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Empowering Local Knowledge for Resilient Design: Rebuilding an Orphanage in Flood-Prone Kampung Gedong Pompa

Savira Aristi[1*], Alexandre Humbert[2], Anastasia Dinda Ciptaviana[3], Punto Wijayanto[4], Slamet Riyadi[5] and Kenta Ono[6]

[1,6]Department of Creative Engineering, Faculty of Science and Engineering, Chiba University, Chiba, 263-8522, Japan.

[2]National School of Architecture, École nationale supérieure d'architecture de Paris-La Villette, Paris, 75019, France.

[3]Kampung Kollektief (NGO), East Jakarta, Jakarta, 13220, Indonesia.

[4]Department of Architecture, Faculty of Landscape Architecture and Environmental Engineering, Universitas Trisakti, Jakarta, 11440, Indonesia.

[5]Department of Industrial Product Design, Faculty of Art and Design, Institut Teknologi Bandung, Bandung, 40132, Indonesia.

***Corresponding author:** 23wd8306@student.gs.chiba-u.jp

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Abstract

Urban climate adaptation efforts in the Global South are often dominated by top-down planning approaches that marginalize the situated knowledge of residents living with environmental risk. In flood-prone informal settlements, this disconnect can undermine the relevance of resilience interventions. Addressing this gap requires design processes that position communities not as consultees, but as co-authors of resilient futures. This research examines how local knowledge can inform and empower a community-led design process for resilience in a climate-vulnerable urban settlement. Using Kampung Gedong Pompa, a flood-prone informal neighborhood in North Jakarta, Indonesia, as a case study, the research documents two participatory co-design workshop iterations focused on envisioning the rebuilding of a community orphanage. The study adopts a qualitative methodology grounded in Community-Based Participatory Action Research (CBPAR), complemented by co-design practices and photo elicitation. Data was generated through facilitated workshops, participant dialogues, visual artifacts, photographic documentation, and facilitator reflective field notes. Across the workshops, residents from different generations articulated lived experiences of flooding, collective memory, and material practices. This research contributes to the methodological insights on co-design for researchers working in *kampung* context or similar environments.

1.0 INTRODUCTION

In the context of increasingly uncertain environments and accelerating urbanization in the Global South, there is an urgent need to rethink urban resilience not merely in infrastructural and technical ways but also to prioritize community-led knowledge and inclusive design strategies. Community research highlights the potential to integrate local knowledge in creating social cohesion and expanding democratic participation (Montesi et al., 2025). In Indonesia, where subsidence, coastal flooding, and unauthorized urban growth converge, participation and local knowledge-based design in urban planning have become both an epistemic and practical necessity.

Such integration enhances the legitimacy and utility of scientific research by incorporating lived experience and community knowledge (Raymond et al., 2010). Evidence from other developing-city contexts suggests that local builders' knowledge is vital. For instance, in Indonesia, Bangladesh, and Tanzania, over 80% of housing in flood-prone zones is constructed by local artisans using non-engineered techniques that have been adapted to floods (Kemwita et al., 2023; Sakijege et al., 2014). While sometimes considered "informal," these techniques (e.g., raising buildings on stilts, employing materials that dry rapidly) contribute importantly to household-level resilience. This localization of knowledge aligns with the broader theoretical shifts toward urban resilience, which place more emphasis on the requirement for adaptive, community- or public-initiated solutions to climate and infrastructure hazards. The evolution of theory in resilience, from equilibrium theory to one that considers transformation and social learning, provides a conceptual basis for navigating uncertainty within rapidly changing urban environments (Yuniartanti et al., 2024; Kapucu et al., 2021).

In the Indonesian context, participatory design has taken on cultural and political forms. Historical examples, such as Y.B. Mangunwijaya's 1986 Kampung Code project in Yogyakarta, embodied principles of *gotong royong* (mutual aid) and *musyawarah* (deliberation) (Kamil, 2014). The initiative began as a negotiation around the plan for the eviction of a settlement located by the banks of the Code River in Yogyakarta. It evolved into a *kampung* upgrading initiative that demonstrates the persistence of the inhabitants and their aspirations for change. This project marked the beginning of a locally engaged design process in urban planning in Indonesia which is based on the three key pillars of *bina lingkungan* (environmental development), *bina manusia* (human development), and *bina usaha* (economic development) (Lintang Ayasha et al., 2024). Recent examples like Kampung Kreatif in Bandung (Ekomadyo & Riyadi, 2020) and Terakota Jatisura (Ekomadyo et al., 2024) show how co-design processes may align technical expertise and community values. The instances represent a larger Indonesian trajectory towards design resilience informed by local understanding and social dynamics amidst the forces of climate change and urbanization (Poerbo, 2018; Setiawan et al., 2019).

