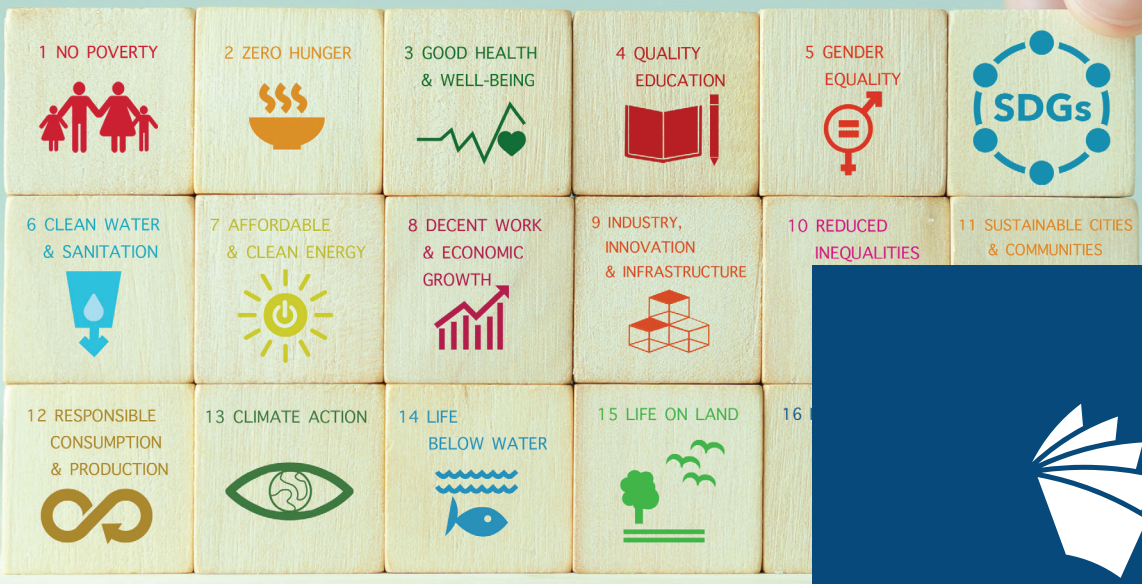

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EDITORIAL

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The Role of Participatory Planning and Design in Addressing the UN Sustainable Development Goals

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Abstract

This editorial explores the role of participatory planning and design in addressing the United Nations Sustainable Development Goals (UN SDGs) within urban, regional, and rural contexts, which is the focus of this thematic issue. Its contributions highlight how participatory approaches can foster inclusive, equitable, and sustainable urban development, moving beyond tokenistic engagement towards genuine community involvement. By examining a range of methods and case studies spanning 13 countries, the issue demonstrates the versatility of participatory planning in tackling key SDGs, particularly those related to sustainable cities (SDG 11), reduced inequalities (SDG 10), climate action (SDG 13), and partnerships for sustainability (SDG 17). We reflect on the successes and challenges of embedding participatory practices within governance structures, drawing on insights from prior academic fora and workshops we convened. Additionally, we acknowledge critiques of the SDGs for their limitations in addressing systemic economic and governance challenges, arguing for a more radical shift in urban planning paradigms. By situating participatory design within contemporary debates on sustainability, governance, and more-than-human approaches, this thematic issue advances the discourse on urban transformation and the future of SDG-driven planning practices.

Keywords

community engagement; participatory design; participatory planning; Sustainable Development Goals (SDGs); urban, regional, and rural resilience

1. Introduction

People and communities around the world are facing numerous global crises with intensifying severity, leading to increased expectations for urgent action from governments, industries, and civil society. In response, the United Nations Sustainable Development Goals (UN SDGs; https://sdgs.un.org) represent a universal global framework for addressing some of the world's most pressing challenges, ranging from poverty eradication, climate change, sustainable cities and communities, to peace and environmental sustainability (Figure 1). These 17 interconnected goals aim to create a more equitable, inclusive, and sustainable future by fostering collaboration across governments, industries, and civil society. Within this context, scholars and practitioners have identified urban planning as a critical discipline, uniquely positioned to address the complex interplay of social, economic, and environmental dynamics in the sustainability aspirations of the built environment.

Urban planning has long engaged with the aspirations of the SDGs, as seen in the literature on the built environment, housing, town planning, and smart cities. Visvizi and del Hoyo (2021) outlined the potential of technology-driven initiatives to advance sustainable urban development while simultaneously cautioning against their limitations when implemented through a techno-centric lens. This tension is illustrated by the adoption of smart city technologies by businesses and city administrations. While such infrastructure investments and deployments aim to optimise resource use, efficiencies, and enhance public governance, predominantly techno-centric and top-down approaches often overlook crucial social, civic, and environmental factors (Loh et al., 2020). To achieve the SDGs, it is crucial to shift the focus from solely "smart" technologies to participatory planning involving meaningful community engagement and collaboration with stakeholders from early design stages to project completion (Caldwell et al., 2021; Fredericks, Caldwell, et al., 2019; Kamols et al., 2021). By leveraging information and communication technology, participatory planning and design can foster a sense of shared ownership, social responsibility,

Figure 1. UN SDGs. Source: UN (n.d.).

and investment in sustainable development for cities, regions, and rural communities. Similarly, Blasi et al. (2022) have strengthened the theoretical linkage between smart cities and the SDGs, arguing for integrating sustainability principles into urban governance. However, as Schraven et al. (2021) and Yigitcanlar et al. (2019) note, meaningful realisation of the SDGs requires more than technological solutions—it necessitates a fundamental shift towards participatory, inclusive, and equitable urban planning practices.

2. Participatory Planning and the UN SDGs

By embracing participatory planning and design, we can collectively strive for inclusive and sustainable urban development, promoting social equity, economic prosperity, and environmental stewardship. However, participatory planning practice comes with challenges. This thematic issue of the *Urban Planning* journal set out to curate a diverse collection of articles that report on challenges and opportunities as well as methods and case studies. It examines how participatory planning and design approaches can further the SDGs in urban, rural, and regional contexts. It aims to foster inclusiveness and sustainability within and beyond urban environments by prioritising the voices and needs of all stakeholders, including diverse communities and non-human living beings (Dolejšová et al., 2021; Heitlinger et al., 2024; Sheikh et al., 2023). To meet the expectations of the SDGs in our built environments, it is essential to transition from tokenistic approaches to community engagement to authentic forms of participation (Kamols et al., 2021; Monno & Khakee, 2012). Participatory planning and design hold the potential to empower communities, fostering a sense of agency and ownership that is critical for realising the SDGs. Yet, this process is not without its challenges. Too often, participatory methods are co-opted by vested interests, diluting their transformative potential (Dobson & Parker, 2023; Mattern, 2020; Teli et al., 2020).

We have sought to address these challenges through a series of academic/practitioner workshops that we convened, beginning with *Designing Smart for Sustainable Communities* at OZCHI 2019 in Perth, Western Australia (Fredericks, Parker, et al., 2019). This workshop highlighted the role of Human-Computer Interaction (HCI) in addressing the SDGs by engaging communities in co-design processes that counteract techno-centric, top-down approaches. At the Participatory Design Conference (PDC) in 2022 in Newcastle upon Tyne, UK, our focus shifted to exploring participatory design as a means of fostering sustainable and resilient communities through deeper collaboration between communities and institutions (Fredericks et al., 2022). Our OZCHI 2023 workshop expanded this discussion to consider the implications of AI, the metaverse, and "designing over a distance" for achieving the SDGs (Fredericks et al., 2023). Together, these workshops have laid the groundwork for this thematic issue, offering critical insights into the role of participatory design and planning in addressing the SDGs.

3. Scope and Coverage

This thematic issue advances participatory planning approaches and methods to explore connections between planning and the advancement of the SDGs in situ. Our key goals were to (i) demonstrate the diversity of responses and contributions from participatory planning and design in addressing the UN SDGs and (ii) highlight how these approaches vary across geographic, socio-cultural, and disciplinary contexts. We are pleased to have been able to bring together contributions from author teams and case studies spanning 13 countries: Australia, Belgium, Bosnia and Herzegovina, China, Estonia, Finland, Germany, Ireland, New Zealand, Poland, Slovakia, Tanzania, and the UK. These articles reflect a rich tapestry of

socio-political, cultural, and environmental conditions, illustrating how participatory planning and design can address the unique challenges and opportunities presented by different regional contexts.

The articles collectively explore a broad spectrum of SDGs, showcasing the versatility of participatory methods in addressing critical global issues. Many of our contributions focus on *SDG 11: Sustainable Cities and Communities*, examining urban (and rural) resilience, inclusivity, and environmental sustainability. Others align with *SDG 10: Reduced Inequalities*, exploring how participatory design can empower marginalised communities and foster equitable development. Additional goals, amongst others, include *SDG 17: Partnerships for the Goals*, emphasising collaboration across sectors and disciplines; *SDG 13: Climate Action*, addressing the urgent need for sustainable responses to climate change; *SDG 5: Gender Equality*, approaches to increase inclusivity and participation from all people; and *SDG 16: Peace, Justice and Strong Institutions*, highlighting governance frameworks that prioritise fairness and transparency. Thus, this diverse collection of articles highlights the global applicability of participatory planning and design and provides critical insights into how these methods can be tailored to meet the specific needs of different communities. By doing so, it shows the potential of participatory approaches to contribute meaningfully to the SDGs, fostering equitable, sustainable, and resilient futures across a wide variety of contexts.

This thematic issue reflects a deliberate effort to balance theoretical and practical insights, offering readers both methodological innovations and empirical case studies. While the boundaries between these categories are often blurred—many contributions seamlessly integrate methodological approaches with practical applications—we have broadly organised the articles into two groups. Five primarily focus on *methods* and seven present in-depth *case studies*. This division highlights the dual emphasis of this thematic issue: advancing the theoretical and procedural frameworks of participatory planning and design while showcasing real-world applications that bring these frameworks to life. In the following section, we briefly summarise each article, organised by these categories.

3.1. Methods

Leading our methods section is the article "Participatory Interventions: Digital Crowd Mapping Perceptions of Safety in Public Space" by Matthewson, Kalms, and Berry. Aligning with *SDG 5: Gender Equality*, and *SDG 11: Sustainable Cities and Communities*, it presents a case study of perceptions of safety amongst women and gender-diverse people in public spaces in Victoria and New South Wales, Australia. The case study utilises a participatory, interactive, geolocative digital crowd-mapping platform. The data and insights provide city planners, urban designers, and community members, with a gender-sensitive lens developed with the expertise of people from the community. This method of data collection and feminist co-design democratises the research process, amplifies marginalised voices, and avoids the hazards of technocentrism and top-down approaches. The authors argue the findings underscore the nuanced, context-specific nature of gender inequality in public spaces, highlighting the pervasive impact of social and environmental factors on safety perceptions and access in both urban contexts and rural areas.

This article, "Informing Heritage Conservation Through Diverse Experiences: The Case of the Leuven Town Hall," by Eisazadeh, Vermeersch, and Heylighen, investigates how participatory approaches can enhance built heritage conservation by integrating diverse perspectives. With Leuven Town Hall in Belgium as a case study, the article examines how engaging individuals with disability experience as experts contributes to

more inclusive conservation practices. The study highlights the role of embodied knowledge in identifying affordances and obstacles within historic sites, linking this approach to *SDG 11: Sustainable Cities and Communities*, and *SDG 10: Reduced Inequalities*. The findings demonstrate the value of participatory design in making heritage sites more accessible and socially sustainable.

The article "Participatory Retrofitting Through Extended Planners in Tanzanian Urban Areas" by Majogoro, Devisch, and Magina examines the role of extended planners, including local communities, informal networks, and grassroots organisations, in participatory urban retrofitting. This case study from Tanzania investigates how bottom-up engagement contributes to sustainable urban transformation. The article discusses the challenges of institutional recognition and scalability, highlighting the need for governance structures that integrate participatory initiatives into formal planning. It aligns with *SDG 11: Sustainable Cities and Communities*, and *SDG 17: Partnerships for the Goals*, advocating for approaches that embed local knowledge in urban decision-making.

This article, "Community Mobilisation Through Translation: A Sustainable Framework for Participatory Planning," by Tan, Rui, and Xu, examines the application of translation theory to a participatory planning framework for engaging the community of Bijiang Village, China. Workshops and public exhibitions were hosted by the community planners to share memories and histories as participatory planning methods to engage village people with the rural urbanisation process. Aligned with *SDG 11: Sustainable Cities and Communities*, it reveals how the participatory framework is applied in a continuous cycle of negotiation and realignment of citizens' interests, facilitating long-term and sustainable development for urban regeneration projects.

The article "AI-Supported Participatory Workshops: Middle-Out Engagement for Crisis Event" by Tomitsch et al. explores how artificial intelligence (AI) can enhance participatory workshops for community decision-making in response to environmental crises. It introduces the "middle-out" engagement approach, bridging top-down institutional and bottom-up community perspectives, which supports *SDG 11: Sustainable Cities and Communities*, and *SDG 17: Partnerships for the Goals*. The study highlights the potential of AI to mediate conflicts, integrate non-human perspectives, and foster inclusive dialogue, offering innovative methodologies for participatory planning.

3.2. Case Studies

This article, "Connecting to the Sea: A Place-Based Study of the Potential of Digital Engagement to Foster Marine Citizenship," authored by Willis and Gupta, used a participatory co-design approach in Plymouth, England to explore the potential for place-based digital engagement to connect people with the sea. This article addresses *SDG 11: Sustainable Cities and Communities*, and *SDG 14: Life Below Water*. The authors explored whether place-based digital technologies can engage communities with marine spaces and make coastal areas more accessible. Using the collaborative community-led concept of a city marine park, they explored the requirements for digital technologies for creating marine citizenship against the challenge of building coastal resilience. This participatory action research study took place in an urban coastal community, in collaboration with a local organisation, over a period of six months. Barriers for accessing the sea and ways in which the sea was perceived as a space in the city are identified. Co-design workshops used creative prototyping with local families to design a digital toolkit for accessing the sea. By enabling access to

temporal and biodiverse marine spaces such as rocky shores, place-based digital technologies can create new ways for communities to access and engage with the sea.

The article "The People and the Fire Tree: Co-Designing a Bushfire Early Warning System to Meet the Sustainable Development Goals" by Munoz-Rivas, Davis, and Pedell examines the integration of participatory design and citizen science to enhance community resilience in rural areas. In an Australian-based bushfire-prone community, participants co-designed "Bushwire," a socio-technical platform that facilitates knowledge sharing, environmental monitoring, and collaborative preparation for natural disasters. The article directly addresses *SDG 11: Sustainable Cities and Communities*, *SDG 13: Climate Action*, *SDG 15: Life on Land*, and *SDG 17: Partnerships for the Goals*. It highlights how digital tools can empower communities to leverage local knowledge, foster trust, and build stronger connections with their environment and among stakeholders. The more-than-human perspective aligns with the thematic issue's emphasis on innovative approaches to achieve the SDGs through collaborative planning and design.

The article "Urban Beekeepers and Local Councils in Aotearoa, New Zealand: Honeybees Are Valuable Allies in Achieving the Sustainable Development Goals" by Dimitrov highlights the significant role urban beekeeping plays in advancing sustainability goals within urban planning and governance frameworks. Examining urban beekeeping in NZ, the article sheds light on how hobbyist beekeepers contribute to sustainable food systems, biodiversity, and community wellbeing. It advocates for better integration of beekeeping practices into urban policies and calls for collaboration between local councils and beekeepers to address challenges such as restrictive bylaws and public misconceptions. This article aligns with *SDG 1: No Poverty*, *SDG 2: Zero Hunger*, *SDG 3: Good Health and Well-being*, *SDG 4: Quality Education*, *SDG 8: Decent Work and Economic Growth*, *SDG 11: Sustainable Cities and Communities*, and *SDG 12: Responsible Consumption and Production*. The study further corroborates the importance of integrating Indigenous Māori perspectives, further enriching the discourse on cultural and ecological sustainability.

This article, "Co-Designing Urban Interventions Through the Lens of SDGs: Insights From the IN-HABIT Project in Nitra, Slovakia," by Melichová and Hrivnák, examines co-design methodologies within the Horizon 2020 IN-HABIT project in Nitra, Slovakia. It analyses stakeholder engagement in urban interventions, focusing on *SDG 11: Sustainable Cities and Communities*, *SDG 10: Reduced Inequalities*, and *SDG 17: Partnerships for the Goals*. The study highlights how co-design strengthens community participation and fosters public-private-people partnerships while identifying institutional barriers. The article concludes with recommendations for enhancing co-design methodologies, including capacity-building and participatory site-specific interventions to support sustainable urban development.

The article "Reshaping Social Spaces After Socialism Through Citizen Participation: The Case of Novo Sarajevo's Post-Conflict Neighborhoods" by Tatlić and Zagora investigates participatory urban interventions in post-socialist and post-conflict Sarajevo. It examines how citizen engagement has influenced the transformation of residential neighbourhoods, addressing socio-spatial inequalities and historical legacies. The study highlights tensions between top-down planning and grassroots initiatives, demonstrating how participatory approaches can reclaim public spaces and foster social cohesion. Aligning with *SDG 11: Sustainable Cities and Communities* and *SDG 16: Peace, Justice, and Strong Institutions*, the article advocates for inclusive planning that integrates community-led initiatives into urban governance frameworks.

This article, "Local Voices, Global Goals: Participatory Planning for Localizing the UN SDGs in UNESCO Heritage Site Management," by Eremenko and Kraski, explores the role of local actors in integrating SDGs into World Heritage Site Management Plans, within a polycentric governance framework. This case study is situated in the medieval town of Toruń, Poland. The authors employ a triangulation of qualitative approaches, including in-depth interviews with diverse groups including citizens and experts, participant observation, and analysis of key documents facilitating the pursuit of the SDGs in urban planning. A key actor, the local Revitalisation Committee contributed to the formulation of the World Heritage Site Management Plan and integration of *SDG 11: Sustainable Cities and Communities*, and *SDG 15: Life on Land* locally.

Finally, the article "Co-Creating Change: Seedbed Interventions as Catalysts for Equitable Urban Planning—The Case of Umeå" by Gäckle et al. presents a comprehensive analysis of seedbed interventions in Umeå, Sweden. The seedbed intervention approach was used to facilitate community engagement amongst diverse groups of citizens to achieve more inclusive urban planning outcomes. Their research aligns with *SDG 5: Gender Equality*, *SDG 10: Reduced Inequalities*, and *SDG 11: Sustainable Cities and Communities* by focusing on the "leave no one behind" principle, central to the 2030 Agenda for Sustainable Development. Seedbed intervention promotes inclusive and safe spaces based on individual participation and co-creative planning necessary for connecting top-down interests with bottom-up planning.

4. Future Outlook

This thematic issue highlights the significant relationship between urban planning and the UN SDGs, demonstrating the merits of genuinely employing participatory planning and design to address critical global challenges. The contributions illustrate the potential of the SDGs as a framework for promoting sustainable, equitable, and inclusive urban development while fostering ecological resilience and social justice. However, the SDGs have been criticised for lacking the radical vision needed to address the deeply entrenched systemic issues underlying contemporary crises (Engebretsen & Greenhalgh, 2025; Foth et al., 2021; Gabay & Ilcan, 2017).

These critiques centre on the SDGs' inability to transform the outdated neoliberal economic paradigms of the 1980s, which prioritise infinite growth and market-driven solutions led by corporations. These aspirations conflict with the Club of Rome's seminal 1972 finding that infinite growth is unsustainable on a finite planet (Meadows et al., 1972). Scholars such as Steele (2019) argue for a shift towards rewilding urban environments, recognising the need to repair human-nature relationships in the face of ecological degradation. Birkeland (2022) critiques current sustainable design frameworks for their limited capacity to deliver truly eco-positive outcomes, advocating instead for transformative approaches that regenerate natural systems.

A more-than-human perspective, as explored by Fieuw et al. (2022), emphasises the importance of planning and designing the built environment for multispecies justice, challenging anthropocentric urban development models. Similarly, Sheikh et al. (2023) propose integrating multispecies entanglements into regional planning to create city-regions that prioritise relational and ecological wellbeing over economic growth. These approaches call for a paradigm shift in urban planning and design, moving beyond the SDGs' limitations and arguing for embracing bold, transformative, regenerative, and inclusive strategies and approaches to achieve genuine sustainability that must not be human-centred but life-centred (Borthwick et al., 2022; Tomitsch et al., 2021). These thematic issue contributions align with these calls for change,

offering valuable insights into how urban planning and design can evolve to address the intertwined challenges of environmental, social, and economic justice in an increasingly uncertain future. Through the integration of participatory methods, ecological awareness, and community agency, these approaches provide pathways for rethinking sustainability to genuinely transform urban and regional systems, fostering a more resilient and equitable future for all.

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Conflict of Interests

The authors declare no conflict of interests.

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Participatory Interventions: Digital Crowd Mapping Perceptions of Safety in Public Space

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Abstract

Current estimates indicate the world will not achieve the United Nations SDG #5 of gender equality by 2030, with a more accurate prediction post-2300. Escalating global crises have brought existing gender disparities into sharper focus, exacerbating issues of unequal access and opportunity. These conditions make the prioritisation of gender equality imperative to the sustainable development of cities, regions, and rural communities. This article presents a case study of the YourGround project, which utilises an interactive, geolocative digital crowd-mapping platform as a participatory method to gather insights into perceptions of safety among women and gender-diverse people in public spaces in Australia's two most populous states, Victoria and New South Wales. The data and insights from YourGround provide city planners, urban designers, and community members, with a gender-sensitive lens developed by the expertise of people from the community. This method of data collection and feminist co-design democratises the research process, amplifies marginalised voices, and avoids the hazards of technocentrism and top-down approaches. The findings underscore the nuanced and context-specific nature of gender inequality in public spaces, highlighting the pervasive impact of social and environmental factors on safety perceptions and access in both urban contexts and rural areas.

Keywords

digital crowd mapping; gender equity; public participation; public space; sustainability

1. Introduction

In 2023 the United Nations report on progress towards the 2030 SDGs recorded weak achievements on many of the targets, including those for SDG #5, on gender equality (United Nations, 2023, pp. 22, 62). SDG #5 states that "gender equality is not only a fundamental human right but a necessary foundation for a peaceful, prosperous and sustainable world" (United Nations, 2015a). Gender equality includes the right and ability to access public space, which is key for participation in many aspects of daily life, from education, work, health, social, and other essential services to leisure and social activities and opportunities (Whitzman et al., 2013). In order to feel free to access public spaces, people need to feel safe, included, and welcome. However, women and gender-diverse people tend to experience public spaces very differently from men and may feel neither safe, included nor welcome (Kalms, 2023; Sheffield, 2020, p. 192; Valentine, 1989). Consequently, many restrict their movements in public spaces and, in particular, exclude themselves from certain areas at certain times (Koskela & Pain, 2000; Vera-Gray, 2018).

Addressing gender equality in public spaces requires innovative methods including listening to those whose voices are not always heard in urban design. The soliciting of the everyday lived experiences of women and gender-diverse people reveals spatial inequities in cities and facilitates understanding of diverse needs (Beebeejaun, 2017). In this article, we draw on two iterations of an Australian social research project, YourGround, a crowd-mapping social survey designed to unpack some of the reasons for feelings of safety and inclusion in particular kinds of locales by women and gender-diverse people, and what they think can be done about it.

1.1. SDGs: Gender Equality

One of the targets for the gender equality goal (SDG #5) is "the elimination of all forms of violence against all women and girls in public and private spheres" (United Nations, 2015a). In 1987, sociologist Liz Kelly identified a continuum of men's violence against women from sexual harassment to rape and detailed how all forms are interconnected (Kelly, 1987). Kelly also described the accumulating effect of violence, which means that violence experienced in private will impact the sense of safety in the public sphere (see also Koskela, 1997). In particular, sexual harassment is especially effective in rendering public spaces uncomfortable and frightening for women as it reminds women of their vulnerability to violence (Bowman, 1993; Vera-Gray, 2018). Harassment is a common experience for women and gender-diverse people in public spaces across the world (Sheffield, 2020). Women's fear of men's violence in public spaces is sometimes dismissed as irrational, but it is a rational response to a lifetime of exposure to potential and actual violence (Bowman, 1993; Vera-Gray, 2018; Whitzman, 2007).

A second target of SDG #5 is ensuring "women's full and effective participation and equal opportunities for leadership at all levels of decision making in political, economic and public life" (United Nations, 2015a). This includes the ability to have a say in the design of public spaces and for those spaces to accommodate their needs. Public spaces have historically been designed for and planned by men, supporting and prioritising men and their activities (Criado-Perez, 2019; Kalms, 2023; Kern, 2019). This situation reinforces gender norms and inequality. An example is travel infrastructure—such as road networks and public transport—which tends to support the movement of men commuting to and from employment (Loukaitou-Sideris, 2016; Matthewson & Kalms, 2021). Women, however, are more likely to have complex travel patterns and make frequent and

shorter trips for a range of activities related not just to employment, but also to meet family and household needs (Sánchez de Madariaga, 2013). In addition, they use public transport and walk more than men (Goel et al., 2023). Public toilets are another example of the gendered nature of the built environment, with the queues for women's toilets a commonplace frustration in the developed world (Anthony & Dufresne, 2007).

At least two more of the United Nations SDGs are involved in or impacted by perceptions of safety and accommodation for women in public spaces: SDG #3 on good health and well-being and #11 on sustainable cities and communities. First, just being in a public space can be stressful for many women and girls to the extent that it can outweigh the benefits of being there. This self-exclusion impacts the broader health and well-being of women in terms of accessing education, employment, and health services, but it also affects their ability to exercise or partake in active transport easily. Second, SDG #11 reinforces the importance of exercise and leisure with a stated target of providing "universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities" (United Nations, 2015b). In addition, feelings of unsafety in public spaces prevent women and gender-diverse people from developing stronger social and community connections that provide everyone with a sense of social belonging and inclusion, which is vital to sustainable communities (Dempsey et al., 2011).

2. Method

The case studies in this article are part of the YourGround project in Australia developed by the XYX Lab at Monash University and digital consultancy CrowdSpot since 2020. YourGround was a crowd-sourced social research project that used geo-locative crowd mapping to understand the equity of access to and use of public spaces. YourGround Victoria (YG-V) focused on surveying women undertaking exercise and recreation activities (XYX Lab & CrowdSpot, 2021). YourGround New South Wales (YG-NSW) broadened its scope to include all engagement by women and gender-diverse people undertaking any activity in all kinds of public spaces: from streets and parks to public facilities and transport hubs (Matthewson et al., 2024).

Datta and Ahmed (2020) discuss traditional maps as too often excluding the experiences and ambitions of women. When such maps inform policies, they automatically exclude and marginalise women constituting a severe limitation on their ease of access. Crowdsourcing is an increasingly used means of gathering information using citizens. In particular, over the last 10–15 years, fast-evolving digital technologies have offered highly innovative ways of obtaining information from the public about a wide range of matters including those to do with urban design (Finucci & Masanotti, 2023). Previous research suggests that such alternative and innovative data-gathering initiatives can draw on the voices of the marginalised, and this can help challenge barriers to participation in public spaces (Kalms, 2023, pp. 22, 84).

YourGround was web-based, accessible by digital/smart devices, and designed to reduce the barriers to engagement by using interactivity, visuals, and an intuitive interface. Easy access to the survey was critical for harvesting the stories and concerns of as wide a range of women as possible. Like other crowd-mapping surveys, YourGround offered anonymity—also important for lowering barriers to participation (Kalms, 2017). However, crowd mapping is dependent on citizens' access to the technologies. Australia does not have the limitations to accessing crowd-mapping technology that some other countries experience (Datta & Ahmed, 2020). Mobile phone usage is extensive. There are some internet coverage gaps but these are mainly in the more regional and rural areas of the country.

Participants to YourGround were able to place a pin on a precise geographic location in a public space to detail where they felt either uneasy, scared, and unwelcome, or happy, safe, and included. Once a pin was placed, the survey form appeared. Visitors to the site could peruse all the pins placed but only some of the supplied survey answers to preserve anonymity. Visitors could then contribute to the overall survey by commenting on existing pins or showing agreement by clicking the "thumbs up" button. YG-V gathered 5,533 responses comprising 3,182 pins, 683 comments, and 1,668 thumbs-up supports; YG-NSW drew on a smaller cohort total of 1,614 responses, with 1,031 pins, 191 comments, and 392 supports.

Underpinning the YourGround project is a gender approach to urban planning that is critical to making public spaces safer and more inclusive for women. Crowd mapping has been used very successfully to record specific incidents and locations of sexual violence and harassment through projects such as HarassMap, SafetiPin, and Free to Be (Chiao et al., 2021; Kalms, 2023; Plan International & XYX Lab, 2018; Viswanath & Basu, 2015). All confirm the high incidence of these events in the lives of women and gender-diverse people. However, YourGround was not designed to be this kind of reporting tool nor to be a tool for directly identifying hot spots (good and bad). Press interest in previous crowd maps run by CrowdSpot had highlighted supposed hotspots, but this approach risks obscuring the subtleties and potentials of the survey. It also risks reproducing particular urban spaces as sites of fear (Fileborn, 2021).

YourGround went beyond the sexual violence mapping projects listed above by inviting participants to describe experiences that made them feel safe and included or otherwise. In particular, it asked for details on the physical aspects of the location that contributed to the experience drawing out matters of particular concern to planners, designers, and policy makers. This acknowledges that safety is complex and extends further than the fear of sexual assault or intimidation, as important as that is, towards elements of exclusion. YourGround also allowed participants to suggest what might help improve the situation.

The YourGround surveys included open-ended questions (which allowed participants to describe in their own words their experiences and opinions), multiple-choice answer questions about safety-related experiences in public spaces, and general demographic questions. Because the survey captured respondent's experiences in both free text and set answers, it was able to be analysed both qualitatively and quantitatively creating a rich dataset. Free-text responses were thematically analysed or coded to identify prevalent trends and provided details that the set answers could not capture. Crowd mapping can be random in who might contribute to the map and consequently, they are not necessarily representative. However, when the many stories gathered are analysed, a collective consensus is possible.

