ROBIN VERBRAEKEN

BRIDGING THE KNOWLEDGE–ACTION GAP IN FLOOD RESILIENCE

DAVAO CITY, THE PHILIPPINES

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(Choi, 2022)

“Filipinos are not born to suffer. We adapt because we are left with no choice. But survival is not something to romanticize. It's something to question.

We keep applauding Filipinos for wading through flooded streets and carrying on despite soaked homes and broken systems. But resilience should not be the standard.

Preparedness, proper infrastructure, and real climate policy should be.

Glorifying resiliency lets leaders escape accountability. It shifts the burden of failure onto the people instead of those in power. And the same communities are left to suffer again and again.

Why are we still here? Why are we still unprotected?

Resilience is not a substitute for governance. If people have to keep rising from the same problem, that's not strength. That's abandonment.

Stop romanticizing resilience. Start demanding accountability.”

(Umpad, 2025)

(Fieldwork documentation, 2025)

Foreword

Ever since taking the Natural Hazards and Disasters course (with Dr. Rob Coates as one of the professors) back in March 2024, I knew that this would be the topic of my thesis. I was deeply intrigued by the social dynamics underlying why floods cause such disruption in vulnerable communities.

After completing the course, I immediately requested Dr. Rob Coates to be my thesis supervisor. I mentioned that I aimed to conduct my research abroad, preferably in the Philippines, which, for the third consecutive year, has ranked highest in the World Risk Index (WRI) of the 2024 World Risk Report, reflecting its extreme exposure and vulnerability to natural hazards. How I was going to organise and achieve this was still completely unknown. Yet, with the support of Dr. Rob Coates and ir. Bert Bruins as my supervisors, and fuelled by a great deal of motivation, I was determined to make it a reality.

Fast forward one year to April 2025, and I had just spent my first month (of a total of 6.5) living in Davao City, the Philippines. My sincere gratitude goes to Rick Heijkoop (Senior Lecturer in Water Management, Rotterdam University of Applied Sciences), Sean Ligtvoet (Senior Technical Specialist, DOST XI), Joey de Hamer and Raimond Duijsens (The Netherlands Red Cross), Dr. Della Grace G. Bacaltos (Davao Central College), Dr. Anthony C. Sales, CESO III (Regional Director, DOST XI), and all the other invaluable individuals who made this endeavour possible and supported the research in countless ways.

The enthusiasm and support of all the people I have met along the way have not only contributed to the outcomes of this research but have also made it an experience I will always cherish.

Salamat!

Robin Verbraeken

“We see the value of the results of Robin’s study, particularly in the context of Davao City. But we also see possible application of the learnings in other areas of the country. Not just Davao, not just Mindanao, but also other regions of the Philippines.

In 6.5 months time Robin was able to generate quite a substantial amount of results from his study which should find application in the way we manage floods in the Philippines.”

Dr. Anthony C. Sales, CESO III (Regional Director, DOST XI)

(Choi, 2022)

Abstract

Flood preparedness in Davao City illustrates a persistent knowledge–action gap: despite extensive training programmes and formal DRR structures, routine floods in barangays Lizada and Daliao still trigger panic, hesitation, and uneven response. This thesis asks why knowledge fails to translate into confident action, and what conditions enable more equitable preparedness. Using an action-research orientation grounded in political ecology and organisational learning, the study combines focus group discussions, participatory mapping, transect walks, key informant interviews, and iterative validation, with analysis structured by the HEVC lens and triangulated across methods. Findings show that although 71 percent of participants reported previous DRR training, first reactions during flood onset remained dominated by fear and confusion, indicating an output–outcome gap in which recorded activities do not yield behavioural capability. The gap is sustained by turnover and institutional amnesia, variable training quality including outsourced seminars with limited relevance, and a policy drift toward “Don’t rely on us” that risks punitive resilience unless information, evacuation design, and support improve. At the same time, communities exhibit promising but fragile capacities: bayanihan as affective solidarity, daily canal brigades that deliver visible risk reduction, and faster barangay-level warnings, all of which require modest but consistent institutional scaffolding to endure and scale. Conceptually, the thesis reframes preparedness as translation under constraint, advancing the ideas of visible resilience and everyday preparedness, and applying single-, double-, and triple-loop learning to diagnose local learning traps. Practically, it identifies levers to convert outputs into outcomes: continuity mechanisms across elections, a public Barangay DRR Dashboard for transparent funds and outcome metrics, polycentric early warnings, role-specific drills aligned with lived problems. Institutionalisation of canal brigades and systematic mobilisation of the NSRC student reserve are also key factors. Together these measures outline a pathway for bridging knowledge and action in Davao’s flood preparedness system.

Keywords: Flood resilience, Knowledge–action gap, Disaster risk reduction (DRR), Political ecology, Organisational learning, Vulnerability and capacity, Participatory methods, Davao City, Philippines

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Acronyms

Acronym	Full Name (as used or implied in-text)
ADB	Asian Development Bank
AdDU	Ateneo de Davao University
APEC	Asia-Pacific Economic Cooperation
BDRRD	Barangay DRR Dashboard
BDRRMC	Barangay Disaster Risk Reduction and Management Committee
BDRRMO	Barangay Disaster Risk Reduction and Management Office
BFAR	Bureau of Fisheries and Aquatic Resources
BFP	Bureau of Fire Protection
BHW	Barangay Health Worker
BPAT	Barangay Peacekeeping Action Team
CDRRMO	City Disaster Risk Reduction and Management Office
CENRO	City Environment and Natural Resources Office
CHO	City Health Office

CPDO	City Planning and Development Office
CSSDO	City Social Services and Development Office
DCPO	Davao City Police Office
DCWD	Davao City Water District
DepEd	Department of Education
DENR	Department of Environment and Natural Resources
DICT	Department of Information and Communications Technology
DILG	Department of the Interior and Local Government
DOST XI	Department of Science and Technology – Region XI
DRR	Disaster Risk Reduction
DRRM	Disaster Risk Reduction and Management
DRRMC	Disaster Risk Reduction and Management Council
DRRMO	Disaster Risk Reduction and Management Office
DSWD	Department of Social Welfare and Development
EMB	Environmental Management Bureau (under DENR)
EVCA	Enhanced Vulnerability and Capacity Assessment
EWS	Early Warning System
FGD	Focus Group Discussion
HEVC	Hazard, Exposure, Vulnerability, and Capacity
HELP Davao Network	Local NGO/CSO coalition in Davao City
IFRC	International Federation of Red Cross and Red Crescent Societies
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
LDRRMF	Local Disaster Risk Reduction and Management Fund
LGU	Local Government Unit
MOA	Memorandum of Agreement
MCS	Mesoscale Convective System
MVP	Minimum Viable Product
NDRRMC	National Disaster Risk Reduction and Management Council
NGO	Non-Governmental Organization
NSRC	National Service Reserve Corps
NSTP	National Service Training Program
OCD XI	Office of Civil Defense – Region XI
OSS	Online Synthesis System
Micro OSS	Micro Online Synthesis System
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PCG	Philippine Coast Guard
PSA	Philippine Statistics Authority
PSSCC	Public Safety and Security Command Center
RA	Republic Act (e.g., RA 10121)
Red Cross	Philippine Red Cross (Davao City Chapter)
SDDRR	Student-Driven Disaster Risk Reduction
SK	Sangguniang Kabataan (Youth Council)

UNDRR	United Nations Office for Disaster Risk Reduction
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNISDR	United Nations International Strategy for Disaster Reduction
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
VCA	Vulnerability and Capacity Assessment
WASH	Water, Sanitation and Hygiene

(Choi, 2022)

Chapter 1. Introduction

1.1 Background and Rationale

Focus group discussions conducted for this research reveal that 73% of participants living in barangays Daliao and Lizada, Davao City, experienced flooding four times or more in the past year, with 88% stating that flooding is a serious problem that requires urgent change. Despite 71% of participants having taken part in disaster risk reduction (DRR) activities or trainings, panic and fear remained the most cited responses when floods struck, accompanied by many additional comments expressing a clear desire for more training and knowledge. How is it possible that after decades of DRR activities, floods continue to have such disruptive impacts on people's lives?

Floods do not have to become disasters; rather, disasters are the product of a hazard intersecting with social, political, and institutional conditions. Rainfall, tides, and stormwater may trigger inundation, but the scale of loss depends on how societies prepare, how risks are communicated, and how governance structures function (Wisner et al., 2004; Oliver-Smith, 2004). Institutions such as the Disaster Risk Reduction and Management Office (DRRMO), Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), and the Red Cross are therefore not neutral recorders of risk, but knowledge producers embedded in power relations (Bankoff, 2003; Wisner et al., 2004). This has become increasingly urgent in the Philippines, one of the most hazard-prone countries globally, where climate change intensifies rainfall patterns and urbanisation accelerates exposure (Porio, 2011).

Despite decades of scientific progress, early warning systems, and policy frameworks such as the Sendai Framework for Disaster Risk Reduction (2015–2030), a persistent paradox remains: why, with so much risk knowledge available, do floods continue to devastate communities? As Gaillard (2013) describes, disaster risk reduction (DRR) is a battlefield of knowledge and action where hazard maps, training, and protocols often fail to translate into meaningful preparedness. Argyris and Schön (1978) frame this problem as a failure of institutional learning: organisations and communities frequently engage in single loop learning, fixing immediate errors, without questioning the underlying assumptions, structures, and power relations that create vulnerability in the first place.

This paradox is acutely visible in Davao City, the economic hub of Mindanao. While investments in drainage, dikes, and response systems exist, floods remain routine disruptions in barangays such as Lizada and Daliao. Key informant interviews pointed to these disruptions being exacerbated by governance fragmentation and disarray across agency boundaries, reinforcing how hazards are shaped by institutional fractures as much as by physical processes. Residents experience inundation multiple times a year, with cascading effects on livelihoods, education, and health (FGD, 2025). In Davao City, exposure is unevenly distributed. Low-elevation coastal tracts and constrained housing markets concentrate lower-income households in flood-prone sites, making preparedness a problem of translation under constraint rather than of generic awareness. Capacities must therefore be read in the context of inequality and governance, not as flat 'community' traits.

Davao City's disaster risk reduction (DRR) agencies have not been idle in the face of these risks. The city has invested in flood mitigation infrastructure, protocols, and rescue systems. Yet a critical shift has increasingly surfaced from institutions like the City Disaster Risk Reduction and Management Office (CDRRMO), "Don't rely on us." This thesis uses "Don't rely on us" as an interpretive shorthand for a shift toward self-preparedness and no-rescue responsibility. It is not an official slogan but an analytic label grounded in interviews and in the city's legal framing of evacuation.

Davao City's Pre-emptive and Emergency Evacuation Ordinance (No. 0246-23, Series of 2023) codifies this drift: residents who refuse lawful evacuation orders and later require rescue commit a prohibited act; they may be forcibly evacuated, and upon violation face a ₱5,000 fine and/or up to one month imprisonment, with a three-day "no-contest" administrative settlement option (Secs. 5–6, 12[g], 13[c], 14). This legal architecture emphasises household compliance and risks producing punitive resilience unless accompanied by accountable improvements in evacuation conditions and support.

While CDRRMO officials frame "Don't rely on us" as an admission of the limits of centralised response in the face of growing climate uncertainty, the phrase also exposes the heart of the knowledge–action gap. In a major flood, emergency services may be delayed or overwhelmed, and residents must prepare to act before official responders arrive. The CDRRMO thus advocates a culture of self-reliance, built around four basic competencies at the community level:

1. Knowing when to evacuate
2. Knowing what to bring
3. Knowing where evacuation centres are
4. Knowing evacuation routes

(KII, 2025)

These competencies are precisely the kind of applied knowledge that many households struggle to enact in practice, due to uneven access to timely information, unclear roles, and fragmented support systems (FGD, 2025). Notably, 18% of participants reported having nothing at home to prepare for floods, highlighting a basic resource barrier even when guidance exists.

Yet this call also makes clear the fragility of self-reliance. Can communities be expected to act independently if hazard maps are outdated, trainings inaccessible, or institutions fragmented? In practice, 'Don't Rely on Us' risks becoming an abdication rather than an empowerment if the informational, institutional, and political conditions for self-reliance are not in place. As one key informant warned, a 'no rescue' stance can even become 'punitive' if enacted without design changes that account for capacity and equity (KII, 2025). This tension between empowerment and punitive resilience lies at the core of the knowledge–action gap that this thesis investigates.

1.2 Research Gap

Over the past two decades, international and national frameworks have placed strong emphasis on proactive disaster risk reduction. The Sendai Framework for Disaster Risk Reduction (2015–2030), the Philippine DRRM Act (RA 10121), and the IFRC's Framework for Community Resilience all call for anticipatory action, multi-hazard planning, and community-based preparedness. Tools such as the Enhanced Vulnerability and Capacity Assessment (EVCA) and the Hazard–Exposure–Vulnerability–Capacity (HEVC) framework provide structured ways to identify risks and capacities at the local level. Together, these approaches define what resilience should look like: informed communities, coordinated institutions, and proactive governance.

Yet across contexts, including Davao City, the transition from response-driven to prevention-oriented DRR remains incomplete. Despite hazard maps, education programmes, and early warning systems, floods continue to cause disproportionate impacts. Disaster exposure disproportionately affects poor residents, women, children, and older adults, reflected by Daliao and Lizada participants identifying mothers with children (44%) and elderly (31%) as least prepared. Additionally, repeated events compound these disadvantages, increasing vulnerability (Cayamanda, 2021; FGD, 2025).

This suggests that the challenge lies not in a lack of frameworks or knowledge, but in the persistent gap between knowing and doing. As Gaillard (2013) argues, DRR is marked by a battlefield where technocratic knowledge often fails to align with community realities. A part of this gap persists because the knowledge itself is often partial or misaligned. As Chambers (1997) argued in Whose Reality Counts?, institutional framings may misrepresent people's realities, amounting to a knowledge problem in its own right (see also von Meding & Chmutina 2023, on reconceptualizing vulnerability as liberatory praxis). Informants also described reactive ordinance-making leading to 'only taking action when there's a need arising,' contributing to weak alignment between plans and everyday realities (KII, 2025).

Existing frameworks excel in setting goals, but they rarely explain why knowledge about risk fails to become meaningful action. They describe outputs such as maps, trainings, drills but leave under-theorised the processes that convert these into behaviour and governance. In practice, hazard maps often remain unvalidated: communities report areas that flood 'multiple times' yet are absent from official maps (KII, 2025). Likewise, although significant awareness programmes exist, their effects on changing everyday behaviours remain limited and uneven.

Policies, moreover, are unevenly enforced. These are not isolated shortcomings but symptoms of what Argyris and Schön (1978) describe as single-loop learning: organisations adjust their actions to correct immediate problems. For example, they deliver more trainings when people show confusion, without questioning whether the format, content, or institutional structures make those trainings effective in the first place. Double-loop learning, by contrast, would mean stepping back to ask deeper questions: Why do residents still panic despite repeated trainings? Why do residents not evacuate? Are the messages relevant to their realities? Is the system designed to incorporate community feedback? Such reflection remains rare in DRR practice,

where activities are often multiplied rather than rethought. Triple-loop learning extends this reflexivity even further. It does not only ask whether current practices work (single-loop) or whether the underlying assumptions are valid (double-loop), but also questions how problems are defined in the first place and whose perspectives shape those definitions (Flood & Romm, 1996). Such reflection remains rare in DRR practice, as more recent work confirms that institutional reflexivity continues to be a central challenge in disaster governance (Marks (2018).

In Davao, this gap crystallises around the “Don’t Rely on Us” call. While policy rhetoric urges communities to act autonomously, the informational and institutional systems needed to support such autonomy remain fragile. Maps lacking local details, undermotivated barangay officials, and fragmented planning reveal how preparedness falters in the translation from knowledge to practice. Several informants also pointed to politicized data use and electoral incentives that discourage strict enforcement in high-risk areas, further stalling preventive action (KII, 2025).

This study addresses this under-theorised space. It explores how global and national frameworks, while normatively valuable, do not fully capture the learning traps that constrain DRR at the local level. By situating the case of Davao City within the concepts of the knowledge–action gap and single-/double-/triple-loop learning, this research contributes to both theory and practice: it identifies not only what preparedness should entail, but also why it often fails to materialise, and what conditions are needed to break free from repetitive cycles of partial learning and inadequate action.

1.3 Research Objectives and Questions

The central concern of this thesis is the persistence of the knowledge–action gap in disaster risk reduction. Despite abundant frameworks, hazard maps, and training programmes, the translation of knowledge into effective preparedness remains uneven. In Davao City, this paradox manifests in the City’s Disaster Risk Reduction and Management Office’s shift to “Don’t rely on us”. While this message recognises the limits of centralised response, its effectiveness depends on whether communities and institutions can convert available knowledge into timely and equitable action.

This research begins from the recognition that both communities and institutions already invest heavily in resilience. Filipino communities mobilise strong social capacities such as bayanihan (mutual aid), local canal cleaning brigades, and locally embedded early warning practices. At the same time, agencies such as the CDRRMO conduct extensive training and preparedness exercises, with 238 activities reported in 2024 and a river-wide drill scheduled for 2025 (KII, 2025).

However, key informant interviews with Davao’s DRR stakeholders and findings from fieldwork Daliao and Lizada reveal that such institutional efforts do not consistently translate into preparedness behaviours. Residents still reported panic as the initial reaction, hesitation to evacuate due to fear, and confusion over warnings and routes, despite prior trainings. This indicates that their impact is uneven, constrained by coverage, contextual relevance, and the difficulty of reinforcing lessons over time. Structural issues, such as outdated hazard maps, fragmented planning, and limited barangay engagement further blunt their effect. Lastly, in some cases trainings are

perceived as top-down or misaligned with local problems such as garbage-clogged drains. In this way, trainings may raise awareness yet still leave knowledge gaps unaddressed, especially when systemic barriers undermine their long-term value.

By analysing these dynamics, the research applies the lens of single-, double and triple-loop learning to interpret why such gaps persist and how they might be overcome. It reframes “Don’t Rely on Us” not simply as a slogan to be operationalised, but as a local articulation of a broader global challenge: how to move from awareness and planning to sustained and transformative action.

Main Research Objective

The objective of this research is to examine why the knowledge–action gap persists in community flood preparedness in Davao City, and to identify the institutional, informational, and social conditions that can shift practice from repetitive single-loop responses toward more transformative forms of learning and resilience.

Main Research Question

Why does the knowledge–action gap persist in community flood preparedness in Davao City, and what conditions are required for institutions and communities to achieve more equitable and effective action?

Sub-questions

1. *Hazards and Exposure*
   How do current hazard, exposure, and vulnerability dynamics shape the flood risks faced by communities in Lizada and Daliao?

2. *Capacities*
   How do capacities at the barangay contribute to preparedness, and to what extent do they enable or constrain self-reliance?

3. *Knowledge–Action Gap*
   How is the knowledge–action gap expressed in practice in Davao’s flood preparedness system, and what institutional and political dynamics sustain it?

Practically, the thesis seeks actionable levers to convert outputs into outcomes, anticipating an accountability-focused recommendation developed later.

1.4 Layout of the Thesis

This thesis is organised into nine chapters. Chapter 1 introduces the research problem, context, and objectives. Chapter 2 develops the theoretical framework, drawing on political ecology, the knowledge–action gap, and organisational learning. Chapter 3 outlines the methodology, detailing the participatory tools and fieldwork design. Chapter 4 provides a system analysis of hazards and exposure in Davao City and the case-study barangays. Chapter 5 turns to existing capacities at both community and institutional levels. Chapter 6 examines the persistence of the knowledge–action gap, focusing on training, drills, and student mobilisation. Chapter 7 discusses the findings through the study's theoretical lenses, interpreting how hazards, capacities, and governance dynamics interact. Chapter 8 concludes by directly answering the research questions, highlighting contributions, and identifying knowledge gaps. Finally, Chapter 9 translates the conclusions into actionable recommendations for institutions, communities, and the education sector.

(K5 News FM Kalibo 94.5, 2025)

Chapter 2. Theoretical Framework

Introduction

Flood hazards in Davao City, as elsewhere, only become disasters through deeper social, political, and institutional dynamics. As the Introduction has shown, the city faces a persistent knowledge–action gap: despite hazard maps, trainings, and drills, communities still describe panic and uncertainty when floodwaters rise. To understand this paradox requires more than a technical or engineering lens. It demands a theoretical framework that can uncover the root causes of vulnerability, the institutional learning traps that reinforce them, and the discourses that shape how responsibility for resilience is distributed between state and community.

This chapter develops such a framework by drawing on four complementary strands of scholarship. First, approaches within the political ecology of disaster risk, notably the Pressure and Release (PAR) model, highlight how risk is socially constructed through inequality, governance failures, and historically embedded vulnerabilities. Second, debates on the knowledge–action gap highlight why the proliferation of technical tools does not automatically translate into preparedness or reduced disaster impacts. Third, organizational learning theory (Argyris & Schön, 1978) provides a lens to analyse whether institutions are merely repeating single-loop fixes or engaging in deeper, double- or triple-loop reflection on the structures that generate risk. Fourth, the discourse of “Don’t Rely on Us” brings into focus the community side of disaster governance: the push for localized preparedness, which may empower but also risks shifting responsibility downward. Finally, participatory tools such as EVCA and HEVC serve as practical bridges between theory and method, illustrating how analysis of hazards, exposure, vulnerability, and capacity can either reinforce reactive routines or enable critical reflection.

Together, these perspectives establish the analytical backbone of the study. They situate Davao’s flood resilience challenge not as a matter of lacking knowledge, but as the product of how knowledge is produced, acted upon, or left untransformed within social and institutional systems. By integrating political ecology, the knowledge–action gap, organizational learning, community discourse, and participatory tools, this chapter provides the conceptual foundation for analysing why preparedness remains uneven in barangays such as Lizada and Daliao, and what conditions are required to move from awareness to transformative action.

2.1 Risk, Vulnerability, and Political Ecology

Disasters are not simply the outcome of natural hazards, they are the product of historically embedded vulnerabilities and social arrangements. This political-ecology perspective shows how risk is socially constructed through power relations, governance failures, and uneven development. Bankoff (2003) traces how colonial and postcolonial narratives cast the Philippines as a “land of disasters,” naturalizing vulnerability and obscuring its political and economic roots. Porio (2011) demonstrates how rapid urbanization, weak regulation, and uneven service provision generate highly differentiated flood risks in Metro Manila, disproportionately affecting the poor.

Heijmans (2009) similarly argues that DRR is never a neutral technical process, but is embedded in struggles over participation, authority, and representation.

The Pressure and Release model (Wisner et al., 2004) operationalizes these insights by linking disasters to root causes, dynamic pressures, and unsafe conditions. Root causes include limited access to resources and entrenched inequalities. Dynamic pressures include urban migration, weak institutions, and fragile environmental governance. As one key informant put it, “Due to deforestation, there are no more trees to take in the heavy rains upstream. It is all a domino effect.” (KII, 2025). Unsafe conditions then restrict people’s capacity to cope, from hazardous housing to precarious livelihoods. In Davao, these constraints keep poorer households in harm’s way: “People choose to build their house alongside the river because that is the only place they could build. That links to the bigger problem of poverty” (KII, 2025). The model is well suited to the Philippine context, where poverty, informal settlements, land-use weaknesses, and service gaps interact with heavy rainfall to magnify losses.

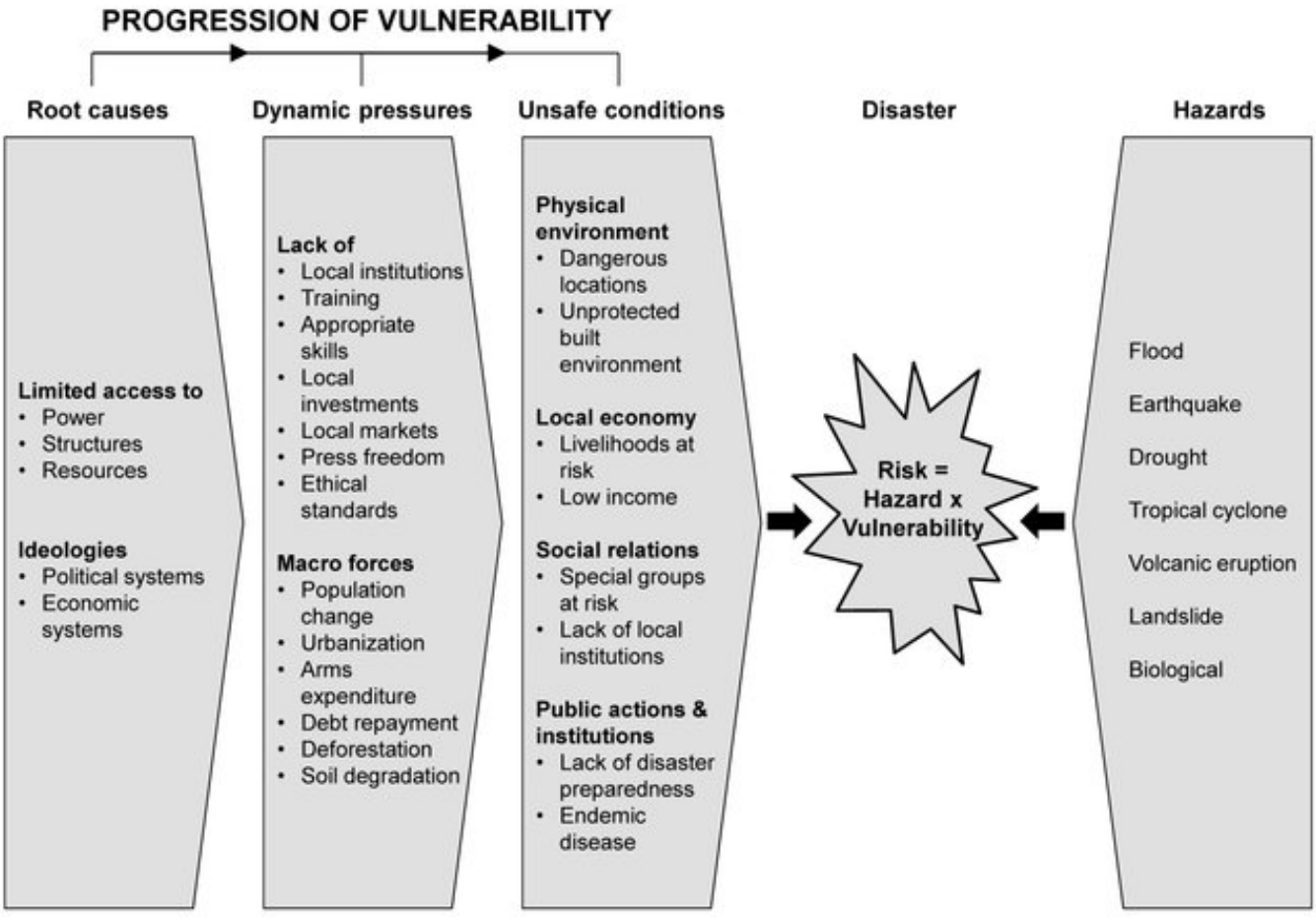


Figure 1: The Pressure and Release model (Wisner et al., 2004)

Recent Southeast Asian scholarship extends this lens. Marks (2018) shows how disaster governance can reinforce existing hierarchies, with planning decisions, infrastructure inequalities, and exclusionary practices producing uneven vulnerability. Cayamanda (2021) highlights how flood risk in Davao is shaped by limited community participation and exclusion from timely information. Tierney (2019) argues that

disasters reveal and deepen existing inequalities rather than arriving as external shocks. Pelling and Dill (2010) add that disaster governance can either reproduce or challenge these inequalities depending on how authority and responsibility are framed. As one respondent stressed, vulnerability is patterned by recovery capacity: “Even if the damage is less, but they [poor communities] have much difficulty to recover. So the vulnerability there is much higher.” (KII, 2025).

Dominant narratives that blame climate change or informal settlers can depoliticize responsibility, diverting scrutiny from planning failures, speculative land markets, and institutional neglect. At national level, Typhoon Haiyan was framed as meteorological “madness,” which sidestepped governance factors (Marks, 2018). Locally, under-recognition of risk also appears in administrative discourse: “Barangay Official will say: ‘No, this is not a flood prone area’ because they’re afraid that might hinder investments. But then when we checked the map and talked to residents, it appeared to have flooded multiple times” (KII, 2025).

