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Environmental Stewardship and Placemaking. Towards Bottom-up Flood-Resilient Urban Design

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Abstract
The role of public space in urban resilience, particularly in disaster risk management, is gaining increasing recognition. Yet, with accelerating climate change and expanding informal settlements in the Majority World, much of city production and climate adaptation is done informally. This signals the need to better understand and operationalise community-level action so that resilience can be implemented respectfully through urban practices without professional designers. Identifying key strategies that have proven effective on the ground aims to move beyond simplistic interpretations of resilience and to advance a broader pursuit of social-ecological resilience thinking.
Grounded in fieldwork in three cities - Tataouine (Tunisia), Nairobi (Kenya), and Kathmandu (Nepal) - this study explores bottom-up flood adaptation initiatives from a social-ecological resilience thinking perspective. Two expressions of such resilience thinking strategies are identified: Environmental Stewardship and Placemaking.
These two strategies demonstrate particular potential in the resilient urban design discourse in three ways. First, through negotiated governance of place, they can build on continuous collective experimentation on the micro scale to advance local resilience. Second, they introduce a strategic dimension in the community-level action that bridges the professional urban design and individual coping mechanism gap. Finally, the strategic social-ecological resilience thinking allows initiatives to grow and develop transformative potential rather than performing only adaptive or coping actions. By identifying these grounded strategies for flood adaptation, the study contributes to a more nuanced and actionable understanding of resilience in informal and under-resourced contexts.

Keywords: resilient urban design, flood adaptation, environmental stewardship, placemaking, public space

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1. Introduction

This paper focuses on bottom-up flood adaptation in public spaces of under-resourced communities. Framing these actions as informal practices of urban design requires exploring three recent shifts in the field.

First, the 'resilience turn,' emerging as a key principle in urban development and disaster risk reduction (Lizarralde et al., 2015; Palazzo, 2018), requires new ways of thinking and practising urban design (Quigley et al., 2018). Understanding resilience in urban design from a social-ecological system (SES) perspective is relevant in public space scholarship as it focuses on the interplay between society and environment. Resilience discourse often relies on the conflicting concepts of robustness and flexibility. Yet, the implementation of this dichotomy, as well as the 'social' aspects of SES, are not sufficiently addressed (Weichselgartner and Kelman, 2014). Gaps in the theory-practice knowledge transmission have been identified, often due to the uncertain, locally influenced, and flexible manner of the field (Quigley et al., 2018; Scaini et al., 2024).

Second, approaches to disaster risk management have changed. In flooding – the most common natural hazard affecting more than 1.6 billion people worldwide (UNDRR, 2020:17) –, community resilience has become widely accepted (Koliou et al., 2020). Additionally, risk co-ownership is emerging. Co-management of natural resources (Palazzo, 2018) is happening through new forms of mosaic and adaptive governance (Buijs et al., 2016; Fransen et al., 2024), e.g. UK's citizen-led Flood Action Groups (Geaves and Penning-Rowsell, 2015).

Finally, the 'Southern turn' in urban studies requires urban design to not only adapt existing concepts but to build theory from and for the Majority World (Yiftachel and Mammon, 2022). Despite the success of community resilience approaches (Dittrich et al., 2016), they are criticised for perpetuating inequalities (Coates, 2015), forcing professionalisation, and potentially leading to maladaptation (Schaer, 2015). This is particularly true in informal contexts most impacted by and least protected from climate change (Revi et al., 2014).

Understanding the diverse practices of informal urban design (Dovey, 2020) and their role in community-led adaptation is thus important. First, to adapt to the evolving field, and second, to operationalise these initiatives and engage with informality in productive ways (Roy, 2005). Social-ecological resilience (SER) thinking has been proposed as a framework to better understand the components of resilience (Folke et al., 2010), particularly in bridging research and practice (Deppisch and Hasibovic, 2013).

This study examines the urban design practices of bottom-up flood adaptation in public spaces of under-resourced communities from the perspective of SER thinking. By observing practices in 3 cities – Tataouine (Tunisia), Nairobi (Kenya), and Kathmandu (Nepal) – the research aims to better understand SER thinking embedded in on-the-ground initiatives. This allows moving beyond the simplistic perceptions of resilient urban design as 'building to last' or 'adapting to change over time' (Quigley et al., 2018).

2. Theoretical Approach

2.1 Public Space in Flood Resilience

As the arena where physical infrastructure meets the social realm, public space plays an important role in climate resilience by combining climate-adapted design with social capital (Matos Silva and Costa, 2016; Li and Lin, 2023). Public space in informal contexts

is more often defined by relationships between people and spaces (Hernández-García, 2013: 22). Here, communities come together and 'invest' in communal, informal adaptations, seen as less risky than housing improvements of rented structures under threat of eviction (Mulligan et al., 2017). With over one billion people worldwide living in informality and many more under-equipped with risk-reducing urban services, their increasing vulnerability has been well documented (Revi et al., 2014). Community resilience discourse is particularly present in such settings, as governments struggle to intervene, are reluctant to (Fransen et al., 2024), or avoid it as a form of organised abandonment (Gilmore, 2023: 96).

The narrative on resilient public spaces implicitly suggests community engagement and ownership as key ingredients. In flood-prone contexts, terms like 'risk citizenship' or 'water'/'hydro' citizenship are used (Nye et al., 2011; McEwen et al., 2020) to refer to new relationships between residents, water, and environmental challenges. Such attachments and place meanings can be particularly striking in informal settlements where riparian zones are often the only public spaces (Kimari and Parish, 2020). These perspectives illustrate the SES nature of flood resilience, intertwining the societal and environmental considerations.

However, resilience implementation is often criticised for its monetary focus, narrow approaches, and lack of contextualisation (Ziervogel et al., 2017). Top-down practices can disregard the lived realities of residents and undermine existing endogenous mechanisms (Trundle et al., 2019) by disregarding the real culprits of vulnerabilities (Weichselgartner and Kelman, 2014). Ziervogel and colleagues (2017) argue that implementation ought to stem from climate justice and people's rights. Viewing climate justice as an aspect of social justice (Wagle and Philip, 2022) links adaptive infrastructure development with concurrently addressing socio-political challenges (Rivero-Villar and Vieyra Medrano, 2022).