One of YourGround's strengths was its ability to investigate multiple axes of information. A key set of the multi-choice answers listed reasons why a place might feel safe or not—these reasons were drawn from a range of research and workshopped with the partners to the projects. Participants could choose as many or as few as they liked. These "reasons for safety" could then be investigated by location types, time of day, and activities—as well as by age, demographic categories, geographic location, and other factors—generating the relative importance of the reasons for safety in different circumstances. While the concept of the two iterations of YourGround was the same, some questions and set answers differed. Some changes were in response to feedback from participants and partners, and others were a result of elements that came through strongly in the coding analysis of YG-V. YG-V provided 8–9 safety factors each for safe and unsafe pins while YG-NSW provided 13 each (Table 1).

3. Findings: How the Findings Feed Into SDG, Participatory Design, and Urban Design

What becomes clear from the findings of the YourGround project is both the complexity of planning for safety and inclusion, but also the level of universality of experiences for women and gender-diverse people in public spaces. In general, women learn to "read" public spaces for clues relating to their risk of being there (Vera-Gray & Kelly, 2020). They read both the physical and social aspects of a location for these clues. The former include the lighting, space conditions, and amenities or facilities and the latter relate to the other people present in the space—who they are, what they are doing, how many there are, and so on. Readings of public spaces are also inflected by the personal history of each woman (Yavuz & Welch, 2010, p. 2495).

3.1. Reasons for Safety and Inclusion

Participants could select from a series of provided reasons for feeling unsafe and excluded. Table 1 lists the reasons in order of frequency of selection for all participants in each iteration of YourGround. The patterns of selection shifted with demographics, situation, activity, and between the two iterations. However, some aspects remained constant.

Table 1. Reasons provided by survey.

YG-NSW		YG-V	
Safe	Unsafe	Safe	Unsafe
There are other people around	Lighting is bad	Space seems well-maintained	Poor lighting
It's easy to see what's around me	Bad vibes	Can see ahead	The behaviour of people here makes me uncomfortable
Good vibes	Feels isolated	Pathway is safe	No people around
Path condition is good (e.g., wide, even)	Hard to see what and who is around	Easy to find my way around	Hard to see what and who is ahead
Lighting is good	There are no people around	Clear exits/entrances	It feels uncared for
I know this place well	It's not well-maintained	Lighting is good	I feel trapped here
It's well-maintained	Bad stories	Buzzing/Good vibe	Bad stories here
It's easy to find my way around	Feel trapped here	Not too crowded	Overcrowded
Mobile phone coverage is good	Hard to find my way around		It's hard to find my way around
It's accessible	Inaccessible/Not fit for my needs		
There are good amenities here	Feels overcrowded		
Not too crowded	Visible security		
Visible security (e.g., CCTV, security personnel)	Mobile phone coverage is poor		

Source: Matthewson et al. (2024) and XYX Lab & CrowdSpot (2021).

First, participants selected far more of the reasons for a place feeling safe and inclusive than they did for a place feeling unsafe. Moreover, while "there are other people around" was the most commonly selected reason for feeling safe (78%) in YG-NSW, less than 1% of participants chose this reason on its own. Just 4% selected only one reason and 83% selected four or more from the list. This pattern generated an average of 5.9 reasons. In marked contrast, on the unsafe pins a much higher 20% of the participants selected only one of the provided reasons for lack of safety, with a much lower 39% choosing four or more. This created an overall average of 2.9 reasons. YG-V presented the same discrepancy: a high average of 3.85 for safe reasons compared with a 1.85 average for unsafe (7% of safe pins selected a single reason and 28% a single reason for unsafe pins).

While this result might suggest that unsafe spaces could be remediated simply by responding to that single element, it was clear that the situation was more complex than this. So, although both surveys recorded bad or poor lighting as the top reason for a place being unsafe, less than one-quarter of participants chose it on its own. This is important to unpack because "improve the lighting" is often a reflexive response to safety concerns; indeed 59% of those who offered recommendations in both iterations of the survey requested better lighting. But in their answers to the range of questions in the surveys, participants to YourGround also suggested that while lighting conditions are a strong contributing factor to their sense of safety, it is by no means the only one. The implication for urban designers and policymakers is that to design safe and inclusive public spaces they need to consider a wide range of design elements and strategies, and not rely on lighting alone to "fix" problematic spaces. Instead, no one element alone can provide a feeling of safety and inclusion—the design of public spaces for safety and inclusion will always require attention to a mix of elements.

Second, collating all the reasons selected for feeling safe and unsafe generated rankings. Table 1 lists the overall rankings but they were dynamic, shifting depending on different analytical categories. For example, poor lighting spiked for those over the age of 50 in YG-NSW but dropped to second place for those under 30 behind bad vibes. Bad vibes were also more important than lighting for street and public transport locations, for waiting and shopping activities, and for those with a migrant or refugee background. Note that with the "vibes" set answer, participants could describe any strong feeling about a location where the direct cause of that feeling might be hard to pinpoint. Isolation equalled lighting in car park areas and spiked for Metropolitan fringe locations.

In the main, these differences in rankings were a matter of degree rather than concerning discrepancies, but they do emphasise the nuanced nature of safety concerns in public spaces. Even though some of the reasons for safety or lack of safety might rank low overall, they still held significance for particular groups, locations, or activities included in the surveys. For example, YG-V found that lighting was much more critical for participants who were runners and dog walkers than it was for those doing other activities (the Victoria study restricted participants to selecting one activity). The stories from participants told us that this was often due to these activities typically being undertaken on a regular schedule before or after standard work hours—dawn and dusk times in winter—meaning that such activity was compromised during these months. The perception that darkness is an unsafe time to be in public spaces meant they felt unsafe exercising or simply did not exercise. It also means that lighting is more critical at this time of day and year. Notably, patterns of occupancy and activity in public spaces change over time—of day, week, and season. This means that perceptions of safety also change and this needs to be factored into any lighting design for public spaces.

These differing patterns of ranking for different groups, times, and the like to some extent reinforce the difficulty in planning for safety and inclusion for all women and gender-diverse people. However, they also strongly suggest that all the nominated YourGround reasons for safety and lack of safety have importance and priority for some groups at some time. They are context-dependent, varying based on individual experiences, activities, and environmental conditions. This means that urban designers need a comprehensive understanding of all the elements listed in Table 1 and the impact they have on safety and inclusion concerns.

Third, a number of the reasons able to be selected for unsafe pins strongly connect to the fear of violence from unknown men. In particular those concerned with poor visibility, limited sightlines, and wariness of isolated spaces and entrapping ones (some of the reasons for feeling safe were the opposite of these; see Table 1). In both surveys "hard to see what and who is around/ahead" ranked fourth overall. However, concerns about visibility also featured in 29% of the stories associated with unsafe pins in YG-NSW and 32% for Victoria (excluding concerns about lighting). Visibility includes awareness of places where predators could potentially hide, places where it might be possible for an opportunistic man to hide and possibly attack (feeling trapped set answers were selected on 17–20% of unsafe pins in the surveys). Visibility is critical to a sense of safety as it allows women and gender-diverse people to assess the risk of gender-based violence (Kalms, 2023, p. 199). In addition, visibility issues were recorded at higher than average levels by LGBTIQA+ participants, a reflection of the vulnerability of this group.

The calls for better lighting noted above are also because at night visibility is reduced, as well as the media often conveying the idea that "bad things happen at night" (Hubbard, 2005, p. 120). For that reason, 27% of YG-NSW specifically never went to certain locations at night (a set answer), while 15% of Victorian participants stated the same in their stories (we presume that were this a set answer this figure would have been higher).

3.2. Women Limit Their Engagement With Public Spaces

Safe and unsafe locations in YG-NSW showed distinct patterns in the types of activities participants did there (the Victoria survey only allowed the selection of one activity). Participants consistently used safe locations for multiple activities, indicating both a sense of comfort in, and versatility of, such spaces and suggesting that public spaces that encourage longer stays and diverse activities receive positive reviews. In contrast, unsafe places were predominantly used for a single activity (67%), suggesting that these locations were far less welcoming. Moreover, that single activity was overwhelmingly "passing through" (travelling to and from a destination) and was selected at a rate more than four times the frequency of the next most selected activity. Clearly, if a place felt unsafe, the participants were reluctant to do anything there but pass through—some noting that they did so as fast as possible if they were unable to avoid the location.

Street, public transport, and trail and walkway locations are clear places where passing through would be expected to be the dominant activity. However, it was also commonly selected for other kinds of public space where other activities are supported and encouraged. For example, it was selected for 58% of pins placed in open spaces including parks. Here there was a sharp distinction between those pins in open spaces deemed safe and those unsafe: passing through features on 41% of safe pins as an activity undertaken there but 71% on unsafe pins placed in open spaces. Relaxing and recreation were dominant (76%) in safe open spaces but dropped to 24% for unsafe open spaces.

Passing through is a critical activity for accessing multiple education, work, health, social service, leisure, entertainment, and other destinations, but it is also the activity that requires the least engagement with public space and the people in it. Moreover, three-quarters of the YourGround participants used safety tactics when negotiating their journeys: avoiding some places if they could (YG-V 15%; YG-NSW 34%) or at night (YG-V 15%; YG-NSW 27%), or would only go if they were with someone else (YG-V 39%; YG-NSW 15%; the different results between the two surveys were due to differing set answers.) This lack of engagement with public spaces or of self-exclusion from them by women and gender-diverse people is a key issue for urban designers and policymakers who want public spaces to be occupied and used by a range of people. The notion suggested by YourGround participants that women and gender-diverse people may not feel welcome or able to linger in public spaces has a major impact on the ability to develop strong social connections with their local community.

3.3. What Makes a Place Safe or Unsafe? The Physical Environment

YourGround was particularly interested in the impact of the physical conditions of public spaces. The nuances of lighting and visibility have already been noted. There was a strong alignment in YG-NSW between the selection of lighting for the safe and the unsafe pins: Lighting (good) was selected on 59% of the safe pins and bad lighting on 57% of the unsafe. YG-V showed more of a discrepancy (58% bad; 47% good) but still confirms the importance of lighting in the perception of safe and inclusive public spaces.

Certain locations ticked multiple boxes for feeling unsafe—notably tunnels and underpasses. The following quote from a participant in YG-NSW highlights the range of unsafe elements in this kind of locale:

> I try to always walk through the train station as the pedestrian railway underpass is scary day or night. The tunnel has broken glass, graffiti, smells of sewage, there is no CCTV, the convex mirrors which once let you see who was in the tunnel have been removed, some of the roof panels have fallen or been taken off, exposing old peeling lead paint. (Comment on Strathfield Station Underpass Pin, YG-NSW.)

The quote highlights poor maintenance and poor visibility, including the lack of or loss of infrastructure that might aid visibility and safety. Being well maintained topped the reasons for safety in YG-V for safe pins (Table 1). Although it was ranked further down in New South Wales, it was considered especially important for public amenities where it ranked second. Poor maintenance, including the presence of rubbish and graffiti, was selected for 26% of the unsafe pins for both YG-NSW and YG-V as an element that made a place feel unwelcoming and unsafe. Levels of maintenance are a key clue that women and gender-diverse people read when assessing risk in any public space and are an element that has a long history in crime prevention literature (Lorenc et al., 2013).

The path condition being good was one of the top four reasons why a location felt safe for YG-NSW participants submitting safe pins and in the top three for YG-V. This was particularly so for older age groups. Conversely, the stories on the unsafe pins suggested that poor path conditions contributed to making a place feel unsafe for some participants.

Mobile phone coverage was introduced into the New South Wales iteration of YourGround based on a safety survey conducted the previous year which considered it a notable safety factor (Transport for NSW, 2023). While coverage was selected as important for 46% of the safe pins, it barely featured as a concern in unsafe

spaces at just 1%. This suggests that while good coverage was part of the package of elements that helped generate a positive sense of safety, its absence was less of an issue for lack of safety. It is possible that because the main activity in unsafe locations was passing through, then participants may not have noticed phone coverage, or they quickly selected the most obvious elements such as lighting and maintenance.

3.4. What Makes a Place Safe or Unsafe? The People

Who is in a location—and what they are doing there—affects how safe and inclusive, or not, it is or is perceived to be. The presence of other people tops the list of reasons for a safe and inclusive space in YG-NSW (78%) and was a strong result from the coding of responses in YG-V (52%). However, both surveys noted caveats about the kind of people around—with "friendly," "diverse," and "welcoming" being noted—and families, children, and dog walkers were clearly described. Within the stories, participants noted that such people provided a sense of positive surveillance, monitoring the behaviour of others which would prevent poor behaviour. Coupled with this was an expectation that if there was a problem, others were around to help. Other area users, passers-by, and nearby workers and residents together also create a busyness in a location, which participants also noted was a factor in a place feeling safe and inclusive—63% for YG-NSW and 43% YG-V, both set answers.

On the other hand, unsafe and excluding locations could be either crowded or empty of people, although the lack of people rated as a much higher concern than overcrowding in both surveys (3–5% for overcrowding and 36–39% for no people around). Isolation was a separately recorded issue, one which meant both "no people around" and that a location wasn't surveilled by nearby buildings or activities at all (42% in NSW as a set answer and 21% in Victoria from the coding).

A further concern for unsafe locations was the kind of people there. If safe and inclusive places were populated by friendly people, unsafe and excluding ones featured unpredictable or difficult people (acknowledged in 46% of YG-V responses for unsafe pins set answer and 39% of YG-NSW coded responses). Spaces that were numerically dominated by men were explicitly noted in around 1% of the stories in both surveys. These were mainly sports venues and particularly skateboard parks. All situations were uncomfortable for women and gender-diverse people who participated in the YourGround surveys.

3.5. Suggestions From Participants

Around a quarter of participants in both surveys made suggestions for what might help—these were free-text answers that were coded. Better lighting formed 59–61% of the suggestions, a result that aligns with the top ranking of lighting as a reason for the lack of safety in both surveys. However, this "better" was qualified by the participants. Better lighting was not necessarily more lighting, although participants in both surveys were especially interested in improved lighting at dawn and dusk in the winter months to make their exercise and commuting feel safer. Better lighting also meant lighting that was properly maintained, and not overly bright as some felt exposed under such conditions. Others were keen to protect native fauna from strong lighting. In general, lighting in public spaces needs to be carefully designed (Yang et al., 2022).

There was a similar result from each survey desiring better maintenance—18% of all the suggestions, which included 8% requesting the trimming of vegetation to ensure better visibility. Alongside maintenance, as might be expected from the importance recorded in YourGround of the presence of people, amenities that

might attract 'good' people to a place were also strongly requested. This result suggests that multiple physical conditions are key for attracting people, which in turn are good for improving perceptions of safety and inclusion.

3.6. Findings Summary

Women's sense of safety in public spaces is strongly impacted by the real and perceived threat of violence from men. The YourGround surveys examined a range of both physical and social environmental factors that either imply an opportunity for perpetration of such violence or offer a sense of safety from it. Participants were highly sensitive to the general feeling or "vibe" of a location and were very much concerned with visibility. YourGround also uncovered a lack of engagement with public spaces by women: They tend to move quickly through spaces they consider unsafe and find too few reasons to linger or occupy.

Overall, the YourGround surveys support existing research that finds women and gender-diverse people often experience feelings of unsafety and exclusion in public spaces, both of which contravene the aims of SDG #5. For women to feel and be safe in public spaces, they need to have a strong sense of belonging through public spaces designed for their needs as well as the right to occupy such spaces free from the threat of violence from men.

The YourGround data highlighted the interconnectedness of diverse environmental and social factors in shaping perceptions of safety and inclusion. This means that addressing women's safety and inclusion is complex with no simple, single solution likely to resolve issues. The findings therefore suggest the importance of multiple and context-specific approaches to improving safety and inclusion in specific locations. Given this, by addressing both environmental and social factors and tailoring interventions to specific contexts and local demographics, policymakers and urban planners can work towards creating safer and more inclusive environments.

4. Conclusion

Addressing women's safety and inclusion concerns in public spaces is not straightforward and demands holistic, nuanced, and gender-sensitive strategies. YourGround participants emphasised the significance of feeling comfortable occupying urban spaces, and improving physical conditions in order to attract people to use and occupy a location is critical to inducing this feeling. At the same time, the surveys also showed the need to address systemic gender inequality issues, such as men's violence, gender-based discrimination, and unequal access to resources.

The YourGround surveys built user-generated spatial datasets that can inform a range of location-based insights to help improve access and inclusivity in public and urban spaces for women and gender-diverse people vital to achieving sustainability goals. These insights can be used by those involved in urban design spaces to improve women's safety and inclusion in public spaces. They provide information highlighting the needs of women and gender-diverse people in communities which can impact strategic planning and budget allocation and build awareness about gender issues within communities. The archive maps are also available online and anyone can zoom into a particular location to see what might have been said about it. This means that there is a longevity of some data for future research and information for local authorities.

However, there are limits to YourGround. While overall it clearly shows addressing women's safety and inclusion is complex with no single bullet remedy, the result that safety is context-specific means that localised investigations of problematic areas identified are important. In doing so, YourGround strongly suggests it is vital to draw on the local knowledge of those who live and work in and nearby when proposing changes. Inclusivity is critical to feeling safe and it begins with including women in not just the evaluation of public spaces but also the design of them.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

Data may be available on request to the corresponding author. Otherwise, see Matthewson et al. (2024) and XYX Lab & CrowdSpot (2021).

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Informing Heritage Conservation Through Diverse Experiences: The Case of the Leuven Town Hall

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Abstract

Awareness is growing of the need for more inclusive and sustainable cities and communities, as evident in the objectives of the United Nations Sustainable Development Goals. The targets underline the importance of participatory approaches, protecting cultural and natural heritage, and providing universal access to inclusive public spaces. To achieve these targets in the context of built heritage, our research explores a pathway that aligns with conservation practice's gradual shift to collaborative approaches involving diverse others. Seeking a more inclusive approach in built heritage conservation, we engage people with diverse bodies and minds as users/experts, attending to their situated and embodied experiences. Their unique expertise-by-experience informs architecture and conservation practice by providing nuanced insights into qualities and obstacles of built heritage. However, suitable methods and tools are necessary to capture and transfer these insights to practice effectively. In this article, we present the approach we experimented with in the case of the historic Leuven Town Hall (Belgium), which is undergoing a restoration project. We outline our process and methods for transforming disability experience into actionable knowledge that facilitates exchange between users/experts, architects, and city representatives. We detail how the resulting tools illustrate and situate the identified qualities and obstacles in the user/experts' interaction with this heritage site, building on the concepts of affordance and gradient of accessibility. Leveraging user/expertise for built heritage, our approach promotes a conservation process inclusive of diverse voices and experiences and fosters collaboration between academia and practice, while contributing to creating inclusive and socially sustainable historic environments.

Keywords
affordance; built heritage; disability; inclusive design; participation; user/expert(ise)

1. Introduction

The United Nations Sustainable Development Goals (UN SDGs) aim towards a better and sustainable future (by 2030). Goals such as "reduced inequalities" (goal 10) and "sustainable cities and communities" (goal 11) emphasize a growing awareness of the need for more inclusive and sustainable societies reflected in their living environments (United Nations, n.d.). The targets of goal 11 underline the importance of participatory approaches, protecting and safeguarding cultural and natural heritage, and providing "universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities." Our research on inclusive built heritage seeks to contribute to achieving these targets.

Conservation practice is increasingly embracing collaborative approaches, influenced by social and political changes that push for more participatory methods including others beyond heritage experts (see Eisazadeh et al., 2023). In line with these changes, we seek a more inclusive approach to built heritage conservation that includes diverse voices and experiences. To this end, we adopt a participatory approach and engage people with diverse bodies and minds, attending to their situated and embodied experiences.

Through their daily encounters with disabling situations, individuals with diverse bodies and minds develop a distinctive expertise derived from their experiences. As users/experts, they offer valuable perspectives on the built environment, contributing insights and solutions that help create spaces that are more accommodating to a wider range of people (Ostroff, 1997).

With the objective of making built heritage more inclusive, we conduct multiple case studies to understand users/experts' experiences in selected heritage sites and explore the potential of disability experience for reviving and reconnecting heritage with the broader society. In this process, suitable methods and tools are required to capture and transform disability experience into actionable knowledge for conservation practice.

In this article, we present our approach in the case of the Leuven Town Hall (*Stadhuis*) in Belgium, which is located in the centre of this historic Flemish city. This prominent heritage site dating back to the 15th century consists of multiple wings around an inner courtyard (the *Vrijthof*), with the gothic wing as the icon of Leuven (Figure 1).

In 2019, the city administration of Leuven organized a design competition for the conservation and adaptation of the Town Hall. To this end, they collaborated with the team of the Flemish Government Architect (*Vlaams Bouwmeester*), whose core mission is to promote architectural quality in the built environment in Flanders through advising on the design and realization of public buildings and spaces. Their vision for the future of this heritage site is described on the team's website:

> With the adaptive reuse of the town hall (including the current police station), the city of Leuven is taking an important step towards opening up this top monument permanently and giving it a

Figure 1. The historic Leuven Town Hall in Belgium (© Negin Eisazadeh, 2020).

> fully-fledged cultural and tourist function….The town hall should thus offer a new, attractive, unique and atmospheric experience for both the people of Leuven and (inter)national visitors. An integrated interpretation, multifunctionality and optimal accessibility and circulation are the main starting points. (Vlaams Bouwmeester, n.d.)

From the very start of this important urban project, the city of Leuven stressed the need for a collaborative approach: "The design team will have to be prepared to go through a process together with the city in which citizens, partners and stakeholders will be very closely involved" (Vlaams Bouwmeester, n.d.).

In the initial design brief, the city's objective to make this heritage site more accessible is evident. This focus on accessibility is present in the winning design, by design teams aNNo architecten, FELT architecture & design, Atelier Arne Deruyter (landscape design), Endeavour, and 88888. As stated on the aNNo architecten website, "[m]aximum accessibility is the keyword" (aNNo architecten, n.d.).

In dialogue with the city of Leuven, we joined this project after the selection of the winning design. Building on previous experience in our research group (Vermeersch & Heylighen, 2015), we proposed to support the existing efforts for "maximum accessibility" by offering and refining our methods and tools to mobilize disability experience to inform the design process. Collaborating with the city and the project designers, we offered insight into the experiences of diverse users/experts in this heritage site in view of the initial design proposal. This collaboration was extended over several years through multiple stages of the design process, from initial to final design, in order to guard the users/experts' input.

To leverage user/expertise for (inclusive) built heritage, we explore how to capture and transfer knowledge from disability experience to inform a conservation practice that is inclusive of more diverse voices and

experiences. This article details our approach to translating disability experience into tangible and actionable knowledge that informs the design process in the Leuven Town Hall project.

We elaborate on this participatory process and present the methods and tools we used to mediate and facilitate the exchange of experiences, knowledge, needs, and ambitions between users/experts, architects, and city representatives. To communicate the insights gained from in situ go-along interviews with users/experts, we produced graphic and text reports that illustrate and situate the identified qualities and obstacles they experienced. By adopting the "concept of affordances" as action possibilities provided by the environment (Rietveld & Kiverstein, 2014), initially advanced by Gibson in 1979 (Gibson, 2015), we link the needs of diverse users to the features of the built environment. Moreover, we visualize the disability experience using a gradient of accessibility (Vermeersch & Heylighen, 2015), which goes beyond the accessible-inaccessible dichotomy. Furthermore, in the follow-up sessions, we made visuo-haptic models as accessible representations (Vermeersch & Heylighen, 2021) to discuss the design (alterations) with users/experts.

In what follows, we begin by exploring the connections between inclusive heritage, sustainability, and participatory approaches. We then elaborate on disability experience and the concept of affordance which forms and frames our research. We outline the methodology, elaborating our methods for data collection and analysis to gain insights into the users/experts' experiences in this heritage context. Subsequently, we present our resulting tools, linking embodied experiences with affordances, and their spatial grounding and implications. In discussing our approach, we explore the complexities and nuances of engaging users/experts in heritage conservation, highlighting the impact of such participatory approaches on creating inclusive and sustainable environments. We conclude by reflecting on our experiences and the potential for future research to further refine and enhance participatory practices in heritage conservation.

2. Points of Departure

2.1. Participatory Approaches to Heritage and Sustainability

Over recent years, participatory approaches to heritage that incorporate the perspectives of various stakeholders beyond the conventional heritage experts have gained prominence (Avrami et al., 2019). As heritage values are increasingly viewed as socially constructed, this evolution represents a transition towards more collaborative and inclusive heritage practices (Eisazadeh et al., 2023).

Conservation practice's gradual direction towards more participatory approaches has been shaped by various international heritage charters and documents. One significant example is the *Burra Charter*, first adopted in 1979 and revised in 2013, which has been used as "a reference point in promoting community inclusion in heritage conservation" (Waterton et al., 2006, p. 340) and dedicates Article 12 to participation (ICOMOS Australia, 2013).

In the European context, the *Council of Europe Framework Convention on the Value of Cultural Heritage for Society* (Council of Europe, 2005), known widely as the Faro Convention, highlights the importance of both "access to cultural heritage and democratic participation" (Article 12) while emphasizing everyone's right to "benefit from the cultural heritage and to contribute towards its enrichment" (Article 4a). It recognises "the need to put

people and human values at the centre of an enlarged and cross-disciplinary concept of cultural heritage" and emphasizes "the value and potential of cultural heritage wisely used as a resource for sustainable development and quality of life in a constantly evolving society" (Council of Europe, 2005).

The Faro Convention highlights the link between inclusive heritage and sustainability, emphasizing the importance of participatory approaches in this context. However, it does not clarify how participatory processes could be employed, leading to ambiguity in practice and disparity between theoretical ideals and actual implementation (Colomer, 2023).

The Faro Convention inspired the European Commission's Heritage for All initiative, which is supported by the REACH project—RE-designing Access to Cultural Heritage for a wider participation in preservation, (re-)use, and management of European culture (Forbes & Colella, 2019). This project provides a repository of good practices for participatory approaches to cultural heritage in Europe and beyond (Open-Heritage.eu, 2019) involving diverse stakeholders such as minorities and indigenous communities. Among the 128 projects consulted on the website (Open-Heritage.eu, 2019), a select few focus on diverse bodies and minds, mainly aiming to increase accessibility to culture through inclusive cultural offers and representations. This includes projects in museums (Lugo Museums Network in Spain, Inclusive City Museum in Germany, Full Access to Cultural Spaces project involving ten European countries), events (Macerata Opera Festival in Italy), and archaeological sites (Heritage for All in Poland). Forbes and Colella (2019) look into REACH's repository of good practices, stating that each one can offer valuable lessons. They argue that achieving truly transformative participation requires both short- and long-term processes. These involve testing and experimenting with participatory approaches to facilitate the transition from "rhetoric" to "practice": "from the theoretical consensus about the importance of participation, to the realisation of sustainable initiatives that verify, in the field, what works and what doesn't" (Forbes & Colella, 2019, p. 70).

On the global scale, as mentioned before, the UN SDGs emphasize the importance of fostering inclusive and sustainable environments. Furthermore, towards creating "sustainable cities and communities," Target 11.4 explicitly highlights the importance of protecting and safeguarding cultural and natural heritage. In outlining the link between UN SDGs and heritage, more specifically "reduced inequalities," the International Council on Monuments and Sites (ICOMOS) Sustainable Development Goals Working Group further elaborates:

> The dynamics of growing inequality endanger the sustainability of heritage sites and the inclusive, sustainable development of their communities. Heritage sites and practices can offer platforms for shared identities, experiences, and exchange, which help alleviate social inequalities and support the social cohesion and dignity of communities. On the other hand, in these fast-changing environments, culture-based discrimination needs to be addressed and transformed, fostering inclusive heritage practices that can play a fundamental role in the respect of human rights and the preservation and promotion of cultural diversity. (Labadi et al., 2021, p. 70)

To "harness the role of heritage in reducing inequalities and fostering inclusiveness," the working group advises engaging and empowering local communities, diverse groups, and individuals (Labadi et al., 2021, p. 71), including those with disability experience. Furthermore, they emphasize heritage's important role in shaping the unique character of cities through preserving local identities and shared values and fostering a sense of pride and belonging (p. 76).

Frameworks such as the Burra Charter, the Faro convention, and the UN SDGs highlight the growing importance of participatory approaches in heritage conservation. Despite the promotion of such approaches to engage diverse stakeholders in heritage practice, challenges in implementation exist, highlighting a need for strategies to bridge the gap between theory and practice.

2.2. Disability Experience and Heritage

In the post-modern view, disability is seen as a social and cultural construction rather than a purely biological condition that is found within the body (Devlieger et al., 2003). It is more and more understood as a mismatch between someone's body and the sociomaterial environment. Hence, as opposed to *having a disability*, (any)one can *become* or *be made disabled* (Moser, 2005). This underlines the critical role of the built environment and those who shape it, in creating enabling or disabling interactions for people with diverse bodies and minds.

Inclusive design approaches acknowledge and address this diversity of human abilities and conditions in design processes, seeking resonance between diverse needs. In this connection, users/experts and their specific experiences play an essential role (Heylighen et al., 2017). They can provide complementary perspectives in understanding the built environment, its challenges, and potentials.

Users/experts are a wide spectrum of individuals who develop natural experiences through navigating the everyday challenges posed by their environment (Ostroff, 1997), including toddlers, parents with prams, and ageing individuals with changing abilities. In the context of our research, users/experts are individuals whose diverse bodies and minds differ from the norms that are typically considered in the design of built environments and cities. Hence, they often encounter disabling situations in their daily lives and are generally referred to as disabled people or people with disabilities.

Existing literature acknowledges the value of insights gained from disability experience for architecture (Vermeersch & Heylighen, 2015), and views disability as a creative force for design, which challenges what is assumed to be "normal" (Boys, 2020). Building upon this, we explore the potential of disability experience for identifying what may hinder or facilitate interactions with heritage sites. Moreover, attending to disability experience provides an opportunity to rethink conventional normative approaches in heritage conservation (see Eisazadeh et al., 2023).

To communicate users/experts' situated and embodied knowledge derived from their bodily interactions with a heritage site, suitable methods are required. These methods should link the insights to both the user/expert and the heritage context, facilitating knowledge transfer to professional experts.

2.3. Affordance and Heritage

Building upon the work of Gibson (2015), the concept of affordance has been used in various disciplines including architecture. In architectural theory, this concept serves as a conceptual framework to understand the relationship between built environments and their occupants (Maier et al., 2009). In architectural design, it represents a shift in design thinking (Maier & Fadel, 2009), while in architectural practice, it is used as a tool to explore how design intentions align with actual use (Maier et al., 2009).