A political-ecology lens requires disaggregating “community.” Vulnerabilities are classed, gendered, and spatialised. Capacities are exercised not only against water, but against housing markets, land-use regimes, and governance arrangements that shape who is exposed and who can act. Beyond these general insights, it is essential to foreground the class character of vulnerability. Classic political ecology underscored this through entitlement theory: Watts and Bohle (1993) showed that security in crisis depends on command over resources, not hazards alone. Urban political ecology develops this further. Marks (2018), analysing Southeast Asian cities, demonstrates how vulnerability is unevenly produced through planning decisions, infrastructure inequality, and exclusionary governance that privilege middle-class and elite areas while relegating poorer households to more exposed zones with fewer enabling conditions. In Davao, fisherfolk and other daily wage earners face very different evacuation choices than salaried or formally tenured households because tenure, mobility, savings, and labour obligations structure what is possible.

Taken together, political ecology and the PAR model provide this study’s conceptual foundation. They make visible how floods in Davao become disasters through socio-political arrangements that amplify exposure and constrain coping. Communities mobilize strategies such as bayanihan, canal brigades, and improvised early warnings, yet these are often undermined by systemic inequalities and governance gaps that limit their effect. The thesis therefore treats vulnerability as socially stratified, classed, and spatialised, and traces these dynamics empirically in the chapters that follow.

2.3 The Knowledge–Action Gap in Disaster Risk Reduction

Despite significant investment in technical tools, from hazard mapping to early warning systems, the translation from knowledge to effective action in disaster risk reduction (DRR) remains strikingly limited. Gaillard (2013) characterizes DRR as a “battlefield of knowledge and action,” where the proliferation of scientific and technical instruments has not resulted in proportional reductions in vulnerability.

This gap is not simply a matter of weak implementation but arises from deeper structural disconnects. Recent empirical research confirms this pattern. Vu (2025) highlights persistent misalignment between local DRR policies and good governance

principles, showing how institutional frameworks often fail to ensure that risk information leads to equitable outcomes. Ogra (2021) shows that risk governance is shaped by political contestations and competing interests that override scientific knowledge and dilute policy intentions.

The paradox is further complicated by rapid advances in technology. A 2025 UNDRR report observes that while early warning systems and AI-driven risk modelling have expanded technical capacity, these innovations remain ineffective unless embedded in socio-cultural contexts and institutional arrangements. Without such integration, technology risks reproducing the knowledge–action gap by generating information that cannot be acted upon at the community level. This pattern is visible in Davao, where trainings, hazard maps, and drills proliferate but residents in high-risk barangays still describe confusion and panic during floods, indicating that technical inputs can fail to translate into preparedness practices, and at times may even create confusion that undermines preparedness.

These studies reaffirm the paradox at the heart of DRR: high technical capacity coexists with persistent inaction. Hazard knowledge accumulates faster than the institutional and political mechanisms required to translate it into conditions that enable vulnerable groups to act on risk knowledge. DRR strategies continue to be dominated by top-down, expert-driven approaches that privilege technocratic knowledge while neglecting local realities and equity considerations. KIIs repeatedly traced the gap to disconnected data and low trust: “Even the barangay doesn’t always get the latest flood data. They wait for the city, and the city waits for someone else. Hazard maps come from top down, from people who never even went there” (KII, 2025). The result, is lost memory and weak learning loops: “Has this been flooded in the last 10 years? - ‘We don’t know.’ How high was the water level? - ‘We don’t know.’ Nobody seems to care, and nobody seems to recall (KII, 2025).

In sum, the knowledge–action gap is less a matter of technical or awareness deficits than of governance and institutional culture. It persists because trainings, maps, and drills often remain outputs without becoming outcomes, constrained by inequality, fragmented systems, and a tendency to privilege visible short-term fixes over systemic transformation. Bridging this gap requires not more data alone but a reorientation of disaster governance: aligning knowledge production with participatory and accountable institutions, embedding it in everyday community practices, and ensuring that preparedness is not merely a behavioural challenge but a matter of equitable, trusted, and transformative action.

2.4 Organisational Learning and DRR

Disaster risk reduction remains limited not for lack of technical knowledge, but due to how institutions learn, or fail to learn, from events. Argyris and Schön (1978) distinguish between three modes of learning. *Single-loop learning* fixes immediate problems without questioning underlying frameworks. *Double-loop learning* revisits and reforms assumptions, rules, and policies. *Triple-loop learning* goes further by asking how problems are defined and whose perspectives shape those definitions (Flood & Romm, 1996; Adams, 1979).

Examples illustrate these distinctions. In the case of waste-related flooding, a single-loop response is to clear canals more often. A double-loop response asks why improper waste disposal persists, questioning service provision, poverty, or coordination failures. A triple-loop response interrogates why "waste" is framed as the core problem, and how institutional standpoints cast communities as deficient. This underscores that knowledge is socially situated and that problem framings can reproduce the very vulnerabilities DRR seeks to reduce (Adams, 1979).

Recent scholarship shows how DRR governance in Southeast Asia often defaults to single-loop fixes, reinforcing vulnerabilities rather than transforming them. Djalante et al. (2012) argue that disaster governance systems in the region frequently lack reflexivity, constrained by bureaucratic rigidity and short-term political cycles. Lebel et al. (2019) find that effective adaptive governance depends on multi-stakeholder learning platforms where communities, governments, and scientists reflect together. Amil (2024) similarly observes that although collaborative governance is formally encouraged in the Philippines, actual reflexivity is weak and most actions adhere to standard protocols rather than challenge structural assumptions. UNDRR (2025) highlights a similar risk with technological tools: AI-driven warnings or modelling can reinforce single-loop routines if institutions lack reflective capacity.

In Davao, these dynamics are visible in flood preparedness and evacuation. A *single-loop* response follows the 2023 Pre-emptive and Emergency Evacuation Ordinance (Ordinance No. 0246-23): when there is a flood threat, households are ordered to evacuate, with penalties if they refuse. A *double-loop* response would ask why many residents resist evacuation; because evacuation centres are overcrowded or flood-prone, sanitation is poor, health risks are high, looting is feared, animals cannot be brought, or households weigh flood risk against losing their few possessions (FGD; KII, 2025). Rather than punishing refusal, double-loop learning would reform evacuation design and support to address these barriers. One key informant warned that the prevailing approach risks punitive drift: "It's a punitive policy, it's so top-down. Why not focus on creating a more balanced policy for that?" (KII, 2025). A *triple-loop* response questions who defines evacuation as the problem, whose safety counts, and how poor households juggle multiple risks daily. This highlights the politics of problem framing: compliance is prioritised over addressing structural conditions.

Viewed through this lens, many DRR actions in Davao remain symptomatic, such as conducting additional drills or trainings each year. The deeper question is whether institutions have the willingness and capacity to interrogate and reform the drivers of vulnerability, from weak housing regulation to inadequate centre provision. In practice, most systems remain within single-loop routines, while genuine double-loop reflexivity is rare and politically constrained (Djalante et al., 2012; Lebel et al., 2019). Triple-loop reflexivity remains largely aspirational but analytically valuable for exposing how problem definitions redistribute responsibility.

This thesis applies these distinctions as follows: *single-loop* for symptomatic fixes (e.g., more drills), *double-loop* for questioning design and assumptions (e.g., who trainings reach, why panic persists), and *triple-loop* for interrogating the politics of problem framing (who defines preparedness, who bears its burdens). This distinction provides a diagnostic tool for interpreting practices observed in Daliao and Lizada and is referenced throughout Chapters 5–7 to maintain consistency.

2.5 The “Don’t Rely on Us” Discourse

Alongside debates on institutional learning, disaster risk reduction in the Philippines has increasingly emphasized community self-reliance. The message “Don’t rely on us,” often articulated by disaster agencies such as Davao City’s DRRMO, reflects an acknowledgement of the limits of centralized response in the face of growing climate uncertainty. During major floods, emergency services may be delayed, overstretched, or unable to reach certain areas, making local preparedness essential. The city’s DRRMO has translated this into a no-rescue policy that stresses four core competencies at the household and community level (KII, 2025):

- Knowing when to evacuate
- Knowing what to bring
- Knowing where evacuation centres are
- Knowing which routes to take

This framing is backed by Davao City’s Pre-emptive and Emergency Evacuation Ordinance (Ordinance No. 0246-23, Series of 2023). Under this ordinance, residents who refuse lawful evacuation orders and later require rescue commit a prohibited act; they may be forcibly evacuated for safety and, upon violation, face a ₱5,000 fine and/or imprisonment of up to one month at the court’s discretion, with a three-day “no-contest” option to settle administratively (Secs. 5–6, 12[g], 13[c], 14). This legal architecture underscores that preparedness is framed not only as capacity-building but also as compliance, raising questions about whether responsibility for resilience is being enforced in punitive rather than supportive ways.

This discourse aligns with a broader shift toward the localization of disaster preparedness. Community-based approaches, long promoted in the Philippines, recognize that residents are always the first responders and that their knowledge, networks, and actions often determine survival (Heijmans, 2009). The emphasis on self-reliance resonates with international calls for localization under the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015) and with the practices of NGOs and grassroots networks across Southeast Asia that have championed community-driven DRR. At its best, the “Don’t rely on us” message is empowering: it stresses agency, builds awareness, and acknowledges that official rescue emergency services may be overwhelmed and take time to act. Yet as Heijmans (2009) and White and O’Hare (2014) caution, empowerment discourses can also mask persistent mismatches between institutional framings and community realities, particularly when technical expertise is privileged over lived knowledge.

Yet the discourse also exposes deep tensions. Advocating self-reliance without addressing structural deficits risks shifting responsibility from state to community. As scholars have noted, empowerment rhetoric can obscure the reality that many communities are excluded from timely risk information, lack access to updated hazard maps, and receive little or no training (Zhao et al., 2025). In the Philippines, this is compounded by politicized practices such as the manipulation of flood maps, under-resourced barangay councils, and warning systems that residents distrust due to repeated false alarms or poor contextualization (Cayamanda, 2021). This dynamic reflects what Chmutina and von Meding (2019) describe as the depoliticization of

disaster risk, in which resilience discourses obscure structural inequalities and shift responsibility downward, ultimately deepening rather than reducing vulnerability.

The “Don’t rely on us” discourse should therefore be read as a parallel lens to institutional learning. While double-loop learning addresses the capacity of institutions to reflect and reform, this discourse highlights the community side of the equation: the push for localized preparedness and self-organization in contexts where state support is limited. Both perspectives illuminate different aspects of DRR governance in Davao, one focusing on how institutions learn, the other on how communities are expected to adapt when institutions cannot guarantee protection. When institutional learning remains single-loop, the burden of preparedness is displaced onto communities, making ‘Don’t Rely on Us’ less an empowerment strategy and more a transfer of responsibility. This underscores the need to analyse both institutional reflexivity and community self-reliance as interconnected dimensions of Davao’s flood resilience.

2.6 Tools for Reflection: EVCA and HEVC

The theoretical debates outlined above find practical expression in the participatory tools used to analyse disaster risk. One of the earliest and most influential frameworks is the Vulnerability and Capacity Assessment (VCA), developed by Anderson and Woodrow (1989) to document both vulnerabilities and coping capacities. By focusing on social and institutional dimensions alongside hazards, VCA marked a significant departure from technocratic assessments and helped to establish a tradition of participatory disaster risk analysis.

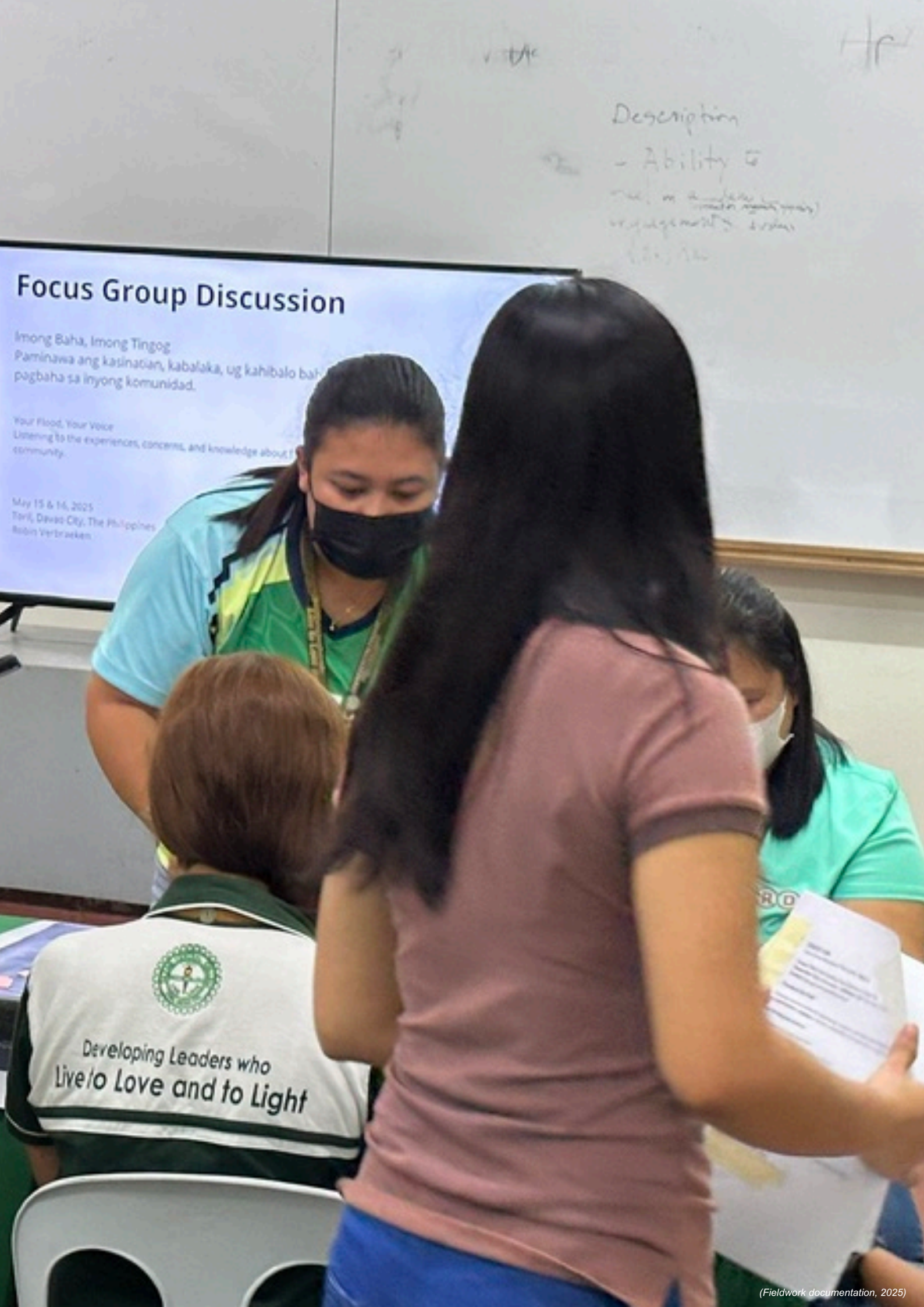
Building on this tradition, the International Federation of Red Cross and Red Crescent Societies developed the Enhanced Vulnerability and Capacity Assessment (EVCA, 2019), while the Hazard, Exposure, Vulnerability, and Capacity (HEVC) tool was later introduced as a complementary approach. Both combine participatory engagement with structured data gathering. When applied rigorously, these tools can go beyond cataloguing hazards to surface the root causes of vulnerability, such as weak land-use regulation, entrenched poverty, or institutional blind spots in governance. In this sense, EVCA and HEVC can support double-loop learning, providing opportunities for institutions and communities to jointly reflect on structural conditions rather than only on immediate risks.

Yet their potential is not always realized. When used superficially, EVCA and HEVC can become single-loop exercises that map hazards without questioning underlying social or political drivers. This reflects the broader knowledge–action gap: participatory activities may be performed for compliance or donor accountability, but without genuine reflection they do little to transform decision-making.

For this study, EVCA and HEVC are approached not merely as technical tools but as interpretive devices. Their outputs are read through the lenses of political ecology and organizational learning, allowing an assessment of whether they reinforce reactive routines or enable deeper institutional change. Positioned this way, EVCA and HEVC bridge theory and method: they embody the possibility of participatory, reflexive practice, while also illustrating the risks of remaining confined to surface-level engagement.

2.7 Synthesis

The theories reviewed in this chapter converge on a central contention: floods do not have to become disasters but are socially produced outcomes shaped by governance, inequality, and institutional practice. Political ecology highlights how hazards only become disasters through historically embedded vulnerabilities rooted in poverty, exclusion, and institutional neglect. The knowledge–action gap shows that even as hazard data and technical tools proliferate, these often fail to reshape behaviours or governance structures, reinforcing the divide between knowing and doing. Organisational learning theory explains why: most DRR systems operate in single-loop mode, multiplying activities without questioning the assumptions and policies that reproduce risk. At the same time, discourses like “Don’t Rely on Us” illustrate the community dimension of this paradox, where empowerment rhetoric risks shifting responsibility downward if structural conditions remain unaddressed. Participatory tools such as EVCA and HEVC can support double-loop learning by surfacing blind spots and root causes, but when applied superficially they risk becoming single-loop exercises that validate existing practices. In synthesis, this thesis uses political ecology to situate vulnerability and capacity, the knowledge–action gap to analyse the translation from outputs to outcomes under conditions of inequality, and organisational learning to interrogate how institutions and communities adapt, or fail to adapt, across single-, double-, and triple-loop processes. Together, these lenses establish the analytical foundation of this thesis and are explicitly mobilised in Chapters 4–7.



(Fieldwork documentation, 2025)

Chapter 3. Methodology

Introduction

This chapter outlines the methodological framework of the study. It explains how the research was designed, why particular methods were chosen, and how these were implemented in practice. Rather than providing only a technical description, the methodology reflects on the challenges, adaptations, and implications of conducting participatory flood resilience research in Davao City. By combining description with reflection, the chapter shows how methodological choices were shaped by theoretical concerns, field realities, and the researcher's own positionality.

Grounded in the PAR model, the methodology treats floods not as natural events but as socially produced outcomes shaped by governance, inequality, and institutional practice (Bankoff, 2003; Porio, 2011; Wisner, Blaikie, Cannon, & Davis, 2004). To operationalise this, the research adopted an action research orientation that emphasised participation, reflexivity, and co-production (Reason & Bradbury, 2015). This orientation was appropriate for two reasons. First, it enabled knowledge to be generated with communities rather than about them, surfacing everyday practices and coping strategies often absent in technocratic disaster risk reduction (DRR) planning (Gaillard & Mercer, 2013). Second, it provided reflective spaces where institutional actors could critically examine their own practices, creating opportunities to bridge the divide between knowing and doing.

Three principles structured the methodological design. First, triangulation: focus group discussions, participatory mapping, transect walks, and key informant interviews were deliberately combined to cross-check perspectives and expose mismatches between institutional narratives and lived realities. Triangulation thus served not only as a technical safeguard but also as a way to engage what Gaillard (2013) calls the "battlefield of knowledge and action." Second, reflexivity: the researcher's positionality, as an outsider, as a partner of local institutions, and as a facilitator of community dialogue, was treated as integral to knowledge production (Berger, 2015; Holmes, 2020). Third, iteration: methods were adapted over time, from an exploratory student FGD to more refined sector-based sessions, improving inclusivity, accessibility, and depth of engagement.

The chapter is organised as follows. Section 3.2 introduces the overall research approach. Section 3.3 reflects on researcher positioning and reflexivity. Section 3.4 outlines the case study sites and the enabling role of Davao Central College. Sections 3.5 to 3.9 detail the specific methods employed, while Section 3.10 describes data processing, Section 3.11 addresses ethical considerations, and Section 3.12 discusses methodological limitations. Together, these sections show how the methodology operationalised the theoretical framework: political ecology guided site selection and attention to inequality, the knowledge–action gap shaped tools to test whether knowledge was usable in practice, and organisational learning provided the lens to interpret whether practices reflected single-, double-, or triple-loop learning.

3.1 Research Approach

The research adopted an action research orientation, integrating inquiry with practice and emphasising collaboration between researcher and participants (Reason & Bradbury, 2015). This orientation was appropriate given the ambition of the study: to generate knowledge about the persistence of the knowledge–action gap in flood preparedness in Davao City.

This orientation aligns closely with the theoretical framework and guided the research design throughout. It resonates with the PAR model by recognising that floods are not purely natural events but outcomes of governance, inequality, and institutional arrangements (Kelman, 2020; Pelling & Garschagen, 2019). The aim, therefore, was to co-produce situated knowledge that exposes these social dynamics rather than reproduce technocratic framings. It also directly responds to the knowledge–action gap (Gaillard, 2013) by embedding iterative feedback and validation into the research process. This enabled critical reflection on whether the risk knowledge produced through training, mapping, or discussion was genuinely usable for preparedness or remained trapped in abstract form. Furthermore, the study drew on organisational learning theory (Argyris & Schön, 1978) to analyse how institutions and communities engaged with findings, distinguishing between single-loop routines and moments of double-loop reflection, where underlying assumptions or governance practices were questioned. While not observed directly, the concept of triple-loop learning (Flood & Romm, 1996) was retained as a theoretical horizon, reminding that disaster risk reduction is shaped by how problems are defined and whose perspectives dominate those framings. Together, these lenses shaped how the study both generated and interpreted knowledge about preparedness.

In practice, these theoretical commitments translated into three interrelated principles: participation, reflexivity, and iteration. Participation meant that methods such as focus group discussions (FGDs), participatory mapping (PM), and transect walks (TW) treated participants not merely as respondents but as co-producers of knowledge and interpretation. Reflexivity required continual awareness of how the researcher's positionality influenced access, relationships, and analysis (see Section 3.3). Iteration ensured that tools and interactions evolved through cycles of learning, for example, insights from a pilot student FGD at Davao Central College were used to refine facilitation, inclusivity, and material design for subsequent sector-based FGDs. Validation sessions further extended this process by allowing participants to review and refine findings, closing feedback loops and enhancing credibility. Such iterative and collaborative engagement was particularly crucial in a fragmented institutional landscape: without it, mismatches between official narratives and lived realities would have remained obscured.

The approach was designed to keep theory and method coherent. Political ecology directed attention to differentiated vulnerabilities; the knowledge–action gap shaped instruments that reveal slippage between outputs (maps, drills, trainings) and outcomes (behaviour, trust); and organisational learning worked as a diagnostic to see whether practices remained single-loop (more of the same), moved to double-loop (redesign and inclusion), or reached toward triple-loop (who defines the problem, and for whom).

3.2 Researcher Positionality and Reflexivity

In qualitative and participatory research, the position of the researcher is not neutral. Who conducts the research, how they are perceived, and the networks they operate through all shape access, data quality, and interpretation (Berger, 2015; Holmes, 2020). In line with the PAR model and organisational learning perspectives, this study recognises that knowledge is socially situated and contested (Cornwall, 2016; Gaillard, 2019). Reflexivity is therefore not treated as a weakness but as a marker of transparency and rigour, clarifying how findings were co-produced rather than "discovered."

The researcher holds a dual educational background in water management and metropolitan development. At Rotterdam University of Applied Sciences, studies in Communication & Multimedia Design (BSc) and Water Management (BSc) provided skills in stakeholder engagement and technical analysis. At TU Delft and Wageningen University, the Metropolitan Analysis, Design & Engineering (MSc) programme expanded expertise in natural hazards, disaster risk reduction, climate change adaptation, and urban space planning. This interdisciplinary training shaped a methodological orientation toward participatory and action-oriented research in disaster risk reduction.

This orientation was reinforced by a 6.5-month field placement in Davao City, during which the researcher was formally affiliated with the Department of Science and Technology Region XI (DOST XI). This affiliation facilitated access to government agencies and experts, many of whom might have been harder to reach without the legitimacy attached to a foreign researcher linked to an international programme. At the same time, this institutional embedding inevitably shaped the data: some informants emphasised formal protocols and presented idealised accounts, while others used the "outsider" presence as a safe channel to voice criticism.

The research was entirely self-funded. No financial compensation, housing, food, or other benefits were provided by any institution. This had two important implications. First, it underlines that the research was driven by enthusiasm, curiosity, and academic motivation rather than financial benefit. Second, it ensured full independence: the researcher retained final authority over research direction, scope, and analysis, free from institutional or donor influence.

In community settings, the researcher's visible identity as a tall, white European male generated curiosity and hospitality, but also potential power asymmetries. Some participants may have felt constrained by assumptions of authority or external resources. Efforts to mitigate these dynamics included collaborating with local facilitators fluent in Bisaya, ensuring bilingual and visually clear materials, and embedding validation steps that returned interpretive authority to participants. These measures helped reduce hierarchies and encouraged openness, though they could not eliminate them entirely.

Language was another dimension of positionality. While most interactions were conducted in English, translation into Bisaya was frequently required. This introduced the possibility of reframing and loss of nuance (Squires, 2009). Triangulation across multiple methods, FGDs, mapping, KIIs, and transect walks, was therefore essential

to safeguard accuracy. For example, discrepancies between official accounts and community narratives were not dismissed as errors but treated as indicators of contested knowledge, aligning with the study's theoretical framing of DRR as a "battlefield of knowledge and action" (Gaillard, 2013; Morton et al., 2021).

These positional dynamics shaped not only access but also interpretation. Key informants occasionally downplayed governance failures, while some community participants were more candid precisely because of the researcher's outsider status, perceiving less risk of local repercussions. Such asymmetries are themselves analytically meaningful: they reveal how power relations influence what knowledge is shared, how it is framed, and whose voices shape the definition of preparedness. In this sense, reflexivity also resonates with triple-loop learning: not only examining what is done (single-loop) or why it is done (double-loop), but also questioning who defines the problem of flood risk in the first place.

In sum, reflexivity was embedded throughout the research process. Acknowledging the influence of identity, affiliation, and language made it possible to situate the data within its relational context. Rather than striving for impossible neutrality, the research embraced co-production and iterative validation to balance insider and outsider perspectives. In this way, positionality became not a limitation but a resource, sharpening the analysis of how knowledge about floods is produced, contested, and mobilised in Davao City.

3.3 Case Study Sites and Boundaries

The case study design aligns with the theoretical framework in two respects. First, from a political ecology perspective, Daliao and Lizada illustrate how hazard exposure interacts with socio-political processes such as land-use change, weak regulation, and uneven service provision. Flood risk here is not solely hydrological but is produced through patterns of urban growth, infrastructure neglect, and limited institutional support (Kelman, 2020; Pelling & Garschagen, 2019). Second, in relation to the "Don't Rely on Us" discourse, these barangays exemplify the tensions of localised preparedness. While communities are urged to act autonomously, their capacity to do so is constrained by outdated hazard maps, limited resources, and fragmented planning (Cayamanda, 2021). Focusing on these sites therefore allowed the research to probe how responsibility for resilience is negotiated between state institutions and local actors. This framing makes explicit that Daliao and Lizada are not generic communities but intersecting groups whose vulnerabilities and capacities differ by gender, livelihood, and institutional role.

Several considerations shaped the selection of these barangays. Geographically, they combine coastal and riverine risk, making them representative of the overlapping hazards faced by many peri-urban areas in the Philippines. Demographically, with populations of roughly 21,000 each, they reflect the scale and diversity of mid-sized barangays where urbanisation pressures are rapidly reshaping risk profiles. Socially, their grassroots initiatives, such as the canal brigades, provide valuable insights into existing capacities and collective action. These initiatives are not merely practical solutions but also expressions of community agency that challenge narratives of passivity often applied to vulnerable groups.

Davao Central College (DCC), located in the focus area, saw the value of the research and offered support with several participatory activities, including focus group discussions (FGDs), participatory mapping (PM), and transect walks (TW). Their institutional position and connections in the focus area created the opportunity to conduct these activities at the scale this research was able to achieve. Their support was built up from four key layers:

Bureaucratic guidelines

When aiming to conduct participatory activities like FGDs, researchers are not allowed to simply enter a neighbourhood and start engaging with residents. It is mandatory to follow official protocols, which begin with submitting a formal letter of intent addressed to the barangay captain, in the case of Daliao that outlines the research background, objectives, and plans for the participatory activities. This is followed by an official meeting with the barangay captain, where further elaboration is required. Only when the barangay captain gives formal permission can the activities be organised. In this process, DCC served as the crucial link between the researcher and the barangay officials.

Network

DCC has long promoted collaborative research and is active in the focus area. Their strong relationships with multiple sectors enabled effective communication and participant involvement. DCC distributed the official letter of intent and invitation to formal representatives of various sectors. These representatives, in turn, forwarded the invitation to their respective groups, acting as trusted intermediaries. This network allowed for smooth navigation of the area's complex, layered social dynamics.

Location

DCC offered access to their facilities for the research activities. Depending on the activity and group size, different spaces were utilised to host the sessions. These rooms were equipped with screens for presentations and, when needed, microphones for audio support. Additionally, because of the barangay captain's support, barangay facilities were made available for the larger sector-based FGDs.

Facilitation

Several members of DCC's Research Board supported the project by volunteering to help facilitate the participatory activities. As noted in Section 3.3, since the main researcher did not speak Bisaya or Tagalog, the DCC facilitators' fluency in English also enabled them to serve as translators when necessary. Their contribution was entirely voluntary.