This research builds upon theoretical and contextual work that already exists by investigating participatory design interventions in Kampung Gedong Pompa, a flood-prone *kampung* (village in Indonesian language; often used to call informal settlements) in North Jakarta. With sea levels rising and the land subsiding by a maximum of 8.47 cm per year (Harintaka et al., 2024), residents experience challenges such as tidal floods and insecure housing conditions—challenges that are compounded by the state's tendency to exclude *kampungs* from official planning agendas. Drawing upon co-design values and local knowledge, this research looks towards the potential for residents' extensive understanding of floods, community relations, and material cultures to inform the building of more adaptive and equitable climate resilience measures. Set against the need for urban governance (Prana et al., 2024), and acknowledging the structural challenges that *kampung* residents face such as eviction threats and insecurity around the question of tenure, this paper sets the participatory workshops in Gedong Pompa less as a question of design interventions but most importantly as an act of empowerment. These workshops reclaim residents' rights to have a voice over their environments, to define resilience in their own terms, and to create a collective imagined future amidst intensifying climate dangers.

2.0 LITERATURE REVIEW

Recent urban resilience scholarship increasingly emphasizes the limitations of top-down, technocratic planning approaches and calls for more participatory and bottom-up strategies. Scholars argue that resilience interventions are more effective when communities are actively involved in planning and decision-making processes, particularly in contexts of climate vulnerability. Frantzeskaki and Kabisch (2016) highlight the importance of shifting from formal consultation toward participatory formats such as focus groups and design charrettes, proposing knowledge co-production spaces to support urban environmental governance and sustainability. Similarly, Fischer (2021) emphasizes community-based planning as a pathway to increased civic engagement and democratic governance in climate action.

Empirical studies further demonstrate that both community-driven and government-supported initiatives can strengthen resilience outcomes. Satterthwaite et al. (2020) show how upgrading initiatives in informal settlements enhance resilience by empowering residents and improving local infrastructure. Bayili and Badolo (2024) likewise argue that inclusive and participatory resilience policies foster stronger commitment and engagement from urban populations, which is critical for the implementation of effective resilience strategies. Incremental and flexible planning approaches, such as those observed in Nam An Khanh, Vietnam, further illustrate how community-driven development can support socio-spatial integration and adaptive urban growth in rapidly changing environments (Calabrese et al., 2015).

Participatory practices have also been linked to specific design and planning domains. Borgström et al. (2021) demonstrate how participatory resilience thinking supports the integration of green–blue infrastructure in urban design, emphasizing the role of community involvement in navigating complex socio-ecological systems. Panagoulia (2020) similarly stresses the need for human-centered and participatory approaches in urban analytics, arguing that decision-making processes must remain responsive to residents' lived realities.

Local knowledge, defined as community-based understandings of environmental conditions, practices, and hazards, is increasingly recognized as a foundational component of urban climate resilience (Rahmayati et al., 2017). Such knowledge extends beyond technical adaptation strategies, encompassing cultural memory, place-based identity, and long-standing relationships with the environment. These forms of knowledge shape how communities perceive risk and respond to environmental stress, often enabling adaptation in situ rather than forced displacement (Barker, 2017).

Participatory design offers a methodological framework well suited to engaging local knowledge in urban resilience contexts. Originating from Scandinavian efforts to democratize work practices, participatory design emphasizes inclusion, collaboration, and the redistribution of power between designers and users (Van der Velden & Mörtberg, 2015). Closely related, co-design foregrounds designing *with* communities, recognizing participants as experts of their own lived experiences and as active contributors to solution development (McKercher, 2020).

Together, participatory design and co-design support multidisciplinary, community-driven problem-solving and are frequently applied to address complex or "wicked" societal challenges (Rittel & Webber, 1973; Sanders & Stappers, 2008). While these approaches often require significant time and resource investment, prior studies suggest they can yield dual benefits: contextually grounded design outcomes and enhanced community capacity (Lukito et al., 2021). Participatory methods have also been shown to raise awareness of environmental risks and empower residents to advocate for more equitable resource distribution (Meyer et al., 2018), as well as to support community engagement in disaster recovery planning through simulation and scenario-building (Miles, 2018).

Despite these contributions, much of the existing literature emphasizes participatory principles or project outcomes, offering limited insight into the methodological processes through which co-design facilitates knowledge articulation, negotiation, and legitimacy, particularly in informal settlement contexts.

While participatory design and local knowledge are increasingly recognized in urban resilience research, less attention has been paid to how co-design methods function as methodological tools for articulating and legitimizing local knowledge in *kampung* and similar informal settlement contexts. Existing studies tend to

focus on outcomes or policy implications, leaving the processes of knowledge negotiation, power dynamics, and collective deliberation underexplored. This study addresses this gap by examining participatory co-design workshops in Kampung Gedong Pompa, focusing on co-design as a method for producing situated knowledge for resilience planning.

3.0 CONTEXT: KAMPUNG GEDONG POMPA AND PROJECT BACKGROUND

This contextual account is informed by both prior research data and ongoing dialogue with community members of Kampung Gedong Pompa. Throughout the workshop series, the research team engaged closely with the *Ketua RT* (*Ketua Rukun Tetangga*; neighborhood chief). A semi-structured in-depth interview was conducted with *Ketua RT* between the first and second phases of the workshop series, supplementing observational data and informal conversations held during community interactions.

