RESILIENCE UPGRADING GUIDE

On-Site Upgrading and Housing Resilience for Informal Settlements in Southeast Asia

Linking Disaster Risk Governance and Land-use Planning: The Case of Informal Settlements in Hazard-prone Areas in the Philippines, Vietnam and Thailand (LIRLAP)

An Envisaged Knowledge Product of LIRLAP Project (2019-2025)
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LIRLAP LINKING DISASTER RISK GOVERNANCE AND LAND-USE PLANNING

Resilience Upgrading Guide

The findings and recommendations in this Guide are grounded in extensive empirical research conducted in the Phillipines, Thailand and Vietnam. Data was collected through a combination of site observations, household surveys, on-site focus group discussions, community workshops, and a series of back-to-back workshops including a Gaming Simulation workshop—methods that enabled a deep understanding of local realities and resident perspectives. These efforts were made possible through close collaboration with local partner organizations who led and facilitated engagement with communities. While the data collection was a joint endeavour, TU Dortmund was primarily responsible for the processing, interpretation and synthesis of the data presented in this publication. This Guide shares field-based insights and recommendations intended to inform and inspire local adaptation efforts and should be interpreted in light of specific local contexts and policies.

"As the Project Leader of LIRLAP, I am pleased to endorse this Resilience Upgrading Guide. It draws on rigorous, evidence-based research and is designed as a scientifically grounded yet practice-oriented tool. While developed within the framework of the LIRLAP project, its methodologies and technical validations are transferable and applicable to wider contexts of urban resilience planning and on-site upgrading in low-income communities and regions, which are confronting similar challenges. It aims to support both policymakers and practitioners in advancing inclusive and climate-resilient urban development".

— Stefan Greiving. TU Dortmund
Project Leader, LIRLAP

Formatting considerations:
This document is designed for optimal viewing and printing in a double-sided (duplex) layout.

Cover Photo: Flooding in an informal settlement OpenAI ChatGPT-4o (2024). Digital picture emphasizes potential upgrading measures of vertical evacuation by using rooftops via ladders attached to the buildings with community-based DRRM efforts. It reflects the dense urban environment.

Imprint

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Chapter 4 What Matters for Resilience Upgrading?

- 4.2.2 (Refocused Finance Mechanism) co-developed by Juan Du and Sonia Isam
- 4.2.3 (Going Extreme: On-site Destruction and Reconstruction) co-developed by Ngo Thanh Son and Vu Thanh Bien
- 4.4.1 (Leveraging Settlements Through Reblocking for Community Development) co-developed by Boonanan Natakun and Juan Du

Chapter 5 Policy Interventions

- 5.1 (Empirically Grounded Policy Development) co-developed by Juan Du and Sonia Isam
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Cross-Country Project Team Dynamics and Acknowledgement

Within the framework of LIRLAP funding scheme from 2019 to 2025, besides working with German institutions including University of Stuttgart and LMU University Munich, we truly have very dynamic cooperation with LIRLAP project partners in Metro Manila, Hanoi and Bangkok. This Guide is the knowledge product of a collaborative journey shaped by field immersion, critical dialogue and shared learning across borders. While the writing and compilation were led by TU Dortmund, it stands on the shoulders of a committed research team whose contributions were instrumental in shaping its depth and relevance. Our collaboration across Metro Manila, Bangkok, and Hanoi was built on trust and the grounded expertise of our local partners. They led household surveys, focus group discussions and connected us with stakeholders. Most importantly, our local partners brought the cultural sensitivity and local knowledge essential to engage meaningfully with our studied communities, especially those from vulnerable groups. These community interactions were rooted in mutual exchange rather than one-sided data collection. They were spaces of listening and co-reflection that deepened our understanding and moved the work beyond academic inquiry. This kind of dialogue, built on relationships and contextual fluency, is something foreign institutions alone could not have facilitated. The resulting Guide reflects not just research, but the strength of locally anchored, transdisciplinary collaboration.

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List of Acronyms

BDRRMP	Barangay Disaster Risk Reduction and Management Plan
CBFT	Cement Bamboo Frame Technology
CCA	Climate Change Adaptation
CLUP	Comprehensive Land Use Plan
CMP	Community Mortgage Program
CODI	Community Organization Development Institute
CODI	Community Organizations Development Institute
CSO	Civil Society Organization
DHSUD	Department of Human Settlements and Urban Development
DRRM	Disaster Risk Reduction and Management
EFA	Evidence for Action
FGD	Focus group discussion
HOA	Homeowners association
ISF	Informal settler family
KTT	Khu tập thể (multi-family apartment blocks in Hanoi)
LIAC	Local Inter-Agency Committee
LSP	Local Shelter Plan
NEDA	National Economic and Development Authority
NGO	Non-governmental organization
PCUP	Presidential Commission for the Urban Poor
SEA	Suggested Entry Area
SHFC	Social Housing Finance Corporation
ULHOA	United Libis Homeowners' Association
WP	Work Package

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1. WHAT IS THE PURPOSE OF THE GUIDE?

The purpose of this document is to guide cities when conducting on-site upgrading at informal settlements and urban low-income communities who are in dire need of housing. The on-site upgrading efforts aim to better build the resilience of the community. Additionally, this document also unfolds development challanges faced by certain long-existing urban settlements at the risk of a degraded living environment.

Resilience Upgrading is the Work Package 2 (WP2) of the LIRLAP project, which consists of five work packages in total. By sharing our LIRLAP project six-year research experiences, we provide hands-on strategies for upgrading informal settlements in disaster-prone areas, with a strong focus on the needs, capacities, and lived realities of low-income urban communities across Southeast Asia, with a focus on Metro Manila. Developed from empirical field research in Metro Manila, Bangkok and Hanoi, the Guide integrates both technical and community-based approaches to foster long-term, climate-resilient urban community development. The intended audience is policymakers, urban planning professionals and advanced practitioners, community leaders and development agencies/NGOs and academic researchers. It is intended to navigate and advise relevant planning activities and decisions regarding on-site upgrading and community resilience building. The document has a consistent emphasis on community voices, agency and lived experiences. The Guide respects complexity and accepts lived realities, yet clearly presents trade-offs, "e.g., safety vs. livelihoods, upgrading vs. retreat", rather than pushing singular solutions. Though the content is grounded and participatory in intent, fully engaging non-specialists needs local facilitations in order to widen the accessibility of this Guide.

"It has been a long-time dream to have a PLACE of our own. We were considered as CRIMINALS, squatting and living in a property of NOT our own. This is considered as a crime in the Philippines. It is such a stigma. We are trying to prove that we are serious and doing something to change our status and conditions of our community".
- By Community Leader of Homeowners Association, August 2023

"Our community used to be a slum along the canal. The government planned to dismantle it and relocate us to mid-to-high-rise flats elsewhere. We resisted this plan due to concerns about workplace instability. Baan Mankong's process represents the struggle for the right to the city, which is not just the right to access urban resources, but rather the right to demand bargaining power as those who have been subjected to urban transformation."
- By Bang Bua community leader, March 2023. This canal settlement was upgraded two decades ago.

"The current state of the Thành Công KTT residential blocks reveals significant physical degradation and overcrowding, with some buildings, such as G6A, showing structural instability and high risk of collapse. Living spaces have been extended informally, causing stress on the original building structure, while essential infrastructure such as electrical systems is degraded and fire protection is inadequate. Additionally, flooding remains a recurrent hazard due to overloaded drainage, impacting ground-floor households and causing financial losses".
-By community representatives during the community on-site Focused Grouped Discussion, July 2023.

2. WHY THIS RESILIENCE UPGRADING GUIDE?

Within our study scope, we observed that:

- Urbanization processes are increasingly occurring through informality, such as the proliferation of informal settlements in disaster-prone areas.
- Formal urban planning institutions and tools are often ineffective in addressing this phenomenon, particularly in managing the growth of informal settlements and reducing their exposure to climate-related hazards.

Recent climate-related disasters in Southeast Asia underscore the escalating urgency for urban resilience planning, particularly concerning informal settlements and communities. The Philippines, recognized as one of the most disaster-prone countries globally, has faced a series of devastating natural events in recent years, disproportionately affecting informal settlements. Recent events such as Tropical Storm Trami/Kristine in December 2024, Typhoon Noru/Karding in September 2022, Typhoon Ulysses/Vamco in November 2020, and Typhoon Haiyan/Yolanda in November 2013—one of the most destructive disasters in Philippine history—have caused widespread destruction, displacement of millions, and long-term socio-economic disruption, particularly in informal settlements. A record-breaking heatwave in April 2024 affected multiple Southeast Asian countries, including the Philippines, Vietnam and Thailand, where prolonged high temperatures led to drought conditions, exacerbating the challenges faced by informal settlements lacking adequate resources. These recurring and intensifying climate-related disasters clearly underscore the urgent need for comprehensive, inclusive and climate-resilient planning frameworks.