Successful grassroots transformations of public spaces to increase local flood resilience are increasingly coming to the public eye. They range from the co-owned adaptation of the Cano Martin Pena channel in San Juan to the network of productive places of the Kibera Public Space Project in Nairobi (Lamb and Vale, 2024).

2.2 Resilient Urban Design

The capacity of urban design to span both social and spatial interactions between people and places (Madanipour, 1997) allows a pragmatic perspective in studying the city as a social-ecological system. While the principle of resilience – systems surviving, adapting, and recovering from stresses – is applied in planning stages, the micro-scale of implementation is often neglected (Lazarevic et al., 2018). Yet, this scale is most tangible to residents locally and should not be disregarded over infrastructural solutions (Palazzo, 2018). Weichselgartner and Kelman (2014) argue that addressing the underlying issues of vulnerability requires "critical resilience-thinking through explorations of locality and marginality". SER thinking studies the dynamics between physical and non-physical elements of urban design (Quigley et al., 2018). This enables understanding resilience as a process, focused on the 'particular' and 'local' as main scales of action (Beilin and Wilkinson, 2015).

Despite the number of resilience frameworks, most focus on the city scale or target urban professionals (Lazarevic et al., 2018). This excludes community-level practitioners from organised resilience implementation. Additionally, adapting these frameworks to

respect the particularities of the Majority World contexts is crucial. While lived experiences and approaches differ, the field can strive for unified but flexible theories (Randolph and Storper, 2022) developed through back-and-forth learning between theory and diverse practices.

Through the analysis of bottom-up flood adaptation initiatives in three cities, this study identifies two expressions of SER thinking. These strategies are described here as Environmental Stewardship, borrowed from the scholarship of human geography, and Placemaking, already actively used in design and planning literature.

2.3 Environmental Stewardship

Environmental Stewardship (ES) refers to the actions taken by individuals or groups to "protect, care for, or responsibly use the environment in pursuit of environmental and/or social outcomes" (Bennett et al., 2018). ES is often studied in connection with place attachment – the bonds between people and places – which has shown strong links with pro-environmental behaviours, community resilience (Bramston et al., 2011; Alonso-Vazquez et al., 2019), and stewardship (Gottwald and Stedman, 2020; Enqvist et al., 2019). Despite the Majority World being underrepresented in research on ES (Duggan et al., 2023), literature on indigenous and informal practices (e.g. Dangol and Carrasco, 2019; Diep et al., 2022) is emerging. Some eco-centric practices, grounded in traditional worldviews, reemerge under new formats to tackle modern-day issues, e.g. the custodianship of natural resources (ACHPR, 2017).

Wu and Wu (2013) note the importance of creating overlaps in governance for sustainable urban design. ES can become a strategy for such multilayered mosaic governance model (Buijs et al., 2016). Its deeply environmental and sustainability-oriented motivations (Bramston et al., 2011) can help sustain adaptation solutions in contexts with unstable financial or governmental support (Seebauer et al., 2019). Moreover, enacting ownership through environmental action can challenge the negative perceptions towards informal settlements (Butcher, 2021).

As flood response becomes increasingly collaborative, topics of community-managed water resources (Palazzo, 2018) and nature-based solutions (Diep et al., 2022) gain importance. Research extensively advocates for community-level action due to local knowledge and skills (Haque, 2021), experience and memory (Matos Silva and Costa, 2018; McEwen et al., 2017), agility in action (Seebauer et al., 2019), willingness to act (Thaler and Seebauer, 2019; Satterthwaite et al., 2020), and pre-established trust (Seebauer and Babcicky, 2018). Drawing from the environmentally embedded motivations for communal flood-adaptation, the process can address both the ecological and social systems of SER.

2.4 Placemaking

Placemaking is an approach to transformation and governance of public spaces, driven by local stakeholders, responding directly to their needs (Hes et al., 2020), and forming place attachments (Ellery et al., 2021). It is becoming a globally acknowledged method of empowering public space appropriation (Strydom et al., 2018), yet such practices have long existed in different cultures and expressions (Hes et al., 2020).

Placemaking and its components (e.g. place attachments, participation) appear in many resilience frameworks, due to their focus on experimentation (Ahern, 2011), the connection between physical and social infrastructure (Shafiei Dastjerdi et al., 2021), and

environmental management (Strydom et al., 2018). Enqvist et al. (2019) name Placemaking Stewardship as a type of local environmental activism. Murphy et al. (2019) note that ES groups' engagement in placemaking is motivated by their relationships to the spaces. This points to people-centred public spaces increasing local agency and contributing to local flood vulnerability reduction (Matos Silva and Costa, 2016). Theorisation of Southern urban practices by Bhan (2019) has put forward several observations – e.g. spatial and temporal contextualisation, uncertainty, incremental and fluid nature. These relate closely to the core elements of Placemaking – People, Process, Product, Programme, and Place evaluation (Mateo-Babiano and Lee, 2020) –, pointing to its relevance in this context. While the term is rarely used in the Majority World, the principles are often implemented (Cordero-Vinueza and Viese, 2025), especially as a pathway towards community empowerment (Strydom et al., 2018). A growing number of case studies attest to placemaking's potential to use public space as both the product and the 'producer of change' (e.g. Ben Othmane Hamrouni and Wanas, 2020).

3. Methodology

This paper combines the empiric experiences from fieldwork with theoretical analysis of SER thinking. Three settings were selected: Tataouine and its rural surroundings in Tunisia, Kathmandu, the rapidly urbanising capital of Nepal, and the informal settlements of Nairobi in Kenya (Figure 1).



Figure 1. Description of selected cities and cases; authors' visuals.