The theory of affordances provides a framework for understanding the relation between the environment and its inhabitants. Coining the term, Gibson states that "*affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*, either for good or ill….It implies the complementarity of the animal and the environment" (Gibson, 2015, p. 119, emphasis in original). Overcoming the objective–subjective dichotomy, "affordance points both ways, to the environment and to the observer" (Gibson, 2015, p. 121). Chemero (2003, p. 181, emphasis added) further refines affordances as "relations between the *abilities* of animals and *features* of the environment," which are understood as real and perceivable, and neither the properties of the environment nor the animal. The features of an object or an environment determine its affordances, which emerge when the characteristics of individuals—such as their physical dimensions and abilities, needs, and intentions—match the features of the environment (Menatti & Casado Da Rocha, 2016).

In the context of the built environment, taking into account the sociocultural context relevant for humans, affordances have been further refined as relations between *aspects* (as opposed to Chemero's *features*) of a *sociomaterial* environment and *abilities* available in a *form of life* (Rietveld & Kiverstein, 2014). Features refer to the physical and observable properties of objects or environments, such as size, shape, texture, colour, and other material qualities, which can be directly sensed and interacted with. Aspects, on the other hand, offer a broader, more holistic view. They include not only these physical features but also how these features are perceived and experienced by individuals within their specific sociocultural contexts. Hence, the theory of affordances facilitates the study of how people interact with the built environment by considering how its various aspects—different features within the sociocultural context—afford diverse users various possibilities for action.

Koutamanis (2006) emphasizes the significant contributions of the "notion of affordances" in architectural design, particularly its capacity to account for the diversity of users, including variations in mobility, perceptual or cognitive abilities. He asserts that by analysing how individual characteristics correlate with architectural elements and spaces, "architects can go beyond vague, stereotypical user profiles, gross generalizations and arbitrary selections." He argues that the insights gained "should lead not to deterministic design solutions but to better understanding of space as a flexible and adaptable arrangement of multiple, overlapping opportunities" (Koutamanis, 2006, p. 362).

In the context of heritage sites, where the material aspects are embedded with meanings and values rooted in the sociocultural context, the theory of affordances holds potential for understanding how these sites are experienced. For example, this theory has been used to explore embodied experiences in a sacred heritage site, allowing to consider both the agency of place and people (see Ackerman, 2019). Another example is the affordance-based approach to heritage in the Hardcode Heritage concept of Rietveld Architecture-Art-Affordances (RAAAF) studio:

> Hardcore Heritage aims at providing affordances for spatial experiences that trigger one's imagination. By taking seriously the idea that people engage with their environment—such as heritage—based on the relevant affordances it offers to them, Hardcore Heritage provides a perspective [that] can clarify the value of cultural objects, by relating the use of objects in sociomaterial practices to the skills and concerns of people, instead of keeping objects at a distance the way conventional historic preservation tends to do. (Rietveld & Rietveld, 2017, p. 2)

As Ackerman (2019, p. 417) notes, "affordances provide a way to both explore and speak about the embodied experience," allowing to consider both the users/experts' abilities and conditions and the features of the historic built environment within its sociocultural context. Affordances can apply to diverse scales of a (heritage) site, from a door handle to a specific room, an entire building, and even its neighbourhood. This versatility enables exploring a heritage site at different levels, from the smallest architectural details to the broader urban fabric. Furthermore, the grounding of affordances in the sociocultural context (Rietveld & Kiverstein, 2014) allows going beyond the physical features to include the potential impact of other people and the specific context of each heritage site.

3. Methodology

In our research on inclusive built heritage, we collaborate with users/experts on multiple case studies across diverse heritage sites in Belgium to understand how people with different bodies and minds experience these historic spaces. This section elaborates on the methods used to gain insights into the users/experts' experiences in a case study on the Leuven Town Hall, which was conducted during the coronavirus (Covid-19) pandemic. This iconic monument renowned for its richly decorated gothic wing overlooking the Great Market (*Grote Markt*) square stands in the historic centre of Leuven, opposite St. Peter's Church. This heritage site consists of multiple buildings constructed over the centuries around an inner courtyard. To effectively study the users/experts' experiences of the Leuven Town Hall, the importance of on-site methods is evident. Such methods allow us to capture both the unique spirit of this historic place, its genius loci (Norberg-Schulz, 1980), and the situated experiences of people with diverse bodies and minds within this historic fabric.

3.1. In Situ Go-Along Interviews

To explore users/experts' interactions with the Leuven Town Hall and its surrounding urban context, we conducted in situ go-along interviews that allow questioning, observing, and discussing their situated and embodied experiences.

The preparation for these interviews included historical research, familiarization with the new design proposed for the Town Hall, and an initial site visit to define the scope and the route for the interviews. This visit highlighted that experiences of the Town Hall extend beyond its legal boundaries to encompass the immediate urban context. In addition to the heritage site itself, various factors can influence these experiences, including the availability, accessibility, and proximity of public transport, the layout and materials (e.g., for pavements) of the urban fabric, vehicular and bicycle traffic, and the presence of people on the site and its surroundings. Therefore, making this heritage site more inclusive, starts from its extended urban context and its reachability. Based on this, we investigate the users/experts' experiences of the heritage site and its immediate urban context. This allows us to reflect on both the dynamic urban interactions around the site and how the users/experts experience the building itself and its connection to the surroundings.

Based on this preparatory stage, we selected specific public spaces within the Town Hall and its immediate context that are important for this heritage site and/or the future project. The route for the interviews was planned accordingly; the way the users/experts entered the building is based on how the Town Hall will be

entered in the new design. Focusing on building parts that are planned to be open to the public, all visits followed a similar route, be it adapted to each user/expert's abilities and preferences and also the availability of the spaces on the day of the visit.

All interviews were semi-structured and based on open-ended questions about the experiences of the users/experts and the qualities and hindrances they are confronted with. This approach allowed the participants to answer and elaborate on the questions as they saw fit, or to introduce other topics for discussion in the interview. Additionally, during the visit, the researcher narrated the story of the building's past and when relevant, showed graphic documents illustrating the future vision for the Town Hall (Figure 2).

This research on Inclusive Built Heritage has been approved by the Comité d'éthique en sciences humaines et sociales (CESHS) at the ULiège. Throughout the project, the users/experts have participated on a voluntary basis. However, at the end of each case study, a small gift is provided to each user/expert as a token of appreciation for their time and contribution.

In preparation for the interviews, informed consent forms were shared with the users/experts and signed by them. These forms informed participants about the research objectives, methods, and data handling procedures, ensuring transparency. The forms also outlined participants' rights, such as the option to remain anonymous in visual and textual data, the ability to withdraw from the study at any time, and the confidentiality measures taken to protect their personal information. Participants were given the opportunity to choose whether they wished to receive updates on the research results and to indicate if they preferred to remain recognizable in visual data.

Additionally, for the Leuven Town Hall, another informed consent form was prepared for the collaboration with the City of Leuven. This form outlined the study's objectives, data collection methods, data handling procedures, and the possibility of publishing the research findings in various formats. It reiterated the

Figure 2. Use of design project documents during in situ go-along interview with user/expert (© Piet Tutenel, 2021).

voluntary nature of the participation of both the users/experts and the city of Leuven while emphasizing confidentiality, data protection, and participants' rights to withdraw at any time. The form also specifies that data, such as interview quotes and photographs, will be pseudonymized unless the users/experts explicitly request otherwise. Moreover, it details the research team's requests for this collaboration and the expected research deliverables, and allows the collaborator to specify any additional conditions.

In the Leuven Townhall project, we collaborated with four volunteer users/experts, whose names have been replaced by pseudonyms: Martin who is autistic and has a background in architecture, Sara who has a vision impairment, Ben who uses a wheelchair and is also able to walk for short distances with support, and Kobe, who is deaf in his right ear and also has ADHD. In the course of our project, we collaborated on previous case studies with Martin and Sara, therefore they were already familiar with us and our methods. Ben also had prior experience working with the research group and was well-acquainted with our approach. Since the research focuses on the embodied experiences of the users/experts, no personal information (e.g., age, marital status) is collected from them, ensuring that the emphasis remains on their interaction with the built heritage rather than personal demographics.

The interviews were conducted in English. During the interview with Sara, we used two existing touristic models of the Town Hall's gothic wing (see Figure 3) to give access to more distant features of the building and communicate through touch additional details about the outside volume. This allowed us to gain insights into her experiences with such models.

The go-along interviews were documented using observatory notes, photos, audio, and video recordings (GoPro mounted on the user/expert). The videos also served as a backup for the audio recording. In each interview one user/expert and two researchers were present, one focusing on the interview questions and the other on recording the information (mainly through photographs). These recording techniques document the diverse conditions of the experiences by capturing, for example, the movement, and acoustic and visual

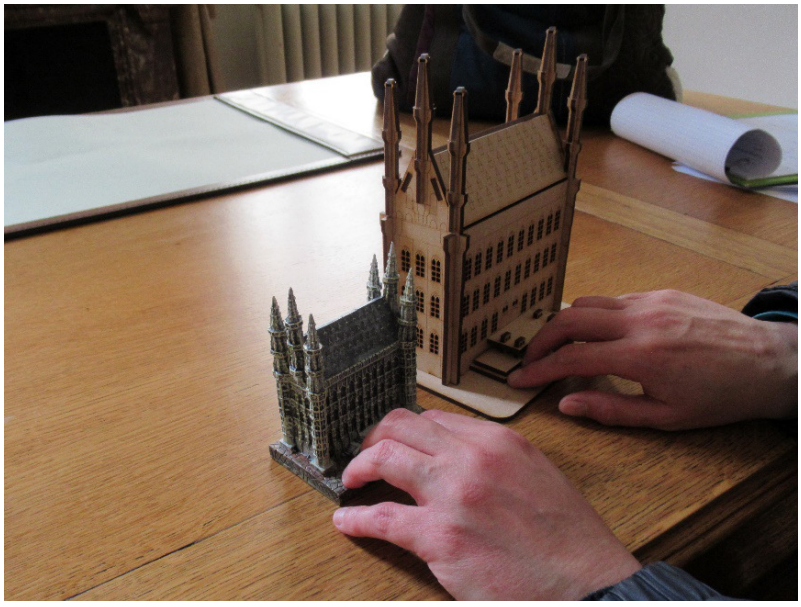

Figure 3. Use of existing touristic models in the interview with user/expert with a vision impairment (© Peter-Willem Vermeersch, 2020).

features in diverse spaces. As the go-along interviews are very attention-consuming, this approach helps minimize the risk of overlooking important details during these interviews.

To analyse the go-along interviews for gaining insights into the users/experts' experiences, audio recordings were transcribed and data were pseudonymized. We conducted a qualitative data analysis roughly following the QUAGOL guide (Dierckx de Casterle et al., 2012). This consisted of an iterative process of coding, developing concepts, and identifying themes, while integrating sensitizing concepts from our conceptual framework. To transfer the insights to the design team, we built on our previous experiences in other projects to develop and refine tools, presented in the next section.

In finetuning our approach, we organized two discussions with representatives from the city and the design team. Notes from these meetings document their perspective on the adopted approach and output. For instance, after the initial two go-along interviews, we requested a meeting to present and validate our approach and preliminary findings, documented in a graphic report. They appreciated the clarity provided by the explanations during the presentation, which led us to complete the graphic report with a glossary of themes to improve understanding. Additionally, given the significance of the concept of affordance to form and frame our analysis, we created a separate table of affordances to further elaborate our findings. The output choices were presented and approved in the second meeting and are detailed in the following section.

4. Results

In our collaboration with the city of Leuven, we communicate the insights gained into the users/experts' experiences to the design team using a twofold approach: a textual report complemented by familiar graphic means, which are detailed in this section.

4.1. Embodied Experiences and Affordances

Adopting an affordance-based approach, as opposed to a function-based approach, to explore and discuss the embodied and situated experiences, allows us to go beyond mere functional suitability of spaces and their elements. This approach addresses not only the specific abilities and needs of each user/expert, but also potential meanings and values that emerge from their interactions with the heritage site.

To collaborate with the architects of the Leuven Town Hall, we employ the theory of affordances to map and communicate the insights gained into the users/experts' experiences, by linking them to aspects of the heritage site. The users/experts' interaction with the heritage site and its urban context can be deciphered in a real and perceivable manner (Chemero, 2003), allowing the identification of matches and mismatches between the built environment and diverse bodies and minds. This understanding informs professional experts (e.g., architects) of the affordances for diverse users, highlighting the links to required spatial features.

Architectural elements and their features, with their specific quality/manner/state afford certain actions, opportunities, and meanings for certain individuals, such as the users/experts with their specific characteristics and needs. To organize and communicate the insights gained during the go-along interviews with them, we prepared a table of affordances (a shortened version is shown in Table 1). This table shows which architectural element(s) and their feature(s) are notable for each user/expert, detailing what (actions)

Table 1. Table of Affordances.

User/expert	Architectural element(s)	Feature(s)		What's afforded	*How?*
Martin	windows	(visual) connection to exterior	affording	self-orientation	*providing an anchor (reference point)*
Sara	windows	natural lighting	affording	wayfinding	*guiding by/towards light*
Ben	floor	height difference	affording	(equitable) access to levels	*providing suitable equitable circulation solutions (e.g., ramps and elevators)*
Kobe	space and/or windows	(natural) lighting	affording	seeing the mouth to lip-read	*providing sufficient light*

they afford and under what conditions (how) they are afforded. As a tool, it informs architects about the needs of diverse users and their associations with spatial features, elaborating on where and how the environment succeeds or fails to meet these needs.

In addition to the Table of Affordances, the textual report includes a glossary of insights, defining the main insights gained into the users/experts' experiences. It describes the main themes (in alphabetical order) and their potential link/relevance for the users/experts. This includes descriptions of various architectural elements (such as stairs and handrails, floors and walls) and their features (such as dimension, style, materiality) while elaborating what they afford for the relevant users/experts and how. Examples of occurrences for these are presented in the graphic analysis, which is detailed in the next part.

4.2. Spatially Grounding Disability Experience

To situate and illustrate the users/experts' experiences of this heritage site, we link the identified affordances to the features of the built environment, indicating them in a graphic report using architectural plans of the site. This report consists of two parts: the approach to the site (Figure 4) and the different sections of the heritage site (Figure 5).

This graphic approach deliberately uses a language that is familiar to the professional heritage experts. In the conservation and management plan of a heritage site, value assessment drawings (i.e., value maps or heritage significance maps) are commonly used in both academia and professional practice. Such drawings graphically represent the varying levels of significance or value of different parts of a heritage site, often using colour coding on architectural drawings such as plans, maps, or diagrams (see Meurs, 2016). This approach is used to document and easily identify the different values that parts of a building or site hold and serves as a tool in making informed decisions in the management and conservation of a heritage site.

This report covers each space as visited by each user/expert, in the order of the visits. For each space, the following details are provided, as indicated in the legend (Table 2): the path taken, disruptions on the path, the overall quality of the space, specific elements (e.g., doors, windows) and the floor, an important component hence indicated separately. The attention to the overall quality of space, distinct elements and the floor aligns with the typical approach in value maps for heritage sites. It should be noted that while some details are quite

straightforward (e.g., path taken), others, such as the overall quality of space, are decided by the researcher(s) based on the overall experience of the user/expert and may involve multiple qualities and obstacles.

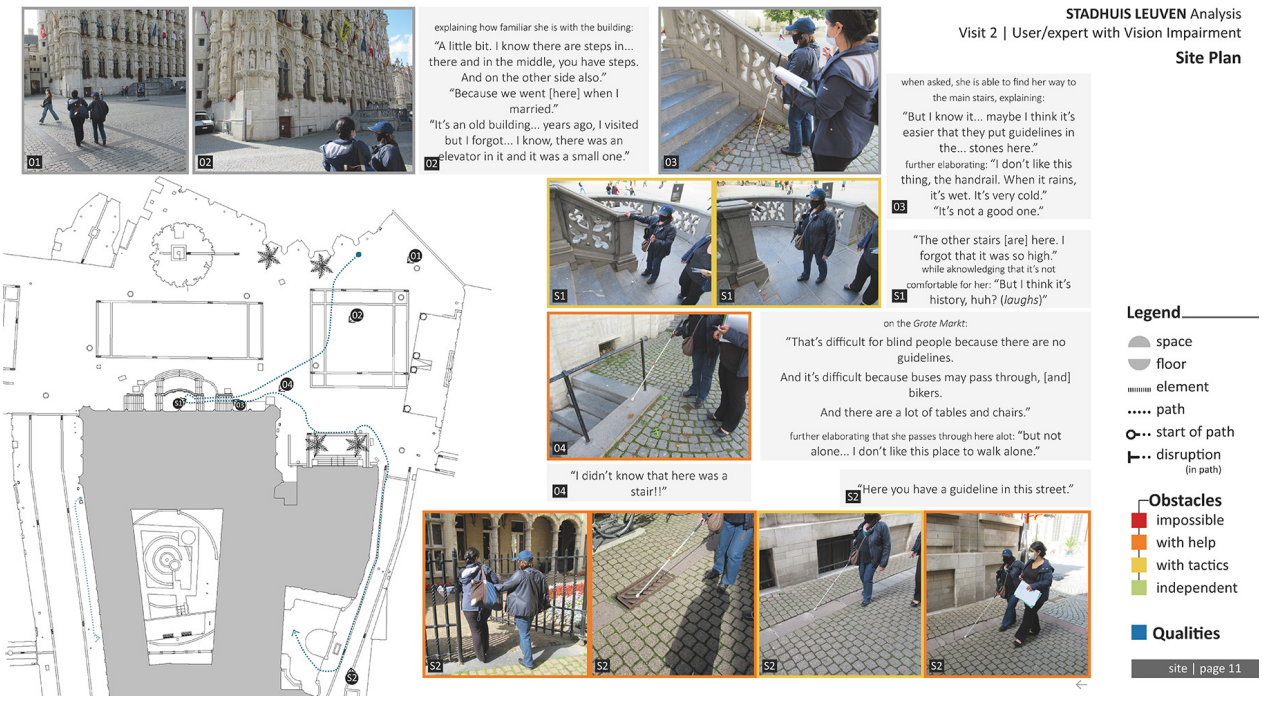

Figure 4. An example page of the graphic report using the site plan.

Figure 5. An example page of the graphic report using the building plan.

Table 2. Graphic report: Legend details.

space	overall quality of the space as experienced by user/expert as either quality or obstacle indicated in the corresponding colour
floor	the floor as experienced by user/expert as either quality or obstacle indicated in the corresponding colour
element	diverse elements such as windows, doors, and ramps as experienced by user/expert as either quality or obstacle indicated in the corresponding colour
path	indication of the path taken during the visit
start of path	indication of the start of the path for each level
disruption	indication of disruptions in the path as experienced by user/expert indicated in the corresponding colour (e.g., impossible to continue, requiring help)
obstacles	hindering aspects of the environment as experienced by user/expert, divided into four categories
qualities	enabling aspects of the environment as experienced by user/expert

The qualities and obstacles identified during the go-along interviews are documented through photos and quotes from the users/experts. To illustrate these qualities and obstacles, we use a gradient of accessibility (Vermeersch & Heylighen, 2015), as shown in Table 3, which articulates qualities and four categories of obstacles, each represented with a specific colour in the graphic report.

Table 3. Gradient of accessibility (after Vermeersch & Heylighen, 2015).

Gradient of accessibility			Description	Example (from the Leuven Town Hall)
	Obstacles	impossible	obstacles the user/expert cannot overcome	a wheelchair user confronted with a staircase (in the Town Hall where a podium is placed on top of a few stairs, the user/expert states: "The main attention point for me is getting to the [podium] as a wheelchair user, because otherwise it doesn't make sense…for instance you have an athlete that has won a gold medal at the Paralympics, wants to give a speech and he can't even get [to] the microphone. That's old-fashioned.")
		with help	obstacles the user/expert can overcome with help	a user/expert with a vision impairment requiring help to navigate large open spaces that lack (natural) guidelines (see Figure 4)
		with tactics	obstacles the user/expert overcomes with their own specific strategy or tactic	a user/expert with a vision impairment using the pavement edge as guidelines for navigation (see Figure 4)
		independent	obstacles the user/expert can overcome and manoeuvre independently	a narrow doorway that is difficult to pass for a user/expert with a vision impairment but still manageable (the user/expert states: "[The doorway] it's too small!")
	Qualities		enabling aspects of the environment	guiding role of light for wayfinding for a user/ expert with a vision impairment (see Figure 5)

In consultation with the architects and city representatives during the preliminary presentation of the findings, we decided to organize the graphic report as a digital file (as opposed to a print file) that will be mainly consulted on a screen. Hence, through a progressive build-up, the graphic report narrates the experiences of each user/expert, starting from their approach to the site and continuing with the different sections of the site. Each graphic sheet that represents one user/expert's experiences in one specific space, is gradually built up in the order of their movement through space. This approach was used in the preliminary presentation to the architects and city representatives and was received positively.

4.3. Follow-Up Sessions

The collaboration with the architects and the city of Leuven on the Leuven Town Hall project was initially intended to end after reporting the findings of the go-along interviews (graphic and text report). However, the city administration requested an extension of our research group's participation and that of the users/experts through to the final design stage. This extended long-term multi-stage collaboration over several years, led by the second author, allowed us to follow up on the analysis results as input for the design process and provide feedback on design alterations. To facilitate the process, the city administration incorporated multiple information and exchange sessions throughout the project's planning, for the sketch design (2021), preliminary design (2022), and final design (2023). These sessions were together with the many other parties involved in the design process, allowing the design team to coherently document and evaluate their feedback (covering topics beyond accessibility).

For the sketch design, we sought complementary feedback from the users/experts through organizing in-person meetings with them. In these discussions, the main means for communicating the design were visuo-haptic stacked plan models (prepared by the first and second author) for the user/expert with vision impairment (Figure 6) and the design plans for the other users/experts (Figure 7). We reported on the users/experts' sketch design feedback to the city and architects in written form.

For the preliminary design, the users/experts were not directly consulted and we provided feedback based on previous insights and discussions. However, for the final design, we consulted once again the (available) users/experts. The users/experts, accompanied by the second author, were present in the meeting with the client and the architects and provided direct input. For this session, the first and second authors updated the visuo-haptic model to represent the final design for the user/expert with a vision impairment.

5. Discussion

In collaborating with the city of Leuven and the design team on the Leuven Town Hall project, we adopted a dynamic and time-intensive participatory approach that engages users/experts in heritage conservation. In this article, we present the process and methods we experimented with and the resulting tools to mediate and facilitate exchange between users/experts, architects, and city representatives.

Acknowledging the critical need for inclusive and participatory approaches in heritage conservation, as advocated by the UN SDGs and various international charters, our experience offers one potential way of implementing a participatory approach in heritage conservation. This application helps bridge the existing gap between theoretical ideals and practical implementation, as highlighted by Colomer (2023). Additionally,

Figure 6. Sketch design discussion with Sara using visuo-haptic models (© Negin Eisazadeh, 2021).

Figure 7. Sketch design discussion with Ben and Martin using plans (© Negin Eisazadeh, 2021).

REACH's repository of good practices for participatory approaches to cultural heritage reveals a lack of projects that attend to disability experience in the context of built heritage, further emphasizing the relevance of our work.

Aligning with the UN SDGs, our research contributes to multiple targets (11.3, 11.4, and 11.7) of the "sustainable cities and communities" objective. In efforts to protect and safeguard heritage sites, this participatory approach is a step towards reviving such sites in sustainable ways that are more fitting for the

diverse, evolving, and ageing society. Furthermore, towards "reducing inequalities," our approach can potentially advance empowering and promoting the "inclusion of all" regardless of their diverse abilities and conditions (target 10.2).

Acknowledging the potential of disability experience for heritage (Eisazadeh et al., 2023), we reconsider the relation between architecture and people with diverse bodies and minds (see Heylighen et al., 2013), focusing on how users/experts experience the Leuven Town Hall. In-depth observation and analysis of each user/expert's interaction with this site, through go-along interviews, allows identifying and understanding qualities and obstacles from their perspective. Integrating these diverse perspectives in the conservation process can render it more inclusive of diverse voices and experiences. However, suitable methods and tools are necessary to capture and transform disability experience into actionable knowledge for practice.

The concept of affordance allows for deciphering embodied experiences (Ackerman, 2019) in relation to the historic built environment within its sociocultural context (Rietveld & Kiverstein, 2014). Using this concept to frame the insights into users/experts' experiences, we highlight how spatial elements facilitate or hinder human actions. Additionally, aligned with designers' visual approach to thinking (Goldschmidt, 1994), the graphic report illustrates and situates these matches and mismatches, offering concrete in situ examples. This visual story of each user/expert's lived experiences is enriched with quotes, giving more context and sometimes even depicting the (specific interaction's) meaning for and impact on the user/expert.

Framing the interactions with built heritage through various levels of affordances, from small details to the urban scale, translates disability experience into tangible and actionable knowledge that informs the design process. This approach does not prescribe specific design solutions; instead, it enhances the client's and architects' understanding of "space as a flexible and adaptable arrangement of multiple, overlapping opportunities" (Koutamanis, 2006), or, in other words, as "a rich landscape of affordances" (Rietveld & Kiverstein, 2014).

Providing architects insights into users/experts' experiences draws their attention to spatial qualities and affordances they might otherwise overlook. This process is comparable to what Rietveld and Kiverstein (2014, p. 331) refer to as "educating attention," where experienced practitioners guide novices "to the right aspects of the environment and their affordances."

The preparation of the graphic and text report is not the end of this participatory process but rather serves as the foundation for initiating a dialogue among the various relevant stakeholders. These reports are fundamental means that communicate to the architects and the city representatives how the users/experts experience this heritage site in view of its future project. Through follow-up sessions, the discussions and negotiations between the users/experts and the architects (whether direct or indirect through the research team) continued up to the point of reaching the final design. By fostering this interaction, architects gain valuable insights that inform and enhance their design decisions, ensuring that the final design for the revival of this heritage site is inclusive for a broader and more diverse range of users.

Given the project's scale and multitude of actors involved, similar to many other large-scale conservation and adaptation projects, this participatory approach was a time-intensive process requiring comprehensive and flexible planning to allow moments of exchange between diverse parties. This process highlighted the need

for commitment and openness from all parties involved. A critical factor that enabled this collaboration was the client's continuous dedication to fostering participation and integrating this participatory approach in the planning. Additionally, the design team's openness to collaboration was important, especially considering that we joined the project after the competition stage. This was also pointed out by one of the architects during a later public discussion regarding this collaboration. He also brought up the concept of shared authorship and how other participants also contribute to the final project, which shows the value and importance that he attributes to the users/experts' contributions.

6. Limitations, Challenges, and Future Research

Regarding the limitations and challenges of the research, all site visits were conducted following safety guidelines during the Covid-19 pandemic. The pandemic had a noticeable impact on the research process, influencing the researcher's focus and causing fatigue, largely due to the physical challenges of wearing masks throughout the visits. Health concerns also influenced the participants' behaviour, as Sara, for example, was less inclined to navigate the space by touching surfaces. Additionally, hand sanitizer stations, placed throughout the building, presented extra obstacles.

For the visit with Kobe, transparent masks were used to facilitate lip-reading; however, these masks frequently fogged, making communication more difficult. During the visit, Kobe remarked on a picture showing what would typically be a normal day in Leuven, stating: "It's a strange Leuven, I don't know Leuven like that. There are people without masks and stuff." As a first-year student in Leuven during the pandemic, Kobe had a markedly different perception of the city, which highlights the potential, yet often unnoticed, impact of Covid-19 on personal experiences of place.

Another key limitation to note is that the visits with users/experts occurred while the building was not in use, meaning it was largely empty. This creates a contrast with real-life conditions, particularly for Kobe, whose experience is significantly shaped by the presence of other people, and this may have an impact on the insights gained.

While the number of users/experts in our research is limited to four, their involvement should be seen as part of a broader knowledge exchange that also includes legislative documents, literature research, best practices, and meetings with the city's Accessibility Advisory Board (Leuven Toegankelijk, n.d.). The in situ interviews offer detailed, in-depth, and rich insights that complement the more generalized knowledge gained from other sources, helping to adapt it to a local context through reinterpretations by involved stakeholders. Limiting the number of users/experts also made the organizational aspects more feasible. The users/experts were carefully selected to represent a diverse range of bodies and minds, allowing us to gain valuable insights into their embodied experiences. These insights act as sensitizing tools for architects, making them aware of the limits of their own empathy, and deepening their understanding of how diverse people experience and interact with heritage spaces.

For future research, we will elaborate on how the design team integrated the insights gained from this collaboration with the users/experts into their design (process). Looking ahead, we consider an added attention to other aspects in understanding the relationship between users/experts and a heritage site. While our go-along interviews primarily focused on the physical features of the built environment and

ongoing interactions, users/experts occasionally shared personal memories and connections to the site. Recognizing the importance of these personal narratives and the affective dimensions of their experiences, additional questions on the user/expert's connections and relations with the heritage site and its story could enrich future interviews. This approach could yield more insights into the personal significance, meanings, and values of the heritage site for them.

7. Conclusion

Participatory approaches in heritage conservation that engage diverse individuals, such as those with a disability experience, can potentially strengthen the link between built heritage and the broader public. By focusing on the embodied experiences of users/experts, this research contributes to a better understanding of the diverse ways in which people, particularly those with disability experience, engage with heritage sites. Through informing the design process, the insights gained can potentially contribute to making heritage sites more inclusive, relevant, and meaningful for a more diverse audience.

Acknowledging the importance of heritage sites as "platforms for shared identities, experiences, and exchanges" and the necessity of "fostering inclusive heritage practices" to reduce inequalities (Labadi et al., 2021, p. 70), these participatory approaches show potential to enhance the relevance and social sustainability of heritage sites. They can benefit both the heritage itself and today's diverse and ever-changing society.

On the global path towards sustainable and inclusive living environments, we acknowledge that there is no one-fits-all model of participation in cultural heritage (Forbes & Colella, 2019). Nevertheless, our experiences in the case of the Leuven Town Hall present an example of how leveraging user/expertise through a participatory process can transform disability experience into actionable knowledge. This approach fosters a more inclusive conservation practice, enriched by diverse voices and experiences.

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Conflict of Interests

The authors declare no conflict of interests.