During many of these recent events, our team was present in the field, witnessing firsthand the impacts on communities. Through direct engagement, we gained valuable insights into the challenges they faced before, during and after disasters. These experiences not only kept us deeply informed of the evolving realities but also rooted this Guide in practical knowledge and lived experiences.

Globally, the scale of vulnerability is immense. According to UN-Habitat (2023), over 1 billion people reside in slums and informal settlements, many of which are situated in areas highly susceptible to climate change impacts such as flooding, landslides, and extreme weather events. The Department of Human Settlement and Urban Development (DHSUD) reported that the number of Informal Settlers Families (ISFs) reached to 5.9 million in the Philippines. According to the National Economic and Development Authority (NEDA, 2017), there estimated that 2.8 million informal settlers, or 556,526 ISFs, living in Metro Manila. Out of this number, 104,000 families are occupying areas identified as danger zones, such as railroad tracks, garbage dumps, canals, rivers and creeks and other flood-prone areas. Many of these ISFs also live in houses made of light materials, and are therefore particularly vulnerable to natural disasters besides evictions.

One of the understandings in international development is that the poor are the hardest hit by disasters, although the economic (and insured) losses are much greater in industrialized countries. Thus, disaster risk management in the developing world — and in particular, the management of informal settlements in hazard-prone areas — needs to be adjusted to the specific context conditions of these countries and be integrated into comprehensive developing strategies considering both formal and informal approaches and tools. In this adjustment, local residents negotiating with risk becomes critically important. Despite all of the scientific details in risk assessments, there is no local impact unless the issues are internalized for localized coping strategies. In the end, the residents are the ones who have the most detailed knowledge about their place and their ways of sustaining life.

2.1. What Makes this Guide Distinct?

This Guide is the final outcome of our research on resilience upgrading in disaster-prone informal settlements in Metro Manila. It stands apart by framing adequate and safe housing not just as shelter, but as a critical pathway to resilience—an area often overlooked in conventional upgrading or climate adaptation approaches. The effort of integrating Disaster Risk Reduction and Management (DRRM) and Climate Change Adaptation (CCA) to Shelter Planning makes our research on resilience upgrading distinct. This echoes the framework idea of "making communities accessible and affordable" of DHSUD (2021), aiming to enable those low-income groups to build resilient homes with livelihood opportunities. Rather than advocating displacement, the Guide emphasizes on-site upgrading as a way to preserve social ties and livelihoods. Importantly, it centers the perspectives and lived experiences of communities, recognizing residents not as passive beneficiaries, but as agents of change who actively shape risk reduction and urban transformation. In the Philippine Development Plan 2023-2028, the visioned outcome of upgrading built environment focuses on improving housing affordability and increasing access of ISFs, homeless, and underprivileged to housing (NEDA, 2023).

Empirically Grounded Across Contexts

Built on field research, not just secondary data, this Guide reflects the voices, constraints and strategies of real communities particularly in Metro Manila.

Community Resilience as a Core Objective

Upgrading is framed as a pathway to adaptation, not just infrastructure improvement—addressing natural disasters and other rising frequency of disasters (e.g., domestic fires).

Community-Centered Design

This Guide recognizes informal communities as active agents of change. It supports their adaptive capacity through owner-built incremental housing, community-based DRRM, potential of vertical evacuation, etc.

Flexible Tools, Not Fixed Solutions

It offers adaptive strategies—such as reblocking, selective retreat and risk-informed planning—that can be tailored to different legal and political contexts.

Engagement with Real Dilemmas

It does not idealize upgrading, e.g. conditional on-site deconstruction and reconstruction. It addresses tensions between safety and livelihood, permanence and flexibility, formality and informality—trying to invite critical dialogue among planners, policymakers and communities.

2.2 What Is Resilience Upgrading in this Guide?

Resilience upgrading is an inclusive, adaptive process that strengthens the capacity of informal settlements to withstand and recover from natural (climate) and man-made disaster risks — while keeping communities in place and centering them as the source and agents of change. The goal of the on-site upgrading is to enhance communities' resilience. It goes beyond infrastructure to include social, economic and institutional dimensions — recognizing that effective upgrading means building not just for, but with communities.

KEY FEATURES

1. On-site first
   Prioritizes on-site upgrading, minimizing relocation
2. Community-led
   Local residents actively shape, implement and maintain upgrading processes
3. Incremental and flexible
   Improvements evolve over time, aligning with resources and capacities
4. Context-sensitive
   Adapts to legal, political, and geographic realities of each setting
5. Livelihood-integrated
   Considers trade-offs of livelihood and technical risk assessments with community perceptions of acceptable risk
6. Aligned with climate policy
   Supports broader adaptation and development goals

GUIDING PRINCIPLES

- Community as Source and Agent
  Communities are not just recipients — they provide knowledge, leadership, and momentum for upgrading.
- Minimize Unnecessary Displacement
  Upgrading should preserve social cohesion and location-based advantages wherever possible.
- Accept and Live With Risk
  "Where is safe and for whom?" should reflect local realities — not just engineering thresholds.
- Build on What Exists
  Value and upgrade existing structures, networks and residents' experiences — don't start from zero.
- Incrementality with Vision
  Upgrading happens in phases, guided by a long-term vision that communities help define.
- Cross-Sector Collaboration
  Link local initiatives to urban policy, disaster risk frameworks and consider flexibility of funding systems.

3. HOW TO USE THIS GUIDE?

3.1 Scope and Focus

The Guide primarily focuses on those urban poor and low-income groups living in disaster-prone and highly urbanized areas who have been profoundly affected by natural disasters exacerbated by climate change and unguided urban development. These negative impacts are multifaceted, affecting individuals and communities socially and economically, psychologically and physically. Therefore, this Guide attempts at identifying viable and localized measures of withstanding these negative impacts with community resilience building. This document aims to offer our project's experiences to address these issues effectively, ensuring community-centered resilience-building efforts. Therefore, an overarching takeaway is to rethink establishing a robust and adaptable enabling structured approach for resilience upgrading. This approach provides evidence-based actionable steps to enable communities and stakeholders to build resilience incrementally and sustainably over time. In Chapter 6, we provide a valuable snapshot of our teaching activities, namely two student projects focusing on climate-resilient upgrading of informal settlements respectively in Metro Manila and Bangkok. For readers interested in detailed information, we have compiled a selection of relevant scientific documents authored by our project team members. These include works directly within the project's scope, as well as our colleagues' studies on similar topics conducted within the same study areas.

Readers find:

Evidence Summaries in green box: such as particular settlement case, survey results, etc.

Supplementary Resources in grey box: further use of our provided linked websites, QR codes, etc. for a comprehensive exploration

3.2 Organisation of this Guide

The evidence presented in this document is primarily derived from our empirical research conducted in Metro Manila, complemented by findings from similar studies in Bangkok and Hanoi. These first-hand data and case studies provide practical insights and best practices, drawn directly from field research and validated among multi-stakeholders for potential levelling up to the policy advice. This approach not only ensures accuracy but also facilitates knowledge transfer by sharing evidence-based lessons and strategies across different planning and legislative contexts.

This Guide is designed in an interactive way. Chapter 4 is the core part of this document, in which you find two types of content blocks:

1. Evidence for Action (EFA): by using project data, e.g., survey or workshop results to demonstrate why on-site upgrading matters in our studied localised contexts, including Metro Manila, Hanoi and Bangkok.

2. Suggested Entry Areas (SEA): our study identified certain action areas with recommendations or lessons learnt. Informed by surveys, interviews, and a series of workshops, these priorities reflect locally relevant and realistic steps toward resilience upgrading.

Chapter 4 discusses the nine (9) EFAs and SEAs that were developed, addressing what matters for resilience upgrading. Reader can understand them by checking EFA-SEA pairs to connect both evidence and planning implications.

EFA-SEA Pair 1. Know the Risk, Plan the Zone (p. 9)
Upgrading begins where risks are known, but must go further. When communities define danger, planning gains depth. No-build doesn't mean no-use. It means shared ground for safety, survival and staying connected to the city.

EFA-SEA Pair 2. Build Up, Be Ready (p. 11)
When families build upward, planning must build with them. Resilience means stronger homes with DRRM-ready upgrades: added floors as flood shelters, faster repair permits and materials that withstand disaster. Support what people prioritize—then systematize it.

EFA-SEA Pair 3. Fund What People Build (p. 12)
Incremental housing works when financing fits real needs. Owner-built upgrades need accessible tailor-made funding, flexible loan schemes and savings support. Align policy tools with on-the-ground practices to scale what already works.

EFA-SEA Pair 4. Rebuild On-Site: Safety First, Funding Innovated (p. 13 / 14. Lessons from Hanoi)
On-site reconstruction is a vital safety intervention, when upgrading falls short. It can be effectively funded by non-state capital. With strong safety enforcement, transparent compensation, and rapid coordination, communities stay rooted and resilient, setting a powerful model for others.