The different geographic locations and climatic conditions were useful in determining commonalities between approaches and motivations in local action. The fieldwork in each city was conducted in collaboration with local stakeholders. Multiple initiatives were followed in each setting (a total of approximately 45). Unfortunate, assessing the exact number is challenging as not all were formalised, organised, or named, and some functioned as umbrella organisations.
The research design is motivated by McFarlane's reflection (2010) on historic power dynamics in comparative in urban studies, inviting to rethink strategies and embrace uncertainty. Focusing on contexts often neglected in theory-making, this study aims to emphasise grassroots knowledge production rather than evaluate the adaptation outcomes. The short-form descriptions in the Learning Cases section honour the ethnographic tradition of 'thick description' and present the settings narratively. This is inspired by 'comparative monographs' (Pinson, 2024:258), aiming to identify commonalities in complex mechanisms across cases.

3.1 Methods

The empirical study is based on 5 fieldworks, employing an ethnographic methodology (Cerwonka and Malkki, 2007:14; Fujii, 2015). The case descriptions are informed by qualitative, observational, and participatory methods. The main methods have been organised as follows (case details in Figure 1):

i. 54 semi-structured interviews (Patton, 2002:341) with varied actors - residents, labourers, farmers, community leaders, community-based organisation (CBO) members, academics, municipal officials, urban professionals, and NGO workers;
ii. 3 focus groups (Patton, 2002:385) with 21 residents from flood-prone neighbourhoods;
iii. 10 workshops on mapping and co-design (Zamenopoulos and Alexiou, 2018) led with residents (between 20 and 30 participants each).

See information on cited respondents in Appendix 1.
Data analysis was done following a variable-oriented case study approach, which focused on concepts identified within the cases rather than specific outcomes of the studied processes (Ragin, 2014:53). The collected data were coded in NVivo using an iterative coding process consistent with the grounded theory approach (Goulding, 1999). First open coding was carried out during the data collection, identifying main themes, whereas axial and selective coding were done after concluding the field activities. The analysis process and outcomes are further described in the Results section.

4. Learning Cases

4.1 Tataouine, Tunisia

> *"As the landscape outside the window changes from lush forests to silver green olive trees, to vast sandy dunes, our seven-hour drive from Tunis to Tataouine nears the end. (…) Water is everywhere, even when it's not. Empty wadis carved through the hills, dry riverbeds with meandering traces of past flows, small channels guiding water onto the fields, rock cupules collecting rain for birds… The landscape feels intentional - fine-tuned*

> *with simple yet sophisticated earth shaping techniques to preserve the smallest drop."* (field notes, 2024).

In the desert, water holds a particular significance. The value of each drop is deeply ingrained in traditional water management practices, combining scarcity through resource preservation and generosity through ecosystem thinking (Wanas and Arbi, 2023). Water has long been treated as a common good, both in local traditions and governance. Communal decision-making determines how much can be stored and how much must be passed downstream to others (T9, T8, T10, T2). The vernacular systems (Figure 2), though straightforward in design, are remarkably refined and *"entirely reliant on natural processes"* (T2). They have been perfected over generations as part of a shared responsibility to maintain these vital installations.

These arid landscapes are paradoxically prone to flash floods (Aouissi et al., 2024), with changing climate patterns extending the droughts and making the rare rainfall more destructive (T6). Local topography further amplifies the flood risk, transforming wadis [dry riverbeds] into dangerous torrents. Meanwhile, attitudes towards floodwater are changing - once seen as waste to rapidly drain away, it is now a resource to conserve (T1, T5, T8).

Tataouine, a city shaped by colonial urban planning, faces ongoing tensions between harsh local conditions and external influences on resource extraction (Grewal, 2019). Despite being the capital of its governorate, decision-making powers have gradually shifted to neighbouring administrations, leaving residents feeling increasingly politically disempowered (T3, T9). While locals are aware of these dynamics, the underlying tensions contribute to the divide between modern-urban and vernacular-rural lifeways in the region. The complex human-nature relationships, shaped by the climatic duality of droughts and floods, exacerbate the chasm.

Flood protection in rural Tataouine is intertwined with agricultural practices. The vernacular systems guide the waters, reduce damage and erosion, recharge the groundwater table, all while irrigating crops and providing local livelihoods. These installations reflect existing mosaic governance, where farmers voluntarily intervene on state or collective land, are provided with saplings, and maintain these protective structures in return (T10, T7, T8, T1). *"No single intervention can work in isolation"*, – a civil society representative explains.

By their shared nature, these spaces become sites of intergenerational knowledge exchange, meetings, mutual aid, and sharing of food and stories (T9, T8). These landmarks shape the landscape in productive ways to respond to the needs of the community. In Tataouine, residents are accustomed to self-organising and informal practices, illustrated also by the housing market largely built through auto-construction (Khiari, 2024). These informal public spaces are platforms for collective problem-solving, since individual attempts to engage with authorities face endless delays or outright rejections (T4, T7, T3). Place-based, communal, and ecological self-organisation has emerged as a pathway to reclaim agency over their environment and develop locally grounded flood adaptation strategies.