Kampung Gedong Pompa, situated below sea level and adjacent to the sea, renders it highly susceptible to tidal floods, seawater intrusion, and land subsidence (Diana, 2023). A seawall was constructed in 2000 in response; however, its structural failures, such as the catastrophic breach in 2007 that submerged parts of the village under 1.6 meters of water (see Figure 1), have amplified resident concerns (Nailufar & Belarminus, 2018). Recurrent cracks persist even though authorities have since raised the wall to a height of 2–3 meters, raising doubts about long-term safety.

Figure 1. 2007 Flood in Kampung Gedong Pompa (2007, Captured by *Ketua RT*)

The socio-economic profile of Kampung Gedong Pompa has evolved over time. Once dominated by fishing households, recent years have seen an increasing shift toward labor and informal trade, reflecting Jakarta's broader urban and industrial transitions (Yuniar et al., 2021; Pristine, 2024). Gedong Pompa now accommodates over 800 families, many of whom live on subsistence incomes and face compounded risks from climate change and urban restructuring (Putri et al., 2020). Figure 2 captured Kampung Gedong Pompa site.

Figure 2. Kampung Gedong Pompa Site Photo; Buildings on the left side are the *rumah susun* (2022, Captured by author)

The *kampung* maintains a strong communal ethos, anchored in religious and familial institutions despite these challenges. However, residents express concern over shifting generational values, with younger populations showing increasing individualism and detachment from communal responsibilities (Pristine, 2024).

Within this landscape, the neighborhood orphanage stands as a symbol of both loss and potential. The orphanage once served as a central institution in the social life of the community. Constructed in two phases, one just before the 2007 flood and an extension thereafter, it previously functioned not only as a shelter for orphans but also as a hub for communal activities. The building and the land on which it sits are owned by the village *imam* (Islamic leader), who co-managed the facility with the *Ketua RT* and a vice-chief through the TPA (religious education) association.

Over the years, however, the orphanage has fallen into severe disrepair (see Figure 3). Land subsidence has caused the entire structure to sink approximately 20 centimeters below current ground level and repeated tidal and monsoonal flooding has progressively weakened the building's structural integrity. The concrete has cracked and spalled, revealing rusted metal reinforcements, while the wooden roof has sustained visible damage from increasingly intense rainfall. Stagnant water, debris, and poor ventilation have rendered the building unhygienic and unsafe, making its current use unsustainable.

Figure 3. Current Condition of the Orphanage (2025, Captured by author)

In response, the bigger goal of the project is to rebuild the orphanage, not merely as a replacement building, but as a catalyst for community revitalization. Developed through a participatory co-design process, the new orphanage is envisioned as a multifunctional and adaptive space—designed with and for the community. The structure will accommodate up to fifty orphans, offering refuge during flood events, and will integrate spaces for learning, religious instruction, social gatherings, cultural preservation, and environmental education. Framed as a humble yet intentional act of "urban acupuncture," the orphanage seeks to rebuild the links between the inhabitants, their environment and a collective motivation weakened by successive crises.

While the envisioned orphanage emphasizes climate-resilient materials and reversible construction techniques to align with the community's ecological context, this paper does not focus on the specific architectural design outcomes. Instead, it centers on the participatory co-design process through which community members collectively envisioned the role, meaning, and future function of the orphanage. The activities aim to reconnect the village with the sea, its natural resources and its memory. The emphasis lies on how local knowledge, historical memory, and socio-environmental aspirations were negotiated and expressed through collaborative design practices.

4.0 RESEARCH METHODOLOGY

4.1 Research Approach

This study adopts a qualitative research approach to examine how local knowledge is articulated, shared, and negotiated through participatory co-design in a flood-prone *kampung* context. A qualitative methodology is appropriate for this research because it allows for an in-depth exploration of lived experience, collective meaning-making, and social interaction as they unfold during participatory processes. The research takes a process-oriented perspective, attending to how knowledge emerges through dialogue, material engagement, and social interaction across the workshops. The methodological framework combines Community-Based Participatory Action Research (CBPAR) with participatory co-design methods, positioning community members as active contributors to both research and design activities.

4.2 Workshop Design and Data Collection

The research comprised two iterative cycles of participatory workshops conducted in Kampung Gedong Pompa. Each workshop was intentionally designed to elicit different forms of local knowledge related to flooding, spatial practices, and material use.

The first workshop iteration followed CBPAR principles (Vivona & Wolfgram, 2021; Wilson, 2018; Kral & Allen, 2015), emphasizing collaboration, reflexivity, and shared ownership. Participants engaged in structured dialogue, storytelling, mapping, and basic physical modeling to articulate aspirations for a flood-resilient orphanage and to reflect on everyday experiences of living with water. These activities supported iterative cycles of planning, action, and reflection, enabling participants to collectively define challenges and propose context-sensitive responses.