EFA-SEA Pair 5. Elevate Homes, Organize Evacuations, Empower Communities (p. 15 / 16)
Proactive, organized evacuations save lives. Start with resilient homes featuring safe rooftop access and durable escape routes. Equally crucial is recognizing communities as formal partners in DRRM planning, empowering them to lead timely, coordinated emergency responses.

EFA-SEA Pair 6. Adapt Building Codes, Plan Flexibly, Integrate On-Site Development (p. 18)
Adaptive building codes and flexible planning unlock incremental upgrading. Tailored construction standards, flexible lot sizes, and heights enable on-site retrofitting and reblocking—making formalization and resilience real for growing communities.

EFA-SEA Pair 7. Reblock to Stay: Upgrade In-Situ, Plan with Community (p. 20. Lessons from Bangkok)
On-site reblocking transforms self-built settlements into organized, secure communities—without uprooting lives. Participatory master planning ensures residents reshape their space together. In contexts like Metro Manila, this calls for context-sensitive regulations that support upgrading where ISFs already live.

EFA-SEA Pair 8. Build Higher: Densify with Public Services (p. 21. Lessons from Hanoi)
Strategic densification optimizes land and housing supply—but only works when paired with infrastructure upgrades and inclusive planning. Projects like Hanoi's C1 show that higher density must come with smarter zoning, better transport, and essential public services to truly support this strategy.

EFA-SEA Pair 9. Selective Retreat: Relocate the Vulnerable, Upgrade the Viable On Site (p. 22)
A middle-ground strategy, which enables differentiated resilience: relocating critical or high-risk infrastructure while supporting risk-adapted, in-situ upgrading based on residents' risk acceptance level. This approach ensures safety without unnecessary displacement, balancing community safety and livelihood interests.

METRO MANILA

Our six sites are all informal settlements or those in the process of regularization. They are Del Rosario Compound (above water), Brgy. Coloong and United Libis HOA (under transmission lines), Brgy. Canumay East in Valenzuela; Estero de San Miguel, Brgy. 412 (along creek), Isla Puting Bato (along coast), Brgy. 20 in Manila; Payatas-San Gabriel (Near former largest dumping site), Brgy. Payatas, Quezon and Tumana Blk.74-75 (along creek in flood plain), Brgy. Tumana, Marikina (see Fig 3). Six community profiling, 216 household surveys and 12 on-site focus group discussions (FGDs) were conducted in 2022.

HANOI

Community FGDs and 206 household surveys in Thành Công Ward of the collective housing blocks in Ba Dinh District were conducted in 2023.

BANGKOK

Community FGDs in two upgraded canal communities were conducted in 2023. One was done in Bang Bua Community along Khlong Lad Phrao, which was upgraded two decades ago; and another in Pracha Ruamjai Community along Klong Prem Prachakorn, which was upgraded in recent years.

Fig. 1: Household survey at Del Rosario Compound, Brgy. Coloong in Valenzuela City. Source: Own fieldwork in June 2022.

Du, J., Greiving, S., Yap, D. L. T. (2022): Informal Settlement Resilience Upgrading- Approaches and Applications from a Cross-Country Perspective in Three Selected Metropolitan Regions of Southeast Asia. Sustainability, 14(15), 8985. https://doi.org/10.3390/su14158985

4. WHAT MATTERS FOR RESILIENCE UPGRADING?

Our cross-country upgrading studies unfold a different landscape concerning its integration with resilience building and DRRM. Thai experts from Community Organization Development Institute (CODI) pointed out that their current on-site upgrading activities have not been substantially integrated with resilience building, despite its success in securing housing and improving general living and environmental conditions. Hanoi distincts itself from Metro Manila and Bangkok with less informal settlements. What we identified is the informal or illegal extension and modification those KTTs or the collective multi-family apartment blocks in Hanoi, built in the socialism era of the 1960s–1980s. Metro Manila is more conscious of involving its local communities in DRRM. For instance, the national DRRM Plan mandated community-based hazard mapping at the lowest administrative level, Barangay (ward).

Chapter 4 outlines the key elements of our studied upgrading contexts, striving for viable urban development. It integrates approaches of rethinking safety and risks, incremental housing, community-based (DRRM) and selective retreat when necessary, etc. For the contextual understanding, we summarized upgrading typologies in Metro Manila (Fig. 2), which is based on the consensus on upgrading hotspots in Metro Manila. Upgrading typologies correspond to issues of upgrading requirements, needs and dimensions and policy adaptations.

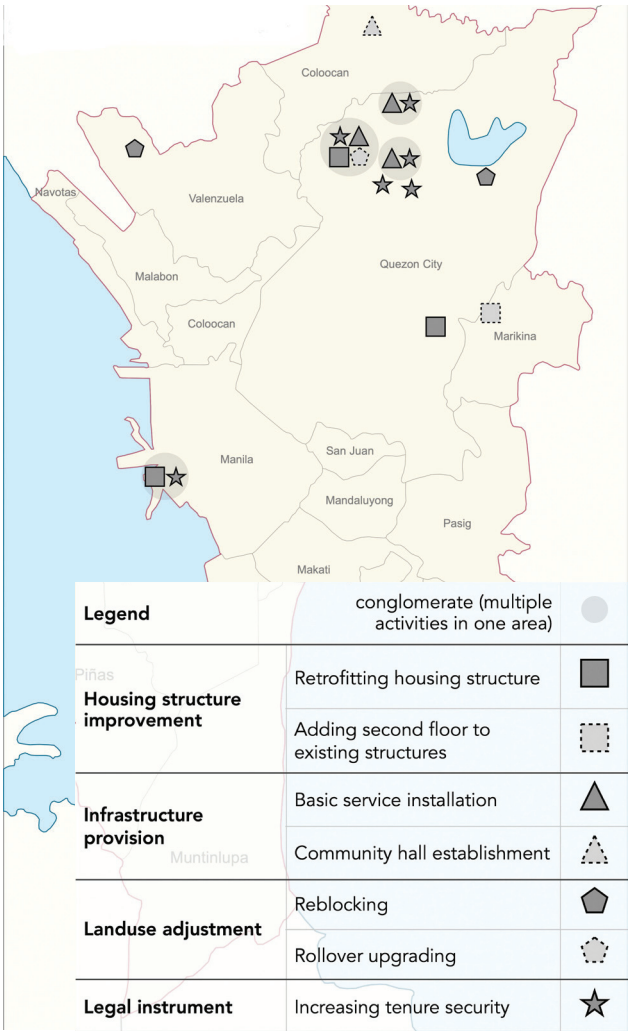


Fig. 2: Upgrading typologies. Source: Based on LIRLAP project multi-stakeholder workshop in 2020, in Metro Manila.

Upgrading Typologies in Metro Manila

1. Retrofitting housing structure
2. Site development, e.g. via infrastructure provision
3. Land use adjustment, e.g. via reblocking
4. Legal instrument, e.g. via securing land tenure

This article investigates the underlined reasons why upgrading strategically falls short in addressing disaster mitigation and community resilience building. It heightens the necessity of tackling on-site upgrading at the settlement level and articulating settlements' spatial correlations with the city development, so as to sustain upgrading outcomes.

Du, J., Greiving, S. (2020): Reclaiming On-Site Upgrading as a Viable Resilience Strategy - Viabilities and Scenarios through the Lens of Disaster-Prone Informal Settlements in Metro Manila. Sustainability, 12(24). https://doi.org/10.3390/su122410600

4.1 Rethinking Safety: Standards, Risks and Livelihoods

Ensuring the safety of informal settlements is a foundational element of resilience upgrading. However, safety measures must align with community acceptance of risks and hazards, particularly in situations where relocation may not be viable or desirable.

Evidence for Action (EFA 1): Multi-hazard mapping in Metro Manila (Fig. 3) highlights the importance of identifying danger zones and continuously assessing risks. It requires way-forward thinking on risk-based resilience planning, particularly collaborating with communities, who can help define risks in a more dynamic environment. Our studied communities showed that livelihood opportunities drive their choices of where to live and how to build their homes. Their perceptions of risks are often not an absolute barrier. It shows that developing adaptive risk management strategies and reconciling risk perceptions of residents and planning authorities are more urgent.