Overall, beyond their genuine enthusiasm and support, DCC also benefited from participating in this research. It aligned with their institutional advocacy for collaborative research and provided them with fresh insights that could inform future initiatives.

Focusing on two barangays inevitably limits the breadth of comparison, but it offers depth of insight. The study does not claim statistical representativeness but rather seeks to generate analytically transferable findings (Lincoln & Guba, 1985; Gaillard &

Gomez, 2015). The dynamics observed in Daliao and Lizada such as recurrent flooding, community self-help initiatives, and tensions between institutional responsibility and local autonomy resonate with broader challenges of flood resilience across Davao City and the Philippines. They thus provide a lens through which to interrogate the persistence of the knowledge–action gap and the possibilities for moving beyond single-loop routines towards more reflexive and equitable forms of preparedness (Tierney, 2019; Pelling & Dill, 2010).

Figure 2: Researcher giving a lecture on sustainable development and water management at Davao Central College April 4, 2025.

3.4 Focus Group Discussions

The Value of Focus Group Discussions in Participatory Flood DRR

Focus group discussions (FGDs) were chosen as a core method because they provide a space for collective reflection on how people actually live with flood risk, beyond what surveys or technical assessments can capture. They make visible everyday practices, constraints, and coping strategies that often remain hidden in official accounts (Krueger & Casey, 2015; Gaillard & Mercer, 2013). In flood-prone and data-poor contexts such as Davao, FGDs are particularly valuable for mapping localised vulnerabilities, surfacing mismatches between institutional narratives and lived realities, and examining how preparedness is experienced in practice (Del Marmol, 2014; Fakhruddin & Ballio, 2013).

Within this study, FGDs were situated in relation to output-outcome discourse promoted by Davao's DRRMO. The city's shift toward a no-rescue policy and an emphasis on household-level competencies raises critical questions about the feasibility and equity of community self-reliance. FGDs did not assume that communities lack initiative; rather, they provided a way to explore the conditions under which self-reliance is possible, when it is constrained, and how responsibility is negotiated between households, barangays, and city institutions.

From a theoretical perspective, FGDs were designed to probe the knowledge–action gap. Read through organisational learning, a single-loop framing aligns with the enforcement logic of evacuation; a double-loop framing would redesign evacuation conditions to remove the barriers participants named; a triple-loop framing would ask who defines safety, whose risks are prioritised, and how the Pre-emptive and Emergency Evacuation Ordinance (No. 0246-23) redistributes responsibility. They also allowed observation of whether preparedness knowledge remained at the level of single-loop routines, repeating trainings without changing behaviours, or whether participants engaged in double-loop reflection, questioning the relevance or design of those trainings. FGDs also created the potential for glimpses of triple-loop awareness, where participants indirectly challenged how problems were framed in the first place (for example, whether "lack of awareness" was really the issue, or whether inadequate institutional support was the deeper cause).

Finally, FGDs were aligned with the Enhanced Vulnerability and Capacity Assessment (EVCA) and HEVC (Hazard, Exposure, Vulnerability, Capacity) frameworks that guide this thesis. In line with the theoretical framework, they served a dual role: surfacing situated knowledge with communities and providing a platform to critically assess whether participatory tools reinforced existing routines or enabled deeper reflection. In this way, FGDs acted both as a method of engagement and as an analytical window onto the dynamics of institutional learning and community resilience.

This research utilised two distinct rounds of FGDs: the first with students and the second with sector-based participants. These rounds were not merely repetitions but iterative steps that allowed for methodological learning, refinement, and recalibration. The student FGD acted as an exploratory pilot, while the sector FGDs incorporated key improvements based on those lessons. This evolution significantly enhanced participation, inclusivity, and the depth of data generated.

Student FGD

Date	Friday April 4, 2025
Duration	1 session, 60 minutes
Location	Davao Central College, Toril, Davao City
Group size	Total of 19 participants, approximately 7 students per subgroup (based on the barangay they lived in)
Language	Presentation given in English. All materials provided in both English and Bisaya, avoiding technical jargon.

Participant Justification

The selection of criminology students as participants was deliberate and strategic. These students, particularly at Davao Central College, occupy a dual position: they are residents of flood-prone barangays, directly affected by local hazards, and at the same time they are being trained to take up roles in community safety and disaster response. This made them uniquely positioned to reflect on both everyday experiences of flooding and the institutional expectations tied to resilience.

Through coursework and on-the-job training (OJT), criminology students gain exposure to the operational side of disaster risk management. For instance, during the

city's Holy Week 2023 operations, they were assigned to man alternate command posts (ACPs) under the supervision of DRRMO staff (NDRRMC, 2023). At the barangay level, their training aligns with the functions of barangay tanods, the first line of defence during routine and emergency situations , whom the Department of Social Welfare and Development (DSWD) formally recognises as "frontliners in the community," particularly in DRR, peacekeeping, and health-related interventions (DSWD, 2020).

This dual grounding as residents with lived flood experiences and as trainees embedded in Davao's DRR structures provided both depth and nuance to the pilot FGD. It allowed students to speak not only about the challenges of preparedness at household level, but also about institutional framings of risk, protocols, and coordination. Their contributions were therefore especially relevant for probing the "Don't Rely on Us" discourse: they could reflect on how self-reliance is framed in training and practice, while also describing its limits in the lived realities of their own families and communities.

Process and Facilitation

The student FGD began with a two-hour lecture delivered by the researcher to around 100 students and staff, focusing on sustainable water management and drawing on Dutch examples to highlight the importance of participation in building resilience. This lecture set a shared academic context for the smaller group discussion that followed.

Figure 3: Student Focus Group Discussions, April 4, 2025.

From the audience, 19 criminology students from Daliao and Lizada were selected for the FGD. After signing consent forms, they were given a short orientation on the session's objectives and structure. Participants were divided into two subgroups according to their barangay of residence and seated at separate tables. Each

subgroup received a booklet of 20 open-ended questions structured around the Prevention, Preparedness, Response, and Recovery (PPRR) framework. Two questions were placed on each page to leave space for written answers.

Three additional facilitators supported the researcher during the session, moving between tables, answering questions, and encouraging participation. Within their groups, students first discussed each question collectively before writing down responses. Snacks were served throughout to create a relaxed atmosphere and sustain engagement. Once the booklets were completed, facilitators collected and immediately photographed them to ensure data security.

The session concluded with a short reflection led by the researcher, outlining next steps, introducing the upcoming validation session, and thanking participants for their involvement.

What Worked Well

The deliberate selection of criminology students proved valuable. As likely future first responders, their engagement with disaster risk reduction (DRR) topics offered both personal relevance and professional foresight. The group size, 19 participants in total, with 6–7 per subgroup, reflected best practices in qualitative inquiry, enabling open discussion within manageable dynamics. The Prevention, Preparedness, Response, and Recovery (PPRR) structure provided a balance of open reflection and analytical consistency. The strong contextual lecture beforehand helped orient participants and frame their thinking. Snacks contributed to a relaxed atmosphere that supported openness. Importantly, the student focus group discussion served as a methodological testing ground. Comparing it with the later sector focus group discussions demonstrates how iterative adjustments improved engagement, data quality, and participant experience. This reflects the action research principle that methods themselves evolve through practice.

Challenges and Limitations

Despite its strengths, the student focus group discussion faced limitations. The absence of embedded facilitators at each table reduced probing and allowed dominant individuals to sometimes silence quieter voices. Reliance on written responses disadvantaged those less confident in writing, leading to surface-level answers despite deeper verbal discussions. The session lacked built-in real-time validation, creating greater demands for later validation sessions. Processing written answers was also laborious, requiring assistance from a native speaker and consuming significant time. These limitations did not undermine the value of the session but highlighted how easily knowledge risks staying at a surface level without the right facilitation. This mirrors the broader theme of the knowledge–action gap in flood resilience, where knowledge is present but not always translated into meaningful action.

Sector FGD

Date	May 15 & May 16, 2025
Duration	4 sessions, 60 minutes each
Location	Daliao Barangay Hall & Davao Central College, Toril, Davao City
Group size	Total of 58 participants, ±15 per sector (Women group, Fisherfolk and Gardener, Local Business owners, Local Government Unit)
Language	All materials and explanation provided in both English and Bisaya, avoiding technical jargon.

Sector FGDs – Participant Justification

The sector FGDs brought together participants from four key groups: women, fisherfolk and gardeners, local government unit (LGU) officials, and local business owners. Each group was included because of its distinct vulnerability profile and relevance to the research questions.

Women are disproportionately affected by disasters due to long-standing inequalities in access to financial resources, risk information, land rights, and decision-making spaces, while simultaneously carrying the burden of caregiving responsibilities (UNISDR, 2015; United Nations, 2018). Poverty intersects strongly with these inequalities, limiting women's ability to prepare, evacuate, or recover after floods. Creating a separate FGD for women provided a safe space to voice perspectives without being overshadowed by male participants, thereby surfacing gendered insights critical for vulnerability reduction.

Fisherfolk and gardeners (landscapers) are among the most vulnerable livelihood groups in the Philippines. Their incomes are precarious and often below subsistence level, leaving households highly exposed to environmental shocks and dependent on daily earnings (Macusi et al., 2025; Cadiz et al., 2024). Many lack access to capital, savings, or formal insurance, which intensifies the risks of flooding. At the same time, they hold rich ecological knowledge derived from daily interaction with their environment (Gaillard & Mercer, 2013). Their inclusion therefore captured both poverty-driven vulnerabilities and locally grounded coping strategies.
LGU officials are mandated under Republic Act 10121 to act as frontline disaster risk reduction implementers and emergency responders (DILG, 2011). Their perspectives brought in institutional framings of hazard mapping, early warning systems, and adaptation initiatives. However, because some LGU staff do not reside in the most flood-prone areas, their accounts needed to be carefully balanced with those of residents (Cayamanda, 2021). Including them in the FGDs made it possible to examine where institutional narratives converged with, or diverged from, community experience, a crucial step in analysing the knowledge–action gap.

Local business owners, representing micro, small, and medium enterprises (MSMEs), are both economically vital and highly vulnerable to disaster risks. In disaster policy and governance frameworks, these are often referred to collectively as the MSME sector, but in this thesis the term local business owners is used throughout to reflect the way participants identified themselves during fieldwork. Poverty plays out differently here: businesses face recurring capital losses, stock damage, and disruptions to daily trade, directly threatening household income and community stability (UNESCAP, 2021; APEC, 2014). Their perspectives revealed how floods translate into livelihood insecurity and customer loss, while also highlighting resilience strategies, such as diversifying income sources and drawing on informal credit networks (Gomes et al., 2021).

Together, these sector FGDs ensured that the research did not treat “the community” as homogenous, but as an intersection of differentiated vulnerabilities and capacities. Bringing these voices into structured dialogue made it possible to probe how the “Don’t Rely on Us” discourse plays out in practice: for whom self-reliance is possible, for whom it is constrained by poverty, and how responsibility for preparedness is unevenly distributed across gender, livelihoods, institutions, and enterprises.

Process and Facilitation

The sector FGDs were conducted over two consecutive days in May 2025. On Thursday 15 May, sessions were held with women, fisherfolk and gardeners, and LGU officials at the Daliao Barangay Hall. On Friday 16 May, the local business owners convened at Davao Central College.

Each session opened with an informal welcome, during which participants were greeted personally, signed consent forms and were offered Dutch stroopwafels and other snacks. Soft background music created a relaxed atmosphere that helped put participants at ease. This informal tone was important in encouraging openness across groups that varied widely in status and confidence.

A short PowerPoint presentation by the researcher introduced the purpose of the study, the objectives of the FGDs, and the structure of the exercise. To ensure inclusivity, key points were translated into Bisaya by facilitators. Participants were then divided into subgroups of five to eight people and guided through a structured questionnaire based on the Prevention, Preparedness, Response, and Recovery (PPRR) framework. The format combined fixed-choice selections where groups identified the two most relevant options per question with open comment sections and three broader open-ended questions at the end.

Unlike the student FGD, facilitators were embedded at each table throughout the discussion. They clarified questions, encouraged participation, and ensured that quieter participants could contribute without being overshadowed. Discussions lasted around 45 minutes and at the end of each session, the researcher collected the completed forms and photographed them to secure the data. A short reflection was given, thanking participants, outlining the next steps, and inviting them to take part in future validation sessions.

Figure 4: Sector Focus Group Discussions, May 15, 2025.

What Worked Well

The sector FGDs benefitted from methodological refinements following the earlier student FGD. The visually attractive and translated questionnaires were effective in ensuring accessibility, especially for groups less confident in formal settings such as fisherfolk and women. Having facilitators embedded at each table significantly improved group dynamics, ensuring equal participation and preventing dominant voices from silencing others. The relaxed and informal setting created by music, snacks, and name tags fostered openness, which, combined with the optimal group sizes of five to eight participants, encouraged everyone to share their perspectives. The simplified structure of the questionnaire, balanced with opportunities for open commentary, produced responses that were both grounded in lived realities and thematically easy to consolidate. Time management was another strength: despite three consecutive FGDs on the first day, the schedule was maintained without delays, which helped sustain energy levels and ensured consistent engagement. These improvements not only enhanced participation but also created conditions where responses moved beyond surface-level reporting, opening space for double-loop reflection on why preparedness sometimes fails, not just what people do.

Challenges and Limitations

Despite these improvements, challenges remained. In some subgroups, dominant personalities occasionally overshadowed quieter participants, and although facilitators intervened, such dynamics underscored the ongoing need for stronger skills in managing group balance. Depth of discussion was sometimes limited by the prioritisation of clarity. While facilitators ensured participants understood each question, they did not always probe deeper into the underlying reasons or mechanisms

behind answers. This risked keeping some exchanges within the realm of single-loop routines, where participants repeated known practices without questioning them more deeply.

The fixed-choice elements of the questionnaire also constrained the exploration of “why” and “how” questions, which could only be addressed when time permitted. As a result, while the sessions successfully generated broad thematic insights, some opportunities for richer exploration were missed. This reflects a broader methodological challenge: creating participatory formats that balance breadth with depth, and that can push further toward double- or even triple-loop questioning without overwhelming participants or facilitators.

3.5 Participatory Mapping

Value and Contribution to the Research

Participatory mapping has become a particularly valuable tool in disaster risk reduction because it operates both as a method of data collection and as a social process of empowerment. Unlike conventional mapping exercises carried out by external experts, it enables communities to visualise and articulate their own spatial knowledge of hazards, resources, vulnerabilities, and capacities, thereby grounding resilience strategies in lived experience rather than external assumptions (Gaillard & Gomez, 2015; IFRC, 2020). The maps produced often reveal highly localised and tacit knowledge, such as informal drainage pathways or locally trusted evacuation routes, that rarely appear in official cartographic products (Twigg, 2013; Forrest et al., 2019).

Figure 5: Participatory Mapping, May 15, 2025.

Yet the deeper significance of participatory mapping lies in the process itself. Mapping sessions bring residents together, foster dialogue, and build collective ownership of risk information. As emphasised in Red Cross and DRR frameworks, such

participatory engagement is not a secondary benefit but a central pathway through which resilience is strengthened (Keating et al., 2017; IFRC, 2020). In this sense, the participatory dimension is at least as important as the technical outputs, aligning with broader resilience thinking that sees community engagement and social capital as indispensable foundations for sustainable disaster risk reduction (Gaillard, 2019). In practice, exercises that merely list flood-prone sites reproduce single-loop routines; when participants debated why sites remain risky despite prior projects and what institutional blind spots were at play, discussion moved toward double-loop reflection. Moments when participants questioned omissions in official maps hinted at triple-loop awareness about who authorises knowledge and whose geographies count.

For this study, participatory mapping directly informed two of the research sub-questions. First, it contributed to understanding existing hazard, exposure, and vulnerability dynamics in the case-study barangays (Research Question 1). Second, it provided insights into community knowledge, motivation, and practices that already support autonomous preparedness (Research Question 2). Additionally, the outputs of the mapping, after validation with participants, guided the design of the transect walk routes. Importantly, participatory mapping was not simply about producing maps as outputs but about creating a shared platform where risk could be visualised, debated, and collectively owned. In this way, it helped to bridge the knowledge–action gap by turning abstract risks into tangible and actionable information, while also revealing whether mapping functioned as a single-loop exercise (listing hazards) or enabled double-loop reflection on root causes and structural constraints (Gaillard & Mercer, 2013; Forrest et al., 2019).

Set-up and Process

The participatory mapping exercises were held on 15 and 16 May 2025 with 58 participants across the four sector groups: women, fisherfolk and gardeners, LGU officials, and local business owners. Sessions were conducted in both English and Bisaya. Unlike the FGDs, the materials contained no pre-written text: the only words added were those written on the notes directly by participants during the activity.

Participants were divided into two subgroups, each working around a table with a large HD satellite image of the combined area of Daliao and Lizada. One subgroup was tasked with identifying flood-prone locations, while the other focused on safe or flood-free areas. Red sticky notes were used for flood-prone areas and green sticky notes for safe areas. Participants discussed collectively, wrote the names of specific streets, companies, or puroks on the notes, and placed them directly onto the map.

Facilitators guided participants in locating places, clarifying uncertainties, and encouraging contributions from everyone. Participants were invited to stand and move around their table, which created an atmosphere of active engagement. After twenty minutes, the groups exchanged tables, reviewing and building upon each other's inputs. Where they agreed with previous markings, they added confirmation notes; where they saw missing input, they added new contributions.

Each session concluded with a short discussion, after which photographs were taken of the completed maps to secure the data before the sticky notes were removed, allowing the base maps to be reused for the next group.

3.6 Validation

The Value of Validation in Participatory Flood DRR

Validation is a crucial step in participatory disaster risk reduction because it ensures that the knowledge and insights generated through activities such as focus group discussions, sector consultations, and participatory mapping are accurate, credible, and contextually grounded. More than a procedural formality, validation represents the closing of the feedback loop between researchers and participants, reinforcing trust, transparency, and shared ownership of the findings (Bharucha et al., 2020; Johnson et al., 2020).

In practice, validation sessions allow participants to review and confirm preliminary results, while also correcting misinterpretations or adding overlooked perspectives. This iterative engagement prevents outsider assumptions from distorting conclusions and ensures that the final outputs truly reflect lived realities. In flood-prone contexts, where knowledge of hazard patterns, coping strategies, and institutional relationships is often nuanced and dynamic, validation provides an essential quality check before recommendations are finalised.

At the same time, validation carries a pedagogical and empowering dimension. Participants see their contributions represented in formal outputs and gain a clearer understanding of how their knowledge informs broader disaster risk reduction planning (IFRC, 2020). This step also connects directly to the knowledge–action gap: validation reveals whether participatory exercises are locked in single-loop routines (confirming familiar narratives), or whether participants use the process for double-loop reflection, challenging assumptions and raising deeper structural concerns. In some cases, validation even hints at triple-loop awareness, as participants question how problems are framed, for example, whether resilience should be understood as individual self-reliance or as shared responsibility between communities and institutions.

By confirming both the accuracy and the relevance of findings, validation not only strengthens their legitimacy for policy use but also fosters a sense of collective responsibility for action. In this way, validation is not an endpoint but a bridge between knowledge generation and practical, community-endorsed resilience strategies (Gaillard, 2019; Morton et al., 202)

Validation: Set-up and Process

The validation process was conducted in three formats, each linked to one of the main participatory methods: the student FGD, the sector FGDs, and participatory mapping.

The student FGD validation took place on 5 May 2025 at Davao Central College, with ten criminology students in attendance. The session began with a collective reflection on the original activity, supported by photographs to refresh memories. The researcher explained how the data had been processed and presented the results using the four pillars of Prevention, Preparedness, Response, and Recovery (PPRR). Each set of findings was discussed in turn, with participants invited to provide feedback, corrections, and additions. Follow-up questions were used when answers seemed vague or incomplete, which helped to deepen the discussion.

The sector FGD validation was held on 29 May 2025, also at Davao Central College, with eight participants representing women, fisherfolk and gardeners, LGU officials, and local business owners. In preparation, all answers from the four FGDs had been consolidated and visualised in comparative graphs showing commonalities and divergences. These graphs provided a basis for discussion, prompting participants to reflect not only on accuracy but also on differences across groups and their underlying causes. The session was conducted in a conversational style, with simplified language and translation into Bisaya where needed to ensure inclusivity.

Figure 6: Validation Participatory Mapping, May 19, 2025.

The participatory mapping validation involved the presentation of digitalised maps produced from the original exercises. Eight sector-specific maps (flood-prone and flood-free for each group) were projected and reviewed in turn. Participants confirmed most of the marked locations, corrected those misplaced, and debated areas of confusion, particularly around sub-village boundaries. Open discussion was encouraged to resolve contested points, after which the maps were consolidated into two final versions: one for flood-prone areas and one for safe, flood-free locations.

Reflection on Validation

The validation sessions proved to be both corrective and generative. In the student validation, the opportunity to revisit written responses encouraged participants to clarify vague statements and expand on incomplete answers, thereby improving data quality. However, attendance was lower than anticipated, with only ten of the original nineteen students present, which reduced group energy and the diversity of perspectives. The session also began somewhat tentatively, with students initially reluctant to engage critically, though momentum improved once probing questions were introduced. In this sense, the session functioned largely at the level of single-

loop confirmation, but occasional moments of questioning hinted at double-loop reflection, particularly when students reconsidered whether the training they had received was actually useful during flood events.

The sector validation was more dynamic, benefitting from the use of comparative graphs that helped participants visualise patterns across groups. This not only validated the findings but also enabled richer discussions, such as linking trust in institutions to evacuation behaviour or connecting economic constraints to preparedness practices. Here, validation moved beyond accuracy checks toward double-loop learning, as participants explored the reasons behind differences and began questioning institutional assumptions. The conversational and bilingual facilitation style encouraged openness, though attendance was again limited, especially among fisherfolk and small business owners, for whom lost income from daily labour posed a barrier. This highlights a broader structural challenge in participatory research: sustaining equitable participation when no compensation is provided. For future studies, financial reimbursement should be systematically integrated to acknowledge participants' time and offset potential income losses. Doing so would help ensure that economic precarity does not exclude the most vulnerable groups, thereby strengthening both the inclusiveness and the validity of participatory processes.

The participatory mapping validation, though time intensive, was particularly effective. The use of digitalised maps with the capacity to zoom in on specific areas enhanced precision, enabling participants to confidently identify correct sub-village boundaries. Several misplaced notes were corrected, and confirmation across groups increased the reliability of the final outputs. The process also reinforced collective responsibility, as participants debated and resolved differences in spatial knowledge. In moments where participants questioned why official maps omitted certain local features, the exercise edged toward triple-loop awareness, as it challenged not only specific data points but also the institutional framing of risk.

Taken together, the validation activities significantly strengthened the research findings. They ensured accuracy, revealed new insights, and, perhaps most importantly, demonstrated to participants that their contributions were taken seriously and incorporated into the outcomes. This reciprocal process enhanced trust, deepened engagement, and embedded the principle of co-production at the heart of the methodology. At the same time, validation bridged accuracy checks with opportunities for reflection: in some moments it confirmed familiar accounts consistent with single-loop routines, in others it enabled double-loop questioning of institutional design assumptions, and occasionally it even gestured toward triple-loop reframing of how resilience is defined.

3.7 Key Informant Interviews

The Value of Key Informant Interviews in Participatory Flood DRR

Key Informant Interviews (KIIs) were a vital component of this research because they provided context-specific insights from individuals with specialist knowledge, long institutional memory, or influence over flood risk governance. Unlike group-based tools such as focus group discussions or participatory mapping, KIIs created space for in-depth exploration of technical issues, governance structures, and sensitive topics that may not easily surface in collective settings (Guest, Namey, & Chen, 2020; Braun & Clarke, 2019).

In the context of flood resilience in Davao City, KIIs enabled access to perspectives from barangay leaders, technical officers, NGO staff, and academic experts. These conversations generated a more complete picture of both policy frameworks and lived realities (Bhandari, 2014; IFRC, 2014). They were particularly valuable for triangulation, since institutional accounts could be compared with community narratives to identify mismatches, verify facts, and uncover political or structural drivers of vulnerability (Gaillard & Mercer, 2013; Morton et al., 2021).

Figure 7: Hydrology for Environment, Life and Policy – Davao Network (HELP) event, March 14, 2025.

Crucially, KIIs also provided an opportunity to examine how institutional actors themselves engaged with the knowledge–action gap. Some responses reflected single-loop routines, emphasising familiar solutions such as more trainings or drills. Others suggested double-loop reflection, questioning why such measures often failed to change behaviour or address deeper structural issues. On occasion, conversations hinted at triple-loop awareness, where officials debated the very framing of preparedness and responsibility in the city's evolving "Don't Rely on Us" policy stance.

Finally, KIIs created space to address sensitive or contested issues such as resource allocation, uneven policy enforcement, and political dynamics that participants may have been reluctant to raise in public forums (Bryman, 2016). Embedding these institutional perspectives alongside community voices ensured that the findings were not only technically robust but also socially and politically grounded, offering a clearer view of the dynamics shaping flood resilience in Davao.

Key Informant Interviews: Set-up and Process

A total of 21 semi-structured interviews were conducted with key representatives from a broad range of organisations, with in addition several unregistered informal conversations with experts in meetings or with residents in day-to-day life. These semi structured interviews were set up by the researcher reaching out via email, following the official letter of intent guidelines.

Category	Organisations / Institutions
Academia	- Ateneo de Davao University – Tropical Institute for Climate Studies - University of the Philippines Mindanao - University of the Immaculate Conception
Government agencies	- Bureau of Fisheries and Aquatic Resources (BFAR) - Department of Environment and Natural Resources (DENR) - Department of Science and Technology (DOST) - Department of Education (DepEd) - Office of Civil Defense Region XI (OCD XI) - Barangay Daliao
Local actors	- Davao City Disaster Risk Reduction and Management Office (CDRRMO) - Davao City Water District (DCWD) - Davao Central College (DCC)
Humanitarian / NGOs	- Philippine Red Cross - HELP Davao Network (Hydrology for Environment, Life and Policy)
Informal conversations	Unregistered expert exchanges in meetings and with residents in daily life

Each interview lasted between one and two and a half hours, depending on the role of the participant and the level of detail discussed. Interviews followed a semi-structured guide, with prompts linked to the Prevention, Preparedness, Response, and Recovery (PPRR) framework. This provided a consistent structure while leaving flexibility for emergent themes. Key topics included historical flood impacts and local hazard knowledge, urban planning and drainage challenges, resilience strategies and coordination mechanisms, governance gaps, and the availability and use of data in decision-making.

All interviews were recorded with participant consent and complemented by detailed notes. Recordings were manually transcribed to ensure accuracy. The transcripts were coded and integrated into the broader HEVC (Hazards, Exposure, Vulnerability, Capacity) analytical framework, enabling systematic comparison with data from focus

groups, participatory mapping, and transect walks. This triangulation made it possible to identify not only where accounts converged, but also where institutional narratives risked remaining at the level of single-loop routines or opened opportunities for double-loop reflection on structural drivers of vulnerability.

Reflections on Key Informant Interviews

The key informant interviews proved indispensable to the research. They significantly broadened and deepened the understanding of disaster risk reduction in Davao City by offering perspectives that spanned academic expertise, government mandates, NGO initiatives, and community engagement. This diversity of voices enriched the analysis by showing both alignments and contradictions with the findings from the focus group discussions, thereby strengthening triangulation and interpretation.

Figure 8: Meeting with Office of Civil Defense and City Disaster Risk Reduction Management Office, April 8, 2025.

Interestingly, many informants began by underestimating the relevance of their own insights, often remarking that their role was too narrow or their knowledge too technical to be of value. Yet, as the conversations unfolded, it became clear that their long years of professional and community experience had endowed them with profound knowledge of the systemic dynamics shaping flood resilience. Their accounts shed light on structural challenges such as weak policy implementation, fragmented governance, and limitations in urban planning, while also pointing to grassroots innovations and opportunities for greater participation. These insights revealed how institutional practices often remain in single-loop mode, emphasising more training or drills, but occasionally shifted into double-loop reflection when officials acknowledged that such measures alone were insufficient. In rare moments, the conversations even hinted at triple-loop awareness, when respondents questioned whether the city's framing of resilience, especially its emphasis on household self-reliance under the "Don't Rely on Us" policy stance, was itself part of the problem.

The one-to-one format also proved particularly effective for surfacing candid reflections on politically sensitive matters. Informants were often more willing to share critical perspectives, including observations on institutional rivalries or failures in

coordination, than they might have been in a public setting. These contributions offered essential nuance, showing how the interplay between institutions, policies, and communities shapes disaster outcomes in practice. They also highlighted the knowledge–action gap from an institutional perspective: while risk information and protocols exist on paper, their implementation is hindered by competing mandates, resource constraints, and political dynamics.