The second workshop iteration incorporated elements of photo-elicitation (Harper, 2002) to deepen reflection on material practices. Prior to the workshop, the research team conducted observational fieldwork and documented locally available materials, objects, and spatial arrangements through photography. During the workshop, these images were introduced as visual prompts in co-design discussions.

4.3 Data Sources

Data were generated from multiple qualitative sources across all workshops, including:

- Audio-recorded and transcribed participant discussions
- Visual artifacts produced during workshops (drawings, maps, and scale models)
- Photographic documentation of workshop processes and material environments
- Facilitator reflective journals and field notes

4.4 Data Analysis

Data analysis followed an iterative qualitative thematic analysis process. Workshop transcripts, field notes, and facilitator journals were reviewed to identify recurring patterns related to local knowledge, environmental perception, material practices, and participation dynamics. Visual artifacts were analyzed alongside verbal data, with attention to spatial representations, material choices, and symbolic elements expressed during the workshops.

The analysis proceeded in three stages. First, open coding was conducted to identify key concepts emerging from each workshop. Second, codes were clustered into broader thematic categories reflecting shared meanings across activities and participant groups. Third, themes were compared across workshop iterations to examine continuities and shifts in how knowledge was articulated and negotiated over time. Visual data were interpreted in relation to participants' explanations during presentations and discussions.

5.0 CO-DESIGN ITERATIONS AND FINDINGS

5.1 Co-Design Workshop Planning

The co-design process was structured in two iterations of community workshops, planned to involve residents of Kampung Gedong Pompa in envisioning a future orphanage and re-examining their relationship with water. The goal was to ensure that local knowledge and aspirations directly informed the design, rekindling a connection to water that had faded since the *kampung*'s days as a "seaside village." To meet this goal, the workshops were designed along a deliberate arc of Imagination → Reflection → Synthesis, allowing participants to first dream freely, then critically assess current realities, and finally co-create tangible design ideas.

Location and Setting: All sessions were hosted at the home of the *Ketua RT*. This familiar, semi-open setting was symbolically chosen to emphasize community ownership of the process. Holding the workshops on the *Ketua RT*'s terrace created an informal atmosphere where residents felt at ease; people could drop in, observe, and join the discussion organically. The openness of the venue encouraged transparency and passersby engagement, blurring the line between official participants and the wider community. In preparation, the research team developed detailed facilitation tools, including scripted activity guides, timetables, and topic checklists, to ensure consistency and clarity in each session's execution.

Scheduling*:* Timing was adjusted to respect local daily rhythms and maximize participation. Workshops were scheduled on a weekend: Saturday sessions ran from 14:00 to 17:30, and Sunday sessions from 08:30 to 12:00. This schedule avoided conflicts with important community routines such as morning market hours, midday prayers, and common work shifts for casual laborers. Each workshop concluded with a collective prayer (*doa*) and a shared meal prepared by neighborhood mothers. This conclusion, planned as part of the workshop structure, was more than a formality; it reflected Indonesian hospitality traditions and reinforced reciprocity and trust. By ending with communal dining and prayer, the workshops honored local customs and underscored the social value of coming together, thus encouraging sustained participation in the co-design process.

5.2 Community Engagement and Participant Selection

Community engagement involved culturally embedded and adjustable practices rather than official recruitment. During the initial stage, the research team paid a courtesy visit to the home of *Ketua RT*, led by members of Kampung Kollektief, a local co-design NGO that acts as a cultural intermediary. On this occasion, the team introduced the project, asked for the support of *Ketua RT*, and established guidelines for respectful communication. This initial outreach proved important for gaining community approval and legitimacy for the workshops. *Ketua RT* became an advocate for the project, offering recommendations regarding community norms and facilitating the selection of possible participants. His active participation showed the residents that the workshops had local approval and were considered worth attending.

Recruitment depended on social approval and the flexible social networks typical of the *kampung*, and attendance being voluntary and dynamic. Practically, the facilitation team often invited further bystanders or villagers spontaneously. This degree of flexibility is typical of *kampung* spaces where formal RSVPs are rarely employed, and trust is built by informal communication. For this reason, the workshops attracted a varied group covering several generations from teenagers to adults, all of whom participated because of personal motivation rather than as an obligation.

The research team integrated informal hospitality into the workshop design. Light snacks and drinks were available throughout the sessions, and the closing shared meals (prepared by local mothers) served as both an incentive and a gesture of appreciation. The workshops functioned as community events where creative dialogue could flourish organically. This approach succeeded in eliciting candid discussions and enthusiastic participation, as evidenced by residents' willingness to devote their weekend time and openly share stories, ideas, and even concerns.