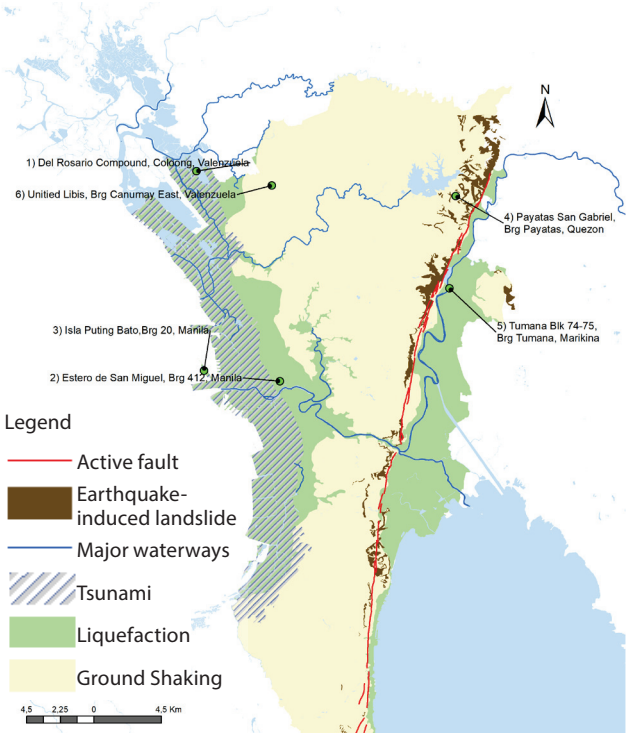


Fig. 3: Multi-hazard map of Metro Manila and spatial development challenges. Source: LIRLAP Resilience Upgrading own GIS spatial analysis based on GADM, OSM and DOST-PHILVOCS provided by PLANADES, 2021

To learn actionable insights for determining livelihood resilience strategies for in-city resettlement planning, check here:

Islam, S.; Magnaye, D. C.; Encarnacion, R. H.; Esguerra, P. S. P. Influencing Factors for Resilient Livelihood Development in Local Government Unit-Administered Resettled Communities. City and Built Environment 2025, 3 (1). https://doi.org/10.1007/s44213-025-00051-w

Clearly, severe prevalence of urban informality and persistence of natural calamities, aggravated by overlay of hazards turns out to be social issues over time intertwined with climate change. Our studied informal settlement communities identified top three development challenges:

1. Disaster-prone location
2. Fears of being relocated
3. No livelihood program

Source: Household survey in Metro Manila, June 2022

Suggested Entry Areas (SEA 1): No-build zones or designated hazard areas do not equal areas without land use planning and being segregated from the city development. At the community level, balancing technical safety standards with community perceptions of acceptable risk shall be taken into consideration. This involves engaging communities in risk assessments and hazard mapping to align plans with their realities. Where is safe and for whom is safe is a dynamic issue. Metro Manila is nowhere absolute safe. It is important to consider balancing safety requirements with community acceptability of risks in the context of their livelihood interests and common strategies (also see 4.4.3 Selective Retreat). Where feasible, risk-tolerant approaches and risk-reduction measures on-site, such as elevating housing, retrofitting structures or drainage systems, can be invested (following chapters).

4.2 Incremental Housing as a Resilience Response

In the past, upgrading programs have primarily focused on the provision of basic infrastructure, with low priority given to environmental safety and housing provision for low-income groups. Environmental measures, particularly in conjunction with the provision of quality and safe housing, remain minor objectives in such projects. The structural quality of housing and adherence to safety standards appear to receive lesser investment priority. What is commonly observed is a haphazard approach of owner-built practices, including self-initiated extensions and modifications, as residents attempt to address their immediate and unmet practical needs. The interconnectedness of housing and informal settlements necessitates a comprehensive strategy that recognizes housing as a pathway to resilience and development (Habitat for Humanity International, 2024).

Safe and quality housing is a major concern regarding "Khu tập thể" (KTTs) or the collective multi-family apartment blocks in Hanoi, built in the socialism era of the 1960s–1980s. Informal way of upgrading by KTT residents, e.g. adding floors, extending balconies, modifying building structures, etc. is widespread and often unanticipated. Our FGDs and household survey in Thành Công Ward revealed that nearly all respondents extended their apartments using two methods: vertical and horizontal expansions.

Fig. 4: Extremely degraded KTT block in Thành Công Ward. Residents awaiting being evacuated. Source: Own fieldwork in March 2023, in Hanoi

Fig. 5: Unguided self modification in Isla Puting Bato along Manila Bay. Source: Own fieldwork in in October 2022, in Manila City

4.2.1 Building on Existing Structures and Resources Integrated with DRRM

Leveraging existing housing structures, limited resources and the adaptive capacities of low-income groups while addressing their vulnerabilities incrementally is crucial for fostering resilience and inclusivity in upgrading programs. Our study in Metro Manila revealed that incremental housing is closely linked to DRRM in the face of disasters due to climate change with the benchmark time Typhoon Ketsana (Ondoy) in 2009. Owner-built practices for modifying dwellings are often shaped by considerations of natural disaster risks, including domestic fires. It is essential to recognize the financial and material constraints of low-income groups and to implement improvements in phases, allowing communities to prioritize based on their immediate needs.

Evidence for Action (EFA 2): Our household survey revealed that the residents' most desired resilience interventions include:

a. adding more floor to the current dwelling, so to stay safe during floods;
b. using stronger housing construction materials, so to withstand typhoons and earthquakes; and
c. having alternative additional sources of income (self-initiated or provided by government).

In Metro Manila, the need for additional permits for incremental housing was highlighted as a barrier, with high costs and varying standards across LGUs posing challenges. Our stakeholders viewed the necessity of having minimal incremental housing standards (see Chapter 4.3.2).

Suggested Entry Areas (SEA 2): The findings navigate us to rethink what residents prioritize—vertical expansion (to accommodate a growing family size and serve as an evacuation shelter during floods; see Chapter 4.3.1), durable materials, and diversified community sustaining livelihoods. Further, these findings imply to integrate such upgrading possibilities with DRRM frameworks, ensuring that resilience upgrading can meet communities' demands and realistic needs. For instance, the development of pilot projects for retrofitting housing, utilizing existing structures to incorporate low-cost, locally available and climate-adaptive materials can equip homes with effective evacuation mechanisms during floods (see Chapter 4.3.1). Figure 6 below shows building materials used by our studied communities in Metro Manila. Despite bamboo's local availability and sustainability potential, our survey shows its very low usage as a building material—suggesting untapped opportunities for climate-resilient housing. Innovations like Cement-Bamboo Frame Technology (CBFT by Base Bahay) in the Philippines demonstrate its feasibility, but technical, regulatory or perception barriers may hinder adoption.

Besides, it is crucial to consider how to align emergency-response upgrading in planning: e.g. approval process for temporary housing structures or immediate repair permits incorporated into sections outlining emergency response procedures or temporary housing guidelines (see Chapter 4.3.2).

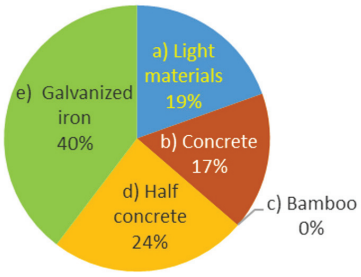


Fig. 6: Types of building materials. Source: Results of the household survey in Metro Manila in June 2022 (Galvanized iron or aluminum is preferred for roofing and framing due to affordability, availability and lower labor costs, while bamboo is often seen as less durable by residents).

To explore how participatory planning co-identifies community resources to build resilience in three Bangkok case-study communitie:

Natakun, B., Marome, W., Archer, D. (2022): Co-identifying Processes of Community Resources: Participatory Planning and Use of a Toolkit for Community Resilience in Bangkok Metropolitan Region (BMR). https://doi.org/10.34044/j.kjss.2022.43.4.28

4.2.2 Refocused Finance Mechanism

In Metro Manila, our study revealed several bottlenecks in implementing incremental housing, including lack of funding capacity. This involves access and approval of government funding for the construction. A collaboration between communities, NGOs, private entities and the National Government to streamline the process of both funding and technical support could be an approach for initiating community projects. The National Government is believed to have a larger role of providing better assistance to communities in bridging the gaps for availing private funding and facilitating government agencies and NGOs in introducing and implementing financing options; such as the Social Housing Finance Corporation (SHFC) might be able to facilitate negotiations to improve micro financing options for Community Mortgage Program (CMP) in effort to uphold its mandate to assist underprivileged citizens to purchase and develop tract of lands as conceptualized by CMP.

Certainly, the absence of a formal policy on incremental housing reflects the current reality.

Evidence for Action (EFA 3): From ULHOA community, Canumay East Valenzuela City
During the 2024 multi-stakeholder community workshop, several priorities related to incremental housing and site development were identified. Funding capacity emerged as a critical component of the broader site development challenges. To address this, ULHOA proposed several key strategies. One key approach is supporting owner-built construction, which aims to reduce costs, address households' limited access to funding, and offer a more affordable pathway to housing development. The proposals are 1) establishing government funding mechanism to support loan policies of incremental housing; 2) Enabling the Pag-IBIG Fund (the Home Development Mutual Fund) to provide dedicated loan programs for Incremental Housing; and 3) Enhancing saving's mechanism through linkages with financial institutions.