Interviews also illuminated divergent readings of the no-rescue evacuation regime. Some officials emphasised household compliance, while community and NGO informants pointed instead to the barriers that make compliance unrealistic without significant changes. This divergence underscores the importance of double-loop reform: rather than punishing households, evacuation and shelter arrangements under Ordinance No. 0246-23 must be redesigned to address these constraints if outcomes are to be equitable.

Figure 9: Meeting with the board of Davao Central College, March 27, 2025.

Overall, the key informant interviews were indispensable for situating community-level observations within broader institutional frameworks. They provided the depth, credibility, and political grounding needed to ensure that the research findings were not only academically rigorous but also relevant to policy and practice in Davao City.

3.8 Transect Walks

The Value of Transect Walks in Participatory Flood DRR

Transect walks are a participatory method that allows researchers and community members to jointly observe, discuss, and document risks and coping strategies directly within the physical environment. Unlike indoor discussions, they anchor knowledge production in lived spaces, making hazards and capacities visible and tangible. Walking systematically through an area provides an opportunity to identify blocked canals, informal housing in flood-prone zones, or natural buffers such as mangroves,

all of which shape local vulnerability and resilience (Kesby et al., 2005; Barboza & O'Brien, 2017; Forino et al., 2015).

In flood-prone contexts, transect walks are especially powerful because they encourage shared reflection on concrete features of the landscape. By physically pointing to drainage outlets, erosion sites, or elevated safe zones, participants create a shared evidence base that validates their narratives and often sparks immediate problem-solving (Gaillard & Mercer, 2013; Cadiz et al., 2024). Beyond documentation, transect walks also foster dialogue across knowledge systems. Local residents highlight lived practices and coping strategies, while officials or researchers provide technical or institutional perspectives, creating reciprocal learning and building trust (IFRC, 2020; Gaillard, 2019).

Within this research, transect walks complemented focus group discussions, participatory mapping, and key informant interviews by grounding analysis in the material realities of the barangays. They contributed to answering all four research sub-questions by revealing how hazards manifest, how exposures are distributed, what vulnerabilities are visible on the ground, and which capacities are already being mobilised. They also made it possible to see whether risk discussions remained at the level of single-loop identification (noting blocked canals), opened into double-loop reflection on why these problems persisted despite repeated interventions, or even hinted at triple-loop questioning of how risk was being defined in the first place. In this way, transect walks were not only a tool of observation but also an entry point into analysing the knowledge–action gap and the political ecology of flood resilience in Davao.

Figure 9: Transect walk 1, Lizada, May 29, 2025.

Transect Walks; Set-up and Process

The final maps produced during the participatory mapping exercise guided the design of the transect routes, which included both flood-prone areas and relatively safe locations. The walks were designed to combine technical authority with community experience, making them platforms for dialogue across social positions and forms of expertise.

Transect Walk 1

The first transect walk was conducted with seven participants, deliberately chosen to ensure a diversity of perspectives. These included local government officials, residents, members of the daily canal brigade, and small business owners. The route was planned after the focus group discussions, participatory mapping, and validation sessions had been completed, so that the transect could build on earlier findings and prioritise the areas participants themselves had identified as most critical.

Considering the age and limited time of participants, travel between the identified sites was done by van. At each stop, participants got out to explore the location on foot, engaging in open discussion about what made the site flood-prone or resilient. Conversations were dynamic and continued during travel between stops. Photographs were taken at all significant sites to document the features under discussion (see Chapter 4, system analysis). The emphasis throughout was not only on identifying risks but also on recognising local strategies and assets, such as drainage maintenance by canal brigades or the protective role of elevated roadways.

Figure 10: Transect walk 1, Daliao, May 29, 2025.

Figure 11: Transect walk 1, Lizada, May 29, 2025.

Transect Walk 2

Because the first transect walk could not cover all locations identified during participatory mapping, a second walk was organised with a smaller group. This included the researcher, an LGU official, and the leader of the canal brigade. Transport was by small three-wheeler, which was better suited for navigating the narrow streets of Daliao. With fewer participants, the group had greater flexibility and more time to explore in depth, often walking extensively through the puroks where streets narrowed to as little as 60 centimetres.

The presence of the canal brigade leader, widely recognised for his work, allowed warm interactions with residents along the route. Several impromptu conversations with residents provided additional insights into local perceptions of flooding and community practices. Without the support of these barangay officials, the researcher would not have been able to access these dense sub-villages, both for legal and safety reasons. After nearly two hours of walking flood-prone zones, speaking with residents, and observing community practices, this second transect walk added a deeper layer of understanding of the everyday realities of Daliao and Lizada.

Figure 12: Transect walk 2, Daliao, August 19, 2025.

Figure 13: Transect walk 2, Daliao, August 19, 2025.

Reflection on Transect Walks

Conducting transect walks at the outset of the research could have been insightful. However, given the substantial contextual differences between the researcher's background and the disaster risk reduction culture in Davao, it was deemed essential to first build a thorough understanding of the focus area and its risk dynamics. This sequencing ensured that residents' limited and valuable time would not be wasted and reduced the risk of missed opportunities for meaningful dialogue, such as failing to ask the right questions, misinterpreting references, or overlooking crucial local knowledge due to an initial lack of contextual understanding.

The transect walks proved to be an essential step in deepening the contextual understanding of Daliao and Lizada. Observing the physical environment directly brought to life many of the issues discussed in the FGDs and KIIs. The walks revealed the complex interplay between urban development, housing patterns, and natural drainage systems in shaping flood risks. For instance, it became clear how narrow access roads, dense informal housing, and obstructed waterways collectively increased vulnerability in certain puroks. At the same time, the group observed adaptive strategies, such as improvised canals dug by residents and elevated homes. These observations illustrated both the production of vulnerability through governance and planning failures, and the creative capacities mobilised by residents to address risks in practice.

Equally important was the relational dimension of the walk. Because the activity unfolded in participants' own neighbourhoods, they spoke with confidence, drawing upon direct experiences and daily observations. Residents welcomed the group's presence, and many offered spontaneous stories and insights when approached along the route. This interaction underscored the importance of situating research in lived spaces rather than detached forums. Walking side by side through familiar streets and landscapes reduced social distance and encouraged candid conversation. Rather than responding to structured questions, participants engaged in a fluid dialogue shaped by what was visible in the environment. This made the exercise not only a method of data collection but also a moment of co-production, where knowledge was built collectively and immediately contextualised.

In analytical terms, the transect walks exposed the dynamics of the knowledge–action gap. They showed how some insights remained at the level of single-loop identification (pointing out blocked canals), while others enabled double-loop reflection (asking why they are repeatedly blocked despite regular clean-ups).

In summary, the transect walks enriched the research by grounding abstract discussions in tangible observations, strengthening trust between participants and researcher, and generating highly contextual insights into both risks and resilience strategies. Also, it revealed the politics of knowledge, whose definitions of "flood risk" guided interventions, and where residents' lived definitions conflicted with institutional framings. They demonstrated the value of participatory field methods that move beyond the meeting room and into the spaces where floods are experienced most directly, while also revealing how knowledge, practice, and governance intersect in the production of vulnerability and resilience.

3.9 Data Processing

The data generated through focus group discussions, participatory mapping, transect walks, and key informant interviews were systematically processed to ensure that the analysis captured both convergence and divergence across methods. Given the participatory and qualitative orientation of this study, data processing was not conceived as a purely technical step but as a careful interpretative process aimed at retaining the richness of community voices while situating them within broader analytical frameworks.

All raw materials, including transcripts, notes, photographs of written responses, and digitalised maps, were first cleaned and organised. Where answers were written in Bisaya, these were translated into English with the support of native speakers to safeguard accuracy. Particular care was taken to avoid the loss of nuance in translation, especially where local terms and idioms carried cultural meaning. Once compiled, the data were manually coded. Coding categories were derived deductively from the Hazard, Exposure, Vulnerability, and Capacity (HEVC) framework but were applied flexibly to allow inductive insights to emerge.

The HEVC framework was chosen as the structuring lens because it provides a rigorous way of separating distinct dimensions of risk while also recognising their interdependence (Wisner et al., 2004; Twigg, 2015; IFRC, 2020). Under this framework, hazards were coded as physical or natural processes such as rainfall and tidal flooding. Exposure captured who and what was at risk in terms of geography, infrastructure, and livelihoods. Vulnerability addressed the social, political, and economic conditions that shaped susceptibility, while capacity highlighted the practices, resources, and organisational strengths that enabled communities to prepare, respond, and adapt. This systematic categorisation facilitated clarity in analysis while ensuring comparability across different data sources.

The processed data were then triangulated. Findings from focus group discussions were compared with insights from participatory mapping, field observations from the transect walks, and institutional perspectives captured in key informant interviews. Where different sources confirmed one another, this provided a stronger basis for reliability. Where discrepancies emerged, these were not treated as errors but as meaningful signals of contested knowledge, differing positionalities, or gaps between institutional narratives and community realities (Gaillard, 2019; Morton et al., 2021). In some cases, contradictions themselves offered valuable analytical entry points. For example, mismatches between LGU accounts and community observations highlighted institutional blind spots in hazard mapping or drainage management, pointing directly to the knowledge–action gap.

To ensure alignment with the overall research design, processed data were continuously linked back to the study's sub-questions. This iterative approach allowed the analysis to move beyond description and towards explanation, tracing how hazards were perceived and experienced, why vulnerabilities persisted, and how local capacities both compensated for and exposed the limitations of formal disaster risk reduction frameworks. It also made it possible to interpret whether findings reflected single-loop routines (repetition of trainings), double-loop reflections (critical

questioning of strategies), or occasional triple-loop awareness (challenging how problems were framed in the first place).

In summary, data processing in this study was an interpretative and iterative endeavour that combined systematic coding with cross-validation and reflexive analysis. By embedding the HEVC framework, the study ensured methodological rigour, while the triangulation of multiple participatory tools safeguarded the legitimacy of findings. This process ultimately strengthened the ability of the researcher to link empirical insights to theoretical perspectives and to produce recommendations that are both contextually grounded and analytically robust.

3.10 Ethical Considerations

All research activities were conducted in line with the basic ethical principles of social research, namely respect for persons, beneficence, and justice. At every stage, care was taken to ensure that participation was voluntary, that information was provided clearly, and that risks to participants were minimised. Before each activity, participants were informed about the purpose of the study, the methods being used, and the ways in which the results would be applied. Informed consent was sought either verbally or in writing, depending on what was most practical in the setting. This ensured that participants understood their role, the voluntary nature of their involvement, and their right to withdraw at any point without consequence (Braun & Clarke, 2019).

Confidentiality was carefully safeguarded. No personal identifiers were included in transcripts or analysis, and participants are referred to anonymously throughout the study. Audio recordings, notes, and digital files were securely stored, accessible only to the researcher and trusted facilitators directly involved in data processing.

The research design also sought to be culturally sensitive and respectful. Materials were provided in both English and Bisaya to avoid excluding participants with limited English proficiency, and technical jargon was deliberately avoided. In sessions with mixed groups, local facilitators supported translation to ensure inclusivity and comfort. Attention was paid to creating safe spaces for discussion, particularly in women's groups, where separate sessions enabled them to share experiences without pressure or interruption. Attention to equity in participation also mattered ethically: unpaid involvement risks excluding the most vulnerable, reproducing inequalities in whose knowledge shapes DRR, an issue central to the thesis's political-ecology lens.

An additional ethical commitment was to reciprocity. Findings were not stored away but shared back with participants and local partners. This was achieved through validation sessions, feedback discussions, and accessible outputs such as visualised maps. Reciprocity was especially important in addressing the knowledge–action gap: by returning knowledge to communities in actionable formats, the research aimed to ensure that participation translated into both recognition and practical benefit (IFRC, 2020; Morton et al., 2021).

Finally, ethical practice was closely linked to reflexivity and positionality. Conducting research in contexts marked by inequalities meant recognising how the researcher's identity, institutional affiliations, and outsider status shaped access, responses, and

interpretation. Ethical considerations were therefore not an afterthought but a guiding principle throughout the methodology, shaping how data were generated, handled, and returned to the communities involved. In this way, ethics was inseparable from the study's political ecology perspective: it was about dignity and respect, but also about acknowledging power, amplifying marginalised voices, and co-producing knowledge in pursuit of more equitable resilience.

3.11 Limitations

While the methodological design of this study was carefully constructed to balance rigour with participation, several limitations must be acknowledged. These limitations do not undermine the findings but clarify the conditions under which they should be interpreted.

Scope and coverage

The study focused on two barangays, Daliao and Lizada, which were selected for their high exposure to flooding and relevance to the research questions. This choice enabled depth of analysis but limits the breadth of comparison. Findings are therefore analytically transferable rather than statistically generalisable, and they should be read as case-based insights into the knowledge–action gap rather than as representative of all flood-prone communities in Davao City.

Participation constraints

Some groups were underrepresented in validation and sector FGDs, particularly fisherfolk and small business owners, due to the opportunity cost of lost income from daily labour. While efforts were made to ensure inclusivity, structural barriers such as poverty and time constraints inevitably limited full participation. This highlights a broader challenge in participatory disaster risk reduction: without financial compensation, the most vulnerable groups may be least able to contribute their knowledge.

Translation and interpretation

Although materials were provided in both English and Bisaya, and local facilitators assisted with translation, nuances may have been lost. Cultural references, idioms, and non-verbal cues could not always be fully conveyed, creating the risk of partial interpretation. This was mitigated through triangulation and repeated validation, but translation remains a source of possible distortion.

Positionality

The researcher's outsider identity, academic affiliation, and reliance on institutional gatekeepers shaped access and responses. While reflexivity and validation were used to mitigate bias, some participants may have withheld sensitive information or tailored their answers to perceived expectations. In practice, the researcher adapted his own behaviour to soften these dynamics. Conscious of being perceived as an outsider or authority figure, he deliberately dressed informally, joined everyday activities such as canal cleaning or snack breaks, and opened sessions with personal anecdotes to signal humility rather than expertise. He also adjusted his facilitation style: in mixed

groups he would step back, letting local facilitators lead in Bisaya, so that participants could speak more freely. These small choices were informed by his reflexive awareness of positionality; they did not erase power asymmetries, but they helped create a more open atmosphere and encouraged participants to share experiences that might otherwise have remained unspoken. This influence is not a flaw but a reality of qualitative, participatory research and should be kept in mind when interpreting the findings.

Methodological trade-offs

To make the tools accessible, compromises were necessary. For example, the fixed-choice elements of sector FGDs ensured clarity but sometimes constrained depth of discussion. Similarly, the need to keep sessions within one to two hours, out of respect for participants' schedules, meant that not every theme could be probed in equal depth. These trade-offs affected the balance between breadth and depth in data collection.

Temporal limitations

The research was conducted within a 6.5-month field period, which limited opportunities to capture seasonal variations in flooding and longer-term community responses. As a result, the study provides a snapshot rather than a longitudinal perspective.

Taken together, these limitations highlight that the study does not claim exhaustive coverage or neutral observation. Instead, it offers a contextually grounded, interpretive account of flood resilience in Daliao and Lizada. Recognising these constraints reinforces rather than weakens the study's contribution: by situating the knowledge produced within its methodological boundaries, the analysis remains transparent, credible, and open to further refinement in future research. Acknowledging this, mirrors the thesis's core claim that knowledge is always produced under constraint, and that closing the knowledge–action gap requires designing processes, research and policy alike, that are reflexive about those constraints.

(Fieldwork documentation, 2025)

Chapter 4. System Analysis

Introduction

This chapter provides a system analysis of flood risk in Davao City, with a focus on Barangays Lizada and Daliao. It answers Sub-question 1, How do current hazard and exposure dynamics shape the flood risks faced by communities in Lizada and Daliao? The analysis follows the HEVC logic, where hazards are the physical processes that generate flooding, and exposure is the location of people, assets, and lifelines in relation to those processes.

Evidence is triangulated from participatory mapping, focus group discussions, transect walks and key-informant interviews. Given local data realities, participatory maps are treated as the primary evidence for exposure at barangay level, while city-level lifeline information and qualitative reports from FGDs and KIIs provide frequency, depth, duration, and disruption patterns.

What this chapter does.

1. Summarises the urban and coastal setting to situate the analysis,
2. Describes the dominant hazard drivers in Davao City, riverine, pluvial, and coastal or tidal, and how they operate in Daliao and Lizada,
3. Identifies who and what is exposed, first at city scale for critical lifelines, then at barangay scale using participatory mapping of repeatedly affected locations,
4. Presents local vulnerabilities,
5. Synthesises these findings into an explicit answer to Sub-question 1.

4.1 Study area

Davao City

Davao City sits on the Gulf of Davao in southeastern Mindanao and is the Philippines' largest city by land area (≈2,444 km²). The 2020 census reports ≈1.8 million residents. The urban core occupies a flat coastal plain, while the jurisdiction stretches inland across hills, forest reserves, watersheds, and upland communities up to Mount Apo (2,954 m) (PhilAtlas, 2021; Philippine Statistics Authority, 2021).

Figure 14: Location Study Area (Wikimedia Commons, n.d.)

Figure 15: Davao River flowing through Davao City, June 3, 2025

Figure 16: Communities living on riverbanks of the Malagos Creek, June 26, 2025

Figure 17: Centre of Davao City, March 7, 2025

Socio-economically, activities are spatially differentiated: commercial, industrial, and service sectors concentrate on the coastal lowlands; agriculture and fisheries remain vital in peri-urban and rural barangays; and highland areas host indigenous and farming communities reliant on land and forest resources. In-migration has accelerated demographic growth, increasing pressure on land, housing, and infrastructure. “People choose to build their house alongside the river because that is the only place they could build. That links to the bigger problem of poverty” (KII 2025). These patterns provide the backdrop against which flood risk must be understood, but they also interact with fragile socio-economic conditions. Insecure tenure, rising land prices, and livelihood precarity push lower-income households into hazard-prone areas where access to services is limited.

The built environment makes these pressures visible: high-rise districts and congested roads signal rapid urbanization, while vegetation loss, settlement expansion along waterways, and unregulated development in low-lying areas point to rising environmental stress. Consistent with political-ecology perspectives, disasters in such settings arise not from natural hazards alone but from their intersection with fragile social and physical conditions (Wisner et al., 2004). Poor drainage, congested housing, and insecure land tenure magnify losses, while middle-class households in elevated subdivisions face far less disruption.

Hydrologically, much of the city drains to the Gulf via the Davao and Talomo river systems, with many barangays historically recognized as flood-prone (Cayamanda, 2021). This coastal-plain setting means that riverine, pluvial, and tidal processes can compound, especially where drainage and land-use pressures coincide, and where poorer barangays have been pushed into historically flood-prone zones because safer plots are unaffordable.

This thesis zooms in on Daliao and Lizada in Toril District. These are low-elevation, coastal barangays that mix concrete and semi-permanent housing near the waterfront with more scattered dwellings inland. They clearly show how city-scale drivers translate into everyday risk at community scale (PhilAtlas, 2021).

Barangay Daliao

Barangay Daliao is a coastal community in Toril District, Davao City. Based on the 2020 census, its population is 21,479 (Philippine Statistics Authority, 2021, as cited in PhilAtlas, 2021). The barangay covers about 1.9 km², yielding a density of roughly 11,331 residents/km² (CityPopulation, 2023). Average elevation is around 9 m above sea level, and the terrain is predominantly low-lying (PhilAtlas, 2021).

Hydrologically, Daliao differs from some neighbouring coastal barangays: it has no natural creeks and relies on a constructed drainage system to convey stormwater and surface runoff (TW, 2025). The built environment mixes concrete dwellings with semi-permanent structures, with denser settlement along the coastal margin and more scattered units inland.

Daliao also hosts key livelihood and mobility nodes including the Daliao Fish Port and coastal settlement clusters (e.g., Sitio Kalubin-an), which anchor daily economic activity and concentrate people and assets along the shoreline. These features make Daliao an instructive lens for examining how city-scale flood drivers (riverine, pluvial, and coastal/tidal) translate into everyday risk at community scale.

Figure 18: Location Barangay Daliao (Open street map)

Figure 19: Coastal communities of Daliao, August 19, 2025

Figure 20: Daliao Fish Port, May 29, 2025

Figure 20: Coastal communities of Daliao, August 19, 2025

Figure 21: Centre of Daliao, May 29, 2025

Figure 22: Drainage overgrown with vegetation, Daliao, May 29, 2025

Figure 23: Drainage full of garbage, Daliao, August 19, 2025

Figure 24: Garbage on the street blocking discharge to drainage, Daliao, August 19, 2025

Barangay Lizada (study-area profile)

Barangay Lizada is a coastal community in Toril District, Davao City. Based on the 2020 census, its population is 23,717(Philippine Statistics Authority, 2021, as cited in PhilAtlas, 2021). The barangay covers about 4.5 km², yielding a density of roughly 5,250 residents/km² (CityPopulation, 2023). Average elevation is around 5 m above sea level, and the terrain comprises coastal flats with a gentle inland rise (PhilAtlas, 2021).

Hydrologically, Lizada shares the coastal setting of its neighbour Daliao: residents report chronic, shallow-to-knee-deep flooding during heavy rainfall, with tidal conditions occasionally compounding pluvial runoff (FGDs and KIIs; 2025). The built environment mixes concrete dwellings with semi-permanent structures, with denser settlement along the waterfront and more scattered concrete houses inland.

Lizada also contains coastal settlement clusters and local access roads that connect to the Toril corridor, concentrating people and assets near the shoreline. Lizada offers a useful lens for showing how city-scale flood drivers such as riverine, pluvial, and coastal/tidal translate into everyday risks at the community level.

Figure 25: Location Barangay Lizada (Open Street map)

Figure 26: Coastal communities of Lizada, May 29, 2025

Figure 27: East Lizada, May 29, 2025

Figure 28: Garbage dumped next to the canal, Lizada , May 29, 2025

Figure 29: Coastal communities of Lizada, May 29, 2025

4.2 System actors and mandates

This section situates the governance side of the flood risk system. It maps the principal organizations involved in prevention, preparedness, response, and recovery in Davao City, with emphasis on roles that shape hazard data, drainage and water management, land use, early warning, emergency access, and community interface. The purpose is descriptive: to clarify institutional responsibilities and coordination touchpoints relevant to the hazards and exposure analysis that follows. Assessment of effectiveness, overlaps, and capacities is reserved for Chapter 5.

National and Regional Coordination

Agency / Actor	Mandate / Role
Office of Civil Defense (OCD Region XI)	Serves as secretariat and implementing arm of the NDRRMC; provides policy guidance, training, technical support, and incident command system backstopping for LGUs.
PAGASA (Philippine Atmospheric, Geophysical and Astronomical Services Administration / DOST)	Issues meteorological and hydrological forecasts, extreme rainfall advisories, and flood warnings used by the city and barangays.
Department of Public Works and Highways (DPWH Region XI)	Designs, constructs, and maintains national roads, bridges, flood-control structures, and major drainage in flood-prone areas of Davao.
Department of Science and Technology (DOST Region XI)	Provides research, hazard monitoring, and community-based DRRM technologies, including early warning systems.
DENR / EMB and CENRO (City Environment and Natural Resources Office)	Manage forests, watersheds, mangroves, coastal ecosystems, and waste regulation, with direct implications for waterways, drainage, and encroachment.
Philippine Coast Guard (Toril Substation)	Provides maritime safety, rescue, and coastal monitoring in Toril and adjacent coastal barangays.

City-level Operations and Infrastructure

Agency / Actor	Mandate / Role
City DRRMO (Disaster Risk Reduction and Management Office)	Leads planning, risk communication, early warning dissemination, training and drills, and citywide response coordination; serves as the central link to barangay DRRMCs and emergency services.
City Engineer's Office	Plans, maintains, and rehabilitates local drainage systems, roadside canals, culverts, and minor flood-control works; coordinates with DPWH on major waterways.

City Planning and Development Office (CPDO)	Integrates hazard and exposure data into land-use planning, zoning, and development permitting.
Davao City Water District (DCWD)	Ensures safe water supply during and after floods; expanding into wastewater and watershed protection roles.
City Health Office (CHO)	Provides frontline medical services, supervises barangay health stations, and supports emergency health response during floods.
City Social Services and Development Office (CSSDO)	Oversees evacuation centres, relief distribution, and psychosocial support.
Public Safety and Security Command Center (PSSCC)	Monitors real-time incidents, traffic, and provides logistics and coordination during floods.
Davao City Police Office (DCPO)	Maintains public order, supports evacuation, and coordinates with barangay-level tanods.
Bureau of Fire Protection (BFP Davao)	Provides firefighting and urban search and rescue; mobilises water pumps and evacuation support.

Emergency Services and Auxiliaries

Agency / Actor	Mandate / Role
Philippine Red Cross, Davao City Chapter	Auxiliary to government; provides first aid, WASH support, vulnerability and capacity assessments, and community DRR education.
Local NGOs and CSOs (e.g., HELP Davao Network)	Advocate for risk reduction, support mangrove rehabilitation, environmental education, youth engagement, and community mobilisation.
Community and civic groups	Assist in sandbagging, canal clean-ups, localized early warning, and evacuation support.
Religious organizations	Mobilize volunteers and facilities; some churches double as temporary evacuation centres.
Private sector (small businesses, sari-sari stores, fish traders)	Provide goods, services, and recovery support but are themselves highly exposed.

Barangay-level Structures

Agency / Actor	Mandate / Role
Barangay DRRMCs (Disaster Risk Reduction and Management Committees)	Established under RA 10121, chaired by the barangay captain; implement localized preparedness, canal clearing, information campaigns, evacuation, and ground reporting to the City DRRMO.

Barangay Councils (Sangguniang Barangay)	Allocate the 5% DRRM fund and enact ordinances on waste management, canal clearing, and land use.
Barangay Tanods	Community police aides providing evacuation security and crowd control.
Barangay Peacekeeping Action Teams (BPATs)	Linked to the council; assist barangay DRRMCs in evacuation and local security.
Barangay Health Stations & Health Workers (BHWs)	Provide basic health services, monitor flood-related diseases, and staff evacuation centres.
Barangay Schools (DepEd)	Serve as official evacuation centres during flood events.
Community brigades (canal brigades, coastal watch)	Groups mobilised for canal clearing, coastal monitoring, and mangrove planting.
Fisherfolk associations and cooperatives	Registered with BFAR; contribute to coastal resource management and monitoring.
Transport groups (jeepney and tricycle associations)	Regulate local routes and are critical for evacuation logistics during flood events.
Women's and youth organizations / Sangguniang Kabataan (SK)	Mobilise women and young people for education campaigns, relief, and psychosocial support.

4.3 Hazards

Flood hazards in Davao City result from natural processes such as extreme rainfall, river overflow, sea level rise, storm surges, flash floods, and landslides. These hazards often overlap. "You get the flood from the sea, and then the rivers overflow. It is like three types of flooding happening" (KII, 2025). These processes are city wide in nature but their manifestations differ locally. In the coastal barangays of Lizada and Daliao they appear as chronic, low depth and recurring inundations that disrupt daily life.

City Level Hazards

Rainfall is the most fundamental hazard in Davao. Because of the city's location between the Davao Gulf and upland mountains, much of the rain is orographic (moist air which is forced to rise over mountains or high land) in nature (KII, 2025). This type of rainfall is often not captured by national models but it is the central trigger of flooding in the city. Key informant interviews described how rainfall has intensified. "The big floods in Davao came from rain that should normally be the amount of one month but now came down in 2 to 3 days" (KII, 2025). FGDs confirmed this, with 73% of participants reporting floods more than four times in the past year (FGD, 2025). PAGASA (2020) projects stronger rainfall extremes nationwide and hydrological research confirms that extreme rainfall events in the Davao River basin are becoming more frequent and severe (Navarra et al., 2024).

Scientific studies provide an explanation for these sudden and intense rainfall events. Mindanao is highly exposed to mesoscale convective systems (MCSs), which are organized clusters of thunderstorms capable of releasing extreme rainfall within only a few hours. These systems are intensified by the interaction between coastal moisture from the Davao Gulf and the uplift created by surrounding mountains, which amplifies local orographic rainfall. Because MCSs are driven by rapid atmospheric instability and moisture surges, they are difficult to predict using standard synoptic forecasts. This scientific finding explains why communities consistently describe floods as arriving suddenly and with little warning (Yoshikane et al., 2023).

Davao is crossed by six major river basins. Sedimentation reduces river capacity and contributes to flooding. “When it rains hard, it directly floods because the river is so shallow because of all the sedimentation” (KII, 2025). In extreme rainfall, river expansion has been observed as hundreds of meters (KII, 2025).

