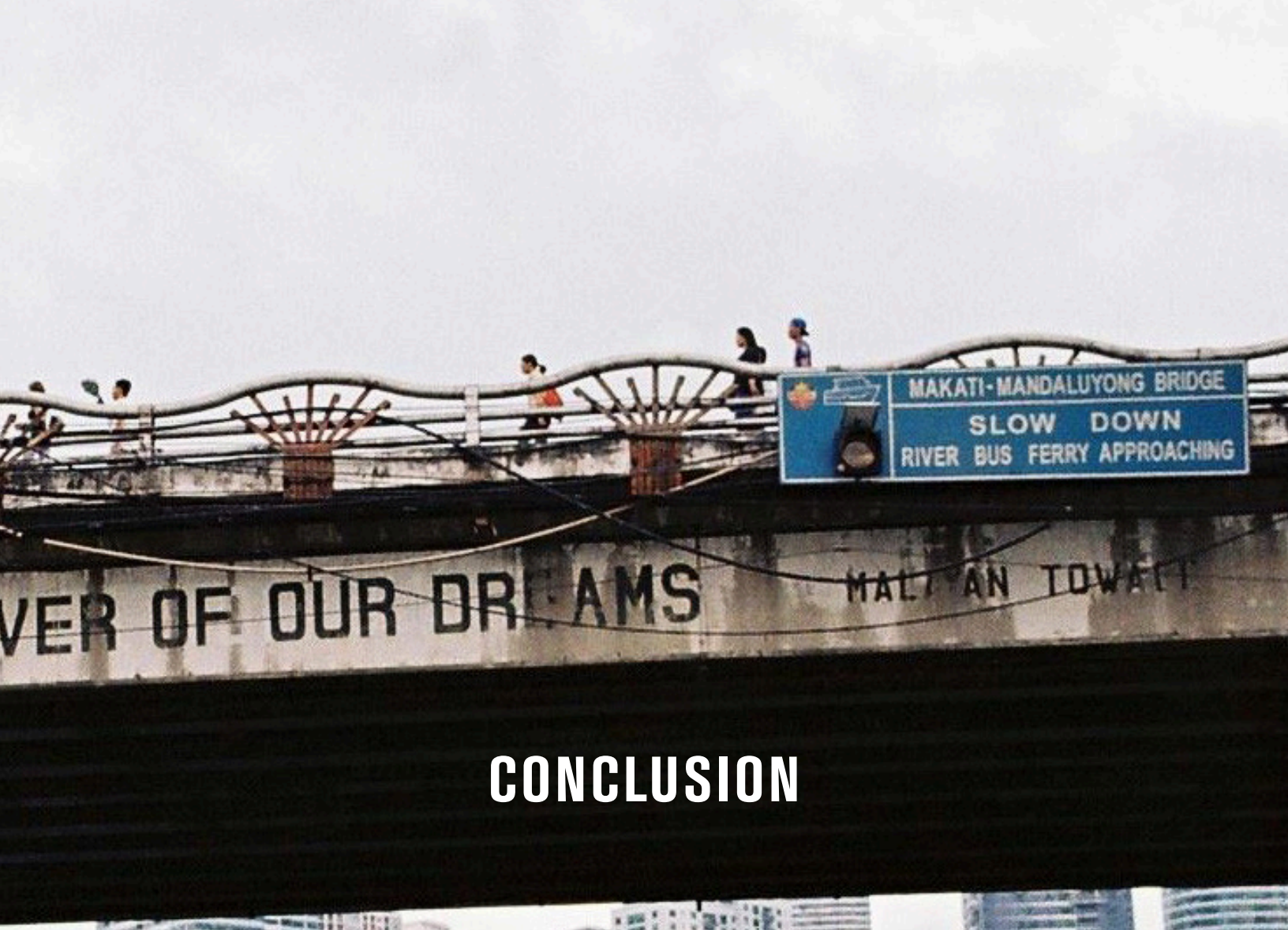



*fig. 6.01* Makati-Mandaluyong Bridge as seen from the Pasig River Ferry.


MAKATI-MANDALUYONG BRIDGE
SLOW DOWN
RIVER BUS FERRY APPROACHING
VER OF OUR DRI AMS

# CONCLUSION

# CONCLUSION

*Of the River* looked to the Pasig River to examine of how the contentious nature of water and resilience has translated into Metro Manila's governance, physical infrastructure, and social networks. While unraveling this story, the thesis also pulled a thread through many of the ideals that have shaped the megacity as a whole. From the Spanish's walls to the Marcos era floodway, national imaginaries have operated spatially and driven manipulations of the material environment. These seemingly banal infrastructures, reflective of their times, have reinforced structural inequalities, extending the issue of flooding far beyond drainage. In imagining more equitable adaptations, these marginalizing hazardscapes have been revealed and refused.

Despite Metro Manila being an entity that planners struggle to contain and many work to comprehend, it is clear that there has been and continues to be gap between strategic macro- and tactical micro-scale actions. Not every everyone can be considered from the top-down, but not everyone can be seen from the bottom-up. Meeting at the meso-level is not only about compromise, but the meeting of distinct imaginaries. Whether it be though an empowered MMDA, smaller physical interventions, or crowdsourced mapping, looking at resilience as a collective project can be a productive method for enacting change while straddling the sociopolitical fault line. *Bayanihan* is already there, it is just a matter of harnessing it in a way that translates to community agency.

As designers, we must understand cities and their climates as negotiated terrain with competing imaginaries rather than as problems requiring technocratic solutions that leave no room for contestation. An equitable design approach challenges us to shift who we consider our clients—not just those with the chequebooks but those living with risk. Unmatched in its disciplinary capacity to imagine alternate futures, architecture can help reshape and create larger visions from the ground up, positioning architects as facilitators, mediators, and negotiators. In Metro Manila, as we attempt to see from both the bottom and top and the inside and outside, we can look to the serpent for a place to begin.


***fig. 6.02*** Spaces of opportunity along the Pasig River overlaid on its morphology.
1 : 150,000

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# GLOSSARY

## ABBREVIATIONS

| | |
|---|---|
| BPO | business processing outsourcing |
| CAD / $ | Canadian dollar, 1 CAD = 40 PHP |
| DPWH | Department of Public Works and Highways |
| LGU | local government unit |
| MMETROPLAN | Metro Manila Transport, Land Use, and Development Planning Project |
| MMDA | Metropolitan Manila Development Authority |
| NCR | National Capital Region |
| NGO | non-governmental organization |
| P3DM | participatory 3D mapping |
| PHP / ₱ | Philippine peso, 1 PHP = 0.025 CAD |
| PRRC | Pasig River Rehabilitation Commission |

## FILIPINO TRANSLATIONS

| | |
|---|---|
| *bangka* | small double-outrigger dugout boat |
| *barangay* | smallest administrative division, ward |
| *bayanihan* | community cooperation |
| *estero* | estuarine rivulet or canal |
| *ilog* | river |

## DEFINITIONS

| | |
|---|---|
| imaginary | collectively held vision of the future |
| coastal flooding | inundation of land along the coast of a large open water body, typically from storm surge |
| fluvial flooding | inundation due to the water level of a river, stream, or lake rising and overflowing onto the surrounding shore |
| pluvial flooding | inundation due to a rainfall event, created independent of an overflowing water body |