(Source: Outcomes of the community workshop, Canumay East, Valenzuela City, February 13, 2024)

Suggested Entry Areas (SEA 3): In the Philippine Development Plan (PDF) 2023-2028, NEDA emphasizes that subsidies in the form of mortgage financing, direct housing production, and community-driven development will be continued to ensure housing affordability. Additional subsidies for ISFs will be studied to improve affordability of housing (NEDA, 2023). The PDP 2023-2028, originally by NEDA, remains the nation's socioeconomic guide. Its continuity is now overseen by the new Department of Economy, Planning, and Development (DEPDev), created on April 10, 2025, to strengthen the plan's implementation and policy coordination. For ULHOA community's incremental housing and site development, we conducted a Gaming Simulation (February 16, 2024) workshop as a follow-up to address the gaps of existing policies and plans and to test the potential adaptions and adjustments concerning these raised proposals. Here are the brief summaries.

1. <u>Potential Solutions</u>

a) Micro-funding for incremental housing projects.
b) Better integration of housing construction and site development financing to loan packages of CMP.
c) Assessment and technical design assistance and construction skills training to household.

2. Gaps in Existing Policies and Programs

2.1. Lack of Funding

a) Government funding is inaccessible due to ULHOA's unresolved land loan.
b) Members struggle with repayment due to irregular income (e.g., tricycle drivers, laundry workers).
c) Public funds now prioritize vertical housing, which is unsuitable for ULHOA.
d) ULHOA lacks awareness of alternative funding options.

2.2. Limited Access to Design Support

a) Professional services (architects, engineers) are unaffordable.
b) Members are unsure how to access technical assistance.
c) Government support for design services is minimal.
d) Most homes remain substandard; 80% of members can't afford improvements.

2.3. Shift Toward Vertical Housing

a) Housing programs (e.g., SHFC) now focus on vertical developments.
b) Support for horizontal/incremental housing is declining.

(Source: Outcomes of the community workshop, Canumay East, Valenzuela City, February 13, 2024)

3. Potential Policy and Plans Adaptations and Adjustments

Proposals to address challenges in owner-built incremental housing within the ULHOA community include a) micro-funding for projects, b) integrating housing construction financing into loan packages, and c) providing assessment and training to households. Issues such as difficulty in accessing government funding, affordability of hiring professionals, and a shift in government priorities towards vertical housing are the major areas of concern. A consortium approach is proposed to streamline access to funding and technical support for ULHOA's community projects. ULHOA will serve as the convenor, identifying the community's needs and coordinating efforts. The national government, including agencies like Presidential Commission for the Urban Poor (PCUP), will support in fulfilling documentary requirements and connecting the community to public and private funding sources. NGOs will offer technical and professional assistance, while also facilitating linkages to private funders. Private companies are encouraged to contribute through grants or other forms of support. This collaborative model aims to strengthen community-led housing initiatives and build self-reliance among stakeholders.

(Source: Outcomes of the Gaming Simulation workshop, Quezon City, February 16, 2024)

4.2.3 Going Extreme: On-site Destruction and Reconstruction

On-site destruction and reconstruction is a necessary intervention for those structurally extremely unsafe buildings. The C1 Thành Công apartment complex, originally a five-story building, was selected by the Hanoi People's Committee for redevelopment due to severe structural damage. Prolonged exposure to heavy rainfall and flooding in 2008 caused critical subsidence, making it uninhabitable and prompting forced evacuation to protect residents' safety. However, the redevelopment process faced significant delays. Initially launched in 2008, the project stalled for seven years due to legal disputes and resident opposition over compensation and relocation terms. By 2015, an agreement was finally reached, allowing construction to resume. The new structure, a 17-story building with two basement levels, was funded entirely through non-state enterprise capital.

Evidence for Action (EFA 4): There is the situation in which upgrading and retrofitting cannot mitigate the risks and incrementally improve housing conditions. Reconstruction then has to be considered

as one upgrading strategy. The case of C1 Thành Công highlights the complexities of redeveloping high-risk buildings in urban centres. Despite prolonged legal battles and disputes among residents, developer and local authorities, the on-site reconstruction of C1 ensured that the original residents will be able to live in their familiar area with existing social network.

Suggested Entry Areas (SEA 4): Experiences drawn from C1 tell us that on-site destruction and reconstruction requires a focus on three key areas. First, stronger safety oversight is essential to ensure the strict enforcement of protective measures (including the installation of reinforced barriers) frequent inspections and prompt responses to complaints from affected residents. Risk assessment has to be integrated in the reconstruction process with updated zoning plans to incorporate risk assessment. This helps minimize the risk of accidents and ensures a safer construction process. To certain level, it demands solid legislation base regarding land use standard and building codes (good practice can be found in Chile, Peru, etc.). Second, transparent compensation and relocation plans play a crucial role in building trust between authorities, developers, and residents. Clear and publicly available compensation policies should be established, and early-stage discussions should be held to prevent prolonged disputes that could delay the project. On-site reconstruction requires a specific funding scheme in case of a voluntary approach or a compensation scheme when expropriations occur due to existing private property rights. Finally, accelerated construction timelines must be implemented through efficient coordination between government agencies and developers to minimize delays and disruptions to surrounding communities.

Fig. 7: The 17-storied C1 multi-family block in Thành Công Ward used to be five-storied at the same site. Source: Own Fieldwork in March 2023, in Hanoi

We conducted a household survey (206 respondents) in Thành Công ward, covering different degradation level of KTT blocks. While the surveyed households and FGD participants are aware of the degradation of their buildings, they still prefer not to be relocated because their current location is convenient, being in close proximity to hospitals, markets, grocery stores,, schools, etc. (Hanoi FGD and household survey, 2023)

4.3 Community-Based DRRM as a Pillar for Upgrading Programs

As stated, our study focused on lower-income urban communities who have very limited resources in improving their living conditions and coping with the risks. Our study in Metro Manila showed that community organizations and leaders play the vital role in facilitating early warning, evacuation and relief operations. They act as data keepers, coordinators, managers and organizers during disasters. Our 12 instances of FGDs were conducted in Metro Manila pointed out the necessity of having quick response and sustained post-disaster rehabilitation carried out by local institutions and organizations that have long term engagement with the community. The social cohesion and residents' experiences from previous disasters allow community members to calibrate and re-calibrate their situation at the onset of hazards.

To understand what actions are taken by lower-income residents to cope and adapt using their individual and collective assets in response to current and future hazards in Thailand:

Archer, D., Marome, W., Natakun, B. (2019): The Role of Collective and Individual Assets in Building Urban Community Resilience.
https://doi.org/10.1080/19463138.2019.1671425

4.3.1 Organized and Proactive Evacuations

Organized and proactive evacuations significantly matter in dealing with natural disasters and risks. Our studied communities in Metro Manila have regular drills and training in this regard. Residents are able to describe the evacuation routes and point out the evacuation centres or shelters. There also exists an early warning system in place in case of hazard. Nevertheless, the question that often arises is the accessibility of these evacuation shelters with a sudden onset disaster. The accessibility was often cut off from both within and outside of the settlement. Particularly, in the unplanned and organic developed settlements as seen in our studied sites, roads and alleys are narrow and hindered by unexpected illegal constructions such as privately built retaining walls, which block off the evacuation routes.

Evidence for Action (EFA 5): Piloting and developing upgrading measures for effective evacuations

Our study in Brgy. Tumana shows that residents need an efficient mechanism to quickly safeguard property and kids during the flood. Often, residents have been trapped during floods without chances of evacuating themselves elsewhere.

Community Evacuation Maps
During the FGDs, we requested residents of all studied communities to map their evacuation routes. Improving evacuation routes and accessible evacuation centres was ranked as one of the community development top priorities. Our study shows the importance of having the communities collectively identify the "danger-zones" and jointly develop strategies on how to respond during both sudden and slow onset disasters.

Fig. 8: Evacuation map of Tumana identified by residents of Block 74 and 75 Tumana Creek typically overflows during typhoon and monsoon seasons. Source: On-site FGD in June 2022.

Measures to be considered:

a. To continue vertical expansion of their houses in anticipation of floods (see also Chapter 4.2.1)
b. Built-in ladders or external staircases that lead to rooftops or elevated safe areas. These should be constructed with durable and non-corrosive materials (see cover image).
c. Accessible rooftop shelters that can bear the weight of the household members during emergencies with added railings or low walls for safety. These areas can double as safe spaces or platforms for rescue.

Suggested Entry Areas (SEA 5): Our studied communities in Metro Manila revealed that prioritization of community-based DRRM has not been mainstreamed at the barangay and city level. From this, potential adjustments that could be done include allowing legal institutional identity (community-based organization, NGOs, CSOs) at the barangay level and recognizing community as a planning unit in the DRRM plan process.

Fig. 9: Retrofitted informal housing structures. Source: OpenAI ChatGPT-4o (2024). Digital image featuring retrofitted buildings with external metal frames for earthquake resilience. The street is lively, with market stalls, pedestrians and cyclists navigating the dense environment, while also emphasizing the urban density and everyday life.