5.3 Research Teams and Facilitation Roles

Each workshop was supported by a facilitation team. Workshops 1–3 (the first iteration) were led by Author 2 (the second author of this paper), with a team comprising two co-design practitioners from Kampung Kollektief, two local facilitators from Kampung Gedong Pompa, and four architecture students from Trisakti University. Workshop 4 (the second iteration) was led by Author 1 (the first author), supported by one Kampung Kollektief member, two design practitioners, and a product design student from Institut Teknologi Bandung. The core facilitation roles and responsibilities were as follows:

1. Team Leader: This role involved overall coordination and strategic guidance. The team leader prepared detailed workshop briefs, scripts, and schedules in advance, and briefed the rest of the team on the objectives and flow of activities. During the sessions, the leader oversaw progress and intervened only when necessary. (Author 2 who led the first iteration is not fluent in *Bahasa Indonesia*; as a result, he adopted an observatory and coordinative stance during the live sessions, communicating through translators and focusing on adjustments rather than direct facilitation.)

2. Facilitators / Co-Facilitators: These team members guided participants through the exercises, ensuring the activities ran according to plan and that every voice was heard. They prompted discussion with prepared questions, kept the group on task, and made real-time tweaks to adapt to the participants' energy and understanding.

3. Note Takers: Assigned note takers to record observations, quotes, and insights from participants. Because workshops were conducted in *Bahasa Indonesia*, note takers often summarized key points in English for the benefit of non-Indonesian team members, and later translated full notes after the session.

4. Documentarians: A role involved photographing and videotaping the sessions. This visual record covered not only final outputs (like drawings or models) but also the process (like group interactions, body language, and use of materials).

5. Translators: This role was taken on by all members of the research team who spoke English and Indonesian fluently to ensure communication between team leader and workshop participants.

5.4 Results: Co-design outcomes

5.4.1 Imaginative Visioning with teen residents (Workshop 1)

In the first workshop, nine local teenagers (both boys and girls) explored the theme "*If water were not dangerous, how would you imagine life*?" through collaborative drawing. This exercise revealed that young residents do not view water solely as a hazard; they also associate it with play, memory, and identity. Over a large paper roll laid out on the ground, a blue line represented the water's surface, and participants sketched scenes of life above and below this waterline. Figure 4 explains the layout planning of the workshop.

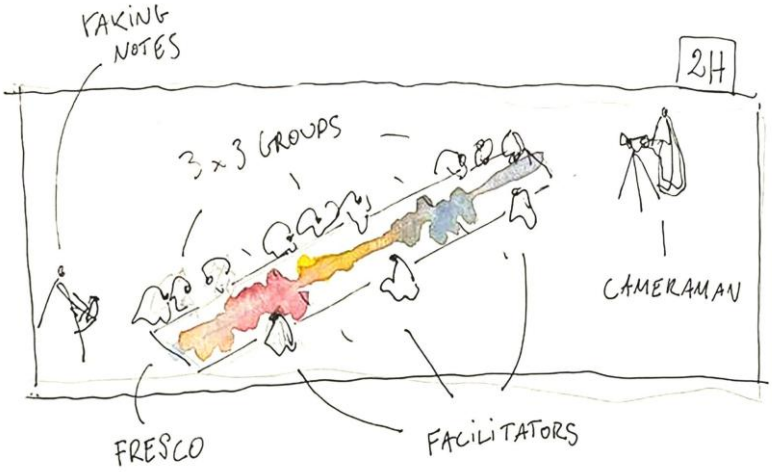

Figure 4. Layout Planning of Workshop 1 (2025, Drawn by Author 2)

Several key themes emerged from the murals (see Figure 5):

1. Recreational Spaces: Many drawings featured soccer fields, including imaginative floating soccer pitches, reflecting a desire for more proper play spaces.
2. Living with Floods: Participants sketched stilt houses, boats, and even entire floating neighborhoods. These ideas suggest an intuitive acceptance that water can coexist with habitation. One teenager's drawing of a floating house was so compelling that he was later invited to elaborate this concept in the third workshop.
3. Beach and Nature: Interestingly, a recurring element was a beach scene. Its presence in several of the drawings testifies to a close relationship with water.
4. During the closing presentation, the teenagers explained their illustrations to each other. This dialogic reflection confirmed that, despite its dangers, water is an integral part of their daily lives, and they express a need for suitable spaces to enjoy it safely.

Figure 5. Workshop 1 Results by Participants (2025, Captured by author team)

5.4.2 Spatial Reflections on Daily Life with Flooding with adult residents (Workshop 2)

The second workshop, held the following day, engaged ten adult residents (split by gender) in mapping how floods have, or might, impact their daily routines. This session shifted from imagination to realistic reflection, asking "*How have floods impacted your daily life?*" Using printed base maps of the neighborhood and a scale model of the area, participants charted their movement patterns and important locations across three temporal contexts: the past (specifically before the major 2007 flood), the present, and an envisioned future with better flood adaptation. Each group used colored pencils and yarn to trace routes and mark key sites such as homes, wells or water points, places of employment, markets, waste disposal areas, and evacuation checkpoints. Figure 6 explains the layout planning of the workshop.