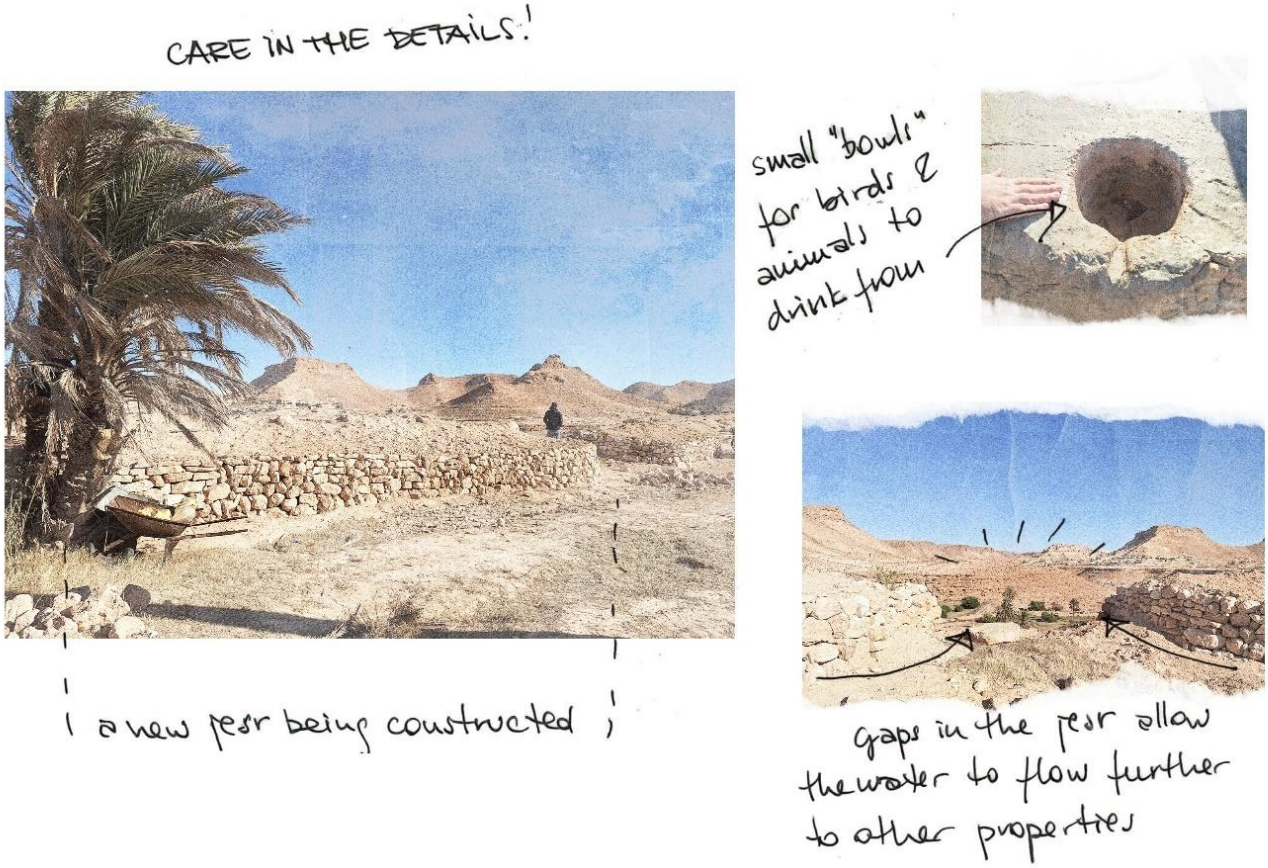


Figure 2. Vernacular water management installations in Tataouine; authors' photography and collage.

The vernacular practices and their transposition from the rural to urban environment show signs of both ES and Placemaking – through nurturing the environment, its responsible use, collective action, spatial transformation, and layered stakeholder engagement.

4.2 Nairobi, Kenya

Looking at the small stream that one can easily jump over without getting wet feet, it is difficult to imagine how, in April 2024, it swelled with floodwaters and took hundreds of lives (Oluchiri, 2025). The 2024 Kenya-Tanzania floods were swiftly followed by forced evictions of thousands of residents to create a 30-meter riparian 'buffer zone'. *"We died twice"*, a local activist reflects – once in the muddy waters, and again as homes were razed in the name of flood protection.

For many, this moment crystallised the fragility and the deep political disempowerment faced by Nairobi's urban poor (N2, N5). The spatial inequality, rooted in colonial urbanism and continued through capitalist agendas, leaves one wondering what counts as 'formal' when the majority lives in 'informality'? And who gets to decide? The fight for environmental and spatial justice is thus a fight for self-determination (Kimari and Parish, 2020). It challenges dominant narratives of progress and planning, insisting that environmental action is a necessity born from systemic abandonment (N6, N7, N9; Gilmore, 2023: 96). Underdeveloped urban drainage, encroached rivers, and missing

waste services make even small rains disastrous (N8, N10). While El Niño intensified the 2024 floods, the residents blame systemic neglect for the scale of the disaster (N4, N1).

In 2022, the Nairobi Rivers Commission (NRC) was established to address these growing issues. Out of this came a multi-level governance framework, dividing Nairobi's three rivers into 18 zones and linking NGOs, community leaders, and CBOs in a network. While the model signals a shift towards co-governance, it also exposes its limits. Zone coordinators, though central to this model, are unpaid and overstretched (N2, N9, N11, N12). Coordination remains fragmented, and few mechanisms exist for impactful collaboration or decision-making. Many community leaders refuse to participate, citing mistrust in the authorities and the already existing River Regeneration Networks (N2, N3, N5).

In this fragile and deeply politicised context, communities along Nairobi's rivers are asserting diverse forms of local agency. They clean rivers, plant trees, grow food, map flood risks, build playgrounds, organise events, and reinvent abandoned spaces. These acts of ES and Placemaking allow reasserting their right to the city and recovering from the traumatic events (Das, 2007). Caring for the river is both a survival strategy and a quiet form of resistance - creating ownership and meaning despite formal land tenure (N5, N6; Butcher, 2021).

Much of this action is led by CBOs and youth groups. Hundreds of such organisations work along the rivers, transforming spaces and uniting the communities (N8, N12). These efforts go beyond coping with floods – they aim for transformative adaptation (Muchiri and Opiyo, 2022), addressing underlying social and political issues. Yet, as Trundle et al. (2019) observe, such community systems remain largely misunderstood and unsupported in formal planning.

> *"After a few minutes of walking along the river, we arrive at a peculiar sight – a sharp border between a lush garden filled with vegetables, plants, and trees settled in organically cascading slopes towards the river, in stark opposition to a desert-like platform of sand riddled with rubbish. After approaching, I notice the platform holds several recently-planted saplings. (..) "On your right is the illegal 'occupation' by the youth groups where they plant vegetables. On the left, a tree-planting project by the government," my guide explains."* (field notes, 2024)

Such disparities (Figure 3) only deepen the mutual mistrust. The community activists have again and again proven their capabilities, knowledge, and motivation, yet a genuine consolidation of top-down and bottom-up approaches remains elusive (N9, N2). Guided by both feelings of responsibility towards the degraded river and an urgent need for safe and community-owned public spaces, these actions persist unaided to protect communities from recurrent floods.