4.3.2 Adapted Building Codes and Construction Standards

In Thailand, formal building codes are generally not directly applied to flood management or climate resilience in informal settlements. However, under the Baan Mankong Program, context-specific building guidelines are co-developed with local communities, particularly during the participatory reblocking process (see Section 4.4.1: Reblocking in Thailand).

According to insights shared by experts from the Community Organizations Development Institute (CODI) during the final project workshop held in Bangkok on March 21, 2025, these community-driven guidelines incorporate essential safety and design standards—such as minimum setbacks and room dimensions—while prioritizing collective tenure, participatory layout planning, and on-site upgrading to avoid displacement. Importantly, such alternative standards are accessible exclusively to communities formally engaged in the Baan Mankong Program. The guidelines are monitored and implemented by community architects, who play a crucial role in ensuring construction quality and maintaining a coherent neighbourhood layout consistent with the reblocking plan.

Fig. 10: Partially demolished housing structure in ULHOA due to reblocking. Source: Own fieldwork in February 2024

While they deviate from rigid state building codes, these community-specific guidelines are officially recognized within the Baan Mankong program's framework. They provide a flexible, context-sensitive approach to upgrading that supports secure tenure and improved living conditions—transitioning settlements from informality to more formalized, organized and resilient neighbourhoods.

Like in many countries, the Philippines does not have formal building codes specifically designed for high-risk informal settlement areas. Instead, the standards currently applied stem from the national framework for socialized housing, particularly those outlined in Batas Pambansa Bilang 220. These standards focus on new low-cost housing developments, providing minimum design and safety requirements for low-income groups. However, BP 220 does not directly address the complexities of retrofitting existing informal structures in situ. This creates a regulatory gap for communities undergoing transition from informality towards more regularized neighborhood. In conjunction with housing provision, the Philippine Development Plan 2023-2028 calls for a review of BP 220 to consider minimum standards in the following aspects: health, accessibility, climate and disaster resilience, changing housing preferences, etc. (NEDA, 2023).

Evidence for Action (EFA 6): Our study observes the strong need to integrate the community development and local plan, while still enabling the communities' incremental upgrading with adaptive planning adjustments. Quite often, prescribed minimum lot sizes or defined housing structure height have to be adjusted to meet informal settlements' dynamic growth (e.g. population and density) for the purpose of their formalization. Through a Gaming Simulation workshop held in February 2024, we simulated real-time negotiations and compromises among all stakeholders and reached special agreements e.g. to bypass setback rules, compensation funds for community projects, etc.

Suggested Entry Areas (SEA 6): Our study cannot provide a generic approach, as each community, even within our study scope, requires tailor-made measures for improvement. Nevertheless, we observed that, in context of BP 220 in the Philippines, necessity for retrofitting is especially pressing in the low-income communities. Incorporation requirements for retrofitting under the BP 220 and city level plan is crucial to facilitate incremental upgrading of low-income households during the regularization, such as through reblocking (see Chapter 4.4.1). Our research suggests that contextualized planning revisions and implications be incorporated into the current community and site development in a long term.

LIRLAP WP2. (2024): Resilience Upgrading Conducted Community Workshop and Gaming Simulation Workshop, in Metro Manila, February 2024. https://lirlap.raumplanung.tu-dortmund.de/project/news/#c321254

During the dissemination workshop in Metro Manila on March 24, 2025, participants from DHSUD indicated that their department is also streamlining the planning process and making it easier for the LGUs to comply, with Local Shelter Plan (LSP) now being part of the Comprehensive Land Use Plan (CLUP).

ULHOA, Canumay East in Valenzulea has been experiecing on-site reblocking plan. The proposed reblocking, while mitigating safety risks of the transmission line, raises another planning challenge. It entails the regulation of lot sizes, plumbing and electrical connections and the allocation of community common spaces. The emerging balance between safety measures and maintaining the community's housing infrastructure adds complexity to the planning process)

Fig. 11: Needs of reorganizing electrical post in ULHOA due to reblocking. Source: Own Fieldwork in February 2024

4.4. Viable Urban Development Through On-Site Upgrading

Our upgrading study focused on disaster-prone communities in highly urbanized areas with exceptionally high population densities. The access to adequate urban public services remains a significant challenge. Despite the assumption that public services are more readily available in urban areas, our communities face significant gaps in service provision due to overcrowding and limited infrastructure capacity. Issue of settlement legality and land tenure security hinders investments in public services. As a cross-cutting topic, our study shows the need of integrating requirements for public service provision in housing projects when considering sustainable and viable urban developement.

Residents from our studied urban communities across all three cities tend to opt to stay at their current locations, where jobs, livelihood and social benefits such as education and healthcare facilities are existing without the cost of extra travel expenses or reducing their daily work hours (especially during high seasons). Our studied community residents are mostly working on daily base with daily wages (see Fig 12).

According to the household survey done in Metro Manila, household monthly expenditure is ranked in the following sequence: (1) food, (2) utilities (electricity and water), (3) travel, and (4) school fees. The food expenditure is significantly higher than the rest. Same findings apply to Bangkok canal communities.

Average income condition of the six studied communities during the household survey period (Considering the impact of COVID-19)

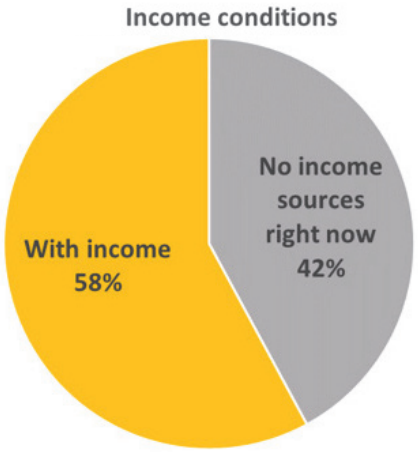


Fig. 12: Average income condition of the six studied communities in Metro Manila, considering the impact of COVID-19. Source: Own household survey in June 2022 in

4.4.1 Leveraging Settlements Through Reblocking for Community Development

Debates on how to tackle settlements as an entirety and their potential integration with the surrounding urban fabrics in a long term involve, to great extent, restructuring the settlement layout such as via reblocking. We have valuable lessons learnt from our studied canal communities in Bangkok. The upgrading efforts of the canal communities are part of the Bann Mankong (Secure Housing) Program, aligned with the government's policy to address canal encroachment. Since 2003, reblocking is a key strategy within the Bann Mankong program, implemented

To understand more contextual details. Refer to this PhD thesis:

Natakun, B. (2013): Dynamics of Upgrading Processes: A Case Study of a Participatory Slum Upgrading in Bangkok. Melbourne School of Design, Faculty of Architecture, Building and Planning, The University of Melbourne. http://hdl.handle.net/11343/38049

under the condition of long-term leased land with a focus on collective land tenure to ensure sustainable and organized housing solutions for communities along canals and drainage channels.

Fig. 13: On-site reconstruction of the canal community, Bangkok. Source: Own fieldwork in September 2022

Evidence for Action (EFA 7): Both our studied canal communities Khlong Bangbua and Pracha Ruamjai underwent on-site upgrading through reblocking scheme under the Bann Mankong Program. The Bangbua community has fully completed the reblocking process and has been completely upgraded for two decades. During our fieldwork in 2022 and 2023, Pracha Ruamjai has recently undergone the reblocking scheme. There were still remaining old structures in Pracha Ruamjai as it remains uncertain whether the remaining houses will eventually be demolished and rebuilt as part of the new master plan. Our FGDs conducted in both communities revealed that both settlements were experiencing haphazard self-construction to improve their housing conditions prior to the Bann Mankong upgrading program. Residents told us that through the upgrading program, the problem of housing encroachment into canal areas and public waterways has been mostly resolved. The government has previously planned to dismantle the community and relocate residents to mid-to-high-rise flats. Via on-site upgrading, communities were allowed to stay at their original land along the canal, but with an improved living environment and a legal status.

Suggested Entry Areas (SEA 7): Our studied settlement in Bangkok revealed that in order to fully implement the reblocking process, some existing houses need to be demolished if they do not align with the new master plan. It can be referred to a process of on-site deconstruction and reconstruction under the reblocking scheme (see also experiences in Hanoi with the C1 block in 4.2.3). This master plan is developed through a participatory process led by CODI architects to ensure an organized and sustainable settlement layout. Importantly, the residents can still stay in the same settlement, despite location and size changes of their new houses.

In the Philippine context, our multi-stakeholder policy workshop held in Spetermber 2024 identified that reblocking is currently the most desirable and doable option for resilience on-site upgrading of informal settlements. BP 220 and Presidential Decree

Fig. 14: Housing typology in recently upgraded canal community Pracha Ruamjai, Bangkok. Source: Own fieldwork in March 2022

Fig. 15: Recently upgraded canal community Pracha Ruamjai, Bangkok. Source: Own fieldworkin March 2022

1216 form the bases for reblocking. Nonetheless, the applications of these regulations are situational, especially in informal settlements. The current situation of ULHOA showed the development gap between the local plan and current community reblocking ongoings (see Fig 10 and 11). Philippine stakeholders consider that it is highly necessary to revisit these laws for a more updated and context-specific policies that account for the realities of informal settlements when implementing reblocking strategy.