Rainfall in upland areas like Bukidnon creates sudden flash floods in Davao City. These are dangerous and unpredictable. “So now the frequency of flash floods is increasing. It used to be decades in between, now it is only just a few years in between” (KII, 2025). “The flash floods, they come when no one expects it” (KII, 2025). As noted earlier, mesoscale convective systems help explain this unpredictability by concentrating rainfall into short and intense bursts.

The coast of Davao is exposed to storm surges and rising seas. Data based estimates show that 80 to 85% of coastal barangays face physical risk from storm surges (KII, 2025). Sea level rise in the Philippines is 5.7 mm per year, almost double the global average (ADB, 2021). Typhoon linked hazards are also changing. “Davao was proud that they were typhoon free, but not anymore, because of the changing climate” (KII, 2025).

Floods bring secondary hazards. “Flooded areas are rodent infested and contaminated water can spread schistosomiasis and other diseases when they come into contact with an open wound” (KII, 2025). Roads and bridges are also prone to collapse after saturation, creating cascading hazards that follow extreme rainfall.

These hazard processes affect all of Davao, but their impacts crystallise where fragile housing, weak drainage, and insecure tenure intersect with physical exposure.

Direct exposure and observation

During the researcher's stay in Davao City, he experienced and witnessed several floods himself. The most impactful occurred when he attended the Philippine Red Cross Resilience Camp 2025 in the Malagos area, located in the northwest of Davao. At the start of the day, it was sunny, and the Malagos creek was just a small stream; very shallow, with almost no current at all. The road crossing the creek was completely dry and accessible.

However, at 13:10, the heavens suddenly opened up, and a heavy thunderstorm arose. Out of interest, the researcher, accompanied by a team of trained Red Cross personnel, went to observe the state of the Malagos Creek at 13:45. What they witnessed was shocking: the previously shallow stream had, within just 35 minutes, turned into a surging, swollen, and turbulent river. The once-accessible road had completely disappeared beneath the water.

When crossing the river, they immediately felt the brute force of the current. Because the researcher was accompanied by trained Red Cross personnel, they were able to cross safely by forming a line and firmly holding on to one another. Further safety was ensured by a large army rescue vehicle on stand-by that could have driven us across the river if it the current became too strong. On the other side, where the resilience camp its WASH training station was set up, participants had already been evacuated, and Red Cross personnel were preparing the area for the rising water. After assisting them, the group collectively decided it was best to cross back before the current became too strong and the water level too high.

By 13:55, only ten minutes later, the water level had already risen significantly compared to the first crossing. The group linked arms tightly and carefully placed one foot after the other, slowly making their way through the torrential river. Following the advice of the Red Cross personnel, they removed their slippers to avoid slipping and to have full feel and control over where they placed their feet.

It was alarming to see how quickly the water level had risen in less than an hour, confirming FGD participants' accounts that floods often arrive suddenly. The residential settlements located along the riverbank figure 32 were not directly hit by the river water at that moment.

This firsthand experience truly opened the researcher's eyes to the brute force of nature, and to how quickly a seemingly peaceful, unthreatening stream can turn into a forceful and uncrossable river within a matter of 30 minutes.

Presented below are the photos of the before and after situation, all taken by the researcher within those first 50 minutes of rain.

Main road, before and after.

Point of reference, that man in both pictures is standing in pretty much the exact the same location.

Figure 30: Accessible and dry road, Malagos Creek, June 26, 2025

Figure 31: Flooded road, Malagos Creek, June 26, 2025

Residential structures located in the riverbed
Point of reference: the fence in front of the first house

Figure 32: Minimal discharge, Malagos Creek, June 26, 2025

Figure 33: High discharge, Malagos Creek, June 26, 2025

Section above the main road

From almost non-existing stream (few centimetres deep) to a wide turbulent river.
Point of reference: photo during flood is taken from the location of the grey tent.

Figure 34: WASH training station, Malagos Creek, June 26, 2025

Figure 35: Malagos Creek, June 26, 2025

Additional flood coverage

Over the course of the researcher's 6.5-month stay in Davao, numerous floods occurred, many of them in the immediate vicinity of his residence. Only a fraction were reported in mainstream news outlets, while most were shared through social media, as illustrated in figure 36. All screenshots were captured by the researcher at the time these floods took place. Shown below is an example of a news article that was published due to the exceptional severity of the event.

4 Dead, 3 Missing in Davao City Floods
By Ivy Tejano | September 18, 2025 – 6:10 PM (Tejano, 2025)

> *DAVAO CITY – The Office of Civil Defense–Region 11 (Davao Region) reported on Thursday that 24 people were trapped, four were killed, and three others were missing in recent floods that struck the city. On September 18, the Baguio Police Station confirmed that another body was discovered at around 11:40 a.m. in Phase 3 of Barangay Tugbok, Tugbok District. Police said the body, found still submerged under a large rock in the river, remained unidentified after being spotted by search and rescue personnel alongside relatives and friends of earlier victims.*
>
> *Authorities had previously recovered another body on Wednesday around 2:50 p.m. along the riverbank at Purok 18 in Barangay Tugbok. Officials clarified that only one person remains missing from the September 14 incident at Mini Asik-Asik Falls, a tributary of the Talomo River in Barangay Carmen, Baguio District. The river's sudden rise caused strong currents that hampered rescue operations, as two river-related emergencies occurred simultaneously, according to the City Disaster Risk Reduction and Management Council (CDRRMC).*
>
> *Three individuals were also stranded on the Talomo River in Barangay Tamayong, Calinan District, while one person was trapped on the Lipadas River in Purok 3, Barangay Mulig, Toril District. At Mini Asik-Asik Falls, 13 of the 20 trapped individuals were rescued, four were confirmed dead, and three remained missing. One person sustained injuries and received immediate medical attention.*
>
> *A search and rescue unit managed to save four individuals stranded in Tamayong in Calinan and Mulig in Toril, who were then given on-site medical care. According to Ezzra Fernandez, information officer of the Office of Civil Defense–Region 11, the agency continues to monitor affected areas and stands ready to deploy additional response teams if needed. The CDRRMO Operations Center is coordinating with relevant agencies to ensure swift and effective response measures. Early warning messages and advisories are being disseminated through social media platforms, email, SMS, Messenger, and Viber. Fernandez further emphasized that the local government is urging the public to remain cautious near rivers and waterfalls, particularly during sudden rainfall or changes in water levels.*

The most common way of occurring floods being shared; via social media.

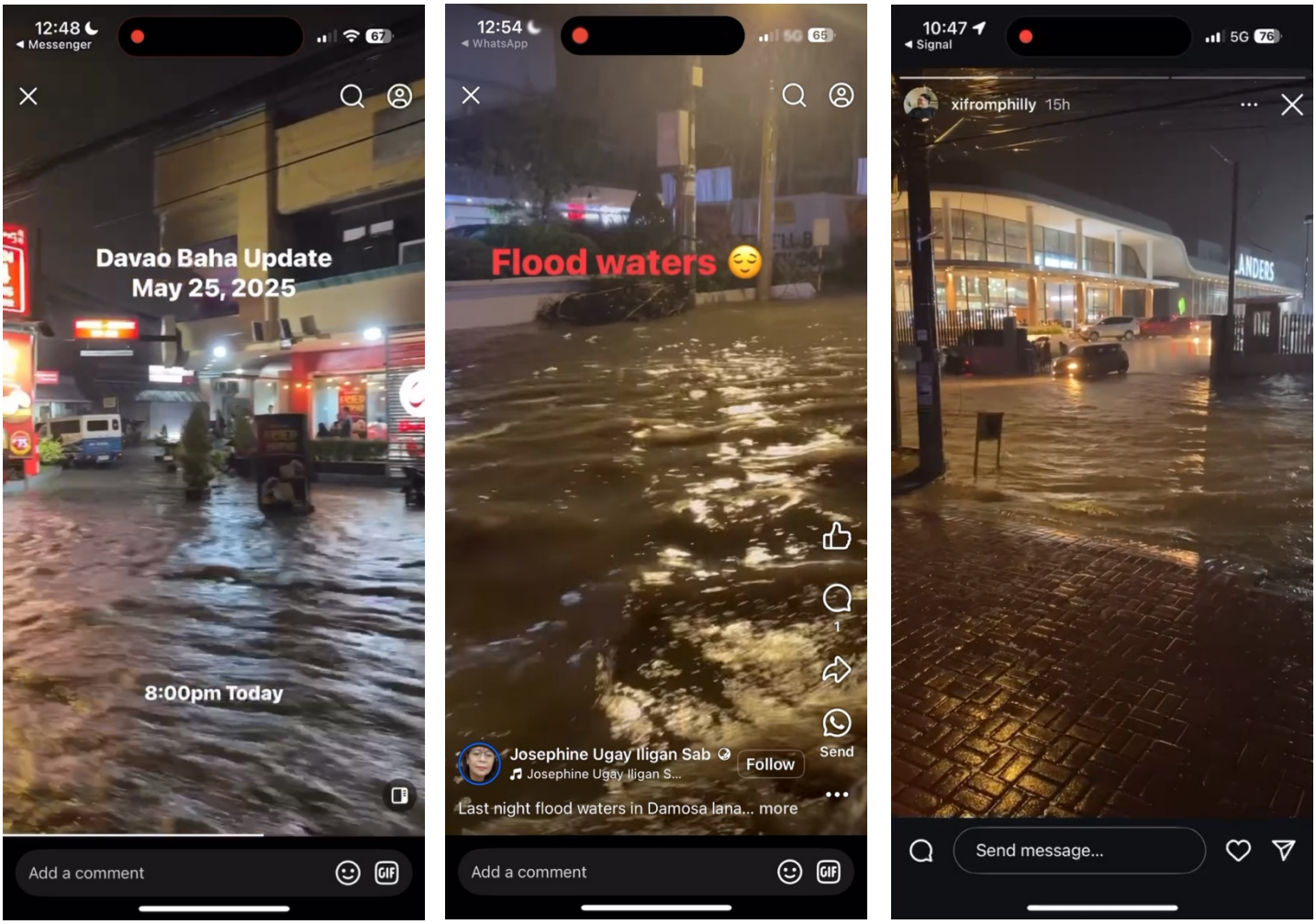


Figure 36: Screenshots of social media content sharing information about the ongoing floods, Downtown, Davao City, May 25, 2025

Barangay Level Hazards: Lizada and Daliao

In Lizada and Daliao, city wide processes are experienced as chronic and repetitive floods that are moderate but frequent. One local informant explained, “While the water might usually not be deep, the regular knee-high inundations cause sustained disruption” (KII, 2025). Flooding occurs after almost every heavy rain in particular parts of the area. FGDs show that 73% of participants experienced flooding more than four times in the past year. 88% said flooding is a serious problem, with 47% calling for urgent change (FGD, April 2025).

Residents also identify tidal flooding as a recurring hazard. “The sea rises and floods houses” (FGD, April 2025). Sea level rise worsens these events in low lying areas. During heavy rains small drains in the barangays overflow and add to the flooding, leading to inundated homes and roads.

These impacts not only affect livelihoods and physical health, but also leave lasting psychological scars. As one 70-year-old woman from the FGD recalled:

> “When I was 12 years old, I experienced a very intense flood, and I still carry trauma from that day. It makes me panic even more than others whenever a flood is coming.”

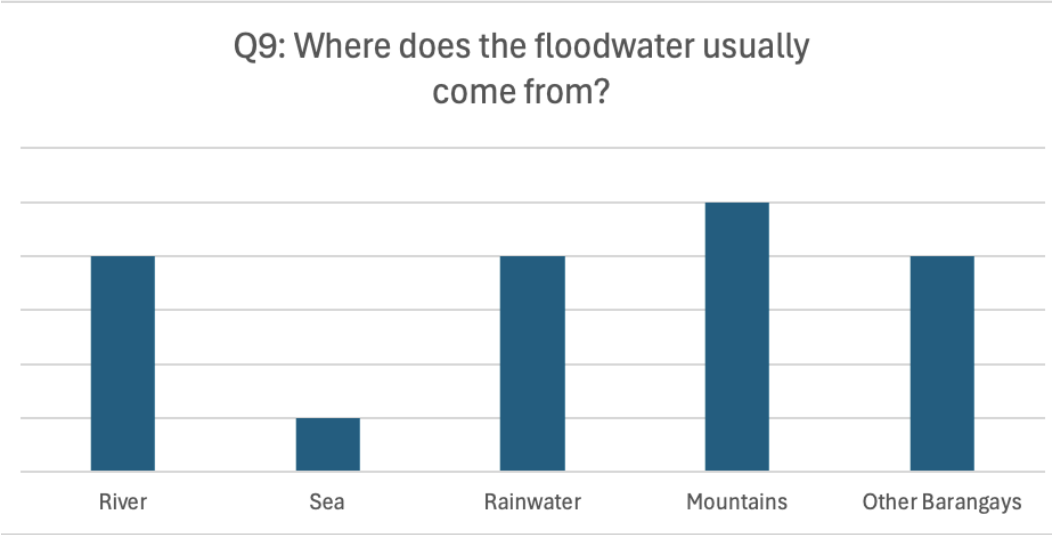


Figure 37: FGD results showing the complexity of the multi-sourced floods (FGD, 2025)

4.4 Exposure

Exposure in Davao City refers to the people, infrastructure, and assets that are physically situated in hazard-prone areas. Unlike hazards, which concern natural and physical processes, exposure is about what lies in the path of these processes. This section therefore highlights how households, schools, businesses, and critical lifelines are positioned in relation to flood-prone zones. It draws on participatory mapping, focus group discussions (FGDs), and key informant interviews (KIIs), supplemented with official statistics and hazard maps. Figure 39 shows the 37 specific locations in Lizada and Daliao that FGD participants identified as repeatedly exposed to flooding.

City-level exposure

A significant portion of Davao's population lives in low-lying floodplains, coastal fringes, or along riverbanks. The Davao City Disaster Risk Reduction and Management Office (CDRRMO) and Comprehensive Disaster Risk Assessment (CDRA) classify exposure under three categories: settlements, economic assets, and critical lifelines. Urban expansion has pushed large numbers of people into hazard-prone areas. Informal settlements often cluster along riverbanks and drainage channels, directly in the path of floodwaters. (KII, 2025). Residents explained growing up there and staying, or they migrated for work and settled near the river and along the coast because affordable housing elsewhere was unavailable. Informal settlers near the water don't just face flooding, they also have less protection or services to recover. More formally, the Mines and Geosciences Bureau (MGB, 2019) flood susceptibility maps indicate that thousands of hectares of the city's built-up land are exposed to flooding.

Exposure also extends to business establishments and markets, particularly those located near major roads and transport nodes. Local business respondents in FGDs acknowledged that some enterprises are situated in more elevated or protected areas, yet others, especially small shops and coastal fisheries, regularly face water intrusion. Agriculture is another sector at risk. Rice fields, banana plantations, and aquaculture ponds lie in areas that are highly sensitive to both riverine and tidal flooding (Cayamanda, 2021; KII, 2025).

The city's lifeline infrastructure, schools, hospitals, evacuation centres, and transport routes, are partly located in flood-susceptible areas. Official data list more than 200 public schools situated within or near hazard zones (DepEd, 2022). KIIs emphasized that flooding of schools disrupts education for thousands of students annually. The exposure of schools is especially disruptive, as it compounds both immediate safety risks and long-term educational continuity. Several barangay health centres and sections of the Southern Philippines Medical Center are also classified as at risk from flooding and storm surge (CDRRMO, 2023). Main transport arteries and roads are repeatedly blocked during flood events, cutting off access for goods and emergency services (KII, 2025).

Barangay-level exposure: Lizada and Daliao

Participatory mapping identified 37 repeatedly inundated locations across the two barangays, highlighting the micro-scale geography of everyday exposure. These hotspots cluster in four settings: the coastal fringe (e.g., Daliao Fish Port, Sitio Kalubin-an), drainage corridors and outfalls, low-lying road sections and intersections, and the surroundings of schools and public facilities. Depths were reported as ankle- to knee-deep, lasting hours to parts of a day, particularly when high rainfall coincided with high tide (FGDs; PM, April 2025).

Residents highlighted frequent flooding along Magsaysay Street and coastal settlement clusters, especially near the Fish Port. Constructed drainage outfalls were often reported to backflow during high tide, prolonging waterlogging. Access to evacuation facilities was described as recurrently hindered (FGD, 2025; PM, April 2025).

Narrow barangay roads, and drains overflow during heavy rain, spreading floodwaters into settlements. Residents emphasized that flooding on these roads cuts off mobility and delays both daily routines and emergency evacuations (FGD, 2025).

Figure 38: Flood at Ramon F. Magsaysay Elementary School, Daliao, July 8, 2025 (Barangay Daliao)

Figure 39: Barangay-level exposure flood hotspots identified with Participatory Mapping (PM, 2025)

4.5 Vulnerability

While hazards and exposure describe the physical and spatial dimensions of flooding, the case of Daliao and Lizada demonstrates that vulnerability is socially produced. Disasters here emerge not from rainfall alone but from the intersection of fragile housing, insecure tenure, precarious livelihoods, and limited access to services. As one Red Cross staffer stressed, *"Most of the time it is the urban poor who are located in these dangerous areas"* (KII, 2025). These conditions determine who is able to prepare, evacuate, and recover, and who must continue to juggle multiple risks on a daily basis.

Focus group discussions and key informant interviews highlighted that vulnerability is differentiated across groups rather than shared by a homogeneous "community." Women described the double burden of ensuring household safety while managing care responsibilities, often in evacuation centres with *"no proper comfort room, no proper sanitation… waterborne diseases are very likely"* (KII, 2025). In the FGD, mothers with children and the elderly were consistently identified as least prepared.

Livelihood groups also revealed distinct vulnerabilities. Fisherfolk and gardeners emphasized how floods directly disrupted daily income, leaving households without reserves to absorb repeated shocks. Past relocation projects failed to reduce risk: *"They resettle people somewhere dry, but then those people can't fish anymore. So they go back to the flood zones"* (KII, 2025). Local business owners explained that even ankle-deep water in shops meant closing for the day, with no safety net and recurring stock losses. Students spoke of losing schooling time when transport routes flooded and classes were suspended. Institutional actors acknowledged these systemic shortcomings; as one planner admitted, *"Drainage systems are all separated; national, provincial, city, barangay are all in disarray"* (KII, 2025).

Underlying these differentiated experiences are structural conditions that reproduce vulnerability. Insecure land tenure and unregulated urban growth push lower-income households into the most hazard-prone sites, while safer housing remains inaccessible due to rising land values. Evacuation is not merely a matter of willingness: residents stressed overcrowding, lack of facilities, and fear of looting as reasons to stay behind, showing how institutional design failures exacerbate risk. Even when warnings exist, they may not be meaningful. As one water district officer explained, *"Even if you have a siren, if people don't know what it means… We should contextualize and translate to the language of the people… it should not be purely English"* (KII,2025). Finally, the burden of preparedness often shifts downward. Residents themselves maintain drainage through canal brigades and improvised measures, compensating for gaps in municipal waste and drainage management.

Taken together, these dynamics demonstrate that vulnerability in Daliao and Lizada is not simply the outcome of hazard proximity but the product of social differentiation and institutional neglect. These conditions frame the context in which capacities must be understood in Chapter 5. Without addressing them, preparedness efforts risk reinforcing rather than reducing inequality.

4.6 Synthesis. Answer to Sub-question 1

This section set out to answer Sub-question 1:

How do current hazard and exposure dynamics shape the flood risks faced by communities in Lizada and Daliao?

The analysis demonstrates that flood risk in Davao City is driven not by a single source but by the convergence of riverine, pluvial, coastal, and upland processes. Orographic rainfall compressed into short bursts, sediment-laden rivers, tidal surges, and occasional upland flash floods combine to create a multi-hazard environment. These drivers increasingly overlap, producing compound floods that, while often shallow-to-moderate in depth, are recurrent and disruptive. This hazard profile resonates with PAGASA projections of intensifying rainfall extremes and with community testimony describing floods that arrive “suddenly and with little warning.”

At the city scale, exposure reflects both demographic growth and uneven development. Settlements continue to expand into floodplains, drainage corridors, and coastal fringes. Informal housing clusters sit directly on riverbanks and outfalls, while agricultural land and fisheries remain highly sensitive to inundation. Critical lifelines are similarly exposed: more than 200 public schools lie within hazard zones, barangay health centres face routine disruption, and main roads to Toril are repeatedly cut during floods. These patterns show that exposure is not incidental but a structural feature of the city’s growth trajectory.

At the barangay scale, participatory mapping and FGDs identified 37 recurrent hotspots in Lizada and Daliao, concentrated along the coastal fringe, road corridors, drainage outlets, and near schools. Residents described floods of ankle- to knee-depth occurring multiple times per year, often lasting hours when high tide coincides with heavy rain. These events do not usually reach catastrophic proportions, but their repetition makes them deeply consequential: they delay schooling, interrupt transport, damage homes, and erode livelihood security. Such findings confirm that in these barangays, flood risk is routine rather than exceptional, woven into everyday life.

The combined picture is of a risk environment shaped less by rare disasters than by recurrent, spatially uneven exposure. Hazards operate at city scale, but their impacts crystallise locally where people, assets, and lifelines are sited in low-lying, drainage-dependent terrain. This aligns with political ecology perspectives that disasters arise at the intersection of natural processes and socio-political arrangements, not from hazards alone.

By situating hazards and exposure in this way, the chapter establishes a critical foundation for the vulnerability and capacity analysis that follows. It shows that the risks experienced in Lizada and Daliao are not simply “natural,” but are the predictable outcomes of how people and infrastructures are located relative to hydrological processes, how drainage and land use are managed, and how institutional decisions shape everyday exposure. Understanding this baseline clarifies why, despite decades of training and infrastructure, preparedness remains uneven: it is built upon an environment where flooding is recurrent, low-depth, and disruptive, creating constant tests of resilience.

In sum, flood risks in Lizada and Daliao are shaped by multiple, compounding hazard drivers whose impacts are amplified by the location of settlements, livelihoods, and lifelines in low-lying coastal plains and drainage corridors. These exposures interact with systemic vulnerabilities, insecure tenure, livelihood precarity, gendered burdens, and governance gaps, making floods a routine feature of community life. These dynamics define the conditions under which capacities must be analysed in Chapter 5.

(Canal Brigade Dalíao, 2025)

Chapter 5. Capacities at barangay level

This chapter documents capacities at barangay levels as practices that translate information, experience, and coordination into everyday preparedness. The aim here is descriptive: to make visible the mechanisms communities already use to cope with recurrent floods. At the same time, these capacities cannot be understood in isolation: their effectiveness is often constrained by structural barriers of tenure, income, governance, and institutional design, as elaborated throughout this chapter. Following the thesis backbone on the knowledge–action gap and organizational learning, a fuller analysis of whether these practices remain in single-loop routines or create conditions for deeper learning is deferred to Chapter 6 and the Discussion (cf. Argyris & Schön, 1978; Gaillard, 2013).

5.1 Strong Culture of Mutual Aid (Bayanihan)

At the heart of community resilience in Davao is *bayanihan*, the Filipino tradition of collective, voluntary mutual aid. Across sector and student FGDs, *bayanihan* consistently appeared as the core of response and recovery. In the sector FGD, 88 percent of respondents stated that people help each other during floods, and 100 percent expressed willingness to do so in the future. Reported recovery practices were divided between "fix what they can" and "helping each other," with no one indicating they would wait for aid or do nothing. These patterns align with recent Davao studies that document neighbourhood cooperation and routine, face-to-face coordination in flood preparedness and recovery (Cayamanda, 2021; Macusi et al., 2025).

The practical and emotional dimensions are clear in people's words: *"After a flood, we recover by cleaning our places, and doing bayanihan to reduce dirty houses, and help the people suffering by flooding"* (FGD, 2025). A fisherfolk participant summarised it as, *"Work together for the good of the barangay."* Many described *"helping with a smile,"* turning hardship into solidarity and making recovery a shared rather than isolating process. Contemporary flood-resilience scholarship helps explain these outcomes: social capital and connectedness shape risk perception, speed collective response, and improve risk communication, which together strengthen household and community recovery (Keating et al., 2017; McClymont et al., 2020).

Yet while *bayanihan* is a powerful capacity, scholars and practitioners caution against romanticising resilience. As one commentary powerfully put it:

> *"Filipinos are not born to suffer. We adapt because we are left with no choice. But survival is not something to romanticize. It's something to question. We keep applauding Filipinos for wading through flooded streets and carrying on despite soaked homes and broken systems. But resilience should not be the standard. Preparedness, proper infrastructure, and real climate policy should be. Glorifying resiliency lets leaders escape accountability. It shifts the burden of failure onto the people instead of those in power. And the same communities are left to suffer again and again. Resilience is not a substitute for governance. If people have to keep rising from the same problem, that's not strength. That's abandonment. Stop romanticizing resilience. Start demanding accountability"* (Umpad, 2025).

This tension is also visible in Davao. Community solidarity enables recovery, but without stronger governance, structural investments, and climate adaptation policies, *bayanihan* risks becoming a coping mechanism for systemic neglect. Within the scope of capacities, it remains a durable mechanism that links knowing and doing at household and barangay scale. However, the discussion chapter will return to the importance of coupling these community strengths with institutional learning and accountability, so that cooperation not only copes with impacts but contributes to reducing underlying risk (Gaillard & Mercer, 2013).

5.2 Canal Brigade

A second key capacity is the daily drainage clean-ups, known locally as the Canal Brigade. Across FGDs, participants consistently credited these collective efforts with reducing the intensity of flooding in Daliao. At present, a team of 18 motivated residents assembles every weekday morning at 7am at the Daliao barangay hall, loads up with basic cleaning equipment, and departs to the selected section of drains scheduled for that day. Clothing, roots, tires, hanging trees, televisions and fridges, leaves, and a lot of plastic are the most commonly found pieces blocking the drains. After cutting away the densely grown vegetation, all this cut debris, together with the other waste, gets collected out of the drains, the plastics separated from the green waste. Routine removal of debris and vegetation restores hydraulic capacity and reduces the likelihood of blockage-driven, pluvial flooding during intense rainfall (Aerts et al., 2014; McClymont et al., 2020). Additionally, monthly coastal clean ups conducted per sector further enhance the safety and liveability of the area.

Figure 40: Researcher joining the Daliao Canal Brigade, August 19, 2025

The researcher took part in the canal brigade, cleaning the drains, and witnessed that upon arrival the water in the drains was basically stagnant. After finishing a section of the drain, a much higher discharge was already visible. Around 9am, a drink and snack is collectively enjoyed after which everyone goes on with their day. While the financial benefits are very low, the main motivation for members to participate is their genuine concern and care for their barangay. They work hard to get as much done as possible within two hours, knowing the positive impact on flood prevention and on the safety

and liveability of the barangay. In resilience terms, repeated small actions that preserve system capacity are a recognised form of everyday risk reduction that shortens recovery times after heavy rain (Keating et al., 2017; McClymont et al., 2020).

The presence of the canal brigade in action also has an awareness effect. Residents, who now see a motivated team of 18 cleaning up “their” trash and “their” drains every day, report increased attention to how waste and vegetation blockages create flooding. During the researcher’s participation, many passers-by came over to chat and showed gratitude toward the team. This everyday visibility strengthens social cohesion and informal coordination, pathways through which social capital improves preparedness, accelerates collective response, and supports clear risk communication (Keating et al., 2017; Cayamanda, 2021; McClymont et al., 2020).

Figure 41: Daliao Canal Brigade, August 19, 2025

One of the most important factors in the success of the Daliao canal brigade is the effort of the barangay captain. Where many officials continue to develop and discuss plans, Barangay Captain Joseph N. Dumongho ensures things actually get done. He comes from a business background that fuels a hands-on mentality, “first do something, try new initiatives, then write a plan for it, not the other way around.” This has resulted in very active and effective barangay cleaning efforts, and residents praise Joseph N. Dumongho because they experience fewer floods. Such local leadership provides the enabling environment that turns willingness to help into a reliable schedule, tools, and follow-through, an element frequently highlighted in contemporary flood-resilience reviews (Cayamanda, 2021; McClymont et al., 2020). This makes the practice both exemplary and vulnerable, as it could weaken under different leadership.

FGDs and KIIs noted that the canal brigade operates because barangay residents cannot rely on city waste services to keep drains clear “There are still communities disrupting the flow of wastewater because of the solid waste, contributing to the urban

Figure 42: Researcher joining the Daliao Canal Brigade, August 19, 2025

city flooding" (KII, 2025). Members described cleaning the same drains repeatedly, pointing to frustrations that upland barangays keep throwing trash in their drains and institutional maintenance is insufficient. "Plenty of individuals don't know where their trash should go, we lack area in terms of our trash disposal/ storage" (KII, 2025).