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Participatory Retrofitting Through Extended Planners in Tanzanian Urban Areas

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Abstract

The global endeavour to develop inclusive, safe, resilient, and sustainable cities and human settlements is paramount. Land use conflicts in urban areas persist as a critical issue among stakeholders in contemporary urban development discourse. This article examines the effectiveness of local mediation strategies in resolving land use conflicts within East African cities' rapidly expanding metropolitan areas. It focuses explicitly on community-based leaders, referred to as "extended planners," who foster sustainable communities through their involvement in conflict mediation. Unlike municipal authorities, whose responses can be slow, these grassroots leaders promptly engage in mediation efforts, demonstrating their critical role in urban land management. Through an ethnographic approach to data collection and analysis using the cultural-historical activity theory (CHAT), this study highlights the significant influence that extended planners have on conflict resolution and the improvement of community welfare. The findings indicate that residents generally report land use conflicts to the Mtaa Government Office, where mediation sessions are conducted. The grassroots leaders, acting as the primary mediators, facilitate these sessions with the conflicting parties and relevant stakeholders, utilising traditional methods and established mediation protocols. The study underscores the diverse roles of different actors in the mediation process, with grassroots (Mtaa) leaders mainly overseeing it. It concludes with a call for empowering these leaders with essential knowledge in urban planning and conflict resolution skills to increase the mediation sessions' effectiveness.

Keywords

conflict mediation; extended planners; grassroots leaders; land management; land use conflicts

1. Introduction

In the global context, decentralisation is widely regarded as a policy measure that enhances the efficiency of public service delivery (Kessy, 2023; Kobusingye et al., 2016). This concept is promoted as a means of devolving authority from central to local levels (Kombe & Namangaya, 2016), making services more accessible to citizens (Kessy, 2023). In the late 20th century, specifically during the 1980s and 1990s, a significant policy shift occurred in Tanzania, moving from national centralisation to decentralisation (Kombe & Namangaya, 2016; Lupala, 2015), marking a pivotal moment in the governance of urban land transformations (Asabere et al., 2020). This transition aimed to bring governmental power and responsibilities closer to citizens (Kombe & Namangaya, 2016), fostering greater engagement and participation in urban land management (Kessy, 2023; Kombe & Namangaya, 2016). At this foundational stage, Tanzania aligned with East African Federation policies (Smoke, 2003) and Sustainable Development Goal (SDG) 16, focusing on inclusivity and institutional effectiveness (UN, 2015).

In this context, Tanzania has operationalised the concept of decentralisation, achieving key milestones such as establishing local government authorities under the Local Government Act of 1982 (Chaligha et al., 2007; Kombe & Namangaya, 2016). This legislation, among other provisions, establishes sub-ward offices locally called Mtaa within urban authorities. The Mtaa institution, which operates at the grassroots level of the government (Chaligha et al., 2007; Manara & Pani, 2023; Ngowi et al., 2022), plays a critical role in the delivery of essential public services, including mediation of land use conflicts. This function is a critical mechanism for empowering local voices within the broader framework of global policies (UN-Habitat, 2018).

Building on the existing definitions by Wehrmann (2008), who describes land conflict as involving at least two parties with differing interests in property rights and the understanding that land conflicts arise from the interactions between stakeholders with vested interests (Havel, 1986), it becomes evident that some of these conflicts are often rooted in differing temporal perceptions of land use (Havel, 1986). Therefore, conflicts, whether resolved or unresolved, require third-party intervention (Wehrmann, 2008). As per the Tanzanian institutional reforms outlined by Kombe and Namangaya (2016) and Lupala (2015), Mtaa Leaders (MLs) have increasingly assumed the role of third-party mediators at the community level (Manara & Pani, 2023).

In Sub-Saharan Africa, community-based conflict resolution frequently involves third-party mediators, who play pivotal roles in fostering local stability. For instance, chiefs in Kenya, Local Council Courts in Uganda, Umudugudu and Abunzi leaders in Rwanda, Kusasi leaders in Ghana, and Kebele leaders in Ethiopia play similar roles (Ahmed & Muhindi, 2023; John et al., 2018). Although older than the nation-states, these Indigenous mechanisms often intersect with formal judicial systems (Ahmed & Muhindi, 2023; John et al., 2018). Formal courts sometimes refer cases to local mediators for culturally relevant and efficient resolution (Ahmed & Muhindi, 2023; John et al., 2018). In Tanzania's urban settings, Mtaa Government Offices (MGOs) serve the lowest formal administrative functions (Chaligha et al., 2007). Yet, the extent to which these grassroots mechanisms contribute to sustainable development—particularly SDG 16, which promotes peace, justice, and strong institutions—warrants further investigation. Understanding these mediators' role in fostering community harmony through conflict resolution could provide valuable insights into their current and potential impact on sustainable development (UN-Habitat, 2018).

In Tanzania, the government has proactively established policies and land laws to mitigate issues arising from accelerated urbanisation (Kombe & Namangaya, 2016). Concurrently, urban planners have prioritised

developing inclusive and sustainable strategies that foster equity, resilience, and a high quality of life for all residents (Lupala, 2015). Despite these efforts, the negative impacts of urbanisation on urban areas persist, highlighting the need for continuous innovation and adaptation in policy and planning approaches. Building on Kulsrisombat's (2008) argument that urban problems are complex and require a coordinated approach, we argue that successful urban management involves combining the efforts of multiple partners in a cohesive strategy. This requires actively engaging a diverse range of actors across all levels to create more sustainable communities (Tofarides, 2018). Breaking down traditional policy boundaries and allocating clear responsibilities are essential for successful partnerships and achieving development goals (Kulsrisombat, 2008; Lupala, 2015). In light of this, it becomes essential to delve into grassroots leaders' impact in resolving land use conflicts within the community by facilitating mediation sessions.

Emanating from the foregoing dialogue, this article is structured into five sections. The first section comprises the introduction, while the second section delves into the literature review on grassroots land management and introduces the concept of the extended planner. The third section outlines the methodology, which includes ethnographic data collection and cultural-historical activity theory (CHAT) as a tool for data analysis. The fourth section presents the results and discussion, and the fifth concludes with recommendations.

2. Literature Review

2.1. The Concept of Actors in the Land Management Process

Urban land management has become a significant concern for experts, scholars, and governments due to various urban challenges, particularly in global urbanisation (Asabere et al., 2020; Baffour Awuah, 2021; Barlow, 2015). Urban land is the most critical spatial foundation for this urbanisation, as it is essential for urban residents' productivity and daily lives (Song & Deng, 2015). Land management has become inevitable globally, especially in Africa, where the challenges are dire. On this note, Zhang et al. (2020) argue that political and economic levels, the degree of scientific and technological development, and the methods of urban land management are the main pillars of urban land management, and they differ largely among different countries. However, Jenkins (2000) opines that urban land management should strengthen government supervision, policy, institutions, and market tools, forming a top-down governance system. He also suggests involving citizens in public programs, promoting transparency, and forming a bottom-up supervision system. Jenkins (2000) adds that the formation of top-down and bottom-up joint efforts should be used to achieve the efficient and intensive use and management of urban land.

Despite the importance of urban land management, several weaknesses exist, especially in the developing world (Baffour Awuah, 2021; Barlow, 2015; Nuhu, 2019; Ravnborg et al., 2016; UN-Habitat, 2009; Watson, 2009). These weaknesses include low land registration, poor development regulation compliance, lack of access to land, insecure property rights, poor records, weak institutions, inadequate housing, and limited infrastructure funding (Baffour Awuah & Abdulai, 2022). As noted earlier, urban land management differs from country to country in Africa since land management operates through various laws, policies, and reform programs (Babalola et al., 2024). The reform strategies are often decentralisation to improve inclusivity and collaboration between or among institutions (Babalola et al., 2024).

In Sub-Saharan Africa, particularly South Africa, land and spatial inequalities in urban spaces persist, rooted in socio-economic disparities and historical legacies like apartheid. These challenges have hindered efforts to achieve equitable land reform in the post-apartheid era, exacerbating socio-economic inequalities and complicating urban development (Institute for Poverty, Land and Agrarian Studies, 2024). As such, urban land management has focused on the potential of public property and the impact of public investments (Centre for Affordable Housing Finance in Africa, 2019). The emphasis of the reform programmes hinges on building integrated urban systems, which have been seen as one of the most critical requirements in resolving and addressing the vast inequality and responding to the pressures of urbanisation. In Egypt, Moghaieb et al. (2021) note that ineffective urban land management has resulted from the magnitude of economic, social, and environmental misuse of land, while the number of governmental bodies that govern public land is confusing. As such, roles overlap between the General Authority for Urban Planning and the National Centre for Planning State Lands Usage, with no clear linking framework. The road map of reform constitutes a practical and comprehensive institutional structure/framework that consists of all relevant planning institutions and identifies the roles and responsibilities of each institution. Yet, the road map stipulates effective land use planning to achieve proper sector trade-offs that maximise the developmental outcomes of land use options. Also, the authors provide that effective urban land management can be realised by ensuring decentralisation of the political decision-making as a way towards a decentralised land planning system that allows decentralisation authorisation to be placed on different planning levels, which enables the cumulative impacts of future development and shared responsibility for protection and management across a more comprehensive number of stakeholders.

Kironde (2006) argues that the administrative setup effectively hinders the timely delivery of adequate planned land to meet the rising demand in Tanzania. The main obstacle to meeting demand is the extreme centralisation of power in the Ministry of Lands, Housing and Human Settlements Development (MLHHSD) about all aspects of urban management—spanning from surveying and approval of land use schemes to the subsequent granting of title deeds to new land owners. Lupala's analysis of "land management in peri-urban zones of Dar es Salaam" reveals the involvement of various actors in the land management process (Lupala, 2002). The author identifies four primary groups at the local level: community-based actors, groups-based actors operating in small cohorts, individual actors, and grassroots institutions such as the MGOs, Ward Land and Housing tribunals, and the police. He argues that formal institutions, including central and local governments, seldom involve themselves in peri-urban land management (Lupala, 2002). This classification is consistent with the categorisation proposed by Kombe and Kreibich (2000) for public land use planning actors such as landowners, local leaders, community committees, political leaders, and local government authorities. While Lupala's analysis focuses on land management in informal areas situated in peri-urban zones of Dar es Salaam, the same management process applies in urban areas where the planning processes are more formal (United Republic of Tanzania, 2007).

Kreibich and Olima (2002) identify two categories of actors involved in urban land management: local-level actors and gatekeepers. Tofarides (2018) identifies local-level actors as individuals and organisations working at the grassroots, with gatekeepers regulating the flow of information, resources, and policies from higher government levels to the community. Kreibich and Olima (2002) classify local-level actors as grassroots leaders, chiefs, community-based organisations, and local volunteers, while gatekeepers encompass politicians, national organisations, large landowners, senior public officials, and middle- to lower-level civil servants. In this context, MLs function as local-level actors, while urban planners serve as

gatekeepers within the Local Government Authority and the MLHHSD of Tanzania. In the realm of Tanzania's urban land management, "gatekeepers" are the key individuals or entities who hold the power to control access, development, and decision-making regarding urban land (Kessy, 2023; Kombe & Namangaya, 2016). Babeiya (2016) concludes that the decisions made by gatekeepers significantly influence urban growth, development patterns, and land use policies. These decisions are further guided by various legal frameworks, such as the Local Government (Urban Authorities) Act of 1982 and the National Human Settlements Development Policy of 2000, which regulate and direct interventions in land management processes. However, literature often overlooks the relationship between these actors, particularly the MLs. This article argues that MLs, as extended planners, alongside urban planners in local government authorities, play a crucial role in mediating land use conflicts.

At a global level, urban development and management practices are deeply embedded within the framework of the SDGs, particularly Goal 11, which emphasises the creation of sustainable cities and communities (UN, 2015). Goal 11 aspires to foster inclusive, safe, resilient, and sustainable cities and human settlements. Achieving this goal is closely tied to the effectiveness of actors engaged in urban governance across central and local levels, particularly in urban planning and land use conflict management. On this aspect, we argue that if extended urban planners, who form a segment of the urban management team, can adequately play their roles, the apparent land use conflicts among different users can be reduced to a greater extent. Hence, cities will become nests where the quality of life of their inhabitants can improve. Also, dialogues, public meetings, and other gatherings to provide or receive feedback can pioneer urban development and management strategies.

2.2. Gatekeepers in Legal Frameworks for Urban Land Management in Tanzania

Urban land management frameworks in Tanzania can be grouped into three categories: legal instruments for local governance, land tenure and urban use regulations, and environmental management. For example, the 1982 Local Government (Urban Authorities) Act defines the roles of urban authorities, distinguishing them from central government functions, focusing on decentralisation and community empowerment (Kombe & Namangaya, 2016; Lupala, 2015). This Act also allows urban authorities to define wards and sub-wards, involving urban planners in land use management (Peter & Yang, 2019). Although urban planners' roles in land conflict mediation are not specific, the Act includes wards and Mtaa as core governance structures.

The Land Act No. 4 of 1999 provides a foundation for urban land management, addressing land administration and conflict resolution (Wehrmann, 2008). It defines roles for critical figures, such as the Commissioner of Lands and municipal councils, which significantly influence land use decisions, planning, and building regulation (Babeiya, 2016). Land tribunals mediate land conflicts before formal adjudication (Wehrmann, 2008). Despite some defined roles, clarity is needed regarding the responsibilities of MLs within this system. The Ward Tribunals Act, Cap. 206, establishes Ward Tribunals to promote peace and mediate land disputes (Wehrmann, 2008). Although mediation is their primary role, adjudication often dominates. Generally, MGOs and urban planners at planning authorities resolve land conflicts (Kombe, 2010; Manara & Pani, 2023).

The Urban Planning Act No. 8 of 2007 outlines goals for managing land conflicts, sustainable land use, and organised land management. The Act promotes empowering landholders, engaging the public, and using administrative structures across all levels, with the Minister and Director of Urban Planning overseeing consistency in policies and urban development.

While district and national officials have defined roles, grassroots leaders' functions are unclear. In East Africa, traditional leaders, like chiefs, play a crucial role in rural and peri-urban conflict resolution (Ahmed & Muhindi, 2023). In Uganda, local council courts handle family, tenancy, and customary ownership disputes, fostering community harmony before legal proceedings(John et al., 2018; Kreibich & Olima, 2002). Similarly, traditional leaders in Ghana, Ethiopia, South Africa, and Rwanda are essential in grassroots land conflict resolution (John et al., 2018). While their community impact is recognised, there is limited knowledge of these leaders' frameworks, underscoring a need to understand their potential role in urban planning and land management.

2.3. The Role of the Mtaa Government Institution in Land Use Conflict Resolution

According to the United Republic of Tanzania (1982) and Manara and Pani (2023), the Mtaa is a crucial local government body operating at the lowest urban level. It functions under the Ward committee and includes the chairperson, the Mtaa Executive Officer (MEO), and committee members (Ngowi et al., 2022). The chairperson is politically elected every five years (Babeiya, 2016), while the MEO is a government-salaried employee who oversees the day-to-day Mtaa administration and represents the local authority Director (Chaligha et al., 2007; Ngowi et al., 2022; Nuhu et al., 2023). The Mtaa committee comprises up to six elected residents, and it helps the MLs to execute their duties (Ngowi et al., 2022). Despite lacking executive or legislative power, Mtaa fosters community participation and includes ten cell leaders from the ruling party (Manara & Pani, 2023; Ngowi et al., 2022). In carrying out these community activities, the Mtaa government has been actively involved in resolving land use conflicts within the community as an initial step before such disputes proceed to formal court systems. Akintayo et al. (2024) refer to these resolution methods as Alternative Dispute Resolution, which have been significantly effective in resolving conflicts outside the traditional court system.

From this perspective, traditional chiefs, akin to the MLs in Tanzania, assume a crucial role in resolving domestic conflicts in various African societies as mediators promoting peace and fostering community cohesion (John et al., 2018). Scholarly research highlights that despite the establishment of modern judicial systems, the authority of chiefs remains significant, rooted in their strong ties to local customs and the social reverence afforded them within their communities (Ahmed & Muhindi, 2023; KaraniOnyiko et al., 2021; Marfo, 2019). Chiefs employ culturally embedded mediation strategies that address immediate disputes while fostering sustained communal stability (Ahmed & Muhindi, 2023; KaraniOnyiko et al., 2021; Marfo, 2019). Studies by Marfo (2019) and Ahmed and Muhindi (2023), focusing on Ghana and Kenya, respectively, illustrate that chiefs' roles in mediation involve de-escalating tensions, facilitating inclusive dialogue, and promoting win-win solutions that reflect community values. These roles are understood within the framework of social capital theory, which suggests that chiefs' influence and respect derive from their social relationships, providing collective and reproductive benefits. Authors such as Ahmed and Marfo (2019) advocate for targeted capacity-building programs to enhance chiefs' skills in conflict resolution, communication, and negotiation, thereby strengthening the effectiveness and durability of these practices. However, a gap remains in the literature concerning the specific frameworks or structured approaches employed by local leaders in their mediation processes, highlighting the need for further research on these Indigenous mediation mechanisms, particularly in urban environments.

In Uganda, scholars such as Kobusingye et al. (2016) have examined citizen preferences for reporting land conflicts, emphasising the role of decentralisation in establishing numerous institutions aimed at conflict resolution, particularly in northern areas. Despite statutory institutions, citizens often favour customary systems, which, while lacking judicial authority, are perceived as more accessible and efficient. This preference raises critical questions about why citizens opt for informal systems over formal ones and how factors such as accessibility and effectiveness compare. Additionally, it is crucial to examine the frameworks utilised by customary systems in resolving land use conflicts and their applicability within urban contexts. A comprehensive understanding of these dynamics is vital for advocating the recognition and strengthening of customary practices in contemporary land governance.

Kombe and Namangaya (2016), on the concept of "decentralisation by devolution" in Tanzania's urban areas, argue that it was designed to empower local governments to deliver services more effectively. However, they note that the lack of necessary skills limits the full success of this approach. Although there is limited detail on the specific skills missing, Ngowi et al. (2022), who explore the legal knowledge of the MEOs, argue that they generally lack sufficient legal knowledge, which is significant in performing their duties fully. Instead, they address these gaps by relying on professional experience, guidance, training, and past decisions (Ngowi et al., 2022).

However, the question remains: Who oversees conflict resolution at a Mtaa level, and how are they involved? While the MEO is a permanent and pensionable government employee, they act as the secretary of mediation meetings and are employed based on professional qualifications. The remaining staff, including the Mtaa chairperson, are elected by the community and only need to possess basic literacy skills. On the roles of the Mtaa chairperson, Manara and Pani (2023) see Mtaa chairpersons as essential community representatives. They argue that these leaders and their fellow workers work alongside the Municipal Office (MO) to merge formal government practices with local customs, creating a hybrid governance system that combines both approaches. These authors recommend that the government support this blended governance model with additional resources and political backing. According to them, understanding how formal and informal systems interact provides insights into property management and land reform in African cities. Given the significant roles that MLs play, it is essential to examine how they carry out their activities further, especially regarding land use conflict resolution.

2.4. Towards Extended Planners

The term "Extended Planners" is adopted from the extended family concept by Bester and Malan-Van Rooyen (2015). They argue that the extended family consists of multiple generations and can include biological parents and their children, in-laws, grandparents, aunts, uncles, and cousins. This family structure remains popular in the Global South, where relatives often live with a nuclear family (Vogt, 2020). Vogt (2020) emphasises the crucial role of extended family members in supporting youth during their transition to adulthood. These members provide emotional and practical support that complements the nuclear family (Bester & Malan-Van Rooyen, 2015; Vogt, 2020). Based on the foregoing proposition, Vogt (2020) opines that sociology research supports extended family, showing the benefits of close familial ties and mutual obligations among people living together.

Furthermore, in an extended family, members often live together in the same residence, pooling resources and undertaking familial responsibilities, and multigenerational bonds facilitate this arrangement (Bester & Malan-Van Rooyen, 2015). Despite its importance, the extended family faces challenges and risk factors such as complex relationships, conflicting loyalties, and generational conflicts. These intergenerational relationships can complicate child–parent dynamics and relationships between the nuclear family and other relatives.

Expanding on this concept, the term "extended planners" draws parallels to the structure of an extended family. The extended planners' family includes all stakeholders participating in urban planning activities, encompassing grassroots leaders, community organisations, residents, and others (Kombe & Kreibich, 2000; Lupala, 2002). They unite to create a cohesive urban land management community (Lupala, 2002). The unity among stakeholders strengthens the effectiveness of decentralisation by devolution (Kessy, 2023; Kombe & Namangaya, 2016; Lupala, 2015) in managing land use conflicts (Kessy, 2023) mainly through the inclusion of grassroots leaders in the decision-making process.

In this analogy, the nuclear family symbolises the gatekeepers, such as municipal planners whose roles are clearly defined by legal frameworks (United Republic of Tanzania, 2007). The relatives refer to all stakeholders, particularly the MLs. Together, they constitute a collective known as "extended planners," which integrates with municipal planners to manage urban land use collaboratively. In this article, the MLs are called extended planners or relatives, and the municipal planners are the gatekeepers forming the nuclear part of the family. The primary concern is the extended planner's value of their role in managing urban development. As leaders of extended families use the already existing or time-after-time established informal rules and social ties to manage families, the question raised on extended planners is: Which framework can help to understand how extended planners resolve land use conflicts and value their impact within urban planning and land management practices in rapidly urbanising areas?

3. Methodology

Due to the highly situated nature of the relationship between municipal planners and the MLs, this study employs an ethnographic design, specifically participatory observation (Kawulich, 2005; Lareau, 2021), to understand the behaviour, interactions, and context of land use conflict mediation at the MGO (Havel, 1986). Drawing from Kawulich (2005) and Lareau (2021), ethnographic research involves spending consistent time with individuals or institutions. Participant observation was used, with the researchers integrating into society as anthropologists, gathering data through verbal communication while aiming to remain non-intrusive to the culture (Lareau, 2021). This method involved researchers observing and participating in activities within their natural settings to understand their behaviours and experiences better (Lareau, 2021).

This research was conducted between July and September 2023 and throughout the research, we spent 50 days at the MGO and 10 at the MO. During this time, we attended nine meetings at the MGO and one at the MO. We also conducted 16 unstructured interviews, of which 12 were at the MGO and four at the MO levels. These interviews included four urban planners working with the MO, six MLs, and six residents involved in land use conflicts. Among the participants, there were seven men and nine women. The interviews with residents involved in land use conflicts aimed to assess their satisfaction with the adjudication process, particularly regarding the verdicts delivered. Additionally, discussions with Mtaa

government officials and municipal officers sought to provide a deeper understanding of the procedural nuances involved in these conflicts.

Data analysis, utilising CHAT, offered valuable insights into the functioning of the MGO in comparison to urban planners. CHAT was selected as the analytical framework due to its ability to illuminate human activity systems' relational dynamics (Engeström, 2000). Widely applied in fields such as human-computer interaction and education, CHAT provided a flexible approach to understanding the Mtaa government as an institution engaged in land use conflict mediation. The framework facilitates a deeper exploration of these processes by unpacking the critical elements of CHAT, as outlined in Section 3.2.

3.1. Case Selection

During fieldwork, we observed the resolution process of nine reported conflicts. The selection process was guided by specific criteria: (a) the conflict must serve a public interest; (b) the conflict should involve residents; and (c) the conflict should feature interactions between government actors. Furthermore, each dispute must relate to urban planning issues, particularly zoning laws and regulations. Additionally, it was established that one conflict should be resolved at the Mtaa level, while the other two should require resolutions at the MGO and municipal levels. Consequently, the selected conflicts are as follows (see Table 1): (a) a dispute regarding motorcycle parking in a public open space; (b) a contractual disagreement related to a change in land use; and (c) a boundary conflict between neighbours. Each case is community-based, involving residents, and all were mediated at various times, resulting in agreements that signify successful conflict resolution (Tudor et al., 2014).

3.2. Framework for Analysis of the Mediation Process

CHAT helped to clarify the extended planning system's role in mediating land use conflicts. Rooted in Engeström's (2000) and Yamagata-Lynch's (2010, pp. 13–26) work, CHAT offers a framework for understanding learning and social interactions in diverse contexts. CHAT describes the relationship between a subject and an object, mediated by tools within a community, highlighting cultural and historical influences on activities (Engeström, 2000; Yamagata-Lynch, 2010, pp. 13–26). Through this lens, the framework aims to elucidate how cultural and historical contexts mediate human actions and interactions within land use conflict resolution activity (Engeström, 2000; Yamagata-Lynch, 2010, pp. 13–26). According to CHAT, activity systems and their inherent contradictions involve complex networks of interrelated activities embedded within specific social contexts (Engeström, 2000; Gedera & Williams, 2013).

Contradictions, a key CHAT concept, represent historical tensions within and between systems, acting as catalysts for transformation and system development (Engeström, 2000; Gedera & Williams, 2013). Engeström (2000) argues that disruptions create new conflicts and instigate innovative changes. In the same line of thought, Gedera and Williams (2013) conclude that a nuanced understanding of contradictions is crucial for fostering innovations that can enhance the effectiveness of systems.

Following CHAT, the study identified vital mediation steps by MLs and urban planners in each case, treating them as activities (unit of analysis) per Engeström's principle (see Section 3.1 and Table 1). We utilised CHAT elements—subject, object, roles, rules, and community—to construct an interconnected system that captures

the complex interactions within mediation protocols (see Section 4.3). Following Engeström's perspective, activities are inherently interrelated rather than isolated, allowing us to examine how these interactions shape and influence organisational dynamics (Engeström, 2000).

Subsequently, after delineating the activity sequences, we engaged with participants at various times to identify issues causing dissatisfaction with the mediation process outcomes. Several unstructured questions were posed: Were you satisfied with the outcome? Why did you display such deep distress in the meeting, even to the point of tears? What improvements do you think could enhance the success of our future meetings? After identifying these issues as contradictions, we connected them to the elements of CHAT to gain a deeper insight into the mediation process (see Table 2). This approach enabled us to trace the contradictions in the mediation back to specific CHAT elements.

The challenges identified were concentrated on tools, rules, and roles (see Table 2). A focused analysis examined how these affected mediation activities. Challenges presented as contradictions were discussed with participants in semi-structured interviews (see Table 2 and Sections 4.3.1–4.3.3) to foster reflection and explore resolutions.

4. Findings and Discussion

4.1. Types of Land Use Conflicts

In this section, we present the key findings and discuss the role of MLs and urban planners in land use conflict mediation processes. Objectively, the purpose was to understand a framework that can clarify how extended planners address these conflicts and evaluate their impact within the context of urban planning and land management practices in rapidly urbanising areas. The analysis contributed insights into the effectiveness of the frameworks for integrating the roles of local leadership and urban planning in conflict resolution and sustainable urban development. The section begins with a detailed overview of the resolved conflicts documented in Table 1, followed by the application of CHAT to illuminate discrepancies and their relation to CHAT elements within the mediation process.

Eight cases were filed at the MGO, one of which was referred to the MO. The reported conflicts at the MGO include: (a) a conflict between a property owner and tenant over unmet contractual obligations; (b) a neighbourly conflict on noise disturbance from late-night music; (c) a boundary conflict concerning property boundary; (d) a contractual disagreement on change of use; (e) a landlord–tenant conflict over unfulfilled resolutions from a prior meeting; (f) a conflict over motorcycle parking in a public space; (g) a community dispute related to roadside business activities; and (h) a community concern regarding recycling activities on a residential plot. The case referred to the MO is item (c). Three of these cases are further detailed in Table 1.

4.1.1. Defining Constituting Activities

From Table 1, the constituting activities in the first two cases involved (a) initiating a case, (b) gathering for a meeting, (c) making follow-ups, and (d) reporting the mediation proceeding to the Municipality through the Ward office. Case 3 involved initiating a case at the MGO and gathering for the meeting, where it was decided that the case should be referred to the Municipality for expert resolution. At the Municipality, the

Table 1. Mediated land use conflicts.

Case	Mediation activity	Problem	Mediation process	Meeting resolutions	Long-term impact
1	Conflict over motorcycle parking in public open space.	Motorcycle taxi drivers park their motorcycles on the public land adjacent to the residential plot. The gathering causes noise pollution, and among them, they are involved in theft, making the area unsafe for living.	The process involved filing a complaint with the MGO. The mediation meeting was held after just one day. The conflicting parties and the ML followed up on the matter, and the leaders then reported the proceedings to the ward office.	It was decided to register the parking space, and it is already registered. It was decided to register a group and create rules to govern their conduct in space. The conflict was resolved, and everyone signed the agreement document.	Both parties were content with the decision. Implementing the agreements from the meeting will enhance the area's sustainability.
2	Conflict over use change in landlord–tenant agreement.	The landlord and tenants' conflict revolves around rent and utility payment disparities and unauthorised activities like converting residential space for commercial use.	The process is identical to the one in Case 1 above.	Tenants must pay charges within 21 days and vacate the house within the same period. The landlord should register the change of her residential house to an apartment and involve the MGO in signing tenants' contracts.	Despite formally endorsing the meeting resolution, the complainant expressed dissatisfaction with the outcome, signalling concerns about the resolution's sustainability.
3	Neighbours' conflict regarding property boundaries.	Encroachment of neighbour's plot boundary: The complainant alleges that her neighbour erected a fence on her property.	The mediation occurred at the MGO, where the case was initially filed before being referred to the Municipality.	Due to a lack of expertise, the case was transferred to the Municipality so they could use survey instruments to resolve the boundary issue.	An expert restored the boundary, witnessed by all participants who signed the agreement, but the complainant was not satisfied with the verdict, raising concerns about the decision's sustainability.

case adhered to the same procedural norms implemented in the MGO, including conducting a site visit for boundary delineation and recovery. The procedural aspects of conflict mediation exhibit nuanced variations between the Mtaa and Municipal levels. For instance, while municipal experts typically conducted on-site visits during the mediation process in Case 3, interviews with the Mtaa chairperson and Municipal planners revealed a consensus that both entities undertake site visits as required by specific demands. This perspective highlights the unique appeal of local leaders, particularly chiefs, as their close connection to events often makes community members favour informal mediation over formal processes (Ahmed & Muhindi, 2023). Consequently, in terms of conflict mediation protocols, it is evident that the practices of MLs align closely with those of Municipal town planners.