To learn more about how participatory planning processes are encouraged in low-income communities in Thailand in the context of risk resilience:

Marome, W., Natakun, B., Archer, D. (2021): Examining the Use of Serious Games for Enhancing Community Resilience to Climate Risks in Thailand. Sustainability, 13, 4420. https://doi.org/10.3390/su13084420

4.4.2 Increasing Density

All the sites we studied in three countries are located in extremely high-density urban areas. For example, Manila City has the highest population density at 42,857/ km^2. Our study site in Hanoi is located in the Ba Dinh District, with a population density of ca 25,000/km^2 (General Statistics Office of Vietnam, 2019). Promoting land reorganization and public service outreach is pressing in countries experiencing rapid urbanization with population growth. Managing urban growth by allowing for planned densification can increase the usage of public facilities and yield public open spaces (see also via reblocking).

Evidence for Action (EFA 8): Increasing density to certain allowed level can be a practical strategy of efficiently sharing existing resources (see also 4.3.2 ULHOA realistic situation). Increasing urban density is a key strategy for optimizing land use in rapidly growing cities like Hanoi. The redevelopment of C1 Thành Công (see Fig 7) replaced the original five-story structure with a modern 17-story apartment building, significantly increasing housing capacity while integrating commercial spaces and public infrastructure. This densification aligns with Hanoi's long-term urban planning vision, aiming to accommodate population growth within existing urban areas rather than expanding outward. However, the process of increasing density in an already crowded urban environment presents challenges, particularly in managing infrastructure demand. By replacing a low-rise structure with a high-rise building, C1 on-site reconstruction maximized the use of limited land while providing more housing units. However, the increased density also placed additional pressure on local infrastructure and services. The success of such projects depends on well-integrated planning and efficient land use policies to ensure a smooth transition to a denser urban environment.

Suggested Entry Areas (SEA 8): How can increasing density be effectively managed in urban redevelopment projects? Effectively managing increasing density in urban redevelopment projects requires a strategic approach that balances growth with infrastructure capacity. Optimized land use planning is essential to ensure that densification aligns with urban zoning regulations and the existing infrastructure network. This includes integrating high-density developments with accessible public transportation, reliable utilities, and sufficient green spaces to maintain environmental quality. Additionally, improved public services and amenities play a crucial role in supporting the growing population. Higher-density areas must be accompanied by expanded schools, healthcare facilities, and recreational spaces to accommodate residents' needs and prevent overburdening existing services.

4.4.3 Need of Selective Retreat Strategy Integrated with On-Site Upgrading

Our earlier studies in Metro Manila unveiled that upgrading has not been a planning priority if compared to the overall resettlement approach. Stakeholders named two significant aspects:

a. There are often strong land disputes concerning informal settlements. Stakeholders consented that the envisaged upgrading achievements cannot be secured because landowners would think ISFs will remain permanently;
b. Upgrading is not recognized as a new project. Hence, there is very little interest or investment in this this area.

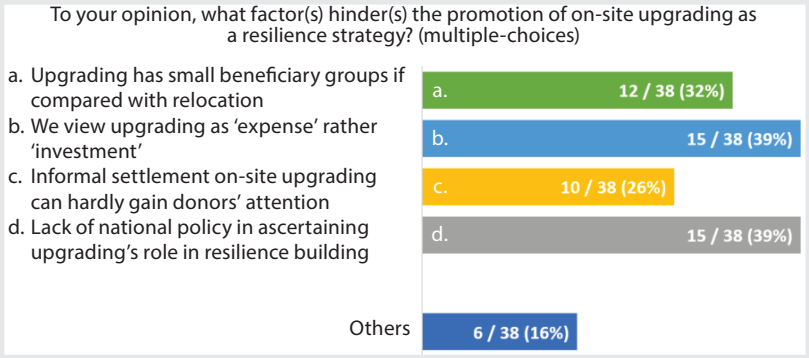


Fig. 16: Potential hindering factors for resilience on-site upgrading. Source: Resilience Upgrading stakeholder online real-time zoom voting in October 2020

The purpose of thinking on selective retreat strategy

A middle-ground strategy should be considered. The goal of adopting a selective retreat strategy is to avoid relocating entire settlements, while still minimizing the adverse impacts of natural hazards, including potential critical infrastructure-related risks triggered by natural hazards. The rest of the community can opt to remain on-site because of certain economic interests (tourism, fishery, etc.) based on communities' acceptance levels of risks (Chapter 4.1) with tailor-made on-site upgrading measures.

Evidence for Action (EFA 9):

Stay or leave after the disasters?

Selective retreat is a strategy that differentiates between various types of land uses or physical structures and their specific characteristics. According to the susceptibility of the various structures as well as the protection goals of the area, some need to be relocated, while others can remain in the hazard prone areas (perspectives and acceptance of risks). This strategy has been implemented in Indonesia in the aftermath of the tsunami in 2004.

Suggested Entry Areas (SEA 9):

This strategy involves relocation of the susceptible critical infrastructures (schools, hospitals) or those particularly dangerous (such as chemical plants, liquid waste deposits, etc.) while allowing settlers to remain in the same area but with improved shelter, e.g. via on-site upgrading that adapts to risks in the area. Different land use types and desired protected physical structures within communities and adjacent surrounding areas are to be considered.

For an international overview:
Greiving, S., Du, J., Puntub, W. (2018): Managed Retreat – A Strategy for the Mitigation of Disaster Risks with International and Comparative Perspectives. Journal of Extreme Events, 05(02). https://doi.org/10.1142/S2345737618500112

For a contextual understanding in Metro Manila:
Lauer, H., Chaves, C. M. C., Lorenzo, E., Islam, S., Birkmann, J. (2024): Risk Reduction through Managed Retreat? Investigating Enabling Conditions and Assessing Resettlement Effects on Community Resilience in Metro Manila. Natural Hazards and Earth System Sciences, 24, 2243–2261. https://doi.org/10.5194/nhess-24-2243-2024

5. POLICY INTERVENTIONS

5.1 Empirically Grounded Policy Development

Together with multi-level stakeholders, our Gaming Simulation Workshop in Metro Manila revealed the potential for policy and plan adaptations and adjustments:

a. Establishment of a Local Inter-Agency Committee (LIAC) to be formalized through resolutions passed at local government level in order to collaborate all stakeholder's involvement and strategies for the project planning and implementation.

b. Ensuring access to Barangay Disaster Risk Reduction and Management Plan (BDRRMP) is crucial in guaranteeing easy access to the documents essential for fostering community-wide disaster preparedness and risk reduction. It enables every member of the community to familiarize themselves with emergency procedures, understand their roles, and participate actively in resilience-building activities. Accessible BDRRMP documentation ensures that information on risk assessments, mitigation strategies, and response plans is transparent and available to all, leading to a more informed, prepared, and resilient community ready to face potential disasters.

Fig. 17: Community sociogram showing support organizations during and after disasters in Estero de San Miguel, Manila City. Source: On-site FGD in July 2022

Notice: As introduced at the beginning, this Resilience Upgrading Guide is designed as a hands-on, practical document. While it does not focus heavily on policy development, it aims to provide strong empirical evidence to support and inform policy-making processes. Chapter 5 is dedicated to this, but the primary intent is not to present an exhaustive policy analysis, but rather a snapshot.

5.2 Status of Mainstreaming Resilience Upgrading in Urban Development Planning

Building on the practical strategies and empirical insights outlined in this guide, the mainstreaming of climate-resilient upgrading into urban planning frameworks varies significantly across our examined study sites in Metro Manila, Bangkok, and Hanoi. These differences reflect diverse governance approaches, policy priorities, and implementation challenges. In essence, translating these hands-on approaches into effective policy requires addressing governance fragmentation, securing sustainable funding, enhancing stakeholder capacity, and prioritizing community resilience building. These are critical steps for embedding resilience upgrading as a climate adaptation and disaster risk reduction strategy in urban planning across all three cities.

Metro Manila: Comprehensive Mainstreaming Framework

Despite the recognition of climate change and community resilience building, as reflected in this Guide, community-based upgrading as a resilience strategy faces significant challenges at both the national and local levels in Metro Manila. While the Philippines has a robust legal and policy framework for integrating climate-resilient upgrading in a comprehensive way, including laws such as the Urban Development and Housing Act (1992) and the Climate Change Act (2009), the implementation of community-based upgrading encounters barriers at both levels. At the national level, mainstreaming climate adaptation and disaster risk reduction is outlined in the frameworks, but there remains a gap in translating these into actionable, locally adapted strategies. Locally, governance fragmentation, limited resources and competing priorities further hinder effective implementation. The proposed Disaster Resilience Act (2018) and other specialized frameworks aim to address these gaps, however, a comprehensive integration of community resilience building through on-site upgrading remains an ongoing challenge.