From a resilience perspective, the Canal Brigade shows how communities do not wait passively for external interventions but mobilise their own labour to address an everyday driver of flood risk, but also how institutional gaps shift responsibility downward. The practice operates at the intersection of environmental management and social cohesion: it reduces immediate exposure by keeping drains clear while reinforcing shared responsibility and connectedness among residents. The Canal Brigade stands out as an exemplary form of local scale, practical resilience that directly bridges knowledge and action at barangay level (Gaillard & Mercer, 2013).

Figure 43: Collectively having snacks and a drink, contributing to the group spirit, after the Daliao Canal Brigade has cleared out the designated section of drains for that day, August 19, 2025

5.3 Community-Based Early Warning Systems (EWS)

While the city operates a broader EWS, many barangays and puroks have developed their own systems that do not depend on city-level activation. Key informants explained: "Sometimes the city-wide EWS cannot reach them. There are actually already a lot of barangays and puroks here that already established their own EWS, that don't have to wait for the city's signal to evacuate." These local systems, often using sirens, megaphones, or upstream-downstream phone alerts, reflect a decentralisation of hazard information, enabling faster local action. Participants valued these systems, but also described challenges: equipment maintenance was uncertain, and in some cases, alarms were not trusted after repeated false warnings. These stations will be active in the first few years, but then the maintenance is forgotten (KII, 2025). Additionally, when official channels warn for a "storm surge" and people don't know what a storm surge is, they don't take it seriously. This has happened before and led to many casualties during that time (KII, 2025*).* The PDAT (Purok Disaster Action Team) model, although not active anymore due to lack of funding, illustrates the effectiveness of such systems when trusted leaders and clear protocols are in place (KII, 2025).

5.4 Waste Management Practices and Environmental Consciousness

Both FGDs and KIIs highlighted community-level waste collecting initiatives that reduce flood risk, such as material recovery facilities (Matina) and bottle collection (bote boca). While some are NGO- or donor-driven (for example UNDP awareness programmes), many operate on residents' initiative, motivated by environmental concern rather than financial incentives (KII, 2025). These grassroots practices illustrate how local consciousness about climate change and environmental degradation translates into preventive action (Bankoff, 2003).

5.5 Organised Barangay DRRM Committees

Barangay DRRM committees exist in the at-risk barangays, with their own responders, direct communication lines to the CDRRMO, and independent DRR budgets (5% of the barangay budget). This localised institutional structure should allow for tailored planning and potentially reduces reliance on the city office during smaller-scale events (UNDRR, 2015). However, in practice these BDRRMCs face challenges in being equally effective in increasing community preparedness. These challenges will be explored in Chapters 6 and 7.

5.6 High Awareness and Motivation (Emerging Capacities)

Not all findings represent current capacities, but they reflect a readiness to engage in DRR. Across FGDs, participants consistently recognised that residents themselves should act first to prevent flooding. 100% of sector FGD participants rated community participation as "important" or "very important", and there was strong willingness to join DRR training and seminars to improve preparedness. However, FGDs and KIIs also revealed that willingness does not always translate into action. Residents pointed

to barriers such as unsafe evacuation centres or lack of follow-through after training. “One of the issues is that there is no continuation after projects. The idea stops when the funding stops” (KII, 2025). These findings align with the PAR model that communities are not passive victims, but active agents constrained by structural barriers (Oliver-Smith, 2004; Watts & Bohle, 1993). The capability approach further emphasises that freedoms are real only when institutional and material conditions make them achievable (Sen, 1999).

5.7 Conclusion

Capacities in Daliao and Lizada show that residents do not wait passively for external help but mobilise collective labour, knowledge, and solidarity through mutual aid, canal brigades, improvised early warning, and waste initiatives. These capacities strive to keep everyday disruption manageable but are fragile and unevenly distributed. Women shoulder heavier burdens, fisherfolk are compelled to return quickly to flood-prone zones for livelihoods, and canal brigades repeatedly compensate for incorrect waste disposal upstream . Additionally, early warning falters when mistrusted or under-maintained. These dynamics demonstrate that capacities at barangay level are vital, yet they often function as coping routines that patch institutional gaps rather than transforming vulnerability.

Answer to Sub-question 2: How do capacities at the barangay level contribute to flood preparedness, and to what extent do they enable or constrain self-reliance?

They contribute through collective practices such as bayanihan, brigades, and improvised warnings, which show that communities actively shape preparedness. However, they are constrained by livelihood precarity, gendered care responsibilities, and insecure tenure, which make self-reliance uneven and fragile. Overall, barangay capacities are essential but insufficient: without stable institutional support and equity safeguards, they remain coping routines rather than drivers of transformative resilience.

(Choi, 2022)

Chapter 6. Knowledge Action Gap

Introduction

Flood resilience in Davao is marked by a paradox. On paper, the city is highly active: hundreds of trainings and drills are conducted each year, and all students are formally inducted into the National Service Reserve Corps (NSRC). Yet in practice, community responses to floods remain hesitant. Fieldwork showed that panic, fear, and confusion often dominate the first moments of flooding, despite prior participation in DRR activities. This gap cannot be reduced to behavioural weakness alone. Political ecology directs attention to how exposure and preparedness are socially distributed: barangay officials and middle-class households access training and resources more readily, while poorer households remain marginalised (FGD, 2025). To understand the knowledge–action gap, we must therefore ask: knowledge for whom, and action constrained by what?

This reflects what Gaillard (2013) terms the knowledge–action gap: the disconnect between awareness and decisive behaviour under stress. Similar concerns are echoed in recent studies of disaster governance in the Philippines, which highlight how political turnover, fragmented coordination, and weak enforcement undermine continuity and follow-through (Porio, 2011; Cayamanda, 2021; Tamboon, 2023). As a result, knowledge is present but unevenly translated into preparedness.

This chapter explores two arenas where this gap becomes visible: first, the mixed outcomes of training and drills, and second, the limited mobilization of the National Service Reserve Corps (NSRC). Drawing on Argyris and Schön's (1978) framework of single-, double-, and triple-loop learning, the analysis considers whether institutions simply repeat activities, question their design, or reflect on who sets the terms of learning. The findings suggest that resilience cannot be built through quantity of activities alone. It requires training that is consistent, accountable, and embedded in everyday community practice.

6.1 Training and Drills

City-led Training Programmes

City programmes frame training and drills as routine preparedness work. According to the City Disaster Risk Reduction and Management Office (CDRRMO), 283 DRRM-related trainings were conducted in 2024, spanning first aid/basic life support and community-responder skills, with mixed cohorts of barangay officials and residents. Barangay administrations and the City Social Welfare and Development Office co-identify participants and allocate funds; short "brief knowledge" sessions are voluntary and announced locally. Training teams also prioritise hazard-exposed barangays, run water-safety sessions for flood-prone areas, and deliver multi-day courses tailored to vulnerable groups (KII, 2025).

A flagship initiative is the river-wide simulation exercise (third iteration, September 2025), extending drills to three major river systems. Preparations include coordination

among response clusters, barangay responder councils, and volunteer groups; barangays then cascade information and run practice sessions. Ahead of the exercise, CDRRMO conducts communication tests, table-top exercises, and equipment checks; on the day, responders rehearse evacuation and safe transport of "victims." Yet even CDRRMO acknowledges that while these activities raise awareness, *"perfect execution" of protocols remains a challenge*, a performance gap also observed in other Philippine cities (Davao City Government, 2024).

From a single-loop perspective, these drills show diligence in repeating procedures, but they rarely question whether the design itself addresses everyday realities. Double-loop learning would interrogate why the same groups attend, or why warning systems fail to reach poorer households. Triple-loop learning would ask who decides the protocols in the first place, and whose knowledge is excluded when disaster is framed primarily in technical terms.

Complementary Initiatives and International Frameworks

The Philippine Red Cross complements these city-led efforts. In Davao, its Disaster Resilience Camp combines multi-day, skills-based modules (first aid refreshers, hazard-awareness, leadership tasks) with scenario drills and debriefs. (KII, 2025; Authors observation, 2025). Research confirms that such scenario-based, role-specific practice clarifies responsibilities, strengthens communication, and reduces hesitation under stress, thereby shortening mobilisation and recovery after flood events (Keating et al., 2017; McClymont et al., 2020).

International frameworks emphasise similar priorities. The Sendai Framework for Disaster Risk Reduction 2015–2030 highlights capacity-building, awareness-raising, and training as central means of reducing disaster losses (UNISDR, 2015). Participatory methods such as the Red Cross EVCA tools also demonstrate how training can link hazard awareness with local resources and collective action (IFRC, 2016).

Persistent Panic and Psychological Dimensions

Despite these substantial efforts, outcomes remain uneven. Focus group discussions (FGDs) conducted for this study revealed that panic, fear, and emotional stress are still the most common first reactions during floods, even though 71% of participants had already joined DRR training. As participants explained:

> *"Filipinos have this trait that they panic first before doing something."*

> *"*What do people usually do when the flood starts? - *Panic, struggle, stress out."*

This panic was recognised as causing stampedes, injuries, and delays in evacuation, sometimes leaving people trapped in their homes. Fear, compounded by limited skills, also discouraged residents from helping others despite their willingness:

> *"When you attempt to help someone without the proper knowledge, it can worsen the situation."*

Although participants themselves sometimes described panic as a Filipino trait, research in disaster psychology highlights that panic is a universal response to acute danger, typically expressed as fight, flight, or freeze. What distinguishes the Davao case is not the biological capacity for fear, but the socio-political conditions that leave people with fewer safe options once panic sets in. In this sense, what may appear “cultural” is in fact structurally conditioned.

A key informant stressed that policy awareness at individual level remains thin: "Zero to 50%, I guess, in terms of individual level awareness of our policies, we need to cascade the policies and programs to the individual level”. Recent studies corroborate these experiences. For instance, La Greca et al. (2023) found that evacuation stress during Hurricane Irma was strongly associated with heightened anxiety and distress, suggesting that disaster situations can overwhelm even those with prior exposure or training. More broadly, a recent climate–mental health study confirmed that Filipino populations frequently report anxiety, panic, and post-traumatic stress following floods and typhoons, underlining the psychological vulnerability of disaster-affected communities (Frontiers in Climate, 2025).

Unequal Participation and Class Divides

Furthermore, participation is not evenly spread. Training opportunities often prioritise barangay leaders and organised groups, while ordinary residents, especially informal settlers and women with care duties, are underrepresented. This reveals an implicit class divide: those with institutional roles become ‘prepared,’ while those most at risk are left outside the loop.

Waste Management and Everyday Risk Creation

FGD participants also repeatedly identified improper waste disposal as the main cause of worsening floods, and noted that the situation is deteriorating rather than improving. Recent reports by DPWH-XI and GMA Regional TV (August 2025) confirm that garbage-clogged drains and inadequate storm drainage are major drivers of street flooding in Davao (GMA News, 2025). This aligns with broader vulnerability research that links social practices and institutional gaps to persistent risk creation (Wisner et al., 2004; Cannon & Twigg, 2003).

Institutional and Political Constraints

The problem appears to lie in ineffective and uneven DRR training. Key informants stress that knowledge is the foundation of resilience. Yet, at the community level, panic, inaction, improper waste disposal, and people unable to help each other remain the norm.

Admittedly, with 182 barangays, the CDRRMO has limited capacity. Not all 1.8 million residents can be reached with the same extent of training. Barangay DRRMOs contribute by organizing activities locally. The issue with distributing responsibility to the barangay level is their differing political priorities, where DRR often receives minimal attention (KII, 2025). Additionally, barangay leadership turnover, along with their DRR teams every three years disrupts continuity. A direct result of this turnover

was seen in a recent flood in Baguio District. The barangay administration, including the Barangay DRR Council, was in the middle of a transition. When the flood hit, no rescue teams were in place. This also challenges accountability: who is responsible and accountable for the flood when the council is in transition? “We must explore the possibilities to ensure continuity within DRR (KII, 2025).

Lastly, Barangay DRRMOs are known to employ external agencies to provide training, often through service providers not recognized by the city. This allows barangays to spend as they wish and redirect much of the money to other uses. In some cases, agreements are made with these organizations to mark up the training costs so that, on paper, it looks like the barangay has spent its entire DRR budget, while in reality a large portion of the funds is kept in their pockets. It is important that funding is properly reflected in the trainings and programs, but in practice the quality of these trainings is very poor (KII, 2025).

This KII insight is backed up by evidence which shows recurring issues in the use of disaster risk reduction resources in the Philippines. The Commission on Audit (COA) has repeatedly flagged barangays and local governments for the misuse and diversion of Local Disaster Risk Reduction and Management Funds (LDRRMF). In several cases, these funds were allocated to non-disaster-related expenses such as festivals and office supplies, or funnelled into questionable deals with private service providers at inflated costs (COA, 2019). A report by the Philippine Center for Investigative Journalism (2018) further documented instances where DRRM funds were subcontracted to private groups for seminars and drills, many of which were poorly executed or even fictitious. Transparency International (2017) likewise noted that local DRRM budgets are highly vulnerable to patronage and rent-seeking practices, with barangay officials sometimes striking deals in which “ghost” or substandard training programs were billed at full price. In the case of Davao City, Cayamanda (2021) observed that although trainings are indeed conducted, their quality and consistency are undermined by frequent political turnover, the minimal prioritization of DRR, and the widespread reliance on external contractors.

Top-down Information Flows and the Knowledge–Action Gap

Studies on risk communication in Davao also note that information flows are often top-down, with limited two-way engagement, which weakens residents’ ability to act decisively (Tamboon, 2023). Likewise, comparative research shows that barangay officials usually possess higher preparedness levels than ordinary residents, suggesting that training may be disproportionately reaching officials rather than whole communities, which is reflected in the FGD results (Luna, 2020).

These findings echo Gaillard’s (2013) argument on the *knowledge–action gap*: while knowledge may exist, it does not necessarily translate into confident action under stress. This gap can be understood through the lens of institutional learning. According to Argyris and Schön (1978):

- Single-loop learning: build around fixing errors. Training is offered whenever residents are deemed unprepared (most commonly adapted within DRR).
- Double-loop learning: institutions question whether the design and delivery of training itself is effective.

- Triple-loop learning: reflection extends further. Who decides what the “right” form of learning is, and how is governance shaped?

Synthesis: Training as Socially Patterned Preparedness

Taken together, the uneven distribution of training, the political cycles, and the misuse of DRRM funds demonstrate how the knowledge–action gap is socially produced. It is not a universal deficit but a patterned inequality: better-off groups and officials learn and act with institutional backing, while poorer residents are expected to improvise. Recognising this classed nature of preparedness is crucial to applying the learning framework.

6.2 Why people do not evacuate

Despite frequent framing of non-evacuation as “non-compliance,” participant accounts show that residents often remain in place not out of ignorance but due to structural constraints.

Protection of belongings and livelihoods.

Participants pointed to the need to stay in order to guard assets that are directly tied to income. Across groups, reluctance to leave was linked to protecting small businesses, inventory, and working tools. For some, animals are central to livelihood security, and this directly blocks evacuation: “Evacuation is refused because people do not want to leave their livestock or pets (KII, 2025).

Care burdens and immobility.

Evacuation is hardest for households with dependants and limited support. As the FGD participants stressed, “mothers with small children and older adults” are often not prepared (FGD, 2025). Students described real-time entrapment when water rises quickly, noting people being “trapped in their houses” in narrow streets with strong currents (FGD, 2025).

Security and trust.

Fear of looting discourages timely departure, especially in low-income areas where home contents represent hard-earned savings: “They are afraid that their house would be looted if they evacuate, so they stay behind (KII, 2025)”.

Physical danger and panic.

In some locations, leaving is hazardous in itself. Women reported that “the water is too strong to move through” during peak flooding, while panic disrupts orderly action: “Panic is the first response. That is the problem. Because of panic, you do not know what to do.” (FGD, KII, 2025)

Signal credibility and timing.

Some residents delayed action because they did not believe early warnings in the absence of visible water, leading to late and riskier moves: “They did not believe it would flood because they could not see any water yet (KII, 2025)”. “We find out when

we experience it ourselves while passing through", was stated by one of the FGD women's group.

Taken together, these findings demonstrate that non-evacuation cannot be reduced to lack of awareness or discipline. It reflects a combination of classed resources, livelihood dependence, care burdens, security concerns, and institutional credibility, which narrow the space for action even when warnings are received. In other words, preparedness fails less at the level of knowledge and more at the level of enabling conditions.

6.3 Disaster Risk Reduction in Education and the National Service Reserve Corps (NSRC)

DRR in education

At the same time, disaster risk reduction (DRR) has been systematically embedded across all levels of education in the Philippines. At the basic education level, the Department of Education issued the Comprehensive Disaster Risk Reduction and Management in Basic Education Framework (DepEd Order No. 37, s. 2015), which requires schools to integrate DRR concepts into the curriculum, school improvement plans, and regular safety drills (Department of Education, 2015). This ensures that children are introduced early to hazard awareness and basic preparedness practices.

At the senior high school level, DRR is formalized as the compulsory Grade 12 subject *Disaster Readiness and Risk Reduction*. This subject covers hazard identification, risk mapping, community-based preparedness, and response strategies. By the time students graduate from high school, they are expected to have a working understanding of how disasters develop and how communities can mitigate their effects (Department of Education, 2015).

At the tertiary level, the integration of DRR is tied to the National Service Training Program (NSTP), created by the NSTP Act of 2001 (Republic Act 9163). All college students are required to complete one year of service under either the Civic Welfare Training Service (CWTS), the Literacy Training Service (LTS), or the Reserve Officers' Training Corps (ROTC). CWTS and LTS graduates are automatically enrolled in the National Service Reserve Corps (NSRC), while ROTC graduates are absorbed into the Armed Forces reserve. In principle, this makes every college student part of a legally recognized civic or defence reserve force (Republic Act 9163, 2001).

The National Service Reserve Corps

The National Service Reserve Corps (NSRC) is established by law as a pool of trained civilian volunteers comprising graduates of the Civic Welfare Training Service (CWTS) and the Literacy Training Service (LTS) who can be mobilized in activities such as disaster response, civic welfare programs, and literacy campaigns. Its legal foundation rests on the National Service Training Program Act (Republic Act 9163, 2001), which created the NSRC, and the Philippine Disaster Risk Reduction and Management Act (Republic Act 10121, 2010), which formally designates the NSRC as a partner

resource that local government units (LGUs), the Office of Civil Defense (OCD), and other agencies can tap for disaster preparedness, response, and rehabilitation.

Recent legislative proposals have reinforced this role by placing the NSRC explicitly under the supervision of the National Disaster Risk Reduction and Management Council (NDRRMC) through the OCD (House of Representatives, 2025). The potential scale of this reserve force is substantial. Davao City alone hosts several large universities, including the University of Mindanao with approximately 73,000 undergraduates, the University of Southeastern Philippines with more than 55,000 students, and Ateneo de Davao University with over 21,000, along with other institutions such as the University of the Immaculate Conception and the University of the Philippines Mindanao. Combined, these institutions are estimated to enrol between 160,000 and 170,000 undergraduates. In principle, nearly all of these students, after completing the NSTP, become part of the NSRC and thus constitute a vast pool of potential volunteers. However, in practice, this legal construction does not translate into an accessible or mobilizable resource.

Mobilization in Practice

Despite the enabling legal framework, the actual mobilization of the NSRC in Davao City and elsewhere in the Philippines remains effectively non-existent. Key informants explain that neither the CDRRMO nor the OCD has access to the personal information of NSRC graduates. Universities maintain no systematic, shareable rosters of their CWTS and LTS graduates, and thus disaster management agencies lack the ability to contact or mobilize them. As a result, the potential pool of more than 150,000 students in Davao City remains untapped, even during major floods or typhoons.

The roles envisioned in Republic Acts 9163 and 10121, as well as in CHED's implementing guidelines, include disaster preparedness, response, rehabilitation, and civic welfare. On paper, these tasks cover evacuation support, relief distribution, first aid, and environmental protection. In practice, however, these roles are not carried out by NSRC members in Davao. The NSRC exists as a legal category rather than as an operational volunteer force.

The Gap Between Potential and Practice

The disjunction between the NSRC's extensive mandate on paper and its actual utilization in practice highlights a structural knowledge–action gap. Although students across Davao City are formally trained, organized, and legally recognized as reservists, they are not mobilized in practice. The reason is not unwillingness on the part of students, but the absence of institutional mechanisms: no agency can lawfully or practically access student information, and no clear pathway exists to link trained youth with barangay- or city-level preparedness programs.

Focus group discussions conducted in this research reveal that students are, in fact, eager to help. Students expressed a desire to assist in evacuations, educate their neighbours, and join in waste management campaigns:

> *"Attend seminars. Be one in implementing programs and cooperate in doing flood-related strategies."*
>
> *Yes. Help to spread information, evacuate the things, people, animals that can still be saved, and help the local authorities or rescuers by providing support during this calamity."*
>
> *"Educate one another, and share ideas on what to do during a flood with my neighbourhood."*

These voices show willingness across age and gender lines. To confirm aligned mindsets and levels of motivation across the full NSRC pool, surveys among larger groups should be conducted. Yet willingness without pathways reflects inequality: youth capacity is recognized in law but not in local institutions. The result is a symbolic corps that cannot be activated when needed.

Conclusion

The integration of DRR into the Philippine education system provides a strong knowledge foundation for all students, culminating in their formal inclusion in the National Service Reserve Corps. In principle, this creates a vast pool of young, trained volunteers that could significantly enhance community flood resilience in Davao City. In practice, however, NSRC mobilization does not occur. The bottleneck lies not in student motivation or legal mandate, but in institutional incapacity: agencies do not have access to student data, nor do universities maintain functional systems to connect their graduates with disaster management offices. Unless these systemic barriers are resolved, the NSRC will remain a symbolic legal resource rather than a transformative force in local disaster preparedness.

Answer to Sub-question 3:

How is the knowledge–action gap expressed in practice in Davao's flood preparedness system, and what institutional and political dynamics sustain it?

The knowledge–action gap in Davao's flood preparedness is expressed in routinised outputs such as drill attendance and checklist compliance that do little to alter household-level safety. It is sustained by the downward shifting of responsibility, where residents are urged to be self-reliant even when poverty, insecure housing, and caregiving burdens make non-compliance rational. It is reinforced by limited organisational learning, where single-loop adjustments dominate while political turnover undermines deeper institutional change. Taken together, the gap persists less because communities lack knowledge, and more because governance incentives and organisational cultures reward visible activity counts over equitable resilience outcomes.

(Choi, 2022)

Chapter 7. Discussion

Introduction

Flood preparedness in Davao City is marked by a paradox. On paper, institutions are highly active: hundreds of trainings and drills are implemented each year, disaster risk reduction (DRR) is embedded in school curricula, and barangay structures are formally tasked with community mobilisation. At the same time, communities themselves demonstrate strong traditions of mutual aid, local initiatives such as canal brigades, and willingness to learn more. Yet despite this extensive activity, floods remain routine disruptions in barangays like Lizada and Daliao. Even shallow, recurrent inundations produce panic, hesitation, and uneven response. This persistence of disruption, despite decades of investment, encapsulates the knowledge–action gap at the centre of this study.

The purpose of this chapter is not to repeat the descriptive findings of the preceding chapters, but to interpret them. It examines how hazards, capacities, and institutional practices interact to sustain or to challenge the knowledge–action gap, and how these dynamics illuminate the deeper social and political conditions of flood preparedness in Davao. The analysis is guided by four strands of scholarship introduced earlier: political ecology, which situates flood risk as socially produced rather than natural; the literature on the knowledge–action gap, which explains why knowledge does not automatically translate into behaviour; organisational learning theory, which distinguishes between repetitive single-loop fixes and deeper double-loop reflection; and the discourse of “Don’t rely on us,” which highlights the tension between empowerment and responsibility shifting.

Throughout, the thesis treats capacities as exercised in context, that is, amid uneven access to land, services, and decision power. Political ecology reminds us that if there is a vulnerable class, there is also a relatively protected class; risk is patterned by who can live where, who is heard, and who benefits from urban investments. The discussion therefore asks not only whether people act, but why some must and others need not.

The discussion is structured around the three sub-questions of this thesis. Section 7.1 interprets how hazard and exposure dynamics shape risk at community scale. Section 7.2 analyses community capacities, assessing how far they support genuine self-reliance. Section 7.3 examines how the knowledge–action gap is expressed in practice and sustained by institutional and political dynamics. Finally, Section 7.4 synthesises these insights to identify the conditions under which Davao can move beyond repetitive single-loop responses toward more equitable and effective preparedness, before Section 7.5 reflects briefly on the limitations and transferability of the study.

7.1 Hazards, Exposure and Vulnerability

Routine, Shallow Floods as Design Cases

Flood risk in Lizada and Daliao is defined less by catastrophic events than by recurrent, shallow inundations. Mapping and focus group discussions identified 37 hotspots where water regularly accumulates, with ankle- to knee-deep floods occurring multiple times a year. These events are not exceptional but routine, disrupting mobility, education, and livelihoods. From Cayamanda's (2021) perspective, such "everyday disasters" demonstrate that vulnerability is produced not by rainfall alone but by the siting of people, assets, and services in drainage-dependent and low-lying terrain. Schools, barangay health posts, and access roads are repeatedly exposed, embedding flood disruption into the daily lives of residents. These 'everyday' floods are not accidental. Households concentrated in drainage-dependent, low-lying sites are there less by preference than by constraint as the residual spaces affordable to lower-income groups after higher, serviced land is allocated to more powerful actors. In this sense, exposure is co-produced by urban land politics as much as by rainfall. Residents' emphasis on drainage and waste management can be read as lay diagnoses of governance gaps, not as 'awareness deficits.' This reframes causality from 'nature overwhelms system' to 'systems under-serve particular places.'

Compound Triggers and Warning Limits

The dynamics of these floods are compounded by the interaction of natural processes. Orographic rainfall and mesoscale convective systems compress intense downpours into short periods, while tidal backflow through drainage outfalls prolongs flooding. Residents describe water arriving "suddenly and with little warning," underscoring a disconnect between technical forecasts and lived experience. These compound triggers explain why warnings often feel too late and why confidence in formal early warning systems remains limited. Community framings also emphasise drainage and waste as central drivers, pointing to governance and maintenance failures rather than to hazards alone. This mismatch illustrates the need to attend to multiple perspectives on causation, not only institutional definitions of risk.

Compound Triggers and Community Causation

The evidence base for these findings is strong at the micro-scale: triangulation across participatory mapping, transect walks, and key informant interviews provides confidence in the spatial distribution of hotspots and the routine character of floods. Foregrounding micro-geographies shows not merely where water goes, but whose everyday routines are routinely interrupted, and whose are not. However, the absence of hydrological gauges or long-term flood records constrains analysis of water depth and duration. As a result, conclusions are robust with respect to *where* and *how often* communities experience disruption, but more tentative regarding the magnitude of hydrological drivers. This balance of strengths and weaknesses shapes the claims that can be made: confident about the geography of routine disruption, more cautious about its quantitative hydrology.

Positioning in the Literature

In relation to existing literature, the findings strongly correspond with the Pressure and Release model, which highlights how exposure becomes disastrous through social and political arrangements. They also extend the concept of everyday disaster by providing fine-grained evidence of micro-geographic risk: school gates, road intersections, and drainage outfalls that fail under common rainfall events. A minor conflict emerges with technocratic planning that prioritises extreme-event scenarios, as the data demonstrate that even shallow, frequent floods have severe cumulative impacts. This case therefore contributes to the argument that preparedness frameworks must address routine as well as rare events.

Practice Implications

The implications for practice are clear. Planning and engineering interventions should treat routine, shallow floods as design cases, not residual nuisances. Drainage maintenance and outfall retrofitting are critical, but so too are early warning systems that combine rainfall and tide triggers to reflect compound realities. Schools situated in hotspots require safe access routes and small-scale elevation measures. Most importantly, community framings that emphasise waste and drainage should be integrated into official hazard analysis, ensuring that preparedness strategies address the problems that residents themselves identify as most urgent.

Conceptual Contribution

Conceptually, this section contributes to the thesis by advancing the idea of “everyday preparedness”: the recognition that disaster risk reduction must be designed not only for rare catastrophic events but also for the routine disruptions that most directly shape community vulnerability.

7.2 Capacities

Bayanihan as Affective Capacity

Flood preparedness in Lizada and Daliao is not defined solely by institutional initiatives but by community capacities that operate on a daily basis. Foremost among these is *bayanihan*, the long-standing norm of mutual aid. Focus group discussions show that households consistently help one another during floods, whether through carrying belongings, assisting with evacuation, or repairing properties. Importantly, willingness is not framed as reluctant duty but as solidarity expressed with *“helping with a smile.”* This affective dimension transforms social ties into resilience, sustaining morale and reinforcing trust during crises.