4.3 Kathmandu, Nepal

From the Sithi Nakha festival celebrating water sources to the purifying rituals of religious traditions, rivers hold a special place in the Nepalese spiritual worldview. One would imagine such cultural heritage to be reflected in the modern cityscape of places like Kathmandu. Yet, the reality of the Bagmati River tells a different story. Pronounced biologically dead in 2012 (ADB, 2012), it has suffered from maladies plaguing many

rivers across the Majority World: pollution, industrialisation, and encroachment by accelerating urbanisation.



Figure 3. Government-led greening project alongside illegal 'occupations' in Mathare; authors' photography and collage.

The murky, rank waters are an illustration of its cultural significance being gradually eroded (Figure 4). Not only Bagmati suffers this fate. While historically the water cycle has been *"delicately interwoven with religious practices and feasts"* (Boukalova et al., 2021), today the growing cities are increasingly detached from natural and cultural rhythms (K3). Elegantly carved stone waterspouts that historically provided drinkable water in neighbourhoods are now too polluted, fallen into disrepair, or disconnected from the natural water cycle (K3, K6). This shift in human-river relationships has been further expedited by the record-breaking floods that shook the country in 2024 (K10).
Yet, care for the river has not disappeared; it adapts to new conditions and evolving values (Joshi, 2020). Recent years have shown many bottom-up activities emerging in Kathmandu. They engage in flood adaptation, ecological restoration, education on socio-ecological challenges, community-led public space creation, and nurturing new forms of river culture (K6, K5, K1). The Nepal Mahila Ekata Samaj women's group works on localised urban services, river regeneration, and communal infrastructure projects (K11; Butcher, 2021). The non-profit Nepal River Conservation Trust champions cleanup campaigns, advocacy efforts, river festivals, and responsible eco-tourism (K1, K5). The Waterkeepers initiative has assigned 'keepers' to five important rivers in Nepal, contributing to their conservation and careful use. Many more engage in tree planting, community park creation, waste collection and recycling, and so on (K7, K9). The

diversity of these initiatives forms new meanings and attachments to rivers as public spaces, ecological refuges, community landmarks, or recreational assets. Concurrently, government-led large-scale river regeneration projects have focused on riverbank clearance, infrastructure improvement, heritage conservation, and environmental restoration (HPCIDBC, 2022). However, these initiatives have fallen short in achieving lasting impact due to a lack of coordination, poor project sustainability, political inconsistency, and fragmented jurisdiction (Berg, 2025; K8, K4). A significant hurdle in the process has been the unsuccessful engagement of the informal riverine communities severely affected by the floods. While many have long called the riverside home, social segregation, distrust, and denigrating language used towards them all reveal the roots of difficulties to collaboration (K2). Nevertheless, the residents have been increasingly active in adapting to floods at the household and neighbourhood levels (Dangol and Day, 2017), in addition to positioning themselves as river custodians (K11; Butcher, 2021).

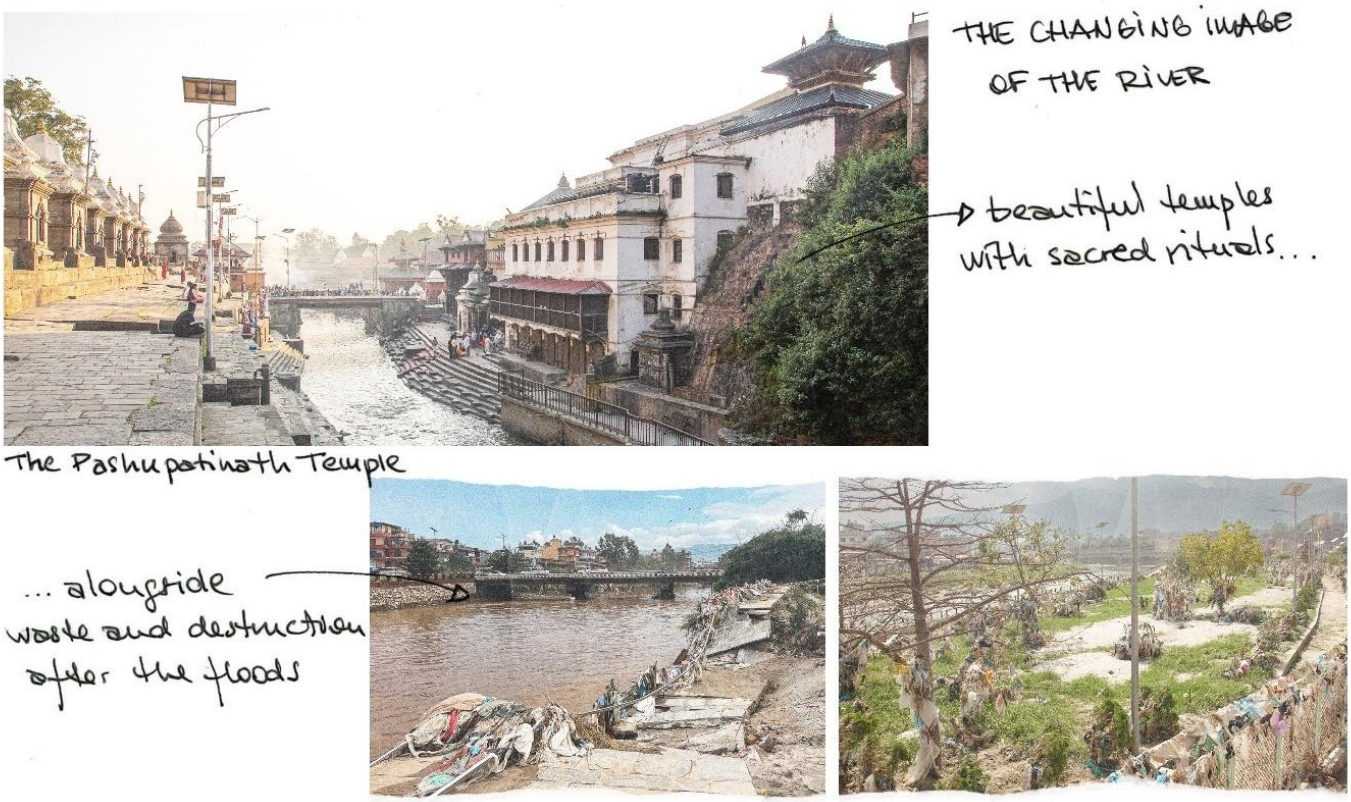


Figure 4. Conflicting perceptions of the Bagmati river; photography from Signe Berg with permission, authors' collage.