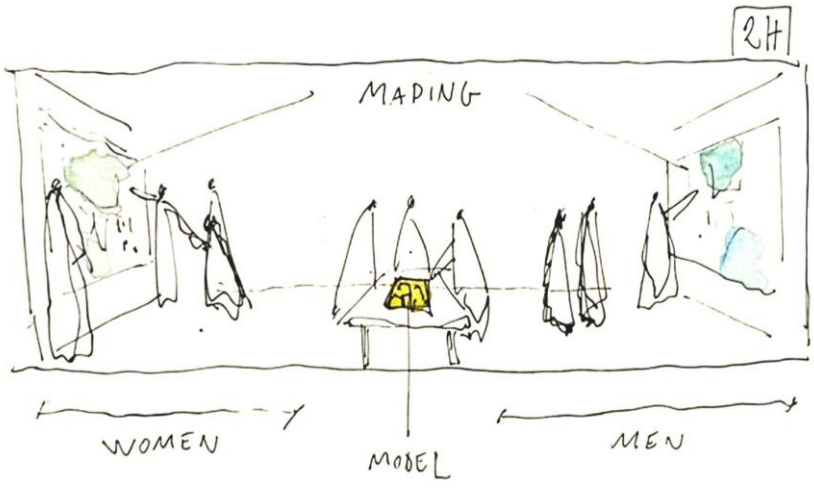

Figure 6. Layout Planning of Workshop 2 (2025, Drawn by Author 2)

Residents collectively visualized how much communal space and connectivity had been lost by layering past and present experiences (see Figure 7). The orphanage courtyard, now left unrenovated post-flood, was frequently mentioned as a potential multi-purpose refuge or community center that could be revitalized. Women's maps emphasized domestic and community care infrastructures. For example, women marked locations of laundry terraces and child-safe spaces. This pointed to an opportunity for the new orphanage design to deliberately incorporate flood resilience features (e.g., elevated platforms, backup power/water) and community functions, so that it serves the dual purpose of home for children and a neighborhood hub. This workshop's reflective outcomes armed the research team with information on what spatial and infrastructural elements mattered most to residents, both functionally and emotionally, in the context of living with water.

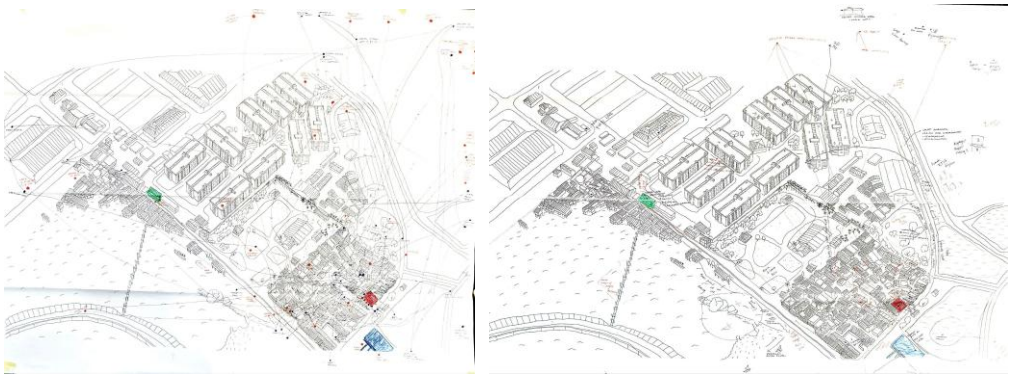

Figure 7. Workshop 2 Results by Participants (2025, Captured by author team)

5.4.3 Co-Design Proposals and Cross-Generational Synthesis (Workshop 3)

The third workshop shifted into a synthesis mode by inviting a selection of participants from the previous sessions to collaborate on design proposals. Six participants (three teenagers and three adults) were grouped into three mixed teams (based on genders and age). Each team was assigned a focus theme; "village", "orphanage", and "house", with the guiding question "*How can we design for life with water as a resource, not a danger?*" Participants were provided with creative materials (clay, paper, cardboard, etc.) to build simple models or collages illustrating their ideas. Figure 8 explains the layout planning of the workshop.

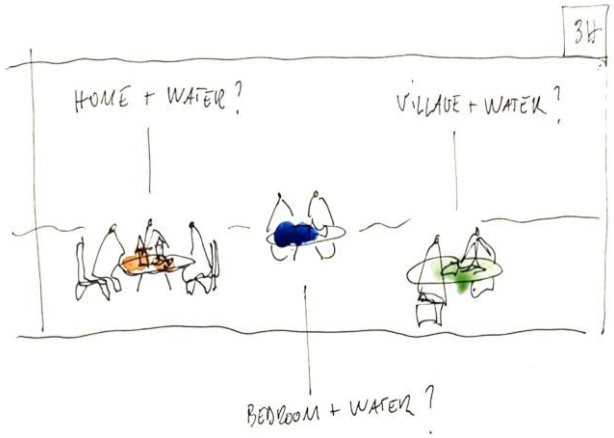

Figure 8. Layout Planning of Workshop 3 (2025, Drawn by Author 2)