4.2. Contradictions in Conflict Mediation Processes

As depicted in Table 1, all case participants signed the agreement document indicating their formal acceptance of the mediation verdict, as Chandrasekhara Rao et al. (1997) suggested. However, a subset appeared discontented with the outcome. Some expressed dissatisfaction with the mediation process during interviews but accepted the verdict. Through participant interviews, the presentation of challenges revealed dissatisfaction with the mediation process. Gedera and Williams (2013) posit that dissatisfaction indicates a contradiction within the system of activities. This study associated these challenges with specific issues related to CHAT elements and the involved activity, as detailed in Table 2.

4.3. Contradictions With CHAT Elements and Mediation Activities

Table 2 illustrates the relationships among the identified challenges, framed as contradictions, what was missed in the mediation process, and the CHAT elements explaining the contradiction(s)—primarily tools, roles, and rules—alongside the activities closely associated with these emerging challenges. In this context, the following sections provide an in-depth discussion of these contradictions, incorporating perspectives from the mediation process and participants and insights from other scholars to enhance understanding and explore diverse resolution strategies. The underlying perspective is that addressing these challenges will enhance the effectiveness of MLs in their roles, contributing to community harmony as they fulfil their responsibilities as extended planners.

4.3.1. Contradictions Related to Tools

Based on Table 2, we identified 10 contradictions related to the instruments or tools employed during the mediation processes. This aligns with arguments put forward by Engeström (2000) that mediation tools are instruments that mediators use to accomplish their objectives. In this regard, each activity within the mediation process was designed to contribute to the overall success of the mediation. Hence, knowledge of laws and regulations was critical, particularly in Activity 2 (see Table 1 and Section 4.1.1), which involves participants convening in meetings and emphasises the importance of accurate record-keeping. Therefore, laws, regulations, and documentation practices are the main pillars of the discussion.

Table 2. Contradictions that arose following the verdict and their relation to CHAT elements.

Case	Participant (P)	Participant status	Contradictions identified by participants during the mediation process	What is causing the contradiction?	CHAT elements explaining the contradiction					
					S	O	T	Ru	Ro	C
1	P1	Complainee	We are being looked down upon because we do not have money. The complainant wants us evicted because they do not understand the struggles of earning a living.	Equal opportunities for participants to present their cases and mechanisms to address expertise disparities affecting fairness.						
	P2	Complainant	These motorcycle taxi riders had to be removed before returning to the procedure; the chairman defended them because they were his voters.	Impartiality, consistent rule application, clear roles, strong procedural enforcement, and adequate stakeholder representation, undermine trust and fairness.						
	P2	Complainant	I submitted the contract during the case initiation, but in the meeting, they needed help locating the document.	Proper document management system.						
	P2	Complainant	Unhappy with the case filing process—too many questions, seems they have no resident records, it is tedious.	Efficient tools for data management that simplify the processes.						
2	P3	Complainee	I was displeased with the language used. Insults went unpunished. There is no freedom to speak, and favouritism is evident; some get more time while others are ignored.	Equal opportunity to participate and enforce respectful communication.						
	P3	Complainee	The office insists on witnessing contracts, but their genuine interest is in collecting money and not in maintaining proper records.	Transparent communication about contract witnessing, accountability to prioritise record-keeping over profit, and reliable tools for effective record management.						
	P4	Witness	The chairman favours residents, while outsiders are mistreated.	Inclusive treatment to prevent perceived favouritism based on origin.						

Table 2. (Cont.) Contradictions that arose following the verdict and their relation to CHAT elements.

Case	Participant (P)	Participant status	Contradictions identified by participants during the mediation process	What is causing the contradiction?	CHAT elements explaining the contradiction					
					S	O	T	Ru	Ro	C
2	P5	Complainant	To rent my house for income, I must get permission to change its use. These legal requirements are very difficult.	Clarity and efficiency in legal processes.						
	P5	Complainant	Youth don't respect leaders or elders, use foul language, and speak disrespectfully to leaders. This is a bad thing.	Clear norms for respectful communication.						
3	P6	Complainant	I have doubts about this expert's measurements.	Transparency in expert methods and the application of expertise.						
	P7	Complainee	Experts should consider reality. Do they want us to demolish a wall to move it to the boundary? This creates an unnecessary new conflict.	Practicality in enforcing regulations.						
	P8	Complainee	Experts demand permits for building fences, but we know permits are for houses, not fences. They should educate us, not blame us.	Public education on building regulations.						
	P9	Witness	It is surprising to be informed of such an important exercise only during implementation.	Community participation.						

Notes: S = Subject; O = Object; T = Tools; Ru = Rules; Ro = Roles; C = Community.

4.3.1.1. Inadequate Understanding of the Laws and Regulations

The results have demonstrated that inadequate understanding of the laws and regulations is often the main missing element of the mediation process on land use conflicts. Participants expect mediators to comprehend these legal frameworks better. However, various cases highlight contradictions and misunderstandings of the legal provisions and some terms in the existing regulations. For instance, in Case 1, there was a need for more clarity about responsibility for a public area next to a house, with conflicting views on whether the individual or the government should manage it. The mediator redirected the focus to finding a solution, emphasising adherence to government regulations for community parking. After a lengthy discussion, the chairperson responded:

> The matter of ownership of public space is unnecessary; let's focus on the problem and find a solution. We must adhere to government regulations to secure a parking space in the community.

In Case 2, tensions arose over converting a residential plot to commercial use, primarily stemming from the complainant's lack of awareness regarding the formal requirements for land use change. The tenant operated an online business from a residential property without obtaining a license or establishing a formal agreement with the landlord. This situation highlights the need to enhance public awareness of licensing requirements among tenants and land use change procedures among landlords.

In Case 3, stakeholders expressed surprise that professionals require permits for constructing fences. They were also perplexed when a professional conducting boundary recovery instructed them to demolish an already-built wall to align with the actual boundary. This directive was perceived as introducing a new conflict (see their remarks in Table 2, P7 & P8).

Wehrmann (2008) underscores the critical role of legal knowledge in conflict mediation, asserting that it enables mediators to make decisions that are beneficial and compliant with legal frameworks. He advocates empowering mediators with a robust understanding of laws and regulatory frameworks and proficient mediation skills to improve decision-making (Wehrmann, 2008). Ngowi et al. (2022) support this perspective, emphasising that MLs often lack sufficient legal knowledge despite being central to conflict resolution. Similarly, Emanuel and Ndimbwa (2013) underscore the necessity for village leaders to be well-versed in conflict resolution laws. Furthermore, Babeiya (2016) and Kombe and Namangaya (2016) stress the importance of empowering local authorities and strengthening legal governance at the grassroots level, a group that includes extended planners.

Our findings highlight specific legal challenges in areas such as the management of public spaces (Case 1), land use changes and business operations (Case 2), and building permit processes (Case 3)—all of which fall within the scope of urban planners' responsibilities. Given these challenges, we recommend specific training for extended planners on critical provisions of the urban land management laws and regulations to strengthen their capacity in these domains.

4.3.1.2. Transparency and Trust in Expert Methods

Wehrmann (2008) emphasises that transparency is critical in fostering trust among participants in the mediation process. He underscores the importance of trust as a fundamental tool for mediators as neutral

third parties. In this context, the approach employed during the mediation left participants questioning the validity of the findings, as evidenced by a complainant's expressed surprise: "I have doubts about this expert's measurements." The complainant expressed his feelings and emotions during a conflict resolution case. This reflects the presence of contradictions in the tools employed and the roles of the experts. It highlights a lack of transparency in experts' tools or methods, questioning the validity of their measurements and conclusions. In response, the expert stated: "The findings are based on science. You can hire another surveyor to confirm. I didn't manipulate any data."

The responses from the complainant and the expert underscore that trust in tools and experts is heavily reliant on the transparency and comprehensibility of the methodology employed. The contradiction arises from stakeholders' lack of understanding of the methodology, highlighting the importance of clarity in communication. Akintayo et al. (2024) argue that mediators must employ simplified language to ensure participants can fully comprehend the processes involved. Therefore, this issue should be addressed by increasing collaboration between experts and mediation participants to enhance trust and understanding. This is consistent with Wehrmann's (2008) assertion that building trust is a fundamental requirement for successful conflict resolution. Consequently, it is essential to employ technology or tools so stakeholders can easily comprehend and verify the process, ensuring transparency.

4.3.1.3. Documentation

The mediation process revealed significant deficiencies in documentation practices, leading to unsatisfactory outcomes. As Table 2 illustrates, Participant 2 highlighted frequent document misplacement, reflecting issues with record-keeping, inconsistent minute-taking, and difficulties reporting to Municipal authorities. For example, in Case 1, an Executive Officer's report was lost and subsequently resubmitted; in Case 2, signed contracts were not retained, and essential documents were missing during meetings. Addressing the lost report, the MEO explained:

> Our mobile phones have limited storage, so we often delete photos to save memory. However, I sent the report through WhatsApp, and it got lost. The Ward Officer probably couldn't find it when he asked for the report, but I sent it to him. The hard copy must have been misplaced among the papers, but it is there.

Case 1 further demonstrated how outdated register books complicated resident identification, as Participant 2's account contradicted details from Table 1. The records consisted of meeting resolutions without the necessary details for comprehensive tracking. The chairperson emphasised the need for efficient tools for data management that simplify the process and suggested potential technological upgrades to improve efficiency:

> This office serves many people. We should have a computer to keep and maintain records and simplify information retrieval. Searching through these cabinets is challenging and may cause respiratory problems as you open them.

Moreover, in Case 3, unauthorised documentation practices were mainly employed as a precaution. The MEO often oversees records but struggles with the workload. These record-keeping issues also extended to the

Municipality, where urban planners faced challenges locating files, underscoring the need for more robust document management systems.

The aforementioned record-keeping challenges align with those highlighted by Ngowi et al. (2022), especially in Eswatini, which point to inefficiencies in information collection, storage, and sharing within local systems. The authors recommend enhancing college curricula to improve executive record management skills and defend increasing staffing at MGO to improve efficiency. In this paper, we stress the importance of documenting conflict resolution structures and defining community jurisdictions, as inadequate documentation systems within the MGO often lead to document loss and difficulty registering complaints.

4.3.2. Contradictions Related to Rules

Table 2 reveals five contradictions in the rules used during the mediation processes. The rules governing community relationships during mediation are culturally accepted practices that mediators use to structure interactions. For instance, initiation rules often assume local residency, becoming embedded as cultural norms within the community. The findings indicate that mediation rules within the MGO are predominantly traditional rather than formal, as Ahmed and Muhindi (2023) noted. This contrasts significantly with the expert-driven practices employed at the municipal level. The Mtaa chairperson highlighted the absence of formal rules, noting that participants rely on community culture and the respect afforded to leaders and elders. Interviews (Table 2) further revealed contradictions in the mediation process, underscoring power imbalances. In Case 1, a respondent complained that wealthier individuals often disregard those with fewer financial resources and that the chairperson favours the wealthy. In Case 2, a tenant who was not a resident felt unfairly treated, while the complainant pointed to a lack of respect from the youth toward the elders. These power imbalances foster mistrust within the community, aligning with Ahmed and Muhindi (2023), KaraniOnyiko et al. (2021), and Marfo (2019), who emphasise that local leaders' mediation roles should focus on de-escalating tensions and facilitating dialogue.

Several scholars have highlighted inconsistencies in how mediation bodies handle land use conflicts. Emanuel and Ndimbwa (2013) describe these bodies as ineffective, noting widespread negative perceptions from participants complaining about favouritism in conflict mediation processes. The authors observe villagers' dissatisfaction with the conflict resolution process, citing delays and perceived bias toward the elite. Conversely, well-managed grassroots mediation processes have garnered more positive feedback for their potential to prevent conflict escalation. Furthermore, Emanuel and Ndimbwa (2013) note that while grassroots leaders play a crucial role in mediation, they often struggle to maintain impartiality. To mitigate power imbalances during meetings, Engeström (2000) and Wehrmann (2008) stress the importance of establishing clear, agreed-upon rules, which the mediator enforces to ensure the objectives of the mediation are achieved.

4.3.3. Contradictions Related to Roles

Table 2 reveals 11 contradictions in the roles used during the mediation processes. Roles involve participants taking on specific responsibilities to ensure the efficient facilitation of the mediation process. Despite these efforts, Table 2 reveals concerns about inequalities stemming from power imbalances, unequal speaking opportunities, and mutual distrust among participants. During the mediation process, mistrust between

participants and mediators was evident. This dissatisfaction, particularly among respondents and complainants, suggests that while resolutions are reached, underlying issues remain unaddressed. Specific incidents which highlight these challenges are presented below.

4.3.3.1. Bias and Favouritism

Participants perceived bias in mediation sessions. For instance, in Case 2, a complainant accused the chairperson of partiality:

> He gives her plenty of time to speak but interrupts me when insulted, perhaps because I am not a native resident but just a tenant.

This perception of inequality suggests marginalised treatment of non-native residents or tenants, undermining trust in the mediation's fairness. Similarly, in Case 1, favouritism towards certain groups was observed:

> He defends motorcycle taxi riders because they are his voters. He should remove them until they follow the procedure for conducting business in the area.

The opinions in the quotes imply allegations of electoral considerations influencing mediation outcomes, and they equally highlight political dynamics that can compromise neutrality and fairness.

5. Conclusion

The findings of this study reveal that urban land management is a critical yet often overlooked area in both academic literature and policy discussions. While there has been notable work in urban planning, particularly by scholars such as Kironde (1995, 2000, 2006), Kombe (2006), and Lugalla (2010), who focus on informal settlements and tenure security, research on urban land governance remains lacking in practical insights. This gap includes the diversity of ownership documentation and polycentric governance institutions, as well as the interactions between residents and government agencies in land transactions. Chigbu et al. (2021) highlight that key institutional and individual roles remain under-explored, signalling a need for strengthened land education, research, and competency-building. Furthermore, academic networks essential for knowledge-sharing and capacity-building in Africa are still developing (Kuusaana et al., 2021). However, progress toward locally adapted, people-centred land management is ongoing (Mabakeng et al., 2021).

Building on the work of Manara and Pani (2023), who advocate for institutions that integrate traditional and modern, formal and informal, and local and global practices to enhance sustainability in urban communities, our research demonstrates that Municipal Governance Organizations play a crucial role in making communities more livable. These institutions facilitate the acceptance of conflicts from community members, create platforms for mediation, and generate resolutions similar to those of Municipal Organizations. This aligns with Akintayo et al.'s (2024) emphasis on strengthening out-of-court mechanisms for conflict resolution, particularly in Africa, where many still report conflicts outside formal court systems, contributing significantly to social harmony.

MGOs utilise a conflict resolution framework that mirrors the approach of municipal planners, involving case reception, discussion sessions, and protocol oversight by the Mtaa chairperson. However, challenges were identified, such as a lack of consensus on session rules and record-keeping issues, such as inaccurate or poorly maintained hardcopy records. These challenges underscore the need for clear procedural guidelines and improved documentation practices to enhance the mediation process.

This study, employing single-case analyses, underscores the need for further research to explore the long-term activities of extended planners. Specifically, investigations are needed to determine whether their approach is reactive or proactive and how they adapt to contradictions. The analytical framework used in this study represents an initial step in understanding the role of extended planners within MGOs. The findings highlight the vital yet under-acknowledged role of MGOs in managing land use conflicts, and it is recommended that policymakers, especially the MLHHSD, consider formalising the recognition of MGOs as extended urban planners. Furthermore, comparative studies across different regions are essential to identify best practices and inform policies supporting proactive conflict resolution in rapidly urbanising areas within Tanzania and internationally.

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Conflict of Interests

The authors declare no conflict of interests.

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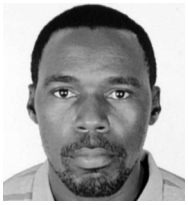

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Community Mobilisation Through Translation: A Sustainable Framework for Participatory Planning

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Abstract

Participatory planning in neighbourhood regeneration faces challenges, including engagement difficulties, consensus-building, implementation complexities, and expectation management. This article investigates participatory planning processes aimed at addressing the aforementioned challenges in Bijiang Village, China. Using the framework of translation, it explores how this approach facilitates community mobilisation and engagement to achieve the United Nations Sustainable Development Goals (SDGs), specifically focusing on fostering sustainable communities. Translation theory comprises four moments: problematisation, interessement, enrolment, and mobilisation. The empirical studies demonstrate that these moments are dynamic and iterative. Initial problem framing, focused on historical landscapes, was unclear at first but became more defined through interest assignment, recruitment, and mobilisation. The interessement phase identifies stakeholders with shared concerns and values, empowering them early in the decision-making process. Enrolment effectively expanded participation by mobilising key stakeholders, such as clan elders and parents, through context-specific social networks and social ecology. This approach ensures that planning outcomes reflect community values and priorities. Mobilisation in Bijiang expanded participation, turned consensus into action, and fostered collective ownership and unity. Workshops, exhibitions, and focus groups translated public issues into defined community planning problems, facilitating the co-construction of solutions. These participatory methods made complex planning terms accessible, fostering deeper community involvement. The cyclical nature of problem framing and consensus-building in Bijiang Village underscores the importance of local socio-cultural context in rural regeneration. Translation theory offers a robust framework for managing complexities in participatory community planning.

It demonstrates how continuous negotiation and realignment of interests through translation address immediate concerns and foster long-term engagement, contributing to sustainable development.

Keywords
community mobilisation; cultural heritage; participatory planning; problem framing; sustainable regeneration; translation

1. Introduction

Participatory planning has become an essential approach in urban regeneration, particularly in fostering sustainable community development that aligns with the United Nations Sustainable Development Goals (SDGs). This approach emphasises the active involvement of community members in the planning and decision-making processes, aiming to create more inclusive, equitable, and culturally sensitive urban environments. Despite its potential, participatory planning encounters numerous challenges, such as difficulties in engagement, complexities in consensus-building, implementation hurdles, and managing expectations (Arnstein, 1969; Healey, 1997). In particular, in the process of community mobilisation, issues such as low enthusiasm and outdated, monotonous participation forms have emerged. Motivation to participate has long been a central focus of scholarly exploration and research. However, in practical application, there has been insufficient research on how to stimulate community mobilisation and how different participation motivations interact and evolve in practice. Additionally, scholars have observed that participatory planning often emphasises techno-centric approaches, overlooking essential social and cultural dimensions needed for sustainable development (Afzalan & Muller, 2018). A significant gap remains in understanding how participatory planning can effectively harness community resources and local ecosystems to drive community mobilisation, especially in rural or semi-rural areas experiencing rapid urbanisation.

The concept of translation, derived from actor-network theory, offers a valuable lens through which to analyse participatory planning. Translation, as developed by Callon (1986) and Latour (2005), refers to the process through which actors (human and non-human) negotiate, align, and redefine their interests to achieve collective goals. Translation involves the dynamic negotiation, alignment, and transformation of interests among actors within a network (Callon, 1986; Latour, 2005). This perspective highlights the iterative and cyclical nature of aligning diverse interests, making it particularly relevant for understanding the complexities of community mobilisation in urban regeneration. While the concept of translation has been explored across various contexts (MacCallum, 2008), its application within participatory planning for urban regeneration remains insufficiently examined.

This research aims to bridge these gaps by providing empirical evidence on the effectiveness of participatory planning in addressing sustainable development challenges, with a specific focus on the role of translation in community mobilisation. The study is guided by the following research questions: How can participatory planning effectively mobilise community resources to enhance engagement in neighbourhood regeneration initiatives? How does the application of translation theory in participatory planning facilitate collaborative problem framing and the co-construction of strategies among diverse stakeholders? In what ways does the integration of local history and cultural heritage into participatory planning influence community mobilisation and contribute to the achievement of the SDGs?

Bijiang Village in Foshan City, South China, serves as a good exemplary case for examining the role of participatory planning within a rapidly urbanising rural context. Historically a traditional water town, Bijiang faces several notable challenges, including initially low community engagement, difficulty in consensus-building across diverse stakeholder groups, and balancing historical preservation with the demands of urbanisation. Additionally, the village contends with practical issues like traffic congestion and environmental concerns tied to the river channel's restoration. These challenges make Bijiang an ideal setting to explore how participatory planning, through the four moments of translation, can effectively engage and align stakeholders around key focus areas: historical landscape restoration, traffic management, and river channel revitalisation. Problematisation framed these issues around shared community concerns, interessement aligned stakeholder interests to foster cooperative relationships, enrolment expanded engagement via local social networks, and mobilisation solidified community commitment, creating inclusive and sustainable outcomes. Bijiang's case provides insight into how participatory planning, grounded in translation theory, can address the complex dynamics of sustainable rural-urban development.

The remainder of the article is structured as follows: a research review focusing on participatory planning and community mobilisation in urban regeneration from the lens of translation; an introduction to the research framework of translation; a presentation of the empirical studies; an analysis and discussion based on these studies; and a concluding section.

2. Research Review: Participatory Planning and Community Mobilisation Through the Lens of Translation

Participatory planning has gained importance in urban regeneration by involving local communities in decision-making to ensure that development projects meet residents' needs and aspirations. In recent years, participatory planning in China has gained significant attention, particularly in the context of rapid urbanisation and the need for sustainable regeneration. The benefits of participatory planning include fostering social cohesion, community empowerment, and enhancing the legitimacy and sustainability of urban projects (Forester, 1999; Innes & Booher, 2004; Roberts, 2004; Tan et al., 2023). By leveraging local knowledge, participatory planning also enables more context-specific solutions (Seo, 2022; Seydel & Huning, 2022). However, recent scholarly debates emphasise the unique challenges in adapting participatory methods within China's existing governance structures (Zhou, 2018), which often require integration with local cultural and social dynamics for effectiveness (Cao et al., 2021).

One of the main challenges in participatory planning is effective community mobilisation. Mobilisation involves strengthening communal bonds and enhancing collective action, addressing local issues that resonate with daily community experiences (Moulaert et al., 2010; Putnam, 2000; Sampson, 2012). Key strategies for effective mobilisation include leveraging local history and culture, establishing inclusive decision-making frameworks, and ensuring transparency in communication. Research shows that local leaders and organisations are instrumental in bridging gaps between residents and policymakers, an essential element in mobilising communities for urban planning (Tan & Altrock, 2016). Yet, participatory planning faces challenges, particularly in mobilising diverse community actors. Engagement levels can remain low due to logistical, socio-economic, and cultural barriers between planners and local communities (Burby, 2003; Li et al., 2020; Lin, 2023). One solution lies in the framework and theory of translation, which is

rooted in actor-network theory and focuses on dynamic, iterative negotiation and interest alignment, addressing the critical issue of sustaining long-term community involvement.

The concept of translation highlights negotiation and alignment among actors within a network, underscoring the fluid and contingent nature of social interactions (Callon, 1986; Latour, 2005). The framework of translation provides a practical lens for understanding and navigating the complexities of community engagement in urban regeneration, offering a method to address issues of power imbalances, particularly between top-down institutional actors and grassroots communities (Booher & Innes, 2002). In addressing power dynamics, translation emphasises interessement and enrolment, encouraging a continuous renegotiation and alignment of interests. Mungai and Van Belle (2018) highlight translation's potential in offering an inclusive approach to consensus-building, aligning well with the dynamic processes essential in participatory planning.

Implementing participatory plans also encounters challenges from bureaucratic resistance (Arnstein, 1969) and managing high community expectations for immediate improvements. Urban regeneration, typically a gradual process, requires sustained momentum, especially in rapidly urbanising areas where local social networks may not be fully integrated with formal planning systems (Healey, 2006). This gap underscores the need to bridge technical solutions with the social and cultural dynamics essential for sustainable development (Caldwell et al., 2021). Translation theory offers a framework for aligning diverse interests and fostering adaptive collaboration, enabling planners to navigate bureaucratic constraints while maintaining community engagement over time.

Another significant research gap in participatory planning is the integration of local cultural heritage and history. Urban regeneration often prioritises technical solutions, leading to community disengagement. Translation theory, through incorporating non-human actors, such as cultural artefacts and historical narratives, offers a way to preserve cultural identity within regeneration efforts, aligning with debates on culturally sensitive planning. This approach bridges modern planning strategies with traditional community values, fostering inclusivity (Rui, 2019).

Recent studies also advocate for innovative participatory tools such as digital platforms and social media to broaden engagement (Lin, 2022). While tech-based approaches are beneficial, they need to be balanced with localised mobilisation strategies that leverage social capital and cultural resources (Afzalan & Muller, 2018). This integrated approach is especially relevant for rural or semi-rural areas facing rapid urbanisation, offering valuable insights for communities seeking sustainable development through participatory planning. Translation theory, therefore, provides a flexible and valuable framework for managing the dynamic interactions essential to successful participatory planning (Rui, 2019).

In conclusion, while participatory planning holds potential for inclusive urban development, overcoming challenges such as power imbalances, cultural barriers, and logistical issues requires a robust theoretical framework. Translation, with its emphasis on negotiation, alignment, and adaptation, offers a robust framework for addressing and understanding these challenges. It supports sustainable outcomes in urban regeneration while fostering a culturally integrated approach to community engagement.

3. Research Framework and Case Study

3.1. Research Framework: Translation

Translation comprises four key moments and stages: problematisation, interessement, enrolment, and mobilisation (Callon, 1986). The first stage of translation, problematisation, involves defining core issues in a way that resonates with diverse actors, effectively framing the problem (Tan & Altrock, 2016). Interessement follows, employing strategies to engage actors and recruit them as network members. In the subsequent stage, enrolment, actors formally commit to specific roles, ensuring their active participation. Finally, mobilisation establishes spokespersons within the network, sustaining its stable operation and addressing any dissent that arises. Among these stages, problematisation is particularly essential as it sets the foundation for collaborative problem framing. Consensus on problem framing is essential for collective action and effective strategy framing to proceed. Mobilisation, as the core stage of translation, underscores the importance of consolidating and stabilizing the network of actors to ensure the implementation and sustainability of the planned initiatives. This focus aligns with the goals of participatory planning to empower communities and foster long-term engagement and ownership of the regeneration projects (Callon, 1986).

Translation processes are, at their core, social interactions that facilitate both problem and strategy framing. The framework of translation's moments offer insights into how actors are brought into alignment within a network, how interests are negotiated and stabilized, and how collective action is mobilised. Translation provides a framework for identifying and resolving conflicts that arise during participatory planning. By focusing on the iterative negotiation and realignment of interests, translation provides tools for identifying and resolving centres of controversy where stakeholders' frames of reference may conflict.

Furthermore, these four moments and stages of translation are not linear in their development. Bryson et al. (2013) propose that public participation is a cyclical and dynamic process. Therefore, this study combines Callon's (1986) four key moments with Bryson et al.'s perspective on the cyclical nature of public participation, proposing a research framework for "translation" based on a spiral cyclic structure (see Figure 1). The process of translation begins with problematisation, and returns to redefining the problem when encountering dissent, rather than following a linear structure where dissent leads to a halt. These moments reflect the iterative and cyclical nature of aligning diverse interests within a network, making it a suitable framework for understanding the complexities of participatory planning. The translation framework offers insights into how consensus is formed through the iterative process of aligning interests. The Bijiang case study shows that consensus is not achieved in a linear way but through continuous renegotiation, where different actors redefine their roles and goals in response to ongoing dialogue and engagement.

By viewing participatory planning through the lens of translation, we can better understand the roles and influences of various actors within the planning network. This approach highlights the importance of recognising and addressing the interests and power dynamics of different stakeholders, facilitating more effective and inclusive engagement (Latour, 2005). The empirical analysis of Bijiang Village will be conducted using the four key moments of translation, detailing the specific processes of communication, mobilisation, and translation. The four moments are crucial in understanding how community mobilisation unfolds.

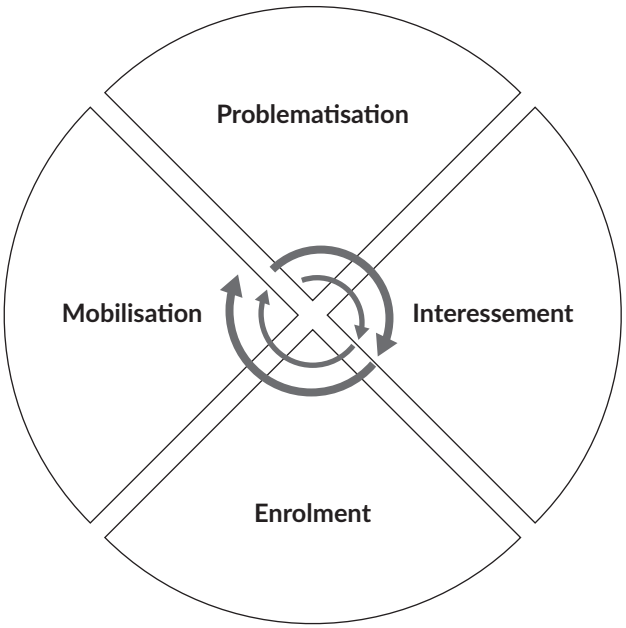

Figure 1. Processes of community translation. Source: Adapted from Bryson et al. (2013) and Callon (1986).

3.2. Case Study: Bijiang Village in Foshan

Bijiang Village, located in Shunde District, Foshan, Guangdong Province, was historically one of the four major market towns of Shunde during the Ming and Qing dynasties. It was known for its convenient waterway transportation, thriving commerce and industry, and abundance of talents. The village boasts a wealth of residential gardens and ancestral halls. In 2005, Bijiang Village was recognised as a Chinese Historic Cultural Village. In December 2018, with special funding from the Guangdong Desheng Community Charity Foundation's Harmony Community Plan – Community Development Direction, the Bijiang Community Residents Committee, in collaboration with Guangzhou Xiangcheng Architecture Company, Guangzhou FAAN NGOK Community Design Centre, and Shunde Yixin Social Work, initiated the Bijiang Community Regeneration Project.

The case study of Bijiang Village provides a practical illustration of the synergies between translation and participatory planning. Historically a traditional water town, Bijiang has faced the pressures of modernisation and sustainable regeneration. Bijiang Village, officially designated as a Chinese Traditional Village in 2012, is renowned for its rich cultural heritage. However, it faces several challenges, including the need for spatial quality improvement, inadequate infrastructure, fading community memory and historical landscapes, and a lack of cohesive village aesthetics. The village has employed participatory planning methods, including workshops and public exhibitions, to engage the community in the regeneration process since 2019. By emphasising local memories and historical landscapes, participatory planning in Bijiang has reignited community involvement, strengthened communal bonds, and promoted intergenerational communication and cultural preservation.