Such a strong emergence of collective action in the face of stagnant official initiatives shows that there is room for negotiated ownership of flood risk management and riparian space use. New collaborations, funding opportunities, and evolving legislation on environmental protection signal willingness and recognition of shared stewardship responsibility (K6, K8).

> *"As [anonymised interviewee] describes the event, I feel deeply moved. They say over one hundred thousand people gathered that day on the banks of the river, holding hands in a continuous human chain, showing their care, their dedication, their stance. The event of 2015 marked the 100th week of the riparian cleaning campaign and brought together people in a celebration of the river and their own efforts to protect it. The river is not forgotten."* (field notes, 2025)

5. Results

The collected data was coded and analysed in a step-wise process (Goulding, 1999). The open coding stage revealed three important aspects of community-led actions:

- The encountered initiatives consistently addressed not only flood protection, but also other needs of the community. This highlighted the relevance of studying the particular Actions the groups chose to implement.
- While mostly organised by community groups, a wide range of stakeholders was involved. This attests to the need and willingness to seek out expertise even in small-scale community projects. The complex actor-network analysis was omitted from this paper.
- Finally, even within the groups, the Motivations of members differed. A particular focus was put on linking the identified Motivations and Actions.

Thus, the analysis was narrowed down to the main Actions and Motivations (Figure 5).

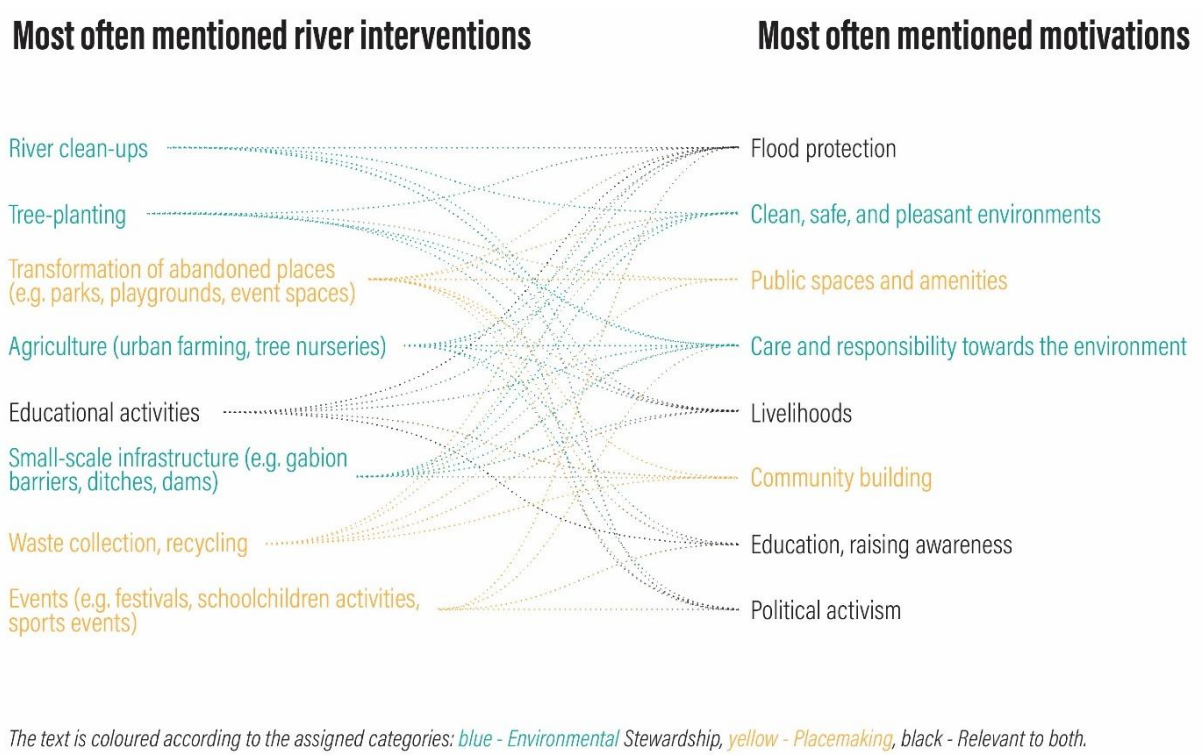


Figure 5. Analysis excerpt of observed Actions and Motivations; authors' visuals.

Axial coding revealed two distinct clusters of interconnected concepts.
Finally, the core concepts of the two clusters were identified during the selective coding phase and compared to established academic literature. The first was identified as Environmental Stewardship (Bennett et al., 2018). It refers to the care and responsibility towards the river and emerged as flood adaptation through ecological, infrastructural, and governance means. The second was identified as Placemaking (Hes et al., 2020) that refers to needs community-oriented for public spaces. This manifested as flood adaptation related to space transformation, education, agency-building, arts, and cultural activities.
The two concepts are detailed in the subsequent sections to understand their role in bottom-up flood adaptation and SER thinking (Figure 6). The analysis follows the three main components of the SER thinking framework (Persistence, Adaptability, and Transformability) by Folke et al. (2010), overlayed by the themes linking SER, urban resilience, and resilient urban design (Diversity, Social capital, Innovation, and Learning), identified by Quigley et al. (2018). The assertations are made based on the Actions and Motivations expressed by the respondents (group members and area residents).