Yet while *bayanihan* ensures that no household is left entirely unsupported, it does not substitute for structured preparedness: in the absence of clear roles, training, and resources, its reach is limited and may falter under more severe or compounding events. More critically, glorifying *bayanihan* in isolation risks excusing weak governance. Resilience is not a substitute for governance, and when solidarity is continually relied upon without parallel investments in infrastructure, policy, and accountability, it becomes less a sign of strength than of abandonment.

Canal Brigade as Visible Risk Reduction

A more concrete expression of community initiative is the Canal Brigade. In Daliao, eighteen residents clean roadside drains each weekday morning from seven to nine, removing sediment and waste that would otherwise clog the system. Observations show that this not only improves hydraulic capacity but also generates visibility: residents see their drains being cleared by other residents, which reinforces awareness and signals accountability. This practice exemplifies everyday risk reduction, translating willingness into tangible preparedness action. However, its sustainability depends on motivated residents and the leadership of the barangay captain, who urged action first and formalised planning only afterwards. Such reliance on charismatic leadership makes the initiative effective but fragile; its replication elsewhere requires institutional support in the form of tools, higher stipends, and more prominent integration into official DRR programmes.

Decentralised Warnings and Paper Capacities

Other capacities also illustrate the decentralisation of preparedness. Barangay-level early warning systems, using megaphones, sirens, or upstream–downstream phone chains, often reach communities more quickly than city alerts. Waste-conscious practices, such as bottle collection and recycling, demonstrate awareness of drainage pressures, though these remain fragmented and small in scale. At the institutional level, every barangay maintains a DRRM committee and a budget allocation, yet their effectiveness varies widely. While structures exist on paper, their realisation in practice is inconsistent, revealing what might be termed “paper capacities”: formally mandated but weakly enacted. These paper capacities sit unevenly atop classed realities; some residents train and decide; others labour and endure.

Strengths and Fragilities

Taken together, these findings highlight both the strength and fragility of community capacities. On the one hand, willingness to train and mobilise is nearly universal, offering a latent resource for more structured preparedness. On the other, reliance on residential action, fragile leadership, and uneven institutional support constrain sustainability.

Positioning in the Literature

In relation to the literature, this corresponds with long-standing recognition of social capital as a resilience driver, but it adds two nuances. First, the affective dimension of bayanihan suggests that emotional solidarity is itself a functional capacity. Second, the Canal Brigade demonstrates that visibility is not incidental but constitutive of resilience: seeing risk reduction enacted builds awareness and accountability. These insights underscore that capacities already exist, but they require consistent institutional scaffolding to endure and scale.

Policy Pathways to Institutionalise Practice

For policy and practice, this means formalising what communities already do well. Barangays and the City Engineer's Office could institutionalise canal brigades through modest funding and logistical support, while CDRRMO could embed bayanihan into standard operating procedures by designating and resourcing micro-groups within puroks. Polycentric early warning, combining barangay triggers with city alerts, would further decentralise preparedness and strengthen confidence. The lesson is that self-reliance cannot be left to community effort alone: it must be recognised, supported, and linked to formal systems if it is to reduce risk sustainably.

Conceptual Contribution

Conceptually, this section advances the argument that resilience is generated not only through formal training or infrastructure but through visible resilience and affective capacities, practices that both reduce hazard and reinforce collective awareness and trust.

7.3 The Knowledge–Action Gap

Outputs Delivered, Outcomes Missing

The paradox of flood preparedness in Davao is most evident in the persistence of panic and hesitation despite widespread training and formalised policies. In 2024 alone, 283 trainings were delivered across the city, and 71% of surveyed participants in Lizada and Daliao had already attended some form of disaster preparedness activity. Yet focus groups consistently described panic, fear, and emotional stress as the most common first reactions when floods occurred. Rather than producing confident action, drills and briefings often failed to translate into muscle memory. This illustrates an output–outcome gap: training is delivered and recorded as an institutional output, but the intended behavioural outcomes remain elusive.

While participants sometimes framed panic as culturally specific, this study understands panic as a universal stress reaction, with its expression patterned by training quality, rehearsal, and the availability of safe options. The persistence of hesitation here is thus read as an output–outcome failure, not as an innate trait.

Training Quality, Outsourcing, and Rent-seeking

The uneven quality of trainings further sustains this gap. Key informant interviews revealed that barangay DRRMOs frequently outsource to unaccredited providers, sometimes inflating costs or organising superficial seminars to satisfy reporting requirements. These practices resonate with national audit reports that document "ghost" trainings, budget diversion, and rent-seeking in local disaster management. As a result, preparedness may exist on paper but not in practice, a pattern that can be termed paper preparedness. For communities, the impact is twofold: trust in training diminishes, and resources that could support more substantive preparedness are lost.

Turnover and Institutional Amnesia

Political turnover compounds these weaknesses. Every three years, barangay elections replace DRRM officers and disrupt team continuity. Experience and institutional memory are routinely lost, forcing new officials to start afresh. This dynamic constitutes a form of institutional amnesia, where knowledge does not accumulate across cycles but resets with each turnover. From an organisational learning perspective, this explains why Davao's DRR system often remains trapped in single-loop routines: confusion after floods is met with the repetition of more of the same training, rather than with reflection on why previous sessions did not stick. Opportunities for double-loop learning, questioning training design, continuity, or incentives are therefore missed.

Misaligned Knowledge and Insider–Outsider Asymmetry

Another driver of the gap is the misalignment between training content and community experience. This mismatch sustains hesitation: people may know evacuation routes in the abstract, but the daily problems they associate with flooding remain unaddressed. The effect is a gap not of knowledge scarcity but of misaligned knowledge, where official framings and local realities diverge. The gap is also political: outsider institutions define 'awareness' and 'proper behaviour,' while insider knowledge about drains, tides, fear of looting, livelihoods, animals, or distrust of shelters is discounted. This is a classic insider/outsider asymmetry: those with power construct the problem; those with least power absorb the penalties.

Latent Capacity of the NSRC

A further example of underutilised capacity is the National Service Reserve Corps (NSRC). By law, every student completing the Civic Welfare or Literacy Training Service becomes part of a recognised civic reserve. In Davao City, this would amount to a potential pool of 160,000–170,000 trained volunteers. In practice, however, mobilisation does not occur. Disaster management offices have no access to student records, and universities do not maintain rosters that could enable activation. Willingness among students is high, as focus groups confirmed, yet without institutional pathways their energy remains untapped. The result is latent capacity: a legally constituted corps that exists on paper but is absent in practice.

Punitive Resilience and Governance Style

Finally, the broader policy discourse shapes how preparedness is framed. Davao's "Don't rely on us" message, codified in Ordinance 0246-23, underscores household responsibility by threatening fines or imprisonment for those who refuse lawful evacuation. While intended to emphasise self-reliance, this risks producing punitive resilience, where preparedness is treated as compliance rather than as a supported capacity. In this framing, responsibility is shifted downward without ensuring that households possess the resources, coordination, or continuity needed to act effectively.

Such punitive framings particularly deepen vulnerability for those already marginalised, such as informal settlers, women, or renters in flood hotspots, while more affluent groups remain relatively unaffected because they can evacuate to secure housing or rely on private resources. Penalty-backed evacuation codifies responsibility-shifting: people are punished for rationally juggling multiple risks (property loss, unsafe shelters, eviction while away). This is not higher-order learning; it is single-loop enforcement that short-circuits double-loop questioning of why evacuation is resisted and what would make it safe. Triple-loop learning would interrogate the framing itself: Who is authorised to define 'preparedness'? Who benefits if training counts as success while behaviour is blamed as failure?

The combination of fines, "no-rescue" orders, and ritualised drills illustrates a disciplinary mode of disaster governance. Rather than enabling households through material buffers and accountable services, responsibility is shifted downward and enforced through punitive measures. This aligns with what Bankoff (2003) terms the authoritarian face of DRR in the Philippines: disaster risk becomes a matter of disciplining populations rather than addressing the structural drivers of vulnerability. In this governance style, compliance is prioritised over equity, and institutional energy is channelled into monitoring and sanctioning households instead of reforming the deficits that make evacuation so difficult in the first place.

Evidence Limits and Triangulation Strength

The strength of this evidence lies in its triangulation: focus group discussions and key informant interviews with agencies in many different domains consistently point to the same dynamics. Its limitations are also clear: behavioural reactions were self-reported rather than observed in real time. Nonetheless, the weight of convergent testimony and official records provides high confidence that Davao's preparedness system produces activity but not assured behaviour.

Conceptual Refinements

These findings strongly corroborate Gaillard's (2013) argument that DRR is a "battlefield of knowledge and action," while extending it with local detail on the mechanisms that sustain the gap. In particular, budget misuse, political turnover, and institutional amnesia provide concrete illustrations of why knowledge does not accumulate into resilience. The evidence also highlights a minor conflict with top-down awareness framing: while institutions diagnose "lack of awareness," communities frame drainage and waste as the primary problem. This divergence illustrates the need for double- and triple-loop learning, where institutional framings themselves are reconsidered.

For policy and practice, the implications are unambiguous. Trainings should be monitored for behavioural outcomes rather than counted as outputs; barangay DRR funds require transparent auditing and outcome-based reporting; continuity mechanisms must insulate DRR work from political turnover; and student mobilisation should be institutionalised through formal barangay–school partnerships. Most importantly, preparedness should be reframed from punitive obligation to supported capacity.

Conceptually, this section contributes three refinements: paper preparedness, where activities exist on paper but lack substance; institutional amnesia, where turnover erases continuity; and punitive resilience, where responsibility is shifted downward without provision of capability. Together, these concepts illustrate how the knowledge–action gap in Davao is not a matter of absent knowledge but of how knowledge is distorted, misaligned, or left unrealised.

7.4 Synthesis: Conditions for Moving Beyond the Gap

Three Dynamics Sustaining the Gap

The preceding sections show that Davao's knowledge–action gap is sustained by three interlocking dynamics. First, hazards and exposure are structural and routine: shallow but recurrent floods arise from compound rainfall–tide interactions and are amplified by the siting of schools, roads, and livelihoods in low-lying terrain. Second, communities possess capacities such as bayanihan and canal brigades that demonstrate ingenuity and solidarity, yet these remain fragile because they depend on residential effort, charismatic leadership, and consistent support. Third, institutions generate outputs in the form of trainings, drills, and legal frameworks, but outcomes remain weak due to poor quality, budget misuse, political turnover, and punitive framings of responsibility. Together, these dynamics explain why floods continue to cause disruption despite extensive activity.

From Inequality to Conditions for Change

Moving beyond this pattern requires conditions that enable both communities and institutions to escape repetitive single-loop fixes and to reduce inequalities in who bears the brunt of disruption. In Davao, better-off groups can often buffer disruption through resources, tenure security, or private mobility, while poorer households endure recurrent losses. At the same time, a deeper reflection is needed: why are many communities still compelled to live and rebuild in high-risk areas at all? Addressing the knowledge–action gap thus also means confronting the structural conditions of housing, governance, and inequality that make such exposure seem inevitable. Conditions for change must therefore address not only institutional performance but also distributional fairness. Four conditions emerge clearly from the analysis.

Condition 1: Continuity Beyond Political Cycles

Institutional continuity must be secured. Political turnover every three years currently erases learning; continuity mechanisms are needed to preserve experience and sustain preparedness routines across electoral cycles.

Condition 2: Transparent and Ring-Fenced DRR Finance

Financial resources must be ring-fenced and transparently audited. Without accountability, barangay DRRM funds are vulnerable to diversion, undermining both trust and capacity.

Condition 3: Aligning Knowledge with Lived Realities

Knowledge must be aligned with lived realities. Trainings that neglect the issues residents most identify as drivers of flooding and stopping them from evacuating, such as drainage, waste, unsafe shelters, fail to produce meaningful action. Embedding community framings into official programmes would bridge this misalignment.

Condition 4: Mobilising Latent Capacities

Latent capacities must be mobilised. The National Service Reserve Corps represents a vast but underused resource; institutionalising student roles in barangay preparedness could transform willingness into sustained practice.

Operational Devices: Barangay DRR Dashboard (BDRRD) and Student-Driven Disaster Risk Reduction (SDDRR)

One governance device that could operationalise these conditions is the Barangay DRR Dashboard (BDRRD). This publicly accessible platform would publish, in near-real time, barangay DRR expenditures, work orders, and training outputs, while linking them to behavioural outcomes such as mobilisation times, role recall, or hotspot clearance. Open sign-ups would allow all residents to register directly, embedding equity and continuity and democratising access beyond gatekeeping. In this way, the dashboard addresses several frictions at once: public ledgers deter “ghost” trainings, digital memory mitigates institutional amnesia across political turnover, and hotspot maps reveal where women, elderly, and low-income renters face disproportionate disruption. At the same time it supports local initiatives and capacities such as the

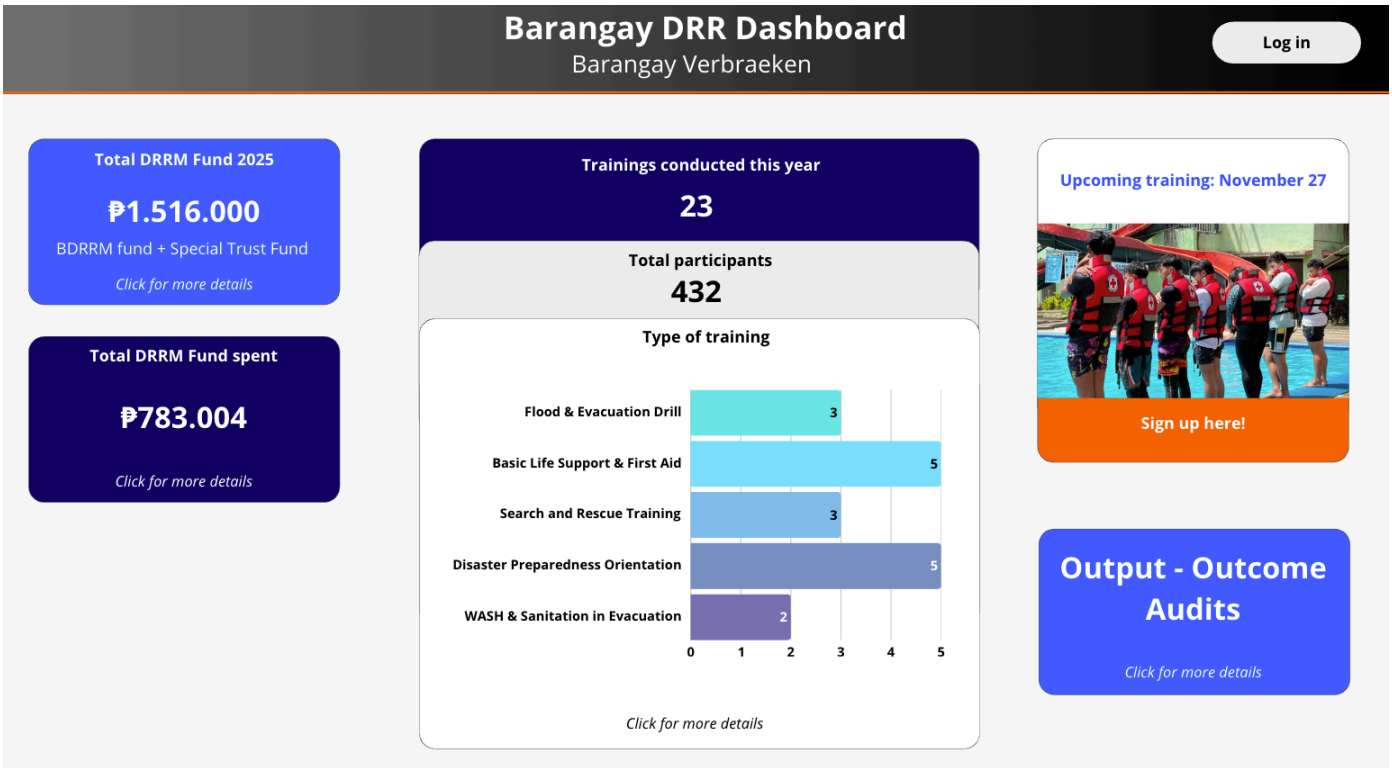


Figure 44: Concept design of the BDRRD main page

Canal Brigade, so that residents can sign up when they want to participate in activities like that. Rather than a technological fix, the BDRRD functions as a governance mechanism: it institutionalises accountability, enables double-loop revisions when outcomes stall, and invites triple-loop reflection on who defines preparedness and who benefits from spending.

Framed within a community-based disaster risk reduction (CBDR) perspective, the dashboard extends beyond information transparency toward participatory governance. CBDR emphasises that communities are not mere recipients of preparedness measures but active co-producers of risk knowledge and response capacity (IFRC, 2012; UNDRR, 2015). In this sense, the BDRRD complements, but differs from, existing community-input tools such as the Micro OSS system currently being developed by JICA (Japan International Cooperation Agency) and local partners, which enables residents to report hazards in real time. While OSS focuses on data generation from below, the BDRRD centres on institutional accountability and supporting latent community capacities: it makes the use of DRR funds, trainings, and outcomes visible to all residents, closing the loop between citizen reporting and official response. By allowing residents, sector groups, and student volunteers to register, verify activities, and view aggregated results, the dashboard operationalises CBDR principles through shared ownership and transparent governance, consistent with the community-based, multi-stakeholder mandate of Republic Act No. 10121 (Philippine Congress, 2010).

The proposal for Student-Driven Disaster Risk Reduction (SDDRR) would complement such a device by linking students directly to purok-level initiatives. Annual student cohorts embed continuity, reduce reliance on transient political leadership, and ground training in the micro-geographies that students already know. As multipliers, students can translate abstract risk information into context-specific routines, while also feeding local insights back into institutional planning. Their involvement in canal cleaning, awareness campaigns, and micro-drills would not only reduce risk directly but also make preparedness visible, reinforcing trust and accountability. Crucially, SDDRR should not only multiply hands; it should multiply voices. Students embedded at purok level can document barriers such as unsafe shelters, neglected drains, or absent training and channel these observations upward. By feeding lived realities into city and barangay planning, students can help trigger double-loop reflection on design flaws and even triple-loop debate over who defines preparedness and how resources are allocated.

From Activity to Outcomes

This synthesis highlights that bridging the knowledge–action gap requires more than increasing the volume of activities. It requires conditions that stabilise learning across cycles, align knowledge with lived realities, safeguard financial integrity, and harness capacities that already exist but remain underutilised. When these conditions are met, preparedness can move beyond symbolic single-loop repetition toward more equitable and effective action. Yet even as these conditions offer a pathway toward stronger preparedness, they operate within the constraints of an unequal urban landscape. Improving continuity, transparency, and participation cannot substitute for confronting

the deeper question of why many Davaoeños must still live in flood-prone, poorly serviced areas in the first place. As the widely shared reflection on Filipino “resilience” reminds us, survival should not be romanticised when it stems from structural neglect. True triple-loop learning requires asking not only how to make risk more manageable, but why such risk is normalised and who benefits when resilience replaces accountability.

7.5 Limitations and Transferability

Case Scope and Representativeness

While the findings presented here provide strong insights into why the knowledge–action gap persists in Davao, they are shaped by methodological and contextual limits that must be acknowledged. The study focused on two barangays, Lizada and Daliao, selected for their existing exposure and relevance to the research questions. This design allowed for depth of analysis, but it also constrains breadth: the findings cannot be taken as statistically representative of all 182 barangays in Davao City. Instead, they should be read as analytically transferable case-based insights, illustrating dynamics that are likely to resonate with other flood-prone communities but require confirmation in different contexts.

Participation and Representation

Participation also introduced limitations. While focus groups engaged a range of sectors, some groups, particularly fisherfolk and small business owners, were underrepresented in validation sessions due to the opportunity costs of lost daily income. Triangulation across other groups and methods helped to validate recurring concerns, ensuring that even if some voices were absent, the themes were not idiosyncratic. This highlights a structural barrier: those most economically vulnerable are often least able to contribute to participatory processes without financial support. The absence of these voices at certain stages may have narrowed the diversity of perspectives, though triangulation across methods and repeated validation helped mitigate this gap.

Language and Positionality

Language and positionality added further constraints. Although materials were provided bilingually and supported by local facilitators, nuance may have been lost in translation, and power asymmetries shaped interactions between the researcher, as an outsider, and community participants. Some institutional informants may have presented idealised accounts, while others may have been more candid precisely because of the researcher’s external status. Cross-checking accounts across FGDs, KIIs, and mapping reduced the risk that any one interaction distorted the analysis. These dynamics inevitably shaped the data but also provided analytical insight into how knowledge is framed and contested in practice.

Temporal Scope

Finally, the temporal scope of 6.5 months limited the ability to capture seasonal variation in flooding and long-term community adaptation. The findings therefore represent a snapshot rather than a longitudinal trajectory. Despite these limitations, triangulation across participatory mapping, transect walks, focus groups, and key informant interviews provided robust convergence on core dynamics: routine floods as everyday disasters, fragile but creative community capacities, and institutional practices that sustain rather than resolve the knowledge–action gap.

Boundaries of the Claims

Taken together, these limits clarify the boundaries of the study's claims. They do not undermine the central conclusion, that preparedness in Davao is constrained not by lack of knowledge but by institutional, political, and financial dynamics but they indicate that further research across additional barangays and over longer periods is needed to refine and test the transferability of these insights.

(Choi, 2022)

Chapter 8. Conclusion

Introduction

This thesis section is set out to answer the main research question: *Why does the knowledge–action gap persist in community flood preparedness in Davao City, and what conditions are required for institutions and communities to achieve more equitable and effective action?* To address this, the study focused on two flood-exposed barangays, Lizada and Daliao, using participatory methods including focus group discussions, participatory mapping, transect walks, and key informant interviews. These approaches provided detailed insights into how hazards are experienced, what capacities already exist, and how institutions and communities interact in shaping preparedness.

While acknowledging methodological limits, triangulation across mapping, FGDs, KIIs, and observation provides confidence that the findings capture not only isolated experiences but recurrent and patterned dynamics. The conclusions below therefore rest on robust convergence, while recognising the partiality of all case-based research.

The purpose of this conclusion is not to repeat descriptive findings but to provide direct, concise answers to the three sub-questions and the overarching research question. Each conclusion is substantiated by the empirical material presented in Chapters 4 to 6 and interpreted through the theoretical lenses of political ecology, the knowledge–action gap, organisational learning, and the “Don’t rely on us” discourse. The chapter also highlights the contributions of the study, identifies knowledge gaps, and outlines directions for future research.

8.1 Hazards and Exposure

The first sub-question asked: *How do current hazard and exposure dynamics shape the flood risks faced by communities in Lizada and Daliao?*

The research shows that flood risk in both barangays is defined less by rare extremes than by routine, shallow inundations. Mapping and fieldwork identified 37 recurrent hotspots, where ankle- to knee-deep floods disrupt mobility, schooling, and livelihoods several times a year. These “everyday disasters” demonstrate that risk is produced not only by intense rainfall events but also by the siting of people and lifelines in drainage-dependent, low-lying terrain. Schools, and key access roads are embedded in hazard-prone areas, locking routine disruption into the daily lives of residents. This pattern is also unequal: lower-income households are constrained to settle in drainage-dependent, low-lying sites, whereas middle-class families in elevated subdivisions are largely insulated from routine disruption.

Flood events are also shaped by compound triggers. Orographic rainfall and mesoscale convective systems compress intense downpours into short bursts, while tidal backflow through drainage outfalls prolongs inundation. Community accounts emphasised clogged drains and waste management as central drivers, illustrating a divergence from institutional framings that prioritise hazard awareness. Together,

these dynamics underline that exposure is structural, systemic, and compounded, rather than incidental or occasional.

In conclusion, hazard and exposure dynamics in Davao's flood-prone barangays create a pattern of recurrent disruption that erodes resilience even in the absence of catastrophic events. Preparedness must therefore be designed for the realities of *everyday floods* as much as for extreme events, recognising the compounded and structural nature of exposure that residents face.

8.2 Capacities

The second sub-question asked: *How do capacities at the barangay contribute to preparedness, and to what extent do they enable or constrain self-reliance?*

The research demonstrates that communities in Lizada and Daliao possess strong capacities rooted in social practices and collective initiative. Bayanihan, the ethic of mutual aid, ensures that neighbours support one another during floods, carrying belongings, guiding children, and assisting in evacuation. The Canal Brigade in Daliao provides a concrete example of community-led preparedness: residents clean drains weekday each morning, reducing blockage and improving discharge while also reinforcing awareness through visible action. These practices illustrate that willingness to act is abundant and that communities already engage in daily risk reduction.

Yet these capacities are also fragile. They rely on citizen labour, charismatic leadership, and sporadic resources, which limits their sustainability and scalability. Local early warning systems, often faster than city alerts, remain patchy, while barangay DRRM committees exist formally but vary widely in effectiveness. In this sense, many institutional capacities are "on paper" but lack depth in practice.

In conclusion, community capacities clearly demonstrate both willingness and ingenuity, but they are not sufficient to sustain self-reliance without institutional scaffolding. Social solidarity and residential action provide a foundation, yet they must be recognised, supported, and resourced by formal institutions to endure and to contribute meaningfully to equitable preparedness. This cautions against romanticising community action: solidarity is genuine, but it also substitutes for under-performing public systems, shifting labour burdens onto the most vulnerable.

8.3 Knowledge–Action Gap

The third sub-question asked: *How is the knowledge–action gap expressed in practice in Davao's flood preparedness system, and what institutional and political dynamics sustain it?*

The research finds that the gap is most visible in the persistence of panic and hesitation during floods despite extensive training. In 2024, 283 trainings were conducted across the city, and 71% of surveyed participants had attended such activities. Yet focus group participants consistently described fear, confusion, and panic as their first responses when floods occurred. This reflects an output–outcome

gap: trainings are delivered and reported as outputs, but the intended behavioural outcomes do not consistently materialise.

Institutional and political dynamics sustain this pattern. At the barangay level, DRRM funds are vulnerable to misuse, with evidence of superficial or inflated training contracts, echoing national audit findings on “ghost” seminars. Political turnover every three years further disrupts continuity, producing institutional amnesia as new officials replace DRRM teams and dismantle established routines. These cycles undermine learning and reinforce repetitive single-loop fixes, where confusion is addressed with more trainings rather than with reflection on design, quality, or sustainability.

Another dimension of the gap is the misalignment between official training content and community perceptions. This mismatch creates misaligned knowledge: communities see their daily challenges overlooked, and trainings fail to resonate with lived realities. In this sense, what institutions frame as an “awareness deficit” is better read as a lay diagnostic of governance gaps. The problem definition itself is therefore contested, revealing the political character of what counts as preparedness knowledge.

The underutilisation of the National Service Reserve Corps illustrates a further institutional weakness. Although more than 160,000 students in Davao are formally included as reservists by law, they are not mobilised in practice. Disaster management offices have no access to student records, and universities do not provide systems that would allow graduates to be reached. Willingness among students is high, but without institutional mechanisms to connect them to preparedness, this capacity remains latent, a legal designation that has little operational effect.

Finally, preparedness is increasingly framed as compliance rather than empowerment. Ordinance 0246-23 enforces evacuation with fines and possible imprisonment, signalling punitive resilience: responsibility is shifted downward to households without ensuring that they possess the resources or roles to act effectively.

In conclusion, the knowledge–action gap in Davao is sustained not by a lack of knowledge but by distorted incentives, weak accountability, political turnover, and misaligned framings of risk. Unless these institutional and political dynamics are addressed, trainings and legal frameworks will continue to generate activity without ensuring confident and equitable action. This confirms Gaillard’s “battlefield” framing, while extending it with three Davao-specific mechanisms: paper preparedness (activities logged without substance), institutional amnesia (learning erased by political turnover), and punitive resilience (responsibility framed as compliance without capacity support). Together, these mechanisms explain not only why knowledge fails to become action, but also whose knowledge is authorised and whose capacities remain invisible.

8.4 Main Research Question

The main research question asked: **Why does the knowledge–action gap persist in community flood preparedness in Davao City, and what conditions are required for institutions and communities to achieve more equitable and effective action?**

This study concludes that the gap persists not because communities lack awareness, but because knowledge is routinely distorted as it is produced, institutionalised, and enacted. At the community level, floods are experienced as "everyday disasters," where shallow but recurrent inundations disrupt mobility, schooling, and livelihoods. Residents mobilise capacities such as *bayanihan* and canal brigades, yet these remain fragile because they depend on voluntary effort without institutional reinforcement. At the institutional level, trainings and drills are multiplied but often compromised by budget misuse, poor design, and political turnover, producing *paper preparedness* rather than resilient behaviour. While official narratives emphasise hazard awareness and compliance, residents themselves stress vulnerabilities such as insecure housing, caregiving burdens, and lost livelihoods as the reasons for not evacuating.

Overcoming this gap requires continuity, accountability, and alignment. Continuity mechanisms must stabilise learning across barangay election cycles to prevent institutional amnesia. Transparent and ring-fenced budgets must ensure that resources support substantive activities rather than symbolic outputs. Training design must be realigned with how communities frame their own risks. Latent capacities, particularly students as a civic reserve, must be mobilised into preparedness activities.