Bijiang Village was chosen as the case study for two main reasons. Firstly, as a traditional rural village, Bijiang still retains strong clan and geographically rooted social networks. At the same time, it is currently undergoing a process of rural urbanisation, with a migrant population four times larger than that of local

residents, underscoring the critical need for fostering social cohesion. Therefore, Bijiang represents a typical example of a rural community transitioning to an urban community, where both traditional and modern social relationships coexist. This dual nature of social relationships in Bijiang—traditional clan ties and modern individualism—provides a rich context for exploring how different social motivations are activated and transformed through the process of community participation. Secondly, viewed through the lens of translation theory, Bijiang's participatory planning process unfolds as a sequence of negotiations and alignments among diverse stakeholders, including residents, clan elders, and social organisations. The moments of problematisation, interessement, enrolment, and mobilisation are clearly reflected as the community collaboratively identified key issues, aligned interests, and consolidated their efforts towards sustainable development goals.

One of the authors, who serves both as the head of the FAAN NGOK Community Design Centre and as a community planner affiliated with Guangzhou Xiangcheng Architecture Company, has been actively leading the regeneration planning and implementation process for Bijiang Village since 2019. In her dual role as a researcher on participatory planning through the lens of translation (Rui, 2019) and as a practitioner of collaborative planning, she has gained deep insights into the participatory process through direct engagement with multiple stakeholders. This involvement has enabled her to apply the translation framework effectively in practice, enhancing collaborative outcomes. Her role in participant observation in Bijiang Village has allowed this study to gather substantial firsthand data and observational findings. From January to July 2019, she hosted monthly workshops with villagers to discuss the restoration of ancestral temples with local elders; in July, she organised a cultural history exhibition that attracted around 500 visitors and collected over 300 valuable pieces of feedback. Beginning in September 2019, she concentrated on transportation issues, conducting three workshops with parent volunteers, the neighbourhood committee, local schools, and traffic police. Through this process, she conducted interviews with 56 individuals and collected 886 completed questionnaires. In April and May 2021, the author organised and participated in four street interviews around the main village street's restoration scope, gathering 228 responses. She subsequently held joint meetings with the neighbourhood committee and led three resident workshops discussing issues like transportation, waste management, and participatory design for the restoration. This series of in-depth participatory research activities formed a solid foundation for data collection in the community regeneration planning, ensuring that community needs were comprehensively and authentically represented.

4. Translation Processes in Bijiang Village's Participatory Planning

4.1. Leveraging Historical Landscapes to Mobilise Participation

As urbanisation reshaped Bijiang Village, its once-vibrant ancestral halls and scenic water town became relics of the past, remembered only in the nostalgia of its residents. However, the strong kinship ties and remaining ancestral halls continued to serve as vital public spaces, particularly for the elderly. The initial efforts to mobilise community participation in Bijiang's regeneration project hinged on these cultural and historical connections. The ancestral halls, as non-human actors, played a critical role in anchoring the project's vision, providing both a symbolic and physical focal point for community efforts.

4.1.1. Problematisation: Framing History as a Common Ground

Initially, community planners encountered challenges in engaging the elderly in discussions about Bijiang's future. Directly addressing community issues yielded limited interest. However, a common thread emerged: shared memories and pride in the village's historical culture. Recognising this, planners identified the elderly gathered in the ancestral halls as pivotal participants in the initial stage of community engagement. Their deep interest in and shared experiences of Bijiang's "old scenes" became a unifying topic to launch community rejuvenation. Consequently, the loss of historic landscapes was problematised as a shared concern, driving community engagement and defining the project's trajectory. The ancestral halls, rich with memories, served as both symbolic and practical starting points for these discussions.

4.1.2. Interessement: Engaging the Elders and Expanding the Network

The next stage, interessement, involved leveraging the enthusiasm of the elderly residents who frequently gathered in the ancestral halls. These elders were emotionally invested in Bijiang's history, recalling the "old scenes" with nostalgia. Community planners strategically chose the ancestral halls and their occupants as core actors in the initial phase of community participation. The respected elders, who carried significant social influence, were enlisted as recruiters—key mediators who used their kinship networks to engage younger generations and more distant clan members. By aligning the elders' interests with the project goals, the planners secured their support, thus expanding the network from individuals to larger family and clan-based communities. This process of interessement involved negotiating roles within the actor-network: the planners, as facilitators, and the elders, as advocates and recruiters. Together, they co-constructed a shared narrative of restoration and preservation that drew in wider community participation. Participatory workshops, including group oral history sessions, were held to reconcile differing memories and rectify discrepancies (see Figure 2). This phase not only enhanced the accuracy of historical knowledge but also built a sense of collective ownership over the project, emphasising the negotiation of interests.

Figure 2. Oral history of the lost Su Clan Ancestral Hall.

4.1.3. Enrolment: Simplifying the Technical to Broaden Participation

Enrolment, the third stage in the translation framework, focuses on formalising roles and ensuring that actors remain committed to the network. The planners knew that complex technical planning drawings would alienate the local community, so they opted for models that depicted the ancestral halls and their surroundings. These models were tangible, visually engaging, and accessible to all, allowing residents to easily understand the planning process. By lowering the threshold for participation and using visual tools, the planners ensured that more residents felt empowered to contribute to the project. The restoration of five key ancestral halls and their historical elements was a crucial outcome of this phase. The restoration not only represented physical changes in the village but also served as a visible demonstration of the community's collective effort and shared identity. The successful enrolment of these historical elements as non-human actors within the network—representing both cultural heritage and the future vision of the village—further solidified the project's foundation.

4.1.4. Mobilisation: Expanding Participation and Sustaining Engagement

The final stage, mobilisation, focused on expanding participation beyond the initial actors and maintaining engagement through public exhibitions and feedback mechanisms. The "Bijiang Memories and Community Vision" exhibition served as a catalyst for broader community involvement. By placing the exhibition in highly frequented public spaces such as markets and parks, the planners ensured that it would reach diverse segments of the population, including those who had not previously participated in the workshops. The exhibition was designed with input-based interaction, such as displaying historical photos and models, and output-based interaction for collecting community stories and visions (see Figure 3). These interactive elements helped mobilise new actors—families, children, and residents who had not been involved before—further expanding the actor-network. The planners skilfully combined online and offline tools to collect feedback, allowing for continuous engagement and timely responses to residents' concerns. The exhibition became a platform where residents could envision future possibilities, providing a space for "resonance" and "dissent," as they reflected on their current community issues and imagined their future.

Figure 3. Children discussing restoration models.

The feedback loop created through public exhibitions and online platforms ensured that participants remained engaged. The publication of collected stories and issues on online public platforms reinforced a sense of ownership and transparency, allowing residents to feel that their contributions were valued and acted upon. This sustained engagement highlights the successful mobilisation of a broad and inclusive network of actors, transitioning the project from initial mobilisation to ongoing community involvement.

4.2. Multi-Stakeholder Consultation on Traffic Issues

Through the initial phase of gathering community stories and concerns, the issue of "traffic congestion and pedestrian safety" emerged as one of the most pressing pain points for Bijiang residents, especially in front of the elementary school. The multi-stakeholder consultation on traffic issues in Bijiang Village demonstrates how translation theory can effectively mobilise and sustain community participation in resolving public issues.

4.2.1. Problematisation: Framing Traffic Congestion as a Shared Concern

The first stage of translation, problematisation, occurred when community planners and the residents' committee identified traffic congestion and pedestrian safety near the elementary school as a shared public issue that affected the entire community. This framing positioned the issue as a problem that all actors (parents, school staff, residents, and local authorities) had to address collectively to safeguard public and personal interests (see Figure 4). By framing the issue in this way, the planners laid the groundwork for involving a broad network of stakeholders, emphasising how the solution would benefit not only individual families but also the entire community. This initial framing fostered consensus, with the community agreeing that addressing the traffic congestion issue would directly enhance both community well-being and safety. The problematisation stage served as the entry point for community mobilisation, aligning the interests of various actors around a common goal: improving traffic conditions during peak school hours.

Figure 4. Workshop with school and parent volunteers.

4.2.2. Interessement: Recruiting Core Actors and Expanding Participation

Once the issue was framed, the process moved into the interessement phase, where the community planners and the residents' committee mobilised the elementary school as a core actor in the network. The school, with its direct involvement in the traffic situation, became a key partner in addressing the issue. Together, they reached out to other interested groups, such as the traffic police department, local businesses, traffic design experts, teachers, students, and parent volunteers. These actors were recruited based on their shared stake in resolving the problem of traffic congestion and ensuring pedestrian safety. The recruitment of diverse actors demonstrated successful interessement, as the planners strategically aligned these actors' interests with the broader community goal. Each stakeholder brought their unique perspective and expertise to the table, contributing to a multidimensional understanding of the problem. The community workshops held during this phase provided a platform for these actors to voice their concerns, propose solutions, and align their interests (see Figure 5). These workshops were essential in ensuring that the issue of traffic congestion was understood from various perspectives, blending professional insights from traffic designers with local knowledge from residents and parents.

Figure 5. Workshop with police and village committee.

4.2.3. Enrolment: Negotiating Solutions and Addressing Dissent

In the enrolment phase, stakeholders formally committed to specific roles in implementing traffic improvements. During the community workshops, enrolment took place as actors agreed on a set of potential solutions, including the introduction of one-way traffic and the establishment of parent waiting areas. However, disagreements emerged regarding the specifics of the one-way traffic system—whether it should be enforced only during peak hours or all day, and the exact direction of the traffic flow. These dissenting opinions necessitated further negotiation, and the planners skilfully expanded participation to include additional voices. By employing both online and on-site voting, as well as conducting interviews with residents, merchants, and students, the planners broadened the actor-network and ensured broader participation from a diverse range of community members in the decision-making process (see Figure 6). This process of addressing dissent reflects how the translation of interests is not always linear; negotiation and realignment of interests were necessary to achieve consensus on a solution that was acceptable to the majority.

Figure 6. Residents' discussion on traffic proposals.

Through these inclusive participatory mechanisms, the planners ensured that the final solution reflected both technical expertise and the lived experiences of community members. The 923 valid responses collected from the surveys and interviews further legitimised the chosen solutions and demonstrated the community's active involvement in the decision-making process.

4.2.4. Mobilisation: Implementing and Sustaining Collaborative Action

The final stage, mobilisation, focused on implementing the agreed-upon traffic solutions and ensuring that the network of actors remained aligned and engaged throughout the process. After the survey results were analysed, the residents' committee, school, and parent volunteer teams collaborated with local authorities to trial the proposed traffic adjustments for one month. This trial period represented a critical step in testing the solutions in real-world conditions and ensuring that they were both practical and effective. The trial period involved coordinated actions between multiple actors: The residents' committee installed traffic signs, the traffic police department enforced the new regulations, and parent volunteers assisted with traffic management during peak hours. The collaborative efforts of these actors resulted in significant improvements to traffic flow and pedestrian safety during the trial, further reinforcing the shared commitment to resolving the issue.

Following the trial's success, the traffic adjustment plan received formal approval from the traffic police department and was permanently implemented. The formal adoption of the plan not only resolved the traffic issue but also enhanced the sense of accomplishment and satisfaction among the participants. This stage illustrates the successful mobilisation of the actor-network, where previously recruited actors continued to support and sustain the traffic management solutions. As a result of this collective action, the student–parent community took on a more active role in maintaining traffic safety, with more parents volunteering for traffic management services. The successful implementation of the traffic plan also strengthened the community's sense of identity and collective responsibility, as residents came to see that safeguarding public interests was synonymous with protecting their personal interests. This shared understanding became a core value of the community, ensuring the sustainability of future participatory actions. The success of the traffic improvement initiative not only resolved the immediate issue but also laid

the groundwork for future participatory efforts, with the community's shared commitment to public safety and collective responsibility serving as a foundation for long-term involvement. By using translation theory as a lens, the traffic issue in Bijiang Village is revealed as more than just a technical problem; it is a socially negotiated and collectively owned process, where various actors—human and non-human—collaborate to achieve a shared goal.

4.3. Further Community Collective Action: Revival of the River Channel

The successful resolution of the traffic congestion issue in 2021 sparked a renewed collective consciousness in Bijiang Village. Residents who had previously disengaged from public matters began to actively participate in addressing community issues. This momentum led to significant community-driven initiatives, such as the revival of the central street river channel.

4.3.1. Problematisation: Defining the River Revival as a Public Priority

The revival of Bijiang's central street river channel had long been a topic of community discussion. Historically, the river was a significant feature of the village's landscape, but it was covered and converted into a road due to environmental and sanitation concerns in the late 1990s. With Bijiang's designation as a Historic Cultural Village in 2005 and Traditional Chinese Village in 2012, interest in reviving the river resurfaced. The river's restoration became a public issue, and in 2022, the community embarked on participatory consultations to frame this issue. In this phase of problematisation, the community planners and residents collectively identified the revival of the river as a shared goal. However, it was not without challenges—concerns over parking, traffic safety, sanitation, and structural safety became significant barriers to achieving consensus. By framing these concerns as essential elements that needed to be addressed, the planners effectively positioned the revival of the river as a project that required collaborative solutions to succeed.

4.3.2. Interessement: Mobilising Stakeholders and Addressing Concerns

Following the initial problematisation, the planners moved into the interessement phase, where they worked to engage a broad range of stakeholders. The consultations focused on both supporters and dissenters, with the goal of aligning diverse interests. Public activities, including four rounds of surveys, were held to gather community input. A total of 267 people participated in these surveys, with varying opinions: 33% supported the revival, 23.4% opposed it, and 43.6% believed in conditional revival (see Figure 7). The objections primarily centred on practical issues such as parking, environmental sanitation, and post-revival safety. Through this process of interessement, the planners mobilised key actors—local residents, business owners, and technical experts—by addressing their concerns. For example, conditional supporters and dissenters voiced apprehensions about traffic safety and sanitation post-revival. By engaging these stakeholders in discussions and offering solutions, such as expanding parking facilities and ensuring sewage interception, the planners succeeded in aligning interests (see Figure 8). These practical solutions made the project more appealing to those who were initially hesitant, effectively bringing them into the network of participants.

Figure 7. River channel revitalisation proposal voting.

Figure 8. River channel model and issues collection.

4.3.3. Enrolment: Negotiating and Formalising Solutions

The enrolment phase involved formalising the roles of different stakeholders and solidifying their commitment to the river revival project (see Figure 9). Through multiple rounds of communication, the community collectively agreed on several key conditions for the project's success: Parking facilities needed to be built before the revival to prevent further congestion; the river channel had to be widened, with the retention of a fire safety passage ensured; and sewage interception and water management were essential to maintaining the river's cleanliness after the revival. By addressing these concerns, the planners were able to secure the commitment of various actors. The residents and technical experts formally accepted their roles in overseeing specific aspects of the project, such as designing the parking facilities and ensuring water sanitation. This formalisation of roles represents successful enrolment, as the actors became fully engaged in the project and aligned their interests with the broader goals of community revitalisation.

Figure 9. Workshop on river channel revitalisation.

4.3.4. Mobilisation: Moving From Consensus to Collective Action

The final phase, mobilisation, involved the actual implementation of the agreed-upon solutions. Following the approval of the community's revival plan in 2023, construction on the parking facilities began, with the river channel revival project launching in January 2024. The construction process was a collective effort, with community members, local businesses, and technical experts working together to ensure the project's success. This phase of mobilisation also strengthened the community's sense of collective identity. The river revival, once a contested issue, became a symbol of the community's ability to unite and take action. Residents who had initially opposed the project, or were indifferent, began to see the benefits of collective action, further reinforcing the shared understanding that "safeguarding public interests is also safeguarding personal interests." This shared commitment ensured the long-term sustainability of the project and laid the groundwork for future participatory efforts in the village. The successful mobilisation of residents in the river revival project suggests that Bijiang Village's approach to participatory planning can serve as a model for other communities seeking to harness local knowledge and collective action for urban regeneration.

5. Discussion

5.1. Problematisation: Initial Problematisation as a Crucial Starting Point and Catalyst

The case of Bijiang Village demonstrates the pivotal role of problematisation as the starting point in the translation process. As a crucial step, problematisation sets the stage for engaging the community by identifying and framing the issues that will be addressed. However, in the Bijiang case, as in many participatory planning contexts, the initial framing of the problem was unclear and ambiguous. The initial problematisation phase serves as both a starting point and a catalyst in translation. By engaging stakeholders, refining problem definitions, and aligning interests, this phase is crucial for transforming vague concerns into clear, shared objectives that the community can collectively address (see Figure 10).

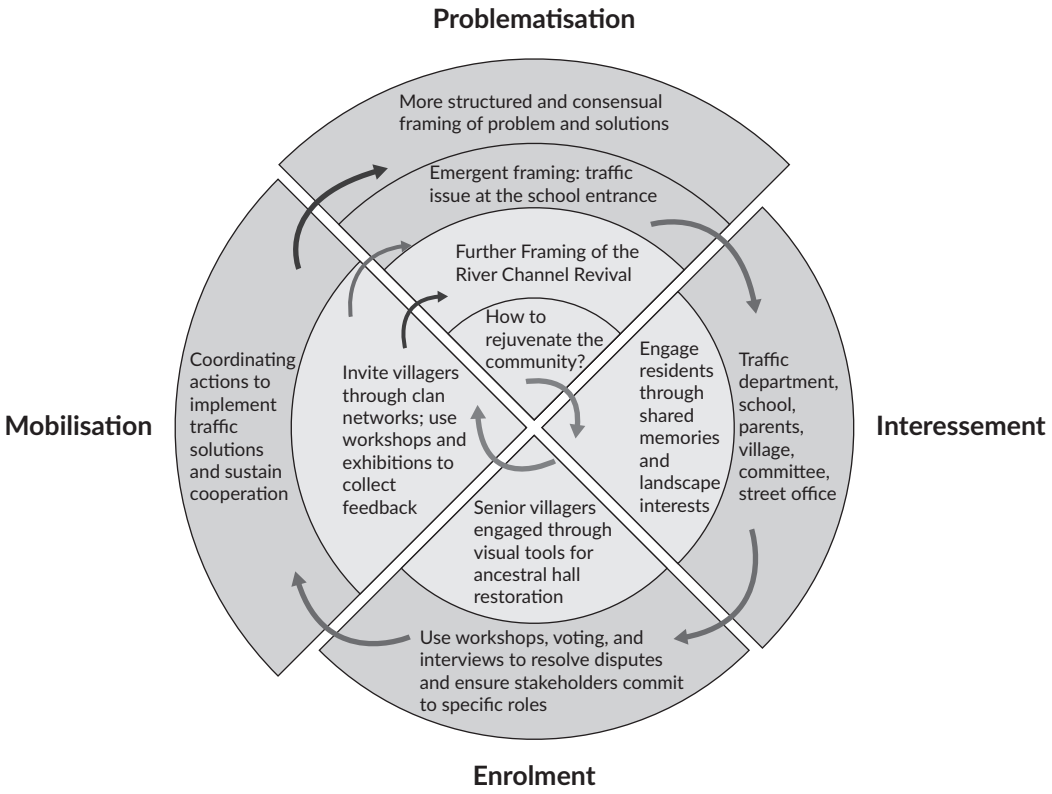

Figure 10. Translation process of community participation at Bijiang.

5.1.1. From Abstract to Concrete: Historical Culture as an Entry Point

In the early stages, community planners struggled to engage villagers in discussions about the community's future vision, as abstract planning terms failed to resonate with them. This highlights the importance of context-specific problem framing in participatory planning. The planners soon discovered that historical culture was a theme that deeply resonated with the villagers, particularly the elderly. However, the initial framing of this issue—restoring the village's historical landscapes—remained vague and undefined. This represents the first phase of problematisation, where the issue is broadly recognised but lacks specificity. To shift from this vague framing to a clearer understanding, the planners enlisted key actors, such as local elders, and mobilised the wider community through clan networks. This recruitment process helped focus the issue on the destruction of historical landscapes due to urbanisation. The involvement of local stakeholders, particularly those with emotional and cultural ties to the village's history, helped refine the problem framing, making it more concrete and relevant to the community. This stage illustrates how problematisation is not a one-time event but a dynamic and iterative process, requiring ongoing dialogue and engagement to clarify and refine the issues at hand.

5.1.2. Problem Framing as a Catalyst for Community Engagement and Consensus-Building

The translation process became even more refined during the next phase of community engagement, specifically with the traffic congestion issue at the elementary school gate. While the initial problematisation of traffic congestion was evident to all, it lacked the detailed understanding necessary for formulating effective strategies. The planners organised public exhibitions and focus group discussions to gather

feedback and identify the root causes of the congestion. Stakeholders, including parents, nearby residents, and traffic management officials, were recruited to participate in a collaborative problem-framing process. Through these participatory mechanisms, the problem of traffic congestion became clearer, and a consensual problem framing emerged. Solutions, such as creating one-way traffic systems and establishing parent waiting areas, were discussed, tested, and refined. This stage illustrates how translation uses feedback loops—through surveys, workshops, and public meetings—to align diverse stakeholder interests and achieve consensus. The successful resolution of the traffic issue not only addressed the immediate concern but also catalysed broader community involvement in public matters. Residents who had previously disengaged from such issues began to recognise the value of collective action and became more invested in solving public problems.

5.2. Interessement: Aligning Stakeholders' Interests and Shared Values, and Early Empowerment

The interessement phase in the participatory translation process is critical for identifying key stakeholders, aligning their interests, and empowering them to take part in decision-making. In Bijiang Village, this phase involved building on the community's strong sense of identity with its historical culture, as well as leveraging its deep-rooted social networks to ensure broader participation. By focusing on shared values and common goals, planners were able to mobilise local residents and stakeholders, creating a foundation for collective action and sustainable development.

5.2.1. Community Engagement Through Utilising Social Capital and Local Networks

In the initial stages of the Bijiang Village project, interessement relied on mobilising influential community members, particularly respected elders and clan leaders, who held a deep reservoir of local social capital. These figures were more than just respected voices; they were cultural gatekeepers with the credibility to inspire broader community involvement. Planners strategically engaged these leaders, not only to align their interests with the project's goals but to foster trust and legitimacy within the village. By enlisting the elders as recruiters and advocates for the project, the planners were able to extend participation beyond individual residents to larger networks of families and clans.

Through clan-based networks and participatory workshops, these community leaders were empowered to present and shape project objectives in ways that resonated with local residents, bridging individual concerns and shared community values. This alignment process reinforced a sense of ownership and cohesion across different social groups, as stakeholders worked collaboratively to identify issues and co-design solutions that honoured the village's historical and cultural heritage. By drawing on existing relationships and trust networks, the planners were able to translate the broader goals of the project into terms that resonated with residents, fostering a participatory culture rooted in shared values and mutual respect.

5.2.2. Interessement as a Mechanism for Aligning Values and Empowerment

The participatory translation process in Bijiang Village illustrates how interessement—the alignment of stakeholders' interests—is crucial to the success of participatory planning. By identifying shared values, such as the preservation of historical culture and the improvement of traffic safety, planners were able to empower local residents and other stakeholders to take active roles in the decision-making process. This

empowerment fostered a sense of ownership and collective agency, ensuring that stakeholders felt responsible for the project's success and were committed to seeing it through.

The alignment of interests and shared values not only facilitated problem and strategy framing but also ensured that the outcomes were socially sustainable. The community's collective engagement in the planning process resulted in solutions that reflected their values, from the restoration of historical sites to implementing traffic safety measures. This alignment of interests, values, and goals is essential for achieving sustainable community development outcomes, as it ensures that solutions are both locally relevant and widely supported.

5.3. Enrolment: Finding Key Stakeholders and Expanding Engagement Via Local Social Networks

The enrolment phase in the participatory translation process is where stakeholders formally take on roles and responsibilities, and the network of participants expands to include key actors who will drive the project forward. In the case of Bijiang Village, local social networks played a crucial role in facilitating this enrolment. By leveraging the influence of respected elders, parents, and community leaders, the planners were able to significantly expand engagement through clan connections and other social networks, ensuring broad participation in both the historical preservation projects and the traffic issue initiatives.

5.3.1. Leveraging Local Social Networks for Sustainable Enrolment

As the Bijiang project progressed, planners leveraged local networks to sustain enrolment by enlisting core community figures, such as clan leaders, active parents, and respected elders, as ambassadors for the initiative. These individuals, not only well-connected but also trusted voices within their social networks, made them ideal advocates for the projects. This strategic use of existing social networks underscored the importance of understanding local dynamics and structures. By empowering these community representatives, planners ensured that participation was inclusive, reaching a broad cross-section of the village and reinforcing ongoing involvement. This approach fostered a community-driven momentum that sustained engagement throughout the project, establishing a participatory culture that was both enduring and reflective of Bijiang's unique social ecosystem.

5.3.2. Context-Specific Approaches in Community Engagement

The Bijiang Village case highlights the importance of adopting context-specific strategies in participatory planning. Here, planners recognised that the social dynamics of the village—marked by clan affiliations, school networks, and neighbourhood committees—were crucial in identifying effective engagement strategies. Rather than applying a one-size-fits-all approach, planners tailored their engagement methods to reflect Bijiang's unique social fabric. For example, involving elders in the historical preservation project was not only symbolic but practically significant, as these elders held influence within the community and could engage others effectively. By embedding the enrolment process within these specific social connections, the planners fostered an authentic and resilient community-driven effort. This context-sensitive approach not only amplified community participation but also ensured that the values and priorities unique to Bijiang were respected and maintained. It demonstrates how understanding and integrating local social nuances can enhance the inclusivity, sustainability, and cultural relevance of participatory planning efforts.

5.4. Mobilisation: Expanding Participation and Transforming Consensus Into Collective Action

In the final stage of participatory planning in Bijiang, mobilisation played a crucial role in expanding participation, sustaining engagement, and translating community consensus into concrete action. Through the "Bijiang Memories and Community Vision" exhibition, held in public spaces, planners engaged a broader demographic, including residents who hadn't previously participated. Interactive displays allowed residents to reflect on historical identity and future possibilities, fostering "resonance" with community goals and encouraging contributions from diverse groups, thus solidifying the actor-network. Feedback mechanisms—both online and offline—strengthened transparency and fostered a sense of collective ownership, ensuring ongoing involvement.

This phase transcended engagement, as practical solutions to community concerns, such as traffic management and river revival, were implemented with the collaboration of local actors. In the traffic initiative, trial runs involved parents, local authorities, and police, demonstrating real-time benefits and reinforcing the commitment to collective safety. Launched in 2024, the river revival project symbolised unity and resilience, even among those initially opposed to it, as it became emblematic of community pride and cooperation. The practical successes of mobilisation emphasised that protecting public interests aligns with personal welfare, embedding this understanding into the village's collective identity.

5.5. Participatory Workshop and Exhibition as Translation Instruments Lowering Barriers with Accessible Communication

In Bijiang Village, participatory workshops, exhibitions, and focus groups served as key translation tools throughout all four moments of participatory planning, not only during mobilisation but across the problematisation, interessement, enrolment, and mobilisation phases. These tools were instrumental in translating complex planning ideas into accessible formats, fostering community ownership, and actively involving residents in shaping the outcomes of historical preservation and traffic management efforts. By making the planning process understandable and inclusive, these instruments aligned with the community's values and priorities.

During the historical and cultural restoration phases, planners opted to use simplified models rather than complex professional blueprints. This approach made the project more accessible, especially to villagers unfamiliar with technical planning language, and significantly increased engagement. The models enabled residents to visualise changes in ways relevant to their daily lives, fostering excitement and interest. Similarly, the "Bijiang Memories and Community Vision" exhibition served as both an informative and participatory space. It displayed visual materials like historical photos and models and encouraged residents to share their stories and ideas, further engaging those who hadn't previously participated.

During the traffic congestion phase, participatory workshops and focus groups provided a deep engagement platform for diverse stakeholders, including parents, students, school representatives, and traffic experts. These workshops allowed for problem framing and facilitated alignment of interests, ensuring that the proposed solutions addressed both technical and community-driven concerns. Surveys and feedback sessions collected input from 889 community members, adding depth to the collaborative process. For example, the trial implementation of one-way traffic system was a direct outcome of participatory workshops and broader

stakeholder engagement, demonstrating how these efforts fostered consensus-building and effective community-driven solutions.

6. Conclusions

The case of Bijiang Village highlights the critical role of participatory translation in mobilising the community and sustaining engagement in urban regeneration projects. By applying the four key moments of translation—problematisation, interessement, enrolment, and mobilisation—this empirical study illustrates how these moments foster effective participatory planning and enhance Bijiang's profile as a Historic Cultural Village.

Problematisation is the process of framing core issues in a way that resonates with the community's values and concerns. In Bijiang, this stage was evident in the early identification of historical cultural preservation and traffic congestion as key issues. These problems were framed in ways that reflected the community's lived experiences and cultural identity, laying the foundation for collective action. Through participatory consultations, the community was actively involved in defining these problems and collaboratively developing solutions, as seen in the planning phases for the traffic congestion issue and the river channel revival. This participatory approach allowed the community to share responsibilities and collectively address objections, ensuring that problem framing was inclusive and relevant to local concerns.

Interessement involves the strategies used to engage and align the interests of diverse stakeholders. In Bijiang, the preservation of historical culture became a catalyst for mobilising local residents who identified strongly with their cultural heritage. By integrating the perspectives of stakeholders—particularly those who felt an emotional connection to the village's history—the planners were able to empower residents and give them a meaningful role in the decision-making process. This phase demonstrated that addressing immediate concerns (such as traffic safety) while leveraging shared values (like cultural heritage) is essential for fostering long-term participation. The case of Bijiang also underscores the importance of recognising the local context and social ecology in achieving sustainable community participation outcomes.

Enrolment focuses on formalising the roles of stakeholders and expanding participation through local social networks. In Bijiang, respected elders and enthusiastic parents played crucial roles in extending participation beyond a small group of individuals. By recruiting key figures within the village's social networks—particularly through clan connections and schools—planners were able to engage a wide spectrum of community members. This demonstrates the importance of understanding and utilising local social capital to enhance participation. These above-mentioned local key figures in Bijiang acted as spokespersons, helping to mobilise the community and expand participation to include a diverse range of actors, from students to local businesses.

Mobilisation expanded community engagement and transformed consensus into action, which reached a broader audience and fostered collective ownership. This phase implemented practical solutions, like traffic management trials and the river revival project, with collaborative support from local actors. These successes reinforced community pride and unity, embedding the idea that protecting public interests aligns with individual welfare and strengthening the village's collective identity.