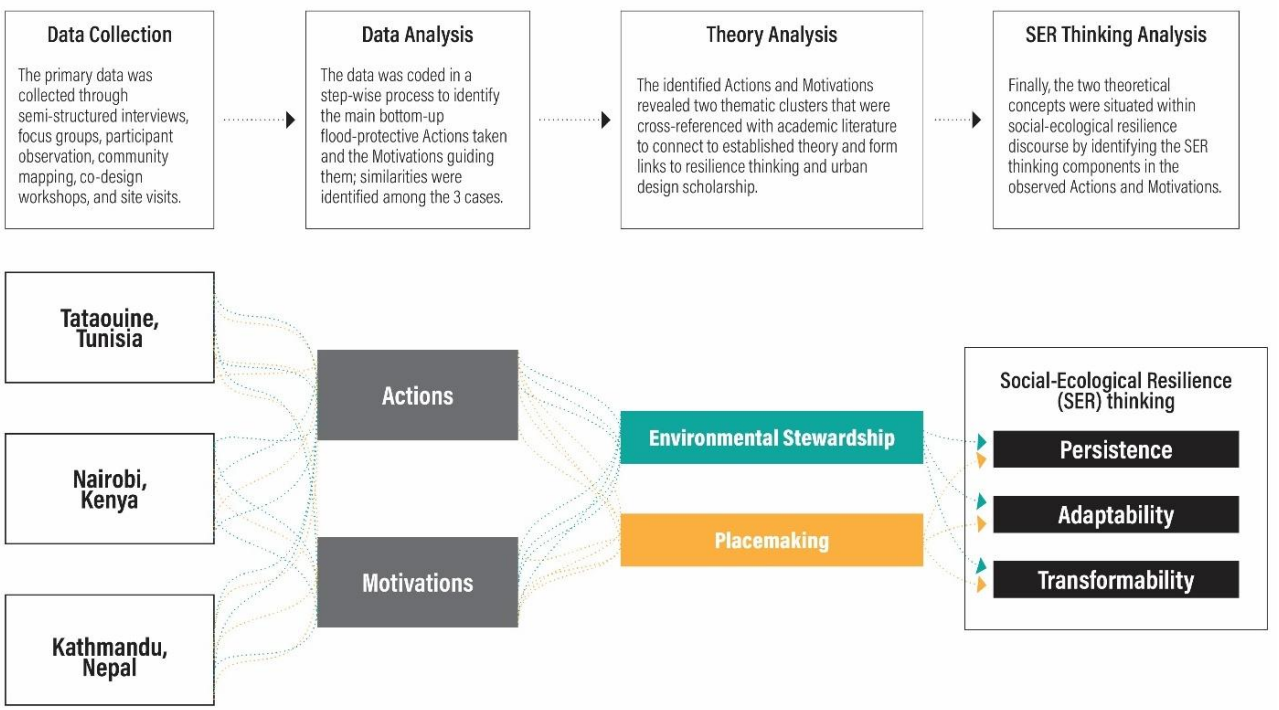


Figure 6. Overview of the data collection and analysis process; authors' visuals.

5.1 ES in SER Thinking

Research shows how self-organised environmental action can be sustained long-term (Seebauer et al., 2019) and gradually accumulate capacity and knowledge (Murphy et al., 2019), revealing the Persistence of such action. The intergenerational learning and collective efforts of the farmers in Tataouine illustrate the incremental evolution of

everyday practices that build up the adaptive capacity. Similarly, in Kathmandu, the civil society-organised weekly river clean-ups have been going strong for more than a decade. Environmentally motivated, such actions also contribute to community building and raising awareness. They have direct impacts on the physical environment on different time scales – from the immediate improvements to the long-term ecological and societal impacts.

The bottom-up and locally attuned roots of ES reflect its Adaptability. In Nairobi, by banding together, local actors tap into the common adaptive capacity and social capital to build on it. Combining informal River Networks and official multi-level governance systems links diverse stakeholders and creates overlaps in governance. This can expand the field of responses to different spatial and temporal scales (Eakin et al., 2025). While numerous community-level organisations engage directly with riparian spaces, ES here is also a tool of resistance and agency-building, e.g. implementing nature-based solutions, yet labelling them as 'occupations.'

These 'occupations' alongside other small-scale innovative solutions (e.g. Tiny Forests in Kathmandu) promote Transformability. Using crises as opportunities for new endeavours, groups self-organise to take ownership of river spaces, co-manage them, and co-design solutions despite the negotiated tenure and possible threats. Light and reactive experimentation can facilitate emergent behaviours in a 'safe-to-fail' environment (Ahern 2011) and lead to gradual change to new states of equilibrium.

The observed ES initiatives show a strong link to SER thinking on all three main aspects of the framework. They also align with Innovation (experimentation, small-scale intervention), Social capital (collective action, local leadership), and Learning (adaptive capacity) components of SER in urban design (Quigley et al., 2018).

5.2 Placemaking in SER Thinking

Persistence might seem contradictory to placemaking's motto 'lighter, quicker, cheaper', yet, through community-building and raised awareness, placemaking initiatives present long-term impacts. In Kathmandu, it responds to cultural shifts in human-nature relationships. As the historic links with rivers fade, local organisations explore new avenues, like recreation, to allow people to experience, learn, and reconnect with nature. Shifting perceptions can develop new types of stewardship (Enqvist et al., 2019) that will, in the long term, build ownership and promote ecological actions. In Tataouine, the perception of water and the connected infrastructure as common goods create community ownership and useful overlaps in local governance. This contributes to the Persistence of the system and opens to a reflection on multiple spatial scales – individual, communal, and watershed.

Placemaking also contributes to Adaptability. Community groups across Nairobi and Kathmandu make deliberate efforts to work on education, knowledge sharing, and dissemination of community stories (Muchiri and Opiyo, 2022). Such educational activities, especially geared towards children and youth, increase their engagement, learning, and social capital (Cordero-Vinueza and Viese, 2025). Youths in Nairobi reclaim the riverbanks through communal projects as a means for livelihoods and political action. The importance of the historic narrative reflected in Nairobi's activism also permeates the motivations behind the Bagmati River Festival. It builds a common narrative promoting collective action for physical change to protect river environments.