After hands-on work, all participants reconvened for a presentation round. Each team explained their model or drawing, followed by a group discussion. Figure 9 are the few examples of the result made by participants. Proposals included an adaptable orphanage with sliding walls and stilted structures, as well as ideas for cultivating gardens and multi-purpose learning areas. The session concluded with general agreement on several points: (1) the orphanage design should prioritize flexibility and multifunctionality, (2) rebuilding it in place with improved structure is preferred over relocation, and (3) water should be embraced in the *kampung*'s design through drainage, storage, and play spaces, rather than simply warded off. *Ketua RT*'s

endorsement of these directions gave the community a sense of validation, and he pledged to bring these ideas forward to local authorities and potential donors.

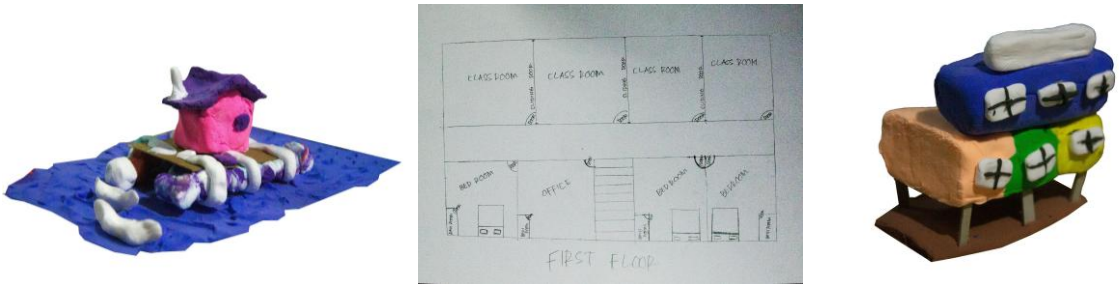

Figure 9. Workshop 3 Results by Participants (2025, Captured by author team)

5.4.4 Local Materials and Information Flows (Iteration 2 Workshop)

A second iteration of engagement, led by Author 1, was conducted to fill specific knowledge gaps that emerged from the first round. These later sessions, held a month after the initial workshops, were more focused and interview-like, involving some of the same participants and a few new faces. The session concentrated on local building materials: the facilitators brought a set of photographs showing various materials found around the *kampung* (e.g. reclaimed wood planks, bamboo, corrugated metal sheets, fishing nets, and tarpaulins). Participants were asked where these materials came from, how they had used them (or seen them used) in the past, and whether they considered them viable for new construction or products (see Figure 10). This discussion revealed rich practical knowledge. For example, residents explained how wood from burnt boats is commonly repurposed for furniture or house repairs; nets are used as partitions between houses and to prevent pests in the home; banners from past political campaigns often get reused as roofing. Many low-cost or waste materials are readily available and well-understood by the community. Participants also discussed limitations: for example, they warned that untreated bamboo decays quickly, and that any design should consider the long-term durability of materials.

Figure 10. Second Iteration Workshop Results (2025, Captured by author team)

5.5 Ongoing and Upcoming Engagement

Participants expressed their eagerness to be involved in future stages of the project, particularly in decision-making processes. This response confirmed a key insight from the workshops: community empowerment in design does not end with the production of tangible outputs. Rather, it is sustained through iterative, relational processes that nurture trust, dialogue, and shared ownership over time.

Several months after the initial workshops, the research team had the opportunity to extend the project's visibility by contributing to the Indonesia Contemporary Art and Design (ICAD) 2025 Exhibition (see Figure 11). The exhibition aims to raise public awareness about the ongoing environmental challenges faced by coastal Jakarta, particularly the threat of land subsidence and recurrent flooding, through the lived experiences of Kampung Gedong Pompa residents. The installation presented a temporal narrative—past, present, and

future—that intertwined historical flood events, the current co-design workshops, and speculative future interventions envisioned by researchers and the community. It also served as an open invitation for cross-disciplinary collaboration, encouraging artists, designers, and academics to engage with Kampung Gedong Pompa as a living site of inquiry.

Figure 11. Exhibition in Indonesia Contemporary Art and Design (2025, Arranged & Captured by author team)

Due to limited time for renewed field engagement, the exhibition design was primarily directed by the research team, while maintaining communication with *Ketua RT*, who was consulted and formally invited to the opening event. To preserve the participatory ethos of the project, an interactive component was integrated into the installation: visitors were invited to write messages addressed to the residents of Kampung Gedong Pompa. These messages are being shared with community members, who may respond, thereby creating a mediated exchange that connects the exhibition audience with the *kampung*'s everyday realities. The exhibition runs from October to November 2025.