In Bijiang, workshops and public exhibitions—such as the "Bijiang Memories and Community Vision" exhibition—served as effective translation instruments that broadened community engagement. These participatory methods translated complex planning concepts into accessible language, enabling residents to fully understand and contribute to the projects. By lowering barriers to participation and encouraging interactive problem-framing, the planners ensured that the community's diverse values and priorities were reflected in the planning outcomes.

The case of Bijiang demonstrates that the four moments of participatory translation operate within a dynamic, cyclical structure, where problem framing, stakeholder engagement, and consensus-building occur iteratively. As interests are continuously negotiated and realigned, the community was able to address immediate concerns while fostering sustained engagement for future projects. The cyclical nature of this process highlights the adaptability required for long-term success in urban regeneration. The iterative approach used in Bijiang allowed for problem reframing and flexible solutions, enabling the community to not only resolve current issues but also create a foundation for ongoing participation in future development projects.

In conclusion, the integration of translation theory into participatory planning offers a robust framework for understanding and managing the complexities of community engagement. The case of Bijiang Village demonstrates that effective participatory planning hinges on the ability to problematise issues, engage stakeholders, leverage local social networks, and mobilise collective action. By continuously negotiating interests and involving community members at each stage of the process, planners can enhance the legitimacy and sustainability of urban regeneration efforts. The insights from Bijiang provide valuable lessons for planners and researchers working across diverse cultural and social contexts. They underscore the critical role of translation in fostering community mobilisation and ensuring the success of participatory planning initiatives. By adopting this framework, communities can address both immediate urban challenges and long-term sustainability goals, contributing to more inclusive and resilient urban development.

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Conflict of Interests

The authors declare no conflict of interests.

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AI-Supported Participatory Workshops: Middle-Out Engagement for Crisis Events

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Abstract

Considering the lived experience of communities is key when making decisions in complex scenarios, such as preparing for and responding to crisis events. The article reports on three participatory workshops, which assigned community representative roles to workshop participants. Using role-playing as a method, participants were given the task of collaborating on making a decision relating to a speculative crisis scenario. Across the workshops, we collected data about simulating a middle-out engagement approach and the role of artificial intelligence (AI) in enhancing collaboration, supporting decision-making, and representing non-human actors. The article makes three contributions to participatory planning and design in the context of the UN Sustainable Development Goals. First, it presents insights about the use of AI in enhancing collaboration and decision-making in crisis event situations. Second, it discusses approaches for bringing more-than-human considerations into participatory planning and design. Third, it reflects on the value of role-playing as a way to simulate a middle-out engagement process, whereby actors from the top and the bottom collaborate towards making informed decisions in complex scenarios. Drawing on the findings from the workshops, the article critically reflects on challenges and risks associated with using AI in participatory workshops and collaborative decision-making.

Keywords

artificial intelligence; community engagement; conversational agents; middle-out engagement; non-human personas; participatory design; participatory planning

1. Introduction

Community engagement has long been used as a way to inform decision-making (Jenkins & Henley, 2014). Often these decision-making processes are led by government authorities or organisations acting on behalf of the government. In practice, community engagement initiatives have faced criticism for being perceived as tokenistic and merely a checkbox activity (Levenda et al., 2020; Monno & Khakee, 2012; Parker & Murray, 2012). Traditionally, these kinds of engagement activities are typically linked to large infrastructure projects to inform planning and design decisions. With awareness of community engagement and the importance of establishing and maintaining a "social license" increasing (Dare et al., 2014), the means for engaging communities and considering their voices have become more sophisticated. These advancements are further accelerated by technological developments (e.g., the rise of social media platforms, augmented reality, and large language models) and documented in scholarly research highlighting the limitations and benefits of traditional approaches (Mackenzie et al., 2012; Salgado & Galanakis, 2014; Zanudin et al., 2019).

In recent years, government authorities have grappled with crises of unprecedented scale and nature. Examples within Australia, where the study presented in this article was carried out, include bushfires and flooding across several states with devastating impacts on local communities and wildlife. The complexity of these crises and the role of human activity (Lewis & Maslin, 2015) add new dimensions to the decision-making about how to prepare for and respond to crises. This was already observed in the context of urban planning and policies in Rittel and Webber's (1973) seminal paper outlining the challenges for addressing wicked problems. When dealing with wicked problems, solutions and responses cannot be reached by following simple procedures, logic, and rules (Conbere & Swenson, 2020). Wicked problems, such as environmental crises, require a systems-focused approach (Zellner & Campbell, 2015) and involve considering diverse perspectives, long time horizons, coalitions working together, dealing with large datasets, and bureaucratic, temporal, and financial constraints (Stark & Taylor, 2014).

This article focuses on participatory workshops for engaging community representatives to inform decision-making when dealing with the wicked problem of an environmental crisis event. It contributes new knowledge by investigating the use of artificial intelligence (AI) to support collaboration and decision-making in crisis events using a simulated middle-out engagement approach that incorporates non-human perspectives. Specifically, the article investigates and compares conversational AI agents that act as facilitators and knowledge sources versus agents that embody non-human actors (i.e., a non-human living species or ecosystems). We use "actors" or "entities" in place of "stakeholders" throughout the article due to the problematic colonial history associated with the term (Reed et al., 2024). The article also reflects on the value of role-playing for simulating middle-out engagement workshops. The article addresses the following research questions:

> RQ1: What is the impact of AI-enabled tools on collaboration and decision-making in participatory community engagement workshop settings?
>
> RQ2: How can the perspectives of non-human species and ecosystems be considered in participatory community engagement workshops? What role can AI play?
>
> RQ3: What is the value of simulating a middle-out coalition for collaborative decision-making in the context of crisis events?

The article's investigation of collaboration and collective decision-making aligns with the UN Sustainable Development Goal (SDG) 17, "Partnerships for the Goals," and SDG 11, "Sustainable Cities and Communities," which entails making cities and human settlements inclusive, safe, resilient, and sustainable. Many, if not all, of the SDGs involve, require, or could benefit from more effective community engagement. Therefore, the article indirectly contributes to all of the goals and beyond. Indeed, through the focus on participatory workshops, the insights from the study can be applied to any co-design processes involving multiple actors that may represent different interests and perspectives. The following sections outline the related work and the workshop setups before presenting the findings based on data and insights collected during the workshops.

2. Related Work

The study sits at the intersection of four distinct but related areas of research: middle-out engagement, technology-supported community engagement, community engagement for crisis events, and human and non-human actors. This section provides an overview of these areas and introduces previous work that serves as a foundation for the study.

2.1. Middle-Out Engagement

Effective community engagement brings together various actors (e.g., government authorities, community organisations, citizens) to create better planning and design outcomes (Sanoff, 1999). Middle-out engagement contributes to this goal by bringing representatives from the top (e.g., government authorities) and the bottom (e.g., community organisations) together to meet in the middle (Caldwell et al., 2021; Fredericks et al., 2016). Middle-out engagement acknowledges that citymaking is a continual process and can enable systemic change through the "accumulation of many voices, actors, devices and technologies" (Fredericks et al., 2019).

A proposed format for bringing the voices together is through the formation of a coalition, which comprises representatives nominated by the affected and interested entities (Caldwell et al., 2021). For example, Gemperle et al. (2023) demonstrated the effectiveness of the middle-out engagement approach in an urban community garden project. The study highlighted how the middle-out approach promoted effective communication, aligned objectives, and facilitated collaborative decision-making within the coalition. Similarly, Dow et al. (2019) implemented a middle-out engagement approach to develop an online directory of local services for people with special educational needs and disabilities. The study aimed to connect local community members with government officials, promoting active participation and dialogue through a middle-out approach.

Building connections, integrating cultural and local perspectives, and understanding people's aspirations are essential for fostering equitable relationships (Fredericks et al., 2023). The middle-out approach facilitates the implementation of policies, infrastructure, and interactions based on the collaborative outcomes of the engagement process. The approach of aligning top-down and bottom-up actors and processes is increasingly adopted and explored in participatory planning, including within the context of mission-oriented innovation processes (Hill, 2022), making this a promising avenue for improving community resilience.

2.2. Technology-Supported Community Engagement

Previous research, primarily within the field of human–computer interaction, has extensively examined the use of digital technologies in community engagement processes. For instance, studies have investigated how social media and web 2.0 tools can enhance urban planning outcomes through digital participation (Fredericks & Foth, 2013). Research from the areas of smart cities, urban informatics, digital civics, and urban human–computer interaction has further emphasised that successful community engagement should prioritise collaboration over one-way information dissemination and should employ a range of situated engagement channels to foster inclusivity (Fredericks et al., 2018).

AI, including large language models, presents an emerging opportunity to augment community engagement and participatory workshops. Governments, private sectors, research agencies, and community groups are increasingly using AI to make sense of big data for resource and crisis management (Fan et al., 2021; Lal et al., 2022; Ye et al., 2021). Previous research has investigated the use of AI tools for automated community planning through the analysis of social media feeds (Hollander et al., 2020) and co-creating AI-powered systems with local communities in citizen science projects (Hsu et al., 2022). While this offers many potential benefits, the application of AI in cities also raises ethical and political concerns, such as questions of data privacy and ownership and the environmental impact of using energy-intensive AI algorithms (Crawford, 2021; Luusua et al., 2023). There is also a risk of AI in urban contexts penalising minorities, which requires careful deliberation about where and how to employ AI (Cugurullo et al., 2024).

The affordances of generative AI open up additional opportunities for engaging communities, which includes the use of conversational agents to support idea generation (Tavanapour et al., 2020), co-creation (Freese, 2023), and group discussion (Kim et al., 2020, 2021; Tavanapour et al., 2020).

2.3. Community Engagement for Crisis Events

Applying community engagement approaches to crisis events is a relatively new field of study. In Australia over the past few years, design researchers have been innovating with co-design (St John & Akama, 2022) and design anthropology (McGrane et al., 2022) methods in response to a range of crisis events including fires and floods (Del Favero et al., 2024). For instance, the Northern Rivers Living Lab, an initiative that began in 2023 following flooding events of the previous year, engages communities to develop "scenarios for Lismore's future that represent the hopes and dreams of the people that live and work here" (Living Lab Northern Rivers, 2023).

Governments across different countries, including Australia, tend to focus on funding physical infrastructure after crises, placing heavy reliance on established government policies (Nahayo et al., 2017; Sufri et al., 2020). This approach often neglects the valuable insights and traditional knowledge of the community, missing opportunities to develop more comprehensive and community-centred solutions. To advance crisis resilience, for instance, following flooding events, it is paramount to consider the perspectives of the local community and the lived experience of community members (Fabiyi & Oloukoi, 2013; Islam et al., 2018; Kamarulzaman et al., 2016). Technology has the potential to support this, for example, by providing an information space that is shared between volunteer groups and formal organisations (Auferbauer & Tellioğlu, 2019) or by fostering risk perception amongst communities through immersive environments (Blackler et al., 2024).

2.4. Human and Non-Human Actors

Involving human representatives from local communities is an important step towards creating better planning and design outcomes. However, similar to human-centred design, a community engagement process that only considers the human perspective risks prioritising human wellbeing above ecological considerations (Borthwick et al., 2022). When it comes to planning and design decisions in complex scenarios, the omission of more-than-human perspectives (Clarke et al., 2019; Loh et al., 2020) may lead to decisions failing to recognise critical feedback loops within the systems that are being manipulated. A review of two Australian city-region foresight strategies found that current approaches do not include non-human beings and concluded that integrating more-than-human perspectives could lead to better urban and regional sustainability outcomes (Sheikh et al., 2023).

The separation of human and non-human perspectives in the creation of knowledge is deeply grounded in Western and colonial worldviews and has shaped the disciplines of planning and design. The distinction of the "civilized" human species from other species (Tiffin, 2001), culture from nature, and cities from "the bush" and "the land" have impacted how community engagement is practised. Indigenous thinking, on the other hand, which is considered essential for sustainable development and environmental conservation, applies a relational worldview, which treats non-human beings as active members of society (Watts, 2013). Recognising this, the UN Environment Programme (Canton, 2021) has acknowledged the critical role of First Nations peoples in ecosystem management and climate change mitigation.

In Australia, "Country" refers to the lands, waters, skies, and all living things and is central to First Nations peoples' identity and culture (Foster et al., 2020, 2022). This connection to Country is not just about land ownership—it encompasses a deep spiritual, physical, social, and cultural relationship with the environment. In New South Wales (NSW), where our study is located, the government architect introduced the Connecting With Country Framework in 2023 to support government, industry, and researchers to develop connections with Country that can inform the planning, design, and delivery of built-environment projects in NSW (NSW Government, 2023). This framework proposes a Country-centred way to work, which no longer positions humans above non-humans.

3. Study Design: Speculative Crisis Scenario Workshops

To investigate the research questions introduced in Section 1, we carried out three workshops over a period of 12 months, which allowed us to reflect on the insights between workshops (Table 1). The workshops used different speculative scenarios as imaginative narratives that explore potential futures. This approach draws on principles of speculative design (Raby & Dunne, 2013) and design fiction (Sterling, 2009), employing creative and thought-provoking narratives to stimulate critical thinking about future possibilities and societal impacts. For example, the UK Ministry of Defence, in collaboration with the Defence Science and Technology Laboratory, used speculative scenarios to explore potential future threats (UK Ministry of Defence, 2023). Similarly, Tsekleves et al. (2017) investigated how speculative scenarios could help older citizens envision the future implications of policy initiatives.

Each workshop involved a different group of participants and, across all workshops, participants role-played actors and formed a coalition to collaborate on making a decision in a given crisis scenario. Ideally, personas

Table 1. Overview of the three speculative crisis scenario workshops.

	Research question	Scenario	Role of AI	# of participants	Length
Workshop A	RQ2, RQ3	Addressing one of the SDGs in a future scenario	n/a	23	3 hours
Workshop B	RQ1, RQ3	Responding to a fictional flooding event	Facilitator and providing relevant information	9	3 hours
Workshop C	RQ1, RQ2, RQ3	Responding to a fictional flooding event	Non-human representative voice	12	3 hours

are grounded in research to limit the influence of potential biases (Adlin et al., 2006; Miaskiewicz & Kozar, 2011). Due to time and resource constraints, we generated personas based on the authors' experience with community engagement projects, which represents a limitation of the study.

The study was approved by the University of Sydney's Human Research Ethics Committee. This section details the setup, procedure, and data collection for each of the workshops. The findings in the following sections are presented as a synthesis of the data collected across all workshops.

3.1. Workshop A: Addressing the SDGs Through Non-Human Perspectives

The first workshop was conducted as a pilot study to test our middle-out framework and the use of human/non-human personas for simulating a participatory workshop. The workshop simulated a coalition of top-down and bottom-up actors (assigned to participants through persona cards) tasked with developing an ideal future scenario that addresses the SDGs. Building on the related work discussed in the previous section, we designed the workshop activities to investigate collaboration with human and non-human actors, speculative scenarios to envision possible futures and outcomes, and technologies that facilitate community engagement with diverse representatives.

3.1.1. Workshop Setup and Scenario

The workshop was conducted as part of a full-day event that included a keynote speaker from the United Nations Association of Australia, followed by three interactive group activities. In this article, we focus on the first group activity, a 3-hour speculative scenario challenge that addressed the SDGs through collaboration among diverse human and non-human actors. Participants were tasked with developing an ideal future scenario related to a specific location, projected 40 years into the future. The activity aimed to encourage participants to think creatively and critically about long-term sustainability and the integration of various perspectives, including those of non-human entities, into planning and design processes.

3.1.2. Participants and Procedure

A total of 23 participants attended the workshop, representing a diverse mix of industry and academia professionals with backgrounds in community engagement, interaction design, computer science,

anthropology, and urban planning. Participants were divided into five groups of four to five members. One of the authors was the lead organiser of the workshop, another author was a co-facilitator and also acted as a participant, and another author was a participant (subsequently joining the research team for workshops B and C).

Each participant was randomly assigned a human (e.g., mayor, doctor, baker, stay-at-home parent, etc.) and a non-human (e.g., native bee, koala, river system, eucalyptus tree, AI robot, etc.) fictional character and asked to represent their perspective in the workshop. The fictional characters were provided with background information represented in the form of a persona card (Tomitsch, Borthwick, et al., 2021), which described their role within the community, backstory, and a key quote in their voice (Figure 1). Each persona was drafted in a way that gave workshop participants some subtle hints about their character's stance and the community that they were representing.

Figure 1. Human and non-human personas cards used in Workshop A as a lens to address the SDGs.

3.1.2.1. Activity 1: Introduction to Fictional Characters and Community

To help participants connect with their characters and set the stage for the subsequent speculative scenario challenge, participants within their group discussed their characters' backstories, the community they represented, and what their characters would like to get out of the workshop.

3.1.2.2. Activity 2: Developing a Future Scenario

Each group was randomly allocated a specific location (e.g., city centre, regional centre, transport hub, etc.), which formed the basis for creating their future scenario, and was asked to choose one or more SDGs to address. Participants then went on to create an ideal scenario set 40 years into the future, considering what technologies might be included (existing or new), what society might be like, and what efforts would be made to address the chosen SDGs—representing their ideal future scenarios both through a written narrative and annotated visuals (Figure 2).

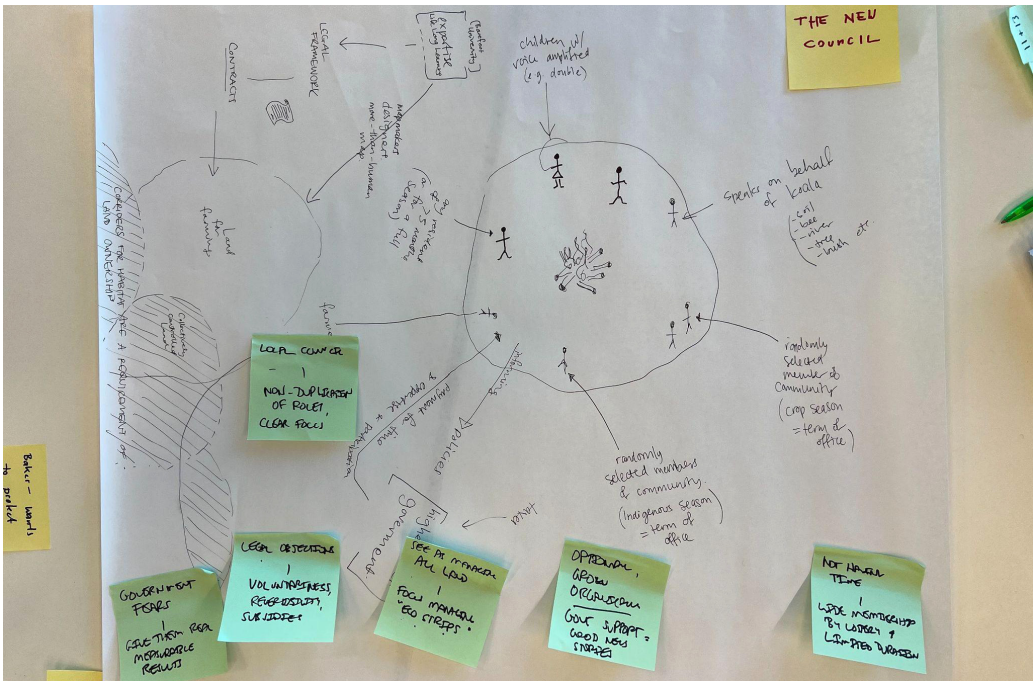

Figure 2. One of the visual future scenarios developed by a group of Workshop A participants.

3.1.3. Data Collection and Analysis

After the workshop activities, we conducted small discussions with each group individually to gather feedback on the activities, participants' experiences, and the effectiveness of using speculative scenarios and representing diverse human and non-human characters through personas. We also discussed the impact of representing diverse human and non-human characters and how this approach influenced their perspective on the scenarios. Data was collected through observations and note-taking during the workshop. The analysis was conducted through post-workshop reflective discussions between the three authors involved in Workshop A.

3.2. Workshop B: Using an AI-Powered Conversational Agent as a Facilitator

The second workshop also implemented a middle-out approach with participants role-playing fictional human community representatives. In addition, it investigated the use of conversational AI agents to enhance collaboration and support decision-making in crisis event situations.

3.2.1. Conversational AI Prototype

Given our focus on face-to-face community engagement workshops, we considered it important that the AI component did not introduce any additional technological complexity or hinder the flow of the discussion. Rather than workshop participants interacting with AI through their personal devices, we were looking for a technology that would allow multi-user interaction and integrate with the existing props and tools used in community engagement workshops, such as sticky notes and (interactive) whiteboards. We therefore opted for a conversational AI agent using natural, spoken language as the interaction modality—akin to Apple's

virtual assistant Siri and Amazon's smart home service Alexa. While predominantly used for dyadic interaction following a request–response paradigm (Ammari et al., 2019), recent research studies highlight the potential of implementing multi-party interactions with conversational agents (Addlesee et al., 2024, 2023; Seymour & Rader, 2024; Skov et al., 2022).

We conceived the agent—referred to as "Sage"—to carry out two functions: first, to provide data-based insights, and second, to take on the role of a (co-)facilitator, which involved, for example, encouraging balanced contributions and mediating conflicts. We implemented the agent as a Wizard of Oz prototype, whereby one of the research team members was located in a remote control room with their voice streamed to a Bluetooth speaker (Figure 3). We embedded the speaker inside a custom-made device made of laser-cut wooden and acrylic material to embody a physical presence. An LED light ring displayed blue–green ambient light patterns whenever Sage was speaking. The team member acting as Sage's voice was instructed to make Sage sound AI-like (similar to Siri and Alexa). ChatGPT was used to generate both pre-prepared and on-the-spot answers, which the team member acting as Sage then read out.

Figure 3. Participants in Workshop B interacting with the conversational AI agent Sage and the paper-based prototype representation of the tabletop displaying the map of Casuarina Waters.

3.2.2. Workshop Setup and Scenario

To test the efficacy of an AI agent in a participatory community engagement workshop setting, we split the session into two activities, with the first being facilitated by a human moderator and the second being augmented by Sage. The workshop scenario focused on a major flooding event in a fictional suburban community named Casuarina Waters. An actual flooding that occurred in a regional town in the Australian state of NSW in 2022 combined with a place-based approach to the map design (Vanni & Crosby, 2023) informed the development of the speculative scenario, ensuring that the context was both believable and relevant to participants. The task for the participants was to debate whether to rebuild Casuarina Waters or relocate to Casuarina Heights, an area on higher ground that was still within the river catchment.

3.2.3. Participants and Procedure

We recruited nine participants to join the workshop. All participants were industry professionals with prior experience in community engagement through their professional roles. Seven research team members supported the workshop, with three members role-playing community engagement manager during the workshop, two members operating the technical aspects of Sage, one member acting as the voice of Sage, and one member taking photographs.

Upon arrival, participants were introduced to the high-level goals of the research study without giving away any details about Sage. Each participant was assigned a fictional character and asked to enact this role until the end of the workshop. Similar to Workshop A, the fictional characters included background information represented in the form of a persona card, describing their role within the community, backstory, likes and frustrations, and motivations. The cards provided workshop participants subtle hints about their character's stance and the community they represented, without coercing participants into taking a position on the workshop outcome. Participants selected a photograph for their persona from a collection of provided portraits, names, and genders. To help them connect with their character, one of the research team members facilitated a 2-minute meditation exercise inviting participants to consider how their character arrived at the workshop, what they had for breakfast, etc. Following this, we started the role-playing exercise by welcoming participants (now acting as community representatives) to the community engagement workshop and playing a fictional TV news report video covering the impact of the flooding event on Casuarina Waters.

3.2.3.1. Activity 1: Existing Community Engagement Platform

After the introduction, we commenced with the first activity in which representatives had to consider the advantages and disadvantages of rebuilding versus relocating Casuarina Waters. This activity was moderated by the three team members acting as facilitators. Participants were seated around a large table on which we placed an A2-size paper-based prototype of an interactive tabletop application. The design of the prototype was inspired by the digital online community engagement platform Social Pinpoint, which allows users to add pins on an interactive map to indicate areas of concern and suggest improvements for a specific location. The prototype initially "displayed" a map of Casuarina Waters. Participants could request the workshop facilitators to "swap" the displayed map to show Casuarina Heights as needed. We asked participants to use yellow and blue sticky notes to "pin" benefits and disadvantages that they could see for their community when rebuilding Casuarina Waters in its current location versus relocating to Casuarina Heights. While adding their pins to the map, participants were encouraged to talk to each other and discuss their stances. The duration of this activity was approximately 30 minutes.

3.2.3.2. Activity 2: AI-Augmented Community Engagement Platform

After a 15-minute break, we began the second part of the workshop in which we introduced our conversational agent Sage. Participants were not aware that one of the team members acted as Sage to provide the impression that Sage was a fully functional conversational AI agent. Participants were asked to further discuss whether to rebuild or relocate Casuarina Waters while working towards a consensus. The three workshop facilitators continued to moderate the session, with Sage being introduced as a co-facilitator and knowledge hub to provide any information that representatives might need to reach a decision.

Sage was placed on the table next to the interactive tabletop prototype and, upon request from one of the facilitators, introduced itself and began the session with a high-level summary of the first workshop activity. Afterwards, participants were allowed to ask Sage questions at any point. To guide participants in interacting with Sage, we facilitated this activity by handing out a prompt card to each representative with relevant example questions. For instance, a participant representing a water engineer received a prompt to ask about the potential for more sustainable water infrastructure in the event of relocation. We also used behaviour cards (e.g., "Pound table and disagree") to simulate reactions as a way to explore different group dynamics. The duration of this activity was approximately 45 minutes.

3.2.4. Data Collection and Analysis

After the workshop activities, we invited participants to step out of the characters they had played and conducted a 35-minute focus group discussion about the use of speculative scenarios, participants' experience of role-playing their assigned characters, and the potential of AI to enhance community engagement. For data analysis, we used the qualitative data analysis tool Dovetail to analyse both the recording of the workshop activities and the post-study focus group discussion. We followed a deductive thematic analysis approach (Braun & Clarke, 2012) that was conducted by one researcher. After an initial set of codes and themes were developed, we discussed the results in a meeting with the larger research team.

3.3. Workshop C: Using an AI-Powered Conversational Agent to Represent a Non-Human Actor

The third workshop used the same speculative scenario as Workshop B, requiring community representatives to form a middle-out coalition and arrive at a collective decision to rebuild Casuarina Waters or relocate to Casuarina Heights. We designed this workshop to investigate the use of conversational AI agents to act as a member of the coalition, representing a non-human actor. The workshop was carried out as part of the afternoon section of a full-day workshop held in conjunction with an academic conference. The morning involved a series of talks and discussions, including presentations on non-human personas, which helped set the scene for the speculative exercise.

3.3.1. Conversational AI Prototype

We employed Sage for this workshop, using the same prototype and Wizard-of-Oz approach. Based on insights from Workshop B and as here the agent was representing a non-human actor, we decided on using a friendly-sounding non-artificial voice instead of an AI-like voice. Again one of the research team members was placed inside another room equipped with a live audio and video feed of the workshop space and ChatGPT was used to generate answers. We decided for Sage to represent the river wetland and to speak on behalf of its non-human species. To bring these perspectives into the workshop and determine potential responses to participant questions, we conducted background research on the river that served as an inspiration for the Casuarina Waters scenario. In practice, this could involve developing an "ecosystema" (Tomlinson et al., 2022) to capture the complex aspects of an ecosystem, which then informs the behaviour of the AI agent.

3.3.2. Workshop Setup and Scenario

The workshop involved two activities. First, we asked participants to develop a charter for their middle-out coalition. We added this component based on insights from Workshop B, which found that participants did not act as a coalition but rather as individuals on behalf of the community they represented (e.g., local shop owner). The second activity involved all participants (including Sage as the wetland) identifying the benefits and disadvantages of rebuilding versus relocating and working towards a collective decision. The scenario was exactly the same as in Workshop B, focusing on a flooding event that had occurred in the fictional suburb of Casuarina Waters.

3.3.3. Participants and Procedure

Twelve people participated as community representatives in the workshop. The research team comprised four members, with two acting as the community engagement workshop facilitators, one member acting as Sage's voice, and one providing support for the agent setup (e.g., controlling the lights on the agent). Two additional conference attendees took photos to document the workshop activities and assisted with the workshop (e.g., swapping out the map in the paper prototype). We used the same persona cards and process of assigning participants their character and introducing the scenario as for Workshop B.

3.3.3.1. Activity 1: Developing a Middle-Out Coalition Charter

The two facilitators asked participants (now role-playing their characters) to record their aspirations for working together as part of a coalition. This involved participants discussing provided value cards in small groups, before sharing their discussion with the wider group and placing their cards on a whiteboard (Figure 4). As people presented and added their cards, the two facilitators guided them to group the cards to identify themes, with the aim of agreeing on core values, goals, and key attributes for the coalition and the decision-making process. This activity took about 30 minutes.

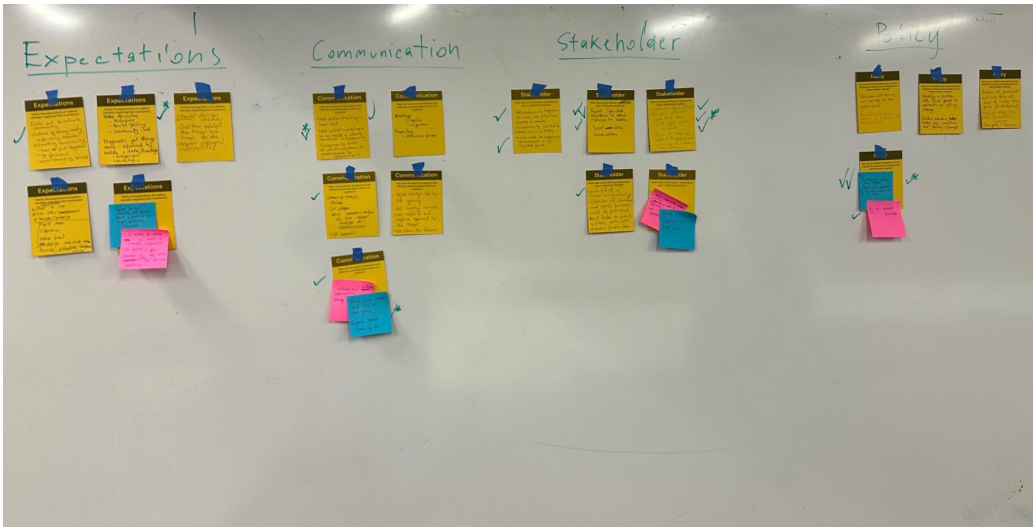

Figure 4. The middle-out coalition charter, which was created by Workshop C participants while acting out their representative roles, capturing the values, goals, and key attributes for the coalition and the decision-making process.