The trial-and-error format common to placemaking increases the Transformability of the SES through innovation (Wu and Wu, 2013). Many initiatives start small – say, as a simple drainage project, evolving into a riverside walkway, and growing into a community park with playgrounds, kitchen gardens, and tree nurseries. Through this incremental process of learning by doing, social links and capacity are built for future crisis response and transformation (Ahern, 2011). In Kathmandu, river cleaners partner with community groups to collect plastic waste and reuse it in crafts.
Throughout the cases, insights from respondents link their Placemaking activities to the different aspects of SER thinking. They reflect the Diversity (of actions, actors, and scales), Social capital (networks, collaboration, memory), and Learning (iterative design) dimensions of SER in urban design.

6. Discussion

Similar to Bhan (2019) proposing modes of Southern urban practices to theorise on-the-ground action, this study proposes ES and Placemaking as two strategies of SER thinking in bottom-up flood adaptation. The following sections connect these strategies to the larger discourse on local resilience, adaptation scales, and self-help action.

6.1 Micro-Scale of Intervention

Informal production of urban design is an underexplored field (Dovey, 2020) that can either enhance or undermine urban resilience (Eakin et al., 2025). Strategies linking formal and informal practices are important for mosaic governance in the Majority World, which remains underexplored (Rivero-Villar and Vieyra Medrano, 2022). Looking at flood adaptation from ES and Placemaking perspectives reveals local implementation of SER thinking in the overlooked micro-scale of bottom-up intervention.
Both strategies are rooted in place – through care for the natural environment or efforts in space transformation. They reflect the focus on locality combined with a global reflection, crucial for the SER approach (Wilkinson, 2012). Through tangible, human-scale experimentation, they show the significant impact that small groups can have in resilience efforts (Adger, 2000) and social change (Folke et al., 2010). Through negotiated governance of place, ES and Placemaking can build on continuous collective experimentation in the micro scale of urban design towards local resilience (Lazarevic et al., 2018).

6.2 Localising Resilience

The idea of urban resilience has become widely accepted, despite its many critiques (Beilin and Wilkinson, 2015). Yet, it remains a largely 'fuzzy' concept (Ragin, 2000) with unclear benchmarks of what 'achieving' it means in practice, and a *"very costly public good"* (Adger et al., 2009) to implement. Nevertheless, its wide acceptance provides an opportunity, as strong willingness emerges from bottom-up initiatives to contribute to local resilience and adaptation (Thaler and Seebauer, 2019).
Numerous resilience frameworks exist for academic theorisation or professional city-wide assessment (Lazarevic et al., 2018). Yet little information is available for community-level strategies that go beyond disconnected coping actions. Thus, ES and Placemaking present themselves as useful tools to fill this gap of strategic thinking at the

community action level. Gearey (2018) notes that understandings of sustainability have to emerge from local meanings, and such place-based strategies can significantly contribute to this (Enqvist et al., 2019).

6.3 Romanticising Self-Help

Despite the benefits of community-level action in disaster risk management, it also faces significant challenges. Alone, it can also be maladaptive, exclusionary, and reactive rather than forward-thinking (Schaer, 2015; Burgess, 1985; Coates, 2015). Systemic issues such as under-resourced CBOs, precarious land tenure, subjective prioritisation, and competition for limited resources often undermine long-term benefits (Schaer, 2015; Mulligan et al., 2020; Adger et al., 2009). Promotion of self-help risks romanticising it and inadvertently delegating government obligations to underprivileged communities, as it cannot replace missing urban services (Beilin and Wilkinson, 2015).

ES and Placemaking are promising strategies that can start small, out of community needs, and grow into multistakeholder mechanisms over time (Murphy et al., 2019) as groups gain agency and influence. As Quigley et al. (2018) point out, grassroots action can lack the scope and coordination for lasting change. Thus, strategies that have proven their Persistence, ability to evolve, accumulated adaptive capacity, and agency-building can shift the CBO-action scope from adaptive to transformative (Adger et al., 2009; Fedele et al., 2019).

6.4 Limitations

The chosen research focus and methods imposed several limitations. The deliberate use of ethnographic fieldwork and qualitative design to generate rich, contextualised descriptions limited the number of study sites. The high number of active initiatives guided the narrow scope of the study: informal, bottom-up, flood adaptations in public space. This purposeful trade-off means the findings illustrate SER thinking but do not estimate prevalence, efficiency, or long-term outcomes. Future mixed-methods or larger-scale work could further the exploration and evaluation of SER thinking in practice.

7. Conclusions

The analysis of bottom-up flood adaptation initiatives from 3 cities (Tataouine, Nairobi, Kathmandu) identifies Environmental Stewardship (ES) and Placemaking as compelling strategies that reflect social-ecological resilience (SER) thinking and align with the SER agenda in urban design.

The theoretical approach addresses 3 recent shifts in urban design: the increasing focus on resilience, the growing attention to community-level action in adaptation, and the 'Southern turn' in theorisation. These shifts highlight the need to better understand and operationalise informal bottom-up action, to explore how resilience is implemented in urban practices without professional designers. Identifying effective on-the-ground strategies aims to move beyond simplistic interpretations of resilience and to advance a broader pursuit of SER thinking.

Studying ES and Placemaking in the bottom-up urban design context demonstrates their potential in the resilient urban design discourse in three ways. First, through negotiated governance of place, they can build on continuous collective experimentation in the

micro scale of urban design to advance local resilience. Second, they introduce a strategic dimension in the community-level action that bridges the professional urban design and individual coping mechanism gap. Finally, the strategic SER thinking allows such initiatives to grow over time and develop transformative potential rather than performing only adaptive or coping actions.

The identified strategies – ES and Placemaking – are by no means exhaustive or fixed. More research into their implementation is necessary to evaluate their contributions to resilient urban design. While Placemaking is already heavily researched and promoted, with clear implementation and best-practice guides, ES is still new in the urban design field. Both strategies are innovative in the context of flood adaptation and require additional exploration. Further research is also needed on the capacity of these strategies for transformative adaptation, addressing underlying social issues and inequalities. This could be done by conducting longitudinal studies on emerging initiatives, like the 'Adopt a river' or similar concepts, currently gaining popularity.

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