Looking ahead, the authors plan to continue facilitating design-based interventions in Kampung Gedong Pompa in close collaboration with residents. Future initiatives will be guided by community-defined priorities and will build on the trust and shared understanding developed through this co-design process.

6.0 DISCUSSIONS

The findings summarized in Table 1 illustrate how participatory co-design in Kampung Gedong Pompa operates as a methodological practice for articulating and negotiating local knowledge in climate-vulnerable *kampung* contexts. The co-design workshops enabled residents to express experiential, relational, and material knowledge that is often overlooked in conventional planning processes, demonstrating the value of participatory methods as tools for situated knowledge production.

A key methodological insight concerns the role of co-design in making local knowledge visible and collectively discussable. Visual and spatial activities such as mapping, storytelling, and modeling supported shared understanding across participants with different backgrounds and levels of confidence. These methods allowed tacit knowledge embedded in everyday practices to be communicated and discussed, strengthening their relevance for resilience-oriented design research.

The results also emphasize the importance of attending to social dynamics within participatory settings. Differences in age, gender, and perceived authority shaped participation, indicating that inclusive outcomes require intentional facilitation strategies. Table 1 highlights how cross-generational engagement enriches the co-design process while also revealing the need for methods that actively redistribute voice and authorship.

Finally, participants' desire for continued involvement beyond the workshops points to a limitation of short-term co-design interventions. The effectiveness of participatory design in *kampung* contexts depends on sustained relationships and ongoing knowledge exchange, rather than on the production of finalized design artifacts alone. Together, these insights position co-design as a methodological approach that integrates knowledge elicitation, power negotiation, and relational continuity, offering practical guidance for researchers working in *kampung* and similar informal urban environments.

Table 1. Methodological Insights for Co-Design in *Kampung* and Similar Contexts

Methodological Insight	Observed Outcome	Implication for Researchers
Making local knowledge visible	Participatory tools (mapping, storytelling, modeling) enabled residents to articulate flood practices, spatial routines, and material expertise.	Co-design methods should be treated as knowledge-elicitation infrastructures, not merely engagement activities.
Designing with environmental relationships	Participants framed water as hazard, memory, and identity simultaneously.	Researchers should design activities that allow ambivalent and relational understandings of environmental risk to emerge.
Cross-generational engagement	Teenagers contributed speculative visions, while adults contributed practical and care-oriented knowledge.	Structuring co-design across age groups strengthens both imaginative and grounded resilience outcomes.
Grounding design in local material ecologies	Residents demonstrated deep knowledge of reclaimed materials and their limits.	Co-design should begin from existing material practices rather than introducing externally defined sustainability solutions.
Addressing persistent power asymmetries	Hierarchies based on age, gender, and facilitator roles shaped participation.	Facilitation must actively decentralize expertise and diversify modes of expression to avoid reproducing authority.
Sustaining participation beyond workshops	Participants sought continued involvement in decision-making processes.	Co-design should be embedded within longer-term knowledge and governance processes rather than isolated events.

7.0 CONCLUSIONS

The participatory design process utilized in Kampung Gedong Pompa showed that local knowledge, often perceived as informal, has great importance in the reimagining of resilient community infrastructure. Community members gave useful insights about reuse materials, layout configurations, and shared maintenance that directly related to their everyday experience, hence redefining expertise and categorizing them as co-designers. Despite this, participation continued to be conditional upon the social hierarchies that accompany age and gender and individual personality. Future workshops in *kampung* contexts need to incorporate a greater variety of inclusive strategies such as small group discussions, rotating facilitator activities, and performative or visual forms of communication to engender equitable participation and elevate the visibility of a wide variety of voices.

Despite efforts towards horizontal collaboration, top-down expectations persisted, where facilitators were often perceived as external experts. This means that empowerment is anything but a natural byproduct of participation but must be consciously cultivated by processes that decentralize authorship and authenticate community knowledge. The community wished to have the level of participation sustained in the decision-making process itself and wanted the level of participation extended beyond the level of the workshop. For participatory design in Kampung Gedong Pompa and other such projects, success depends less on the physical deliverables than it does on the long-term relations of trust, conversation, and shared agency where communities become active co-stewards of their environments.

From a policy perspective, the findings suggest that urban resilience and upgrading programs in *kampung* and similar informal settlements should move beyond consultative participation toward sustained, community-

embedded decision-making structures. Policies that recognize local knowledge as a legitimate form of expertise—and that allocate time and resources for iterative engagement—can help bridge gaps between institutional actors and residents. Supporting long-term participation is essential for building trust and ensuring that resilience interventions align with community-defined priorities.

This research highlights co-design as a means of producing situated knowledge that integrates lived experience, collective memory, and material practice. The study contributes to design research by showing how participatory methods can function as epistemic tools that surface, structure, and legitimize local ways of knowing, particularly in contexts where formal data and documentation are limited. In doing so, it positions co-design as a methodological practice that extends beyond design outcomes to shape how knowledge is generated, shared, and acted upon in marginalized urban contexts.

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