These conditions, however, cannot stand alone. What is needed is a mechanism that integrates them into a single system of accountability and inclusion. A Barangay DRR Dashboard (BDRRD) provides such a vessel. As a public ledger and digital memory, the BDRRD would:

- Preserve continuity by storing records of budgets, activities, and outcomes across election cycles.
- Ensure transparency by linking financial inputs with observable outputs and outcomes.
- Reframe training by tracking participation, quality, and impact rather than mere frequency.
- Mobilise latent capacity by opening training and volunteer sign-ups, including students, to all residents.

A practical step forward is to pilot the BDRRD in one barangay. This would test whether transparency plus outcome tracking can reduce panic, deter "ghost" trainings, and improve mobilisation in ways that scattered reforms cannot achieve alone.

In sum, the persistence of the knowledge–action gap reflects institutional and political dynamics that weaken the translation of knowledge into practice. Addressing this requires more than multiplying activities: it requires embedding continuity, aligning knowledge with lived realities, holding resources to account, and activating underused capacities. The BDRRD consolidates these requirements into one accessible platform. By institutionalising such a dashboard, Davao can move beyond repetitive single-loop fixes toward a living system of accountability and inclusion and with that transforming preparedness from paper compliance into collective resilience.

8.5 Contributions

This thesis makes contributions at three levels: empirical, theoretical, and practical.

Empirical contributions

- It provides detailed accounts of everyday flood risk in mid-sized barangays of Davao City, showing how 37 mapped hotspots of shallow, recurrent inundation disrupt livelihoods, schooling, and mobility.
- It documents community-led practices such as bayanihan and the Canal Brigade, highlighting not only their technical effects on drainage but also their social effects in reinforcing solidarity and visibility of preparedness.
- It demonstrates the underutilisation of the National Service Reserve Corps (NSRC): despite a legal mandate and an estimated pool of more than 160,000 students in Davao, mobilisation remains below 5% annually and primarily post-disaster.

Theoretical contributions

- It extends organisational learning theory by identifying three mechanisms that sustain the knowledge–action gap in Davao: paper preparedness (activities logged but not substantive), institutional amnesia (learning erased by political turnover), and punitive resilience (responsibility framed as compliance without capacity support).
- It advances political ecology perspectives by demonstrating how communities frame floods through drainage and waste governance, in contrast to institutional framings that emphasise awareness deficits. This shows how the definition of "the problem" is itself contested and politically charged.
- It contributes to disaster studies by conceptualising everyday preparedness as a necessary counterpart to catastrophic preparedness, calling attention to the routine floods that most erode resilience.

Together, these concepts refine Gaillard's (2013) knowledge–action "battlefield" by specifying the mechanisms; paper preparedness, institutional amnesia, and punitive resilience that reproduce gaps under conditions of inequality.

Practical contributions

- Specifies the Barangay DRR Dashboard (BDRRD) as shared public infrastructure for preparedness: (a) preserves institutional memory across election cycles, (b) publishes Local Disaster Risk Reduction and Management Fund (LDRRMF) use with output→outcome audits, and (c) mobilises latent capacities through open sign-ups and NSRC/SDDRR tasking.
- It introduces the concept of Student-Driven Disaster Risk Reduction (SDDRR) as a pathway to embed continuity, translate abstract knowledge into micro-geographic practice, and pressure institutions toward double-loop learning.
- It provides actionable lessons for governance: the need for transparent use of barangay DRRM funds, integration of community framings into training, and continuity mechanisms that insulate preparedness from political cycles.
- It demonstrates how participatory methods such as mapping, transect walks, and validation can not only generate data but also foster co-production, ownership, and reflection among communities and institutions.

Taken together, these contributions show that the knowledge–action gap in Davao is not a product of ignorance but of how knowledge is framed, distorted, and left unrealised. By combining detailed empirical evidence, theoretical innovation, and a practical proposal for student-driven DRR, the study advances both scholarship and practice in disaster risk reduction.

8.6 Knowledge Gaps and Future Research

While this study offers new insights into the persistence of the knowledge–action gap in Davao, it also highlights areas where further research is needed.

First, longitudinal evidence is lacking. The study covered a 6.5-month period in the field, which was sufficient to capture local characteristics but not seasonal variability or long-term institutional dynamics. Future work should follow communities across multiple years to observe how preparedness behaviours evolve through seasons, repeated events and changing political cycles.

Second, the scope was limited to two barangays. Although analytically transferable, the findings cannot be generalised across all of Davao City. Comparative studies covering a wider range of barangays, including upland and central urban areas, would test whether the dynamics identified here such as institutional amnesia and latent capacities hold across different socio-political contexts.

Third, behavioural responses remain underexplored. This thesis relied on reported experiences from focus groups and key informants. More direct behavioural data, such as observational studies during drills or real flood events, could provide stronger evidence of how training translates, or fails to translate, into confident action.

Fourth, the dynamics of DRR trainings and how participants actually experience them remain insufficiently understood. While this thesis captured the number of activities and gathered reflections from participants, it did not assess how specific elements of training design, such as facilitation style, group composition, language, or duration influence outcomes. Nor was it possible to track whether knowledge was retained or applied in subsequent events. More grounded assessments, combining direct observation with pre- and post-training surveys or follow-up interviews, could clarify why panic persists despite repeated exposure and identify which approaches foster confidence and which reinforce confusion.

Fifth, the potential of student-driven disaster risk reduction (SDDRR) requires further testing. While this thesis identifies SDDRR as a promising pathway, questions remain about its most effective institutional form: voluntary, mandatory, or salaried. Pilot programmes in partnership with universities and barangays would be needed to evaluate feasibility, motivation, and long-term sustainability. The most important parameter would be the amount of students (of that ± 150.000 potential pool) that actually would confirm their interest and willingness of becoming a part of SDDRR

Sixth, financial governance warrants deeper examination. Evidence of budget misuse was consistent but anecdotal in some cases. Systematic auditing research could clarify how widespread practices of “paper preparedness” are, and what reforms are most effective in ensuring accountability.

Finally, the institutionalisation of a Barangay DRR Dashboard (BDRRD) merits dedicated study. This thesis proposes the dashboard as a way to integrate continuity, transparency, and mobilisation, but its design, usability, and impacts remain untested. Future research should pilot BDRRDs under experimental conditions: for example, comparing barangays with and without dashboards to measure differences in mobilisation time, role recall, volunteer sign-ups, and equity of participation. Mixed-methods evaluation could combine pre-/post-drill surveys, difference-in-differences analysis on hotspot clearance, and qualitative feedback on usability and trust. In addition, research should examine whether dashboards foster double-loop learning at the institutional level or risk being reduced to another symbolic reporting tool.

Addressing these gaps would not only deepen understanding of why the knowledge–action gap persists but also provide clearer guidance for designing institutional and community practices that move beyond single-loop traps.

Alternative methods

If this research were to be conducted again, alternative methodologies could've led to other and additional insights. The recommended alternative methods are:

Venn diagram

A Venn diagram is a drawing, in which circular areas represent groups of items sharing common properties. Venn diagrams can be used to collect social data by using circles to show the links or relationships between different parts of a community or institution. A Venn diagram in the context of a VCA is used to examine similarities and differences between institutions, partners, people and issues in a community and to identify problems and possible solutions. Venn diagrams are especially relevant for institutional analysis as they can help to identify specific organizations that could be involved in implementing a community action plan or specific risk reduction projects.

Historical profile and visualisation

Historical profile and historical visualization are two similar ways to building a picture of past events that have an effect on a community and stimulate discussion on what has happened in the past. The tools are a powerful way of allowing people to voice opinions and share their history. It also offers a good opportunity to discuss changes in hazards patterns and compare with secondary data on landscape changes, trends in weather patterns.

Awareness of the patterns can influence the decisions taken by community members in the planning process. In a historical profile community members create a timeline of the different significant events and developments over the past several decades. With historical visualization, the community members create a chart showing how key aspects of their lives have changed over time.

(International Federation of Red Cross and Red Crescent Societies, n.d.)

(Fieldwork documentation, 2025)

Chapter 9. Recommendations

Introduction

The purpose of this chapter is to translate the conclusions of the study into concrete, actionable recommendations. Whereas the previous chapter answered the research questions in analytical terms, the focus here is on specifying how institutions, communities, and the education sector can act to reduce the knowledge–action gap in Davao's flood-preparedness system.

The recommendations are grounded in four core conditions identified in Chapter 8: securing continuity beyond political turnover, ensuring accountability and transparency in disaster-risk-reduction (DRR) funds, aligning preparedness initiatives with community framings of risk, and mobilising latent capacities that are currently underutilised. Each recommendation is directed at specific actors, with the aim of being relevant, realistic, and implementable in practice.

The chapter is organised into three sets of stakeholder-focused recommendations: for institutions at city and barangay level, for communities themselves, and for the education sector with particular attention to student mobilisation. A final section identifies cross-cutting measures that apply across these domains. Together, these recommendations provide a pathway toward moving Davao's preparedness system beyond repetitive single-loop responses and toward more equitable and effective action.

Central to these recommendations is the proposal for a Barangay DRR Dashboard (BDRRD); a publicly accessible platform that addresses multiple conditions simultaneously by publishing fund use, linking outputs to outcomes, and mobilising capacities through open sign-ups. Short references to the dashboard are woven throughout Sections 9.1–9.3, with a dedicated integrative subsection (9.5) detailing its scope, governance, and pilot plan.

9.1 Recommendations for Institutions (City and Barangay)

Institutions at both city and barangay levels play a decisive role in shaping whether knowledge translates into preparedness. The study has shown that trainings are abundant but often ineffective, that barangay DRRM funds are vulnerable to misuse, and that political turnover produces institutional amnesia. Addressing these issues requires reforms that create continuity, strengthen accountability, and realign preparedness with community realities.

Secure continuity across election cycles

Barangays should institutionalise continuity mechanisms that preserve disaster-preparedness knowledge beyond political turnover. Establishing staggered appointments or standing DRR committees can ensure that experience and institutional memory are not erased every three years, while mandatory hand-over plans during leadership transitions can safeguard ongoing initiatives. These

mechanisms maintain a steady trajectory of preparedness, preventing the recurrent cycle of restarting after each election.

Ensure transparency and accountability in DRR funding

Transparency must be built into the financial governance of disaster risk reduction. A public BDRRD that publishes monthly reports on the use of the five-percent Local DRRM Fund (LDRRMF) can ring-fence this allocation from unrelated expenses and strengthen public oversight. Outcome-based audits should replace activity counts, evaluating whether trainings and drills result in measurable behavioural improvements. Dashboard exports can serve as the evidentiary basis for Commission on Audit (COA) and Barangay DRRMC reporting, ensuring that accountability becomes both visible and functional.

Align training design with lived realities

Preparedness trainings should better reflect the issues residents identify as most urgent. Integrating drainage maintenance, waste management, and flood response into official curricula would make sessions tangible and relatable. Replacing generic awareness lectures with scenario-based, role-specific drills would clarify responsibilities and reduce hesitation under stress, transforming training from formal compliance into genuine readiness.

Evaluate outcomes, not just outputs

Monitoring systems should track how preparedness translates into real performance during floods. Indicators such as mobilisation speed, role recall, and correct use of evacuation routes can provide more meaningful insights than the number of activities held. Through the BDRRD, barangays can record training coverage by purok, gender, and age, making outcomes as visible as outputs. Linking these indicators to institutional performance reviews would encourage learning-oriented accountability and reward genuine improvement rather than symbolic participation.

By addressing these reforms, city and barangay governments can create conditions under which preparedness activities become more than symbolic outputs. They can enable communities to act confidently during floods, reduce the erosion of learning through political cycles, and foster trust by ensuring that resources are used for their intended purpose.

9.2 Recommendations for Communities

Communities in Lizada and Daliao already demonstrate strong capacities through bayanihan, canal brigades, and improvised early-warning systems. These practices show that willingness and ingenuity are not lacking, but they remain fragile because they rely on citizen labour, sporadic resources, and weak DRR leadership. Strengthening these capacities requires more institutional recognition and modest support so that community action can become both sustainable and scalable.

Institutionalise collective practices

Barangays should formalise existing groups such as canal brigades through local by-laws, providing small but regular support in the form of stipends, tools, protective equipment, and refreshments. Successful brigades should be replicated in other barangays, using visible results such as cleaner drains and reduced flooding, as evidence of both effectiveness and awareness building.

Embed bayanihan into preparedness routines

The spontaneous neighbour-to-neighbour assistance seen during floods can be strengthened by forming structured micro-teams with clearly defined roles. Equipping these teams with minimal resources such as radios, flashlights, and rain gear enables them to act safely and effectively. Formalising bayanihan channels solidarity into a reliable, coordinated preparedness structure.

Strengthen community-based early-warning systems

Existing megaphone, siren, and phone-chain systems should be linked to official city alerts to ensure redundancy and timeliness. Community volunteers can be trained to operate warnings consistently during flood onset, ensuring that alerts reach all households rapidly and reliably.

Promote visible resilience

Community action gains power through visibility. Publishing brigade schedules, before-and-after photos, and activity outcomes on the BDRRD would make local efforts publicly recognisable, while allowing teams to request tools directly through the dashboard. This reduces dependence on ad hoc barangay approvals and builds pride in collective maintenance activities such as waste drives and drain-cleaning days. Visible resilience not only reduces risk but also reinforces trust and accountability between communities and local government.

By embedding and modestly supporting the practices communities already sustain, self-reliance can shift from being a rhetorical expectation to a viable and equitable reality. Through visibility on the dashboard, community labour becomes formally recognised and transforms it from hidden substitution for state services into acknowledged contributions that demand institutional support.

9.3 Recommendations for the Education Sector and Students

The education sector holds significant but underused potential for disaster preparedness in Davao. Every university student is formally enrolled in the National Service Reserve Corps (NSRC), creating a pool of more than 160 000 potential volunteers. Yet only a fraction are mobilised each year, mainly for post-disaster relief. Focus-group discussions confirm that students are willing and motivated to help, but mechanisms for sustained integration into preparedness are missing. The BDRRD offers a ready interface: NSRC rosters can be integrated for open sign-ups, ensuring that student willingness is converted into visible, verifiable contributions.

Operationalise the NSRC beyond symbolic registration

Universities should move from paper-based membership toward active deployment by linking student rosters directly to barangay preparedness plans. Annual coordination between universities and barangays would allocate students to specific roles, ensuring each academic year contributes tangible service to local resilience.

Pilot Student-Driven DRR (SDDRR) brigades

Student brigades can be established at the purok level in partnership with local government. Within these brigades, student data administrators can manage dashboard entries and verify information, ensuring data integrity while gaining practical civic experience. Students can assist in coordinating canal cleaning, conducting community drills, maintaining evacuation signage, and running awareness campaigns, activities that merge academic service-learning with real-world impact.

Test institutional models of engagement

Different models for student involvement (voluntary participation, mandatory coursework integration, or compensated service) should be piloted and compared to determine which is most sustainable and motivating. Documented results can guide city and national policy on student involvement in DRR.

Integrate local geographies into education

Educators should use students' own barangays as case studies within DRR curricula, allowing them to contextualise abstract knowledge with lived experience. Assignments and service-learning modules can be designed so students directly contribute to barangay preparedness initiatives, strengthening the connection between theory and practice.

By embedding students systematically into preparedness, the education sector can transform a vast but underutilised legal resource into a living practice. Student-Driven DRR strengthens community resilience and builds continuity beyond political cycles, as preparedness knowledge is renewed annually with each new cohort. Through the BDRRD, student contributions become visible and traceable, providing accountability and feedback from within the puroks and enabling double- and triple-loop learning.

9.4 Cross-Cutting Recommendations

While specific actions target institutions, communities, and the education sector, several measures cut across these domains and are essential for embedding continuity, accountability, and equity into Davao's preparedness system as a whole.

Prioritise everyday preparedness alongside extreme-event planning

City agencies should integrate recurrent, shallow floods into official planning and engineering standards, recognising them as disruptive "everyday disasters" that gradually erode resilience. Addressing these frequent events normalises preparedness and prevents complacency between major storms.

Foster double-loop learning across scales

Structured feedback loops should connect communities, barangays, and city agencies so that training designs, budget allocations, and preparedness strategies evolve in response to lived experience. Validation processes should not only confirm data accuracy but also challenge institutional assumptions, turning reporting into an opportunity for reflection and adaptation rather than compliance.

Promote transparency and visibility of preparedness efforts

The BDRRD should be institutionalised as a public platform consolidating DRR budgets, training statistics, socio-demographic participation data, and outcome audits into one transparent system. This visibility pressures institutions toward deeper organisational learning while assuring residents that preparedness is both equitable and tangible.

Taken together, these cross-cutting recommendations emphasise that equitable preparedness cannot be achieved through isolated initiatives. It requires integrated systems combining hazard realism, sustained learning, and transparent practice across all levels of governance and society.

9.5 Integrative Recommendation: Pilot the Barangay DRR Dashboard (BDRRD)

The integrative recommendation of this thesis is to pilot a Barangay Disaster Risk Reduction Dashboard (BDRRD); a permanent, publicly accessible digital platform that makes preparedness activities, fund allocations, and outcomes transparent to residents while serving as a planning and monitoring tool for agencies. Unlike many initiatives that remain symbolic or paper-based, the BDRRD directly addresses the knowledge–action gap by institutionalising accountability, preserving continuity, and mobilising latent capacities across institutions, communities, and the education sector.

Primary and secondary aims

The dashboard serves a dual purpose. Its primary, public-facing aim is to provide an open website where residents can view barangay DRR funds, activities, and results in real time. Continuous visibility removes dependence on irregular audits or selective reporting. Its secondary, institutional aim is to serve as a coordination and evidence tool by consolidating equity-aware hotspot maps, socio-demographic overlays, and output–outcome audits in one system. This allows the City DRRMO, barangay councils, and partner organisations to plan interventions based on reliable, up-to-date evidence rather than fragmented ad hoc reports.

Governance and independence

To ensure trust and prevent misuse, the BDRRD should operate under a shared governance model separating data ownership, stewardship, and oversight. Stewardship may be entrusted to an external custodian such as DOST XI or a university partner under a memorandum of agreement, while barangays retain legal

data ownership. Oversight would rest with a steering group composed of the BDRRMC chair, a CDRRMO representative, DOST XI, an academic partner, and civil-society organisations. Barangay treasurers or secretaries would upload financial records, and student administrators would verify attendance and outcomes, with all entries logged through an immutable changelog that prevents retroactive alteration. Residents would see only aggregated data, and photos or records would require consent, ensuring compliance with privacy standards. This governance structure prevents single-actor control while the public nature of the dashboard itself acts as a safeguard against corruption.

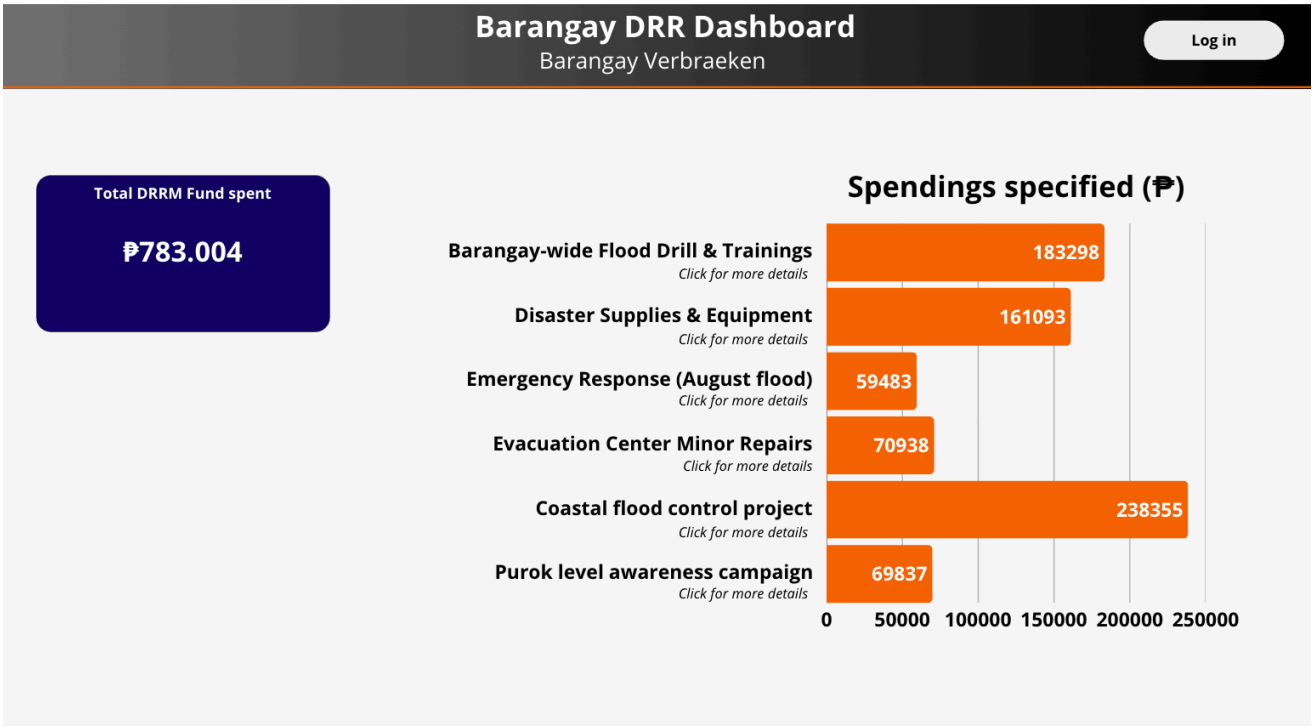


Figure 45: Concept design of the BDRRD financial page

Core modules for the pilot version

The pilot should begin with a minimum-viable-product that immediately demonstrates value. A *Public Ledger* will trace DRR-fund allocations from planning to completion proofs, reducing opportunities for "ghost" projects. An *Output–Outcome Tracker* will link trainings, drills, and brigades to measurable results such as mobilisation time, role recall, and hotspot clearance. An *Equity and Hotspot Map* will display the 37 mapped flood-prone areas in Lizada and Daliao with overlays of schools, health posts, and anonymised socio-demographic data. *Open Sign-ups* will allow residents to register for trainings or volunteer work, lowering barriers created by local gatekeeping. *NSRC/SDDRR integration* will connect student rosters for task assignment and attendance verification, ensuring continuity across academic cohorts. *Alerts and Updates* will publish notices of upcoming activities and automatically remind participants and officials. A *Participatory Risk Mapping Repository* will host VCA outputs and barangay DRR plans with progress tracking, complemented by *Community Scorecards* that present quarterly community-led assessments of inclusion and satisfaction through traffic-light visuals.

Key public indicators

The dashboard will prioritise simple, interpretable indicators that monitor both activity and outcome: the percentage of trainings supported by outcome evidence; median mobilisation time during drills; average role-recall scores; percentage of hotspots cleared within forty-eight hours; participation coverage by purok, sex, and age; proportion of DRR funds with verified completion proofs; and results of citizen-satisfaction pulse surveys. Together, these indicators provide a clear picture of whether preparedness is symbolic or substantive.

Pilot plan

Implementation should begin with a single-barangay pilot. The process would start with co-design workshops to sign a memorandum of agreement, select indicators, and establish privacy rules. A low-code platform would then host the system and import the previous year's DRR-fund and activity data. One drill and two brigade cycles would be conducted while live-logging expenditures and outcomes, followed by the public launch of the dashboard and a community briefing. After several months, results would be evaluated to guide potential scale-up. This incremental approach demonstrates feasibility without demanding large upfront commitments.

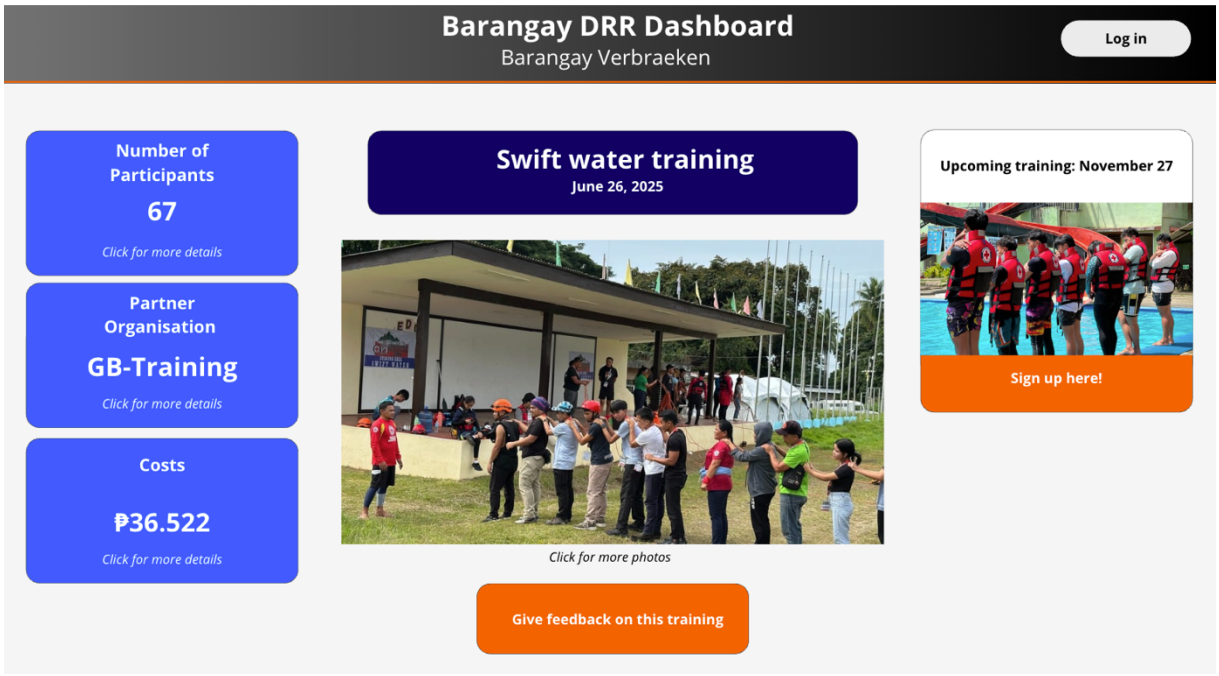


Figure 46: Concept design of the BDRRD training page

Risks and safeguards

Possible risks include politicisation, data manipulation, workload distribution, and sustainability. Politicisation can be mitigated through external custodianship and default public access, while immutable logs and photo-timestamp evidence prevent retroactive editing. Workload can be shared among barangay staff, student clerks, and external technical partners such as DOST or DICT, and every community entry should be triangulated by at least one student verifier and one sector representative.

Sustainability can be secured by allocating a small fixed percentage of the barangay DRR fund to cover hosting, training, and stipends.

Institutional fit and integration

The Department of Science and Technology (DOST XI) is well positioned to serve as custodian, leading the national digitalisation drive and acting as vice-chair for Prevention and Mitigation in the DRR framework. The BDRRD aligns with this mandate by offering a consolidated planning view of hazards, equity overlays, and outcomes. It can also interface with the Online Synthesis System (OSS) and Micro OSS, which allow residents to report hazards via photos and geotags. While OSS provides real-time community input, the BDRRD emphasises transparency and accountability; together they form a complementary ecosystem linking citizen reporting with institutional auditing.

Costs and resourcing

Operational costs include web hosting, staff training, and modest stipends for student verifiers. Because the dashboard builds upon existing reporting requirements, it avoids duplication of work while its public visibility strengthens accountability and trust. Initial setup could be supported through research grants or city partnerships, with barangays later integrating maintenance expenses into their annual DRR budgets.

9.6 Closing statement

Reducing Davao's knowledge–action gap requires more than additional trainings or stricter policies. What is needed are the conditions under which knowledge consistently becomes action: continuity beyond political cycles, transparent and accountable use of resources, alignment of preparedness with community realities, and mobilisation of capacities that are currently underused. By supporting community-led initiatives, opening channels for student participation, and ensuring that institutions adopt adaptive, outcome-oriented practices, Davao can move beyond repetitive single-loop routines of drills and compliance.

The BDRRD operationalises these conditions in practice. By making information public, linking outputs to outcomes, and enabling open sign-ups for residents and students alike, it embodies both accountability and mobilisation. For residents, it guarantees transparency and equitable access to participation; for agencies, it provides a consolidated evidence base for planning, coordination, and monitoring. Together, these functions make the BDRRD a concrete, scalable mechanism for transforming preparedness from symbolic activity into accountable and collective practice.

(Fieldwork documentation, 2025)

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BRIDGING THE KNOWLEDGE–ACTION GAP IN FLOOD RESILIENCE

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