Thailand: Dedicated Program Approach

In contrast to Metro Manila's mainstreaming approach, Bangkok implements resilience upgrading through a dedicated program rather than comprehensive policy integration. Urban upgrading in Bangkok is primarily addressed through the Baan Mankong Program. Although Thailand has established frameworks for both upgrading and climate adaptation separately, integration between these two domains remains weak. However, the Baan Mankong Program indirectly enhances community resilience to climate challenges by improving housing conditions, securing land tenure, and upgrading infrastructure such as drainage systems, which help reduce disaster risk and increase adaptive capacity.

Hanoi: Structured but Fragmented Approach

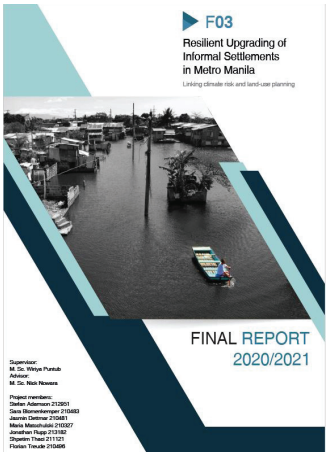
Hanoi has a structured approach to mainstreaming resilience upgrading, but implementation faces challenges that reduce its effectiveness. National frameworks highlight upgrading as crucial for climate adaptation and disaster risk reduction. However, governance fragmentation, with independent operations by the Hanoi People's Committee, Department of Construction, and local authorities, leads to inefficiencies and overlap. Misaligned national plans and a lack of actionable local guidelines further hinder progress. Additionally, municipal plans often prioritize short-term urban expansion over long-term climate resilience, weakening upgrading initiatives.

6. STUDENT WORK ON RESILIENCE UPGRADING

From LIRLAP to students' exploration of resilient upgrading of informal settlements in Metro Manila and Bangkok

LIRLAP resilient upgrading research also spin-off to teaching activities. As part of the bachelor program at the Faculty of Spatial Planning, TU Dortmund University, students conducted independent group research on climate-resilient upgrading of informal settlements in Metro Manila, the Philippines (F03 - 2020/2021) and in Bangkok, Thailand (F04 - 2021/2022).

Resilient Upgrading of Informal Settlements in Metro Manila: Linking Climate Risk and Land-Use Planning



In 2020-2021, a group of seven students conducted a research to examine effective upgrading solutions for ISFs in Malabon, Metro Manila, with a focus on enhancing climate resilience.The research addresses the key factors that influence the success of upgrading projects in hazard-prone areas by synthesising data collected from extensive literature reviews, stakeholder interviews, virtual excursions, and geodata analysis. The findings reveal a significant divergence between current upgrading practices and the desirable approaches for fostering climate resilience, emphasising comprehensive community participation, good governance, and socio-economic inclusion. Essential factors identified for successful upgrading include prioritising stakeholder engagement and dialogue, ensuring transparent governance and democratic decision-making, providing ISFs with access to essential services and quality housing and focusing on implementing resilient building structures and disaster risk reduction plans.

Overall, the study underscores that the lack of consistent incorporation of these critical elements impedes the realisation of effective climate-resilient upgrading in informal settlements, emphasising the necessity for a holistic approach in future initiatives. It is important to note that due to the rise of COVID-19, the students missed opportunities to visit the study areas physically. However, with the help of digital technology and support from UP SURP, accessing local data, conducting virtual community excursions, and reaching out to key stakeholders were possible.

Sucking Up Or Soaking In? Climate Resilient Upgrading of Informal Settlements in Bangkok

In 2021-2022, 11 students conducted a group research

on Climate Resilient Upgrading of Informal Settlements in Bangkok. The project aims to decode lessons learnt from Thailand's existing informal settlement upgrading practices and explore variable solutions in building climate-resilient upgrading for informal settlements by using Bangkok as a case study. This study examines the influence of the upgrading approaches on climate resilience in Bangkok's informal settlements, which are highly vulnerable to fluvial flooding. Focusing on two upgraded communities—Roon Mai Pattana and Chai Khlong Bang Bua—the research utilises SWOT analysis and a flood risk framework. Findings show that the informal settlements continue to be at significant risk of flooding despite upgrades. This is because communities' vulnerability and flood risks are influenced not only by internal factors but also by the broader

conditions in Bangkok, characterised by high population densities and extensive land sealing. Moreover, although current upgrading measures contribute to climate resilience, the communities still lack adequate financial and human resources and political will to improve the integration of climate resilient measures into the communities' urban design.

With support from the German Academic Exchange

Fig. 18: Students visit the Bann Mankong project in Bangkok in February 2022. Source: CODI

Service (DAAD) and Wilo-Foundation, it was made possible for German students to visit Thailand and have an excursion in Bangkok in February 2022. The excursion has not only enhanced the students' experiences in the local context but also helped them understand the realities of informal settlement in Bangkok with their own eyes. Moreover, it was also an excellent opportunity for students to exchange with the informal settlers and relevant government agencies such as CODI (Community Organizations Development Institute), the Department of Sewage and Drainage and the Department of Urban Planning and Development of Bangkok Metropolitan Administration.

For those who are interested to know the existence and share of climate change and disaster related courses in the curricula, and to understand to what extent these topics are already integrated into current urban planning programs at the university level:

Scholz, W., Stober, T., Sassen, H. (2021): Are Urban Planning Schools in the Global South Prepared for Current Challenges of Climate Change and Disaster Risks? Sustainability, 13(3). https://www.mdpi.com/2071-1050/13/3/1064

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To learn more about the dynamics of multi-stakeholders:

Puntub, W., Du, J. (2019): Disaster Risk Governance and Urban Resilience of Informal Settlements: Findings and Reflections of a Multi-Stakeholder Participatory Gap Analysis Workshop in Metro Manila. TRIALOG, 134(3/2018) – August 2019. Resilient Urban Development vs. Right to the City. Trialog Journal. https://www.trialog-journal.de/en/journals/

7. SHARING RESILIENCE UPGRADING GUIDE: KEY MOMENTS FROM THE DISSEMINATION WORKSHOPS

At the end of the sixth year of the LIRLAP project, dissemination workshops were held in three cities: Hanoi, Bangkok, and Metro Manila from March 18 - 24, 2025. These workshops provided a platform for sharing the Resilience Upgrading Guide with local stakeholders, practitioners and community representatives. The events focused on engaging participants through hands-on sessions, discussions and exchanges on the cross-country transferable knowledge. Apart from focused discussions on the relevance and usability of the Upgrading Guide, the workshops ensure that our Guide is accessible to the project multi-level stakeholders and maximizing its applicability in real-world settings.

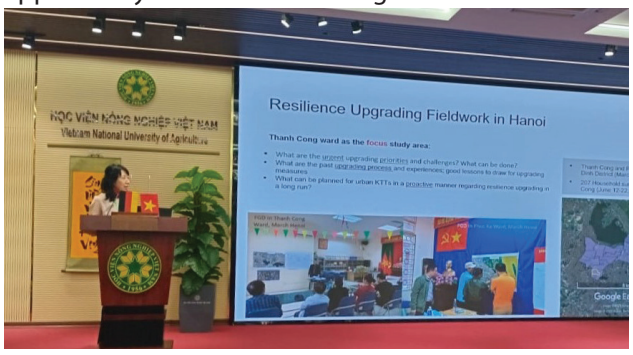

Fig. 19: KTT (multi-family building stock) as Resilience Upgrading focus in Hanoi. Source: LIRLAP final event on March 18, 2025, in Hanoi

Fig. 20: Knowledge transfer between the Philippines and Thailand. Source: LIRLAP final event on March 21, 2025, in Bangkok.

The Guide was officially handed over to these agencies:

Government organization:

1) The Department of Human Settlements and Urban Development (DHSUD)
2) The Department of Public Works and Highways (DPWH) - Flood Control Management Cluster
3) The National Housing Authority (NHA)
4) The Department of Human Settlements and Urban Development (DHSUD)
5) Social Housing Finance Corporation (SHFC)
6) Climate Change Commission (CCC)
7) The National Economic Development Authority (NEDA)
8) Metropolitan Manila Development Authority (MMDA)
9) Presidential Commission for the Urban Poor (PCUP)
10) The Department of Environment and Natural Resources (DENR)

Non-government organization:

11) Technical Assistance Movement for People and Environment (TAMPEI)
12) Radical Architecture and Design Innovation Collaborative (RADIC)
13) Clean Air Asia
14) LinkBuild Inc, Base Bahay Foundation

Fig. 21: Official handover of Resilience Upgrading Guide to the local agencies in Metro Manila. Source: LIRLAP final event on March 24, 2025, in Metro Manila

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Visual Capitalist (2024). Mapped: Asia's Population Patterns by Density. Available at: https://www.visualcapitalist.com/map-asias-population-patterns-by-density/ (accessed on May 22th, 2025)

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