3.3.3.2. Activity 2: AI-Augmented Community Engagement Platform

Following the charter activity, we introduced the paper prototype (showing the maps of Casuarina Waters and Casuarina Heights) and Sage to the participants. Participants were invited to stand around the table on which we placed the paper prototype (Figure 5) and to use sticky notes to "pin" their comments while also discussing them with the other participants. Sage introduced itself as the river ecosystem and throughout the activity answered questions and also at some points interjected to provide additional perspectives. Participants were asked to reach a consensus and record their decision by positioning themselves on a line within the room with the two ends representing rebuilding and relocating. This activity lasted around 40 minutes.

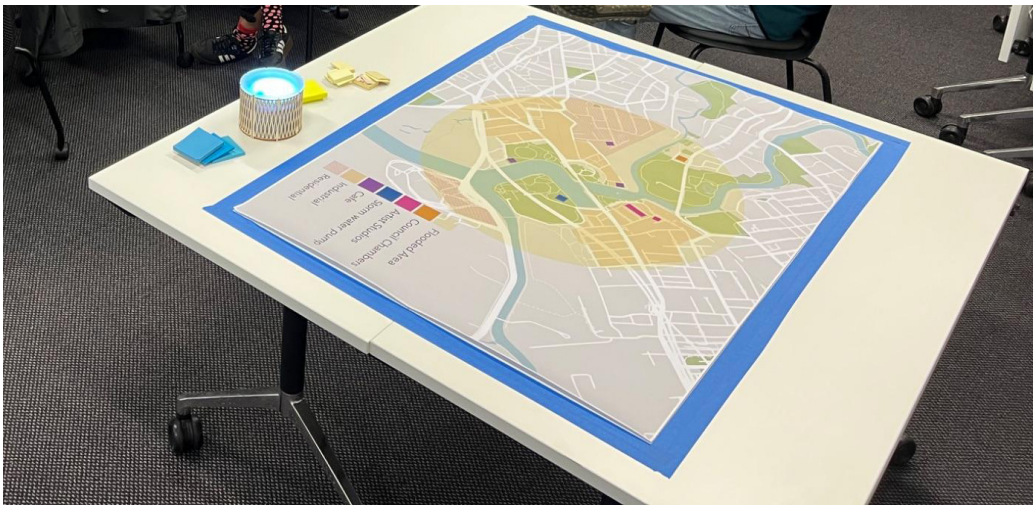

Figure 5. The conversational agent prototype Sage and the paper prototype of the tabletop community engagement platform displaying the map of Casuarina Waters set up for Workshop C.

3.3.4. Data Collection and Analysis

Similar to Workshop B, we conducted a post-study focus group to discuss the efficacy of the simulated middle-out engagement process and the representation of a non-human actor using a conversational agent. The focus group discussion lasted 25 minutes in total. Data was recorded and analysed in the same way as for Workshop B, ensuring a level of consistency and comparability between the two workshops.

4. Enhancing Collaboration and Decision-Making

This section presents synthesised findings from Workshops B and C about the use of AI in participatory workshops to enhance collaboration and support decision-making (RQ1). In Workshop B, before Sage, the conversational agent, was introduced, representatives were arguing their case and forming alliances with those who shared similar interests. Interestingly, after Sage was introduced, the group dynamic changed in several ways. First, instead of having an engaged group discussion (often with representatives interrupting each other), participants turned to talk to Sage, who became the centre of attention. While Sage made remarks in its facilitator role or answered questions, all participants stopped talking and listened to the sometimes very lengthy ChatGPT-generated responses, "watching it when it was speaking like it was a face" and feeling they had to "be polite and listen." This was perceived negatively and described as a sense of "being trapped" listening to the agent. Second, we noticed a bonding amongst all the representatives in a

way that we had not observed before the introduction of Sage. This became especially pronounced when Sage started pushing the participants to make a decision.

In Workshop C, where Sage was introduced from the start as a member of the coalition, we observed very different dynamics in terms of how the human representatives related to each other and Sage. Though, as one participant noted in the focus group, it may have been even better to introduce Sage before the charter activity. As in Workshop B, all representatives listened to Sage when the agent was speaking. However, Sage was treated more like a member of the coalition and also seen that way, as confirmed during the focus group: "I did feel that it was a member because of the style of how it was speaking." There may be two factors at play—on the one hand, Sage represented a non-human member of the coalition rather than a facilitator, and on the other hand, Sage had a warm, friendly non-artificial voice. This observation also points to the potential emergence of new human–machine relations enabled by AI (Crandall et al., 2018; Cugurullo et al., 2024).

We also observed that the use of a conversational agent across both workshops changed the group dynamics. One way this manifested itself was by participants quoting Sage to mediate heated disputes. For example, in Workshop B, the mayor stated "hey, hey, hey, hey, she said speak respectfully…let's just make the conversation calm." Interestingly, this observation suggests that the agent (as a facilitator) is assigned a status of power beyond that of the human representatives in the room. Another way the AI agent changed the group dynamic was by "taking the power out of the room" as one participant put it, referring to one of the representatives who became the "squeaky wheel" before the introduction of Sage.

In Workshop B, participants did arrive at a decision, pressured by Sage. However, during the focus group, they commented feeling coerced into having to make a decision. Therefore, while agents as facilitators have the ability to lead a group towards making a decision (as also found in the study by Kim et al., 2021), this may not be the best outcome for a participatory process. It also introduces problematic ethical concerns as potential biases stemming from the underlying large language models may push participants into making a decision that is based on the AI's biased information that is being provided to participants. This demonstrates the importance of having human facilitators and participants in a community engagement process rather than entirely replacing human involvement with AI. While there is emerging research on using generative AI for qualitative research purposes—for example to generate user personas (de Winter et al., 2024)—there is also criticism that AI cannot replicate the richness of human experience such as affect and embodiment (Gibson & Beattie, 2024). This was also echoed by one of our participants who noticed a lack of empathy in the responses from Sage, simply because they "can't get a feeling from it [and] can't sense it."

In Workshop B, participants asked Sage questions to help them make a decision, for example, "Could you please tell me how long it will take to relocate?" Compared to participants using AI on their personal devices, having this conversation with Sage in a group setting enabled a wider discussion and for participants to have access to the same information. To that end, Sage also successfully acted as a source of data-based insights; for example, the mayor in Workshop B asked, "Can you please give me an example of a town that has relocated successfully in Australia and what made it successful?" to which Sage was able (with the help of ChatGPT) to provide the story of a town relocating in the 1950s to make space for a power station in the Snowy Mountains.

Previous work has mainly investigated the use of conversational agents in group chats and online group discussions (Kim et al., 2020, 2021). While some of our findings are consistent with those studies, we also

found some key differences. For example, in an online chat, both the human and chatbot are only using text for communication, whereas, in our case, using a conversational agent in an in-person discussion inherently led to imbalances in communicative abilities, with human participants being able to additionally communicate non-verbally by using gestures, maintaining eye contact, and interpreting body language. Interestingly, we were able to partially reduce this imbalance by introducing Sage as part of the coalition in Workshop C and using a friendly-sounding non-artificial voice instead of an AI-like voice.

5. Bringing More-Than-Human Perspectives Into Participatory Planning and Design

In this section, we draw on Workshops A and C to discuss the use of non-human personas and the role of AI in considering more-than-human perspectives in community engagement workshops (RQ2). Workshop A involved each participant describing their human and non-human persona cards to the rest of the group. We found that during this step some participants used the first person to present both their personas. This likely helped the participant as well as the group to empathise with the perspectives of the non-human persona. Interestingly, this stands in contrast to some of the literature suggesting that non-human personas (unlike human personas) should be written from a third-person perspective to signpost that their description is provided through an anthropocentric lens (Frawley & Dyson, 2014; Tomitsch, Fredericks, et al., 2021). Throughout the participatory design exercise, participants referred to their personas, keeping them in front of them, and in some instances, adding them to their speculative design sketches. As observed for human personas, having those character cards helped keep their perspectives front and centre throughout the design process (Adlin & Pruitt, 2010; Miaskiewicz & Kozar, 2011).

Workshop C embodied and brought to life a non-human persona (representing the wetland ecosystem) through a conversational AI agent. Our approach aligns with previous work investigating the use of technology to amplify the agency of plants (Sheikh et al., 2021). Our Wizard of Oz prototype and setup seemed to successfully achieve this, as evidenced by participants' comments during the focus group. Interestingly, participants in the focus group discussion referred to the agent as "Sage" whereas in the discussion following Workshop B, participants referred to the agent mostly as "AI." This may have been helped by the agent exhibiting a non-artificial voice in Workshop C. Participants commented positively on aspects such as a "stutter" and "emotion" carried in the voice, making it feel more real and "convincing." Some participants suggested that other voices may be more suitable, making Sage sound less human or like a little girl to represent "emotional value" or an Indigenous voice to convey "knowledge" or a "kind of magical voice that comes from another world." Interestingly, one person from Workshop C proposed a more synthetic voice, warranting further investigation. The physical manifestation—Sage looking somewhat similar to voice-based assistants, such as Alexa or Google Home—might have had some effect on how participants perceived and interacted with Sage.

The fact that in Workshop C Sage every now and then interjected the participant discussion to add its perspective, seemed to have a similar effect to the tangible persona cards in Workshop A, helping to keep nature's perspective in mind. As one participant observed: "The way it sort of, every now and then speak to us…it reminded us this sort of agency of, of the nature." It also prompted participants to empathise and reflect on the more-than-human perspective, asking themselves "whether [the wetland] has a vote" and contemplating the "different species [living] in the wetlands." One participant proposed that Sage could have been even more proactive in suggesting different perspectives.

The pluralism of AI agents and their perspectives is constrained by the underlying AI models and the fact that these models are trained on human language. On the one hand, as Klein and D'Ignazio (2024) argue, this is due to the narrow demographic composition of AI researchers and because of the imbalance of power between those currently designing AI systems and those subject to their decisions. It is important to be mindful of potential biases stemming from those underlying factors and how they might affect an AI agent's position, which could perpetuate existing inequalities (Capraro et al., 2024; Wach et al., 2023). These risks can be mitigated through either pre-processing the input data or post-processing the AI-generated outputs (Ferrara, 2023). However, in practice this is difficult and time-consuming to achieve—highlighting the need for further research.

On the other hand, AI itself is also a non-human actor (Giaccardi & Redström, 2020; Nicenboim et al., 2020) as are councils and other organisational entities involved in a participatory process. Latour (2018) proposed the notion of a "parliament of things" to recognise and represent all non-human entities, including animals, plants, and inanimate objects. In Latour's (2005) actor-network theory, organisations are seen as networks of diverse actors, which represent both human and non-human entities. This also highlights the complex politics of using non-human voices as those voices will always remain based on human-generated or human-filtered datasets. In other words, the perspective of the non-human cannot really be captured by current generative AI models as AI is trained on human language.

The integration of First Nations knowledge also represents an important consideration for future work on representing non-human voices. In Section 2, we reference "Country" as a framework to acknowledge the challenges associated with conflicting knowledge paradigms. As non-Indigenous researchers, we cannot represent Indigenous knowledge itself, but we can recognise its importance, and we can incorporate diverse perspectives, including those of non-human actors in our research design. This ensures that decisions are made with a broader understanding of the interconnectedness of all elements within the environment.

6. Simulating a Middle-Out Coalition for Collaborative Decision-Making

This section reflects on the approach used across all three workshops to simulate a middle-out coalition with participants role-playing assigned characters (RQ3). In Workshop A, we did not enforce the role-playing and solely provided participants with the persona cards without prompting them specifically to act out their characters. Perhaps, this removed a potential level of awkwardness of participants having to step into a role and act. However, some people on their own decided to assume a first-person view and speak from the perspective of their assigned personas. We observed people moving in and out of these roles. However, the majority of the time participants worked on the design challenge as workshop attendees rather than acting out the personas.

Interestingly, none of the participants from Workshop B and C, where we asked people specifically to act out their assigned character, reported any feeling of awkwardness. The fact that the members of the research team also took on a character and the meditation exercise we used to help participants connect with their character may have helped with this. Indeed, we observed that participants really enjoyed acting out their characters. They augmented the background story they were given and added additional details to their character, turning facts into stories. This sometimes caused internal conflicts, as one participant shared in the focus group, stating that they thought the wetland really should be pushed to be "the most important voice" but because they were acting as a city planner representative, they felt they "had to temper that enthusiasm."

This connection with their character was also evident from the questions that participants posed to Sage. For example, in Workshop B, one participant enquired, "It's Jenna, the mayor, could you please tell me how much it's gonna cost to relocate to Casuarina Heights?" Specifically, participants asked questions that would help their character to make an informed decision about rebuilding versus relocating, such as "How likely will…it be that my studio floods again?" and "Will there be a gallery if Casuarina is relocated?"

Forming an actual coalition with representatives from the top and bottom can be a difficult and time-consuming undertaking. Including voices that can speak on behalf of non-human actors adds even further complexity. There is also a risk that when dealing with crisis situations, the experience of participating in a workshop may resurface traumas. We are not advocating against going through this effort and implementing trauma-informed and culturally sensitive and safe participatory processes (Champine et al., 2022). Neither are we proposing to take shortcuts, which may lead to ill-informed decisions with poor outcomes. The value of role-playing in AI-supported workshops is limited by how researchers coordinate these activities in practice and the limited role that AI and simulation can play (as discussed in Section 5). However, we are suggesting that based on our experience of using simulated middle-out coalitions in complex scenarios, role-playing may be a valuable first step to gather initial insights, which can be taken back into the actual project and inform further action. Furthermore, it can be an effective approach to rapidly prototype and explore the potentials and pitfalls of new technologies for community engagement before deploying them in real-world settings. This is akin to science fiction prototyping (Johnson, 2011) and role-play workshops when designing interactive technologies (Seland, 2009).

Dealing with complex scenarios framed through the lens of the SDGs brings many challenges, including disagreements on local priorities, competing interests among different actors, and potential risks due to uncertainties (Moallemi et al., 2020). To tackle these challenges, Moallemi et al. (2020) propose a transdisciplinary approach, which consists of three pillars—joint framing of local goals and actions, evaluating critical uncertainties, and co-creating adaptive pathways. These pillars offer a framing that can be incorporated into future speculative community engagement workshops that address the SDGs through role-play, applying a transdisciplinary approach that integrates an AI-augmented middle-out engagement approach.

7. Conclusion

This article investigated the role of AI as an emerging technology in community engagement workshops focused on building resilience. For example, a flooding event may require various actors to decide whether to rebuild or relocate. Through our study, which involved simulating a middle-out engagement approach, we found that an AI-powered conversational agent can effectively (co-)facilitate the discussion amongst a diverse group of community representatives, providing data-based insights that can help the group in making a decision, and ensuring a balanced contribution of all members. Our findings highlight potential advantages in introducing an agent as a member, embodying a non-human actor, compared to using the agent as a facilitator. Through this approach, the agent can positively influence the group dynamic while also acting as a readily accessible knowledge resource.

Importantly, the article raises several challenges associated with the use of AI in participatory workshops that require further investigation. Those include challenges raised in the broader literature on AI (Crawford, 2021; Wach et al., 2023) that are pertinent to using AI to support collaborative decision-making, such as the risk of

potential biases inherent in the underlying models and coercing participants into making a decision through a skewed representation of data. The energy required to drive AI systems further remains a challenge that cannot be ignored especially when dealing with crisis events linked to the ongoing climate crisis. The article also reflected on the limitation of using human-generated or human-filtered data as a basis for representing non-human actors.

One of the targets of SDG 17, "Partnerships for the Goals," refers to mobilising and sharing knowledge. While there are benefits from doing this across countries as stipulated in the target description, the value of local knowledge cannot be underestimated. The AI-augmented middle-out engagement approach described in this article enables this mobilising and sharing of knowledge specifically within the setting of participatory workshops, bringing together perspectives from authorities and grassroots organisations and local community groups as well as those that are non-human yet fundamental to consider when dealing with long-horizon challenges and building resilience for all.

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Conflict of Interests

The authors declare no conflict of interests.

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Connecting to the Sea: A Place-Based Study of the Potential of Digital Engagement to Foster Marine Citizenship

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Abstract

The Sustainable Development Goals for creating sustainable, resilient cities and addressing human impacts upon coastal waters and marine environments create a mandate for coastal cities to empower local communities to value city seascapes. One key way to achieve this is through more inclusive pathways to connect to the sea using participatory methods. This research used a participatory co-design approach in Plymouth—the UK's first national marine park—to explore the potential for place-based digital engagement to connect people with the sea, especially for deprived neighbourhoods. We sought to answer the research question of whether place-based digital technologies can engage communities with marine spaces and make coastal areas more accessible. Using the collaborative community-led concept of a city marine park, we explored the requirements for digital technologies needed to create marine citizenship and address the challenge of building coastal resilience. We describe a participatory action research study that took place in an urban coastal community, run in collaboration with a local organisation, the Rockpool Project, over a period of six months. Through a baseline survey, we identified some of the barriers to accessing the sea and ways in which the sea was perceived as a space in the city. We also ran a series of co-design workshops using creative prototyping with local families to help define the requirements for a digital toolkit that could enable them to access the sea. The results found that by enabling access to temporal and biodiverse marine spaces such as rocky shores, place-based digital technologies can create new ways for communities to access and engage with the sea. Place-based digital technologies have the potential to create marine citizenship by building a connection between people and marine environments to care for the sea as a shared resource. We propose this can help establish a sense of place and contribute to marine stewardship in coastal communities.

Keywords
co-design; coastal; communities; digital technology; engagement; marine citizenship; participation

1. Introduction

1.1. Research Context: Sustainable Development Goals (SDG's) and Coastal Cities

There are a number of urban planning challenges linked to marine and coastal environments, which are facing unprecedented change due to the dual impacts of human activity and climate change (Department for Environment Food & Rural Affairs [DEFRA], 2002, 2018). These are particularly true of more urban marine environments in cities or towns and include socio-economic and cultural change as well as sea and air pollution, climate change, and extreme weather (Emmins et al., 2023). These can result in reduced visits to the marine and coastal environment, inadequate planning of coastal developments, and the fragmentation of coastal communities (and corresponding loss of social capital; DEFRA, 2002, 2019). One of the ways that has been identified to address this is the designation of City Marine parks (Pittman et al., 2019) that have the potential for building a more inclusive marine citizenship (Fletcher & Potts, 2008; McKinley & Fletcher, 2012) in coastal cities and create socio-economic and environmental benefits. Pittman et al. (2019, p. 3) define a city seascape as "the marine and coastal space (above and below water) that most influences the city and is most influenced by the city." In order to engage with a city seascape and promote marine citizenship, projects need to build a sense of marine citizenship.

Despite the strategic importance of coastal cities to achieving Sustainable Development Goals (SDG's), Pittman et al. (2019, p. 3) highlight the fact that "surprisingly little attention has been directed at finding innovative ways to integrate the seascape into city-wide initiatives to achieve healthy, prosperous, and sustainable coastal cities." Much of the discussion around coastal towns and cities has been anecdotal, as is partly reflected in the fact that there is no official definition of a "coastal community" and as such there is little collated data on the subject, which has deterred efforts towards the governance of coastal spaces and contributed to the ineffective participation within blue space practices (Corfe, 2017; Leyshon, 2018). The UN SDG's for creating sustainable cities and communities provide an agenda for coastal cities to value their city seascapes, which aligns specifically with two interrelated indicators for the SDG11 sustainable cities and communities. The first is that urbanisation should be "inclusive and sustainable urbanisation and that capacity for participatory, integrated, and sustainable human settlement planning and management in all countries" (UN Habitat, 2019). The second is that there should be "universal access to safe, inclusive, and accessible, green and public spaces, particularly for women and children, older persons, and persons with disabilities" (UN Habitat, n.d.). Graells et al. (2021, p. 4) highlight that multidisciplinary research on defining and designing sustainability solutions associated with participatory approaches "are still scarce and represent a gap in the knowledge." Therefore, in addressing the SDG's there are the dual aspects of creating participation and inclusive access to address the specific challenges in SDG11 around coastal cities.

1.2. Overcoming Barriers to Accessing the Sea

In order to address the SDG's for coastal cities, there is a need to understand what barriers prevent access to coastal spaces. In this article, we focus on the challenges for communities and deprived coastal

neighbourhoods. Research has shown that higher levels of deprivation correlate with lower levels of feelings of connectedness with the natural environment (Graells et al., 2021; Gray et al., 2023; Shamsuddin et al., 2012; Toomey et al., 2020, 2023). Association with the sea and marine environments and concern about the impact of the climate crisis have also negatively impacted higher levels of deprivation (Graells et al., 2021). This means there is a need to improve participation and establish a deeper sense of place to engage the coastal communities in place, keeping these assets and delivering the social and environmental benefits they confer. Research has evidenced inequalities around access and well-being in coastal communities, particularly in the UK, and establishes a correlation between higher levels of deprivation in coastal communities and poor well-being outcomes (Barton et al., 2022; Haighton et al., 2019). Conversely, the positive well-being benefits from exposure to green and blue space do not appear to be experienced by communities in disadvantaged areas facing socio-economic challenges (Ashbullby et al., 2013; Pool et al., 2023) and this is further compounded by intersections of age, gender, and disability as well as the barriers to accessing these spaces. Consequently, there is a need for innovative approaches to empower communities' access to city seascapes (Fletcher & Potts, 2008; McKinley & Fletcher, 2010). One of these innovative approaches is digital technologies as, according to Kelly et al. (2022, p. 129), these "emerging technologies have huge potential for engaging and educating groups about the ocean and, in particular, for sharing and developing ocean knowledge." But what is clear is that these technologies need to be aligned to relevant issues and communities, as only then can they increase knowledge uptake and care for the environment, which can promote personal action.

Therefore, the research question we seek to address is: "Can digital technologies enable participation and access to urban coastal space that foster marine citizenship?" In order to address this question, we first outline a literature review that addresses issues of marine citizenship in coastal cities and the challenges of inclusion around barriers to accessing the sea. We propose an approach using digital technologies such as citizen science to create new ways to engage people with the sea and to encourage marine citizenship. We introduce a study involving a coastal city in the UK where we used participatory methods and co-design to explore the potential of digital technologies for overcoming barriers to access to the sea. We outline the results which found that people often lack the tools and experience of accessing the sea and that there is a need for new ways to engage people. We also define the term "digital marine citizenship," which seeks to outline the role of digital engagement in fostering engagement with the sea. In summary, we outline some of the requirements of digital tools that might be appropriate for overcoming barriers to access the sea and how these fit within a broader agenda around addressing SDG aims for coastal cities, participation, and inclusion.

2. Literature Review

2.1. Marine Citizenship and the Sea as a Public Space

In the context of the SDG's it is recognised that individual citizens should have an understanding of the environmental impact of their actions and a corresponding understanding of how to adapt their behaviour or participate in activities to reduce their impact. The pathway to achieving this can be understood as a form of citizenship, that is, a level of responsibility for the environment. According to Fletcher and Potts (2007, p. 514), this relies on the connection between individuals and their local environment as a key rationale for personal involvement in environmental issues through "invoking a sense of global ownership and responsibility that is actualised locally." Therefore, citizenship makes the connection between broader

environmental challenges and individual action at a local scale. In the context of the sea or ocean, as a specific environment, the term "ocean citizenship" describes this relationship between people's everyday lives and the health of the coastal and marine environment (Fletcher & Potts, 2007). Marine citizenship is also a term used to describe how people engage with the sea, take personal responsibility, and create change towards pro-marine conservation behaviours (Buchan et al., 2023; Fletcher & Potts, 2008; McKinley & Fletcher, 2010). According to McKinley (2010), marine citizenship relates to the human–ocean relationship in society such that people also have a right to participate in shaping their relationship with the ocean:

> Having understanding of the individual rights and responsibilities towards the marine environment, having an awareness and concern for the marine environment and the impacts of individual and collective behaviour, and having a desire to have a role in ensuring on-going sustainable management of the marine environment. (McKinley, 2010, p. 294)

The ongoing cultural shifts in the interpretation of the coast and the relationship with the seascapes over time have created challenges for the governance of these spaces and, consequently, for building marine citizenship in coastal communities. From their integration as a part of the working life of the city in the 1900s to their increasing role in societal and cultural activities, the perceptions and definitions of these spaces have been ever-changing and ambiguous (Leyshon, 2018). There have been efforts within environmental governance practices to bring the same cultural and landscape character and planning mechanisms into dialogue for seascapes to better inform the decisions for governing and managing these spaces (Gray et al., 2023; Leyshon, 2018). The significance of these seaside spaces varies substantially in the way they are conceptualised such that seascapes could be perceived as a boundary, or an interface offering different possibilities for these spaces and the way they are managed (Barton et al., 2022; Leyshon, 2018). The characterisation is necessary to localise our understanding and response to environmental change through greater attention to establishing a baseline for informing judgements and decisions concerning the management of change (Leyshon, 2018). For this research, we adopt Pittman et al.'s categorisation of a city seascape as a collaborative community-led city marine park, which is more linked to urban social policy initiatives such as increasing access to green and blue natural infrastructure for community health and well-being (Pittman et al., 2019, p. 3). Pittman et al. (2019) also emphasise the participatory role of the marine park as a place for collective local knowledge and to encourage people to be more responsible and to care for the city seascape. In this way it aims to be a catalyst for pro-environmental behaviour (Pittman et al., 2019, p. 6) through a feedback circle linking experience and understanding to greater value, care, and enjoyment.

2.2. Digital Technologies for Enabling Marine Citizenship

Kelly et al. (2022) outline one of the drivers of ocean literacy as "technological developments," with one of the ways it achieves this being by providing engaging and emotional experiences. Digital technologies offer a promising approach to addressing some of the challenges of engaging people in place (Cigliano et al., 2015; Fuentes et al., 2023; Willis & Gupta, 2023). They can help create new connections with place and foster nature connectedness, as well as give tools to empower communities to actively participate in shaping their physical environments (Willis & Gupta, 2023). Applications of technologies like augmented reality or projection have demonstrated how digital intervention can create new ways to engage with public spaces (Chisik et al., 2022; Nijholt, 2016). Technologies such as mobile applications, immersive experiences,

augmented reality and virtual reality, and interactive maps for wayfinding can not only create new ways to engage with the sea and the marine environment but also provide tools and resources for individuals to become active stewards of marine environments and play a significant role in fostering conservation efforts (Chisik et al., 2022; Nijholt, 2016). Further, leveraging the new modes of participation created by these tools can democratise the decision-making processes by enabling more efficient, inclusive, and participatory engagement with a wider set of stakeholders in collaborative decision-making, enabling them to influence the design and development of public spaces.

The use of digital technologies for citizen science can be particularly valuable in coastal and marine contexts. By fostering marine stewardship, influencing policy and management, and building community capacity for addressing environmental concerns, it can create a broader impact on marine conservation (Cigliano et al., 2015; Conrad & Hilchey, 2010; Jordan et al., 2019; Kelly et al., 2020). As such, digital technologies can not only foster effective engagement with the marine environment but also foster effective participation in the long-term sustainability of placemaking initiatives by embedding them within the community's social fabric. Previous studies have demonstrated this in the context of citizen science projects playing a valuable role in fostering community engagement with environmental issues and natural spaces (Kelly et al., 2019; Nursey-Bray, 2017; Willis & Gupta, 2023). However, globally, marine and coastal citizen science is quite underrepresented, with a bias for simple mass participation programs (Cigliano et al., 2015; Conrad & Hilchey, 2010; Martin et al., 2016; Sandhal & Tøttrup, 2020). There is an opportunity to diversify and expand marine and coastal citizen science to be more place-based and linked to marine citizenship.

3. Methods

3.1. Research Methodology and Study Design

The project adopted a participatory action research framework (Greenwood, 2007; Ivankova & Wingo, 2018) using a co-design approach. The method involved direct collaboration with the stakeholders affected by the study, and we worked with The Rockpool Project (TRP). TRP is a Community Interest Company (CIC) working to engage local residents in discovering, connecting, and protecting their local wildlife across Plymouth's coastlines. TRP CIC have been working with this community towards the creation of the first UK National Marine Park (NMP) along with Plymouth City Council. TRP is a community-driven marine conservation initiative dedicated to exploring and protecting the incredible biodiversity of the UK's rocky shores. They engage people of all ages through hands-on rockpooling activities, citizen science, and educational outreach, fostering a deep connection with local marine environments.

Ethical approval was obtained prior to commencing fieldwork through the Faculty Ethics and Integrity Committee (Ref 4098) at the University of Plymouth, which included processes for parental consent for child participants.

3.2. Setting

The study took place in Plymouth, UK, a coastal city in southwest UK known as an "ocean city," located on one of the world's largest natural harbours. The waterfront includes a road and walkway, with a lido, harbour, marina, and two public beaches. Plymouth established one of the UK's first NMPs (Plymouth Sound

National Marine Park, n.d.). The NMP in Plymouth seeks to address broader challenges around the sea and the city and aims to "forge a new relationship between the city and the sea, encouraging people to become 'marine citizens'" (Plymouth Sound National Marine Park, n.d.). The centre of Plymouth is split into a number of neighbourhoods, some of which have longer-term issues with deprivation and poverty. The Stonehouse neighbourhood is located directly adjacent to the city centre. It is amongst the most deprived neighbourhoods in Plymouth and in the top 1% of most deprived neighbourhoods in the UK. We identified the Stonehouse neighbourhood as the focus of our study, due to these characteristics and its close location to the sea. The study took place primarily in an urban coastal space, Firestone Bay, which was selected because of its proximity to Stonehouse. Firestone Bay is a small pebble beach to the West of Plymouth, which was designated a bathing water site in 2022. It has stepped access to the beach and rockpools at low tide, with a number of local species such as crab, anemones, and seaweed. The beach at Firestone Bay is located less than one kilometre from the centre of Stonehouse neighbourhood (walking time of 20 minutes; see Figure 1a), and for many residents is closer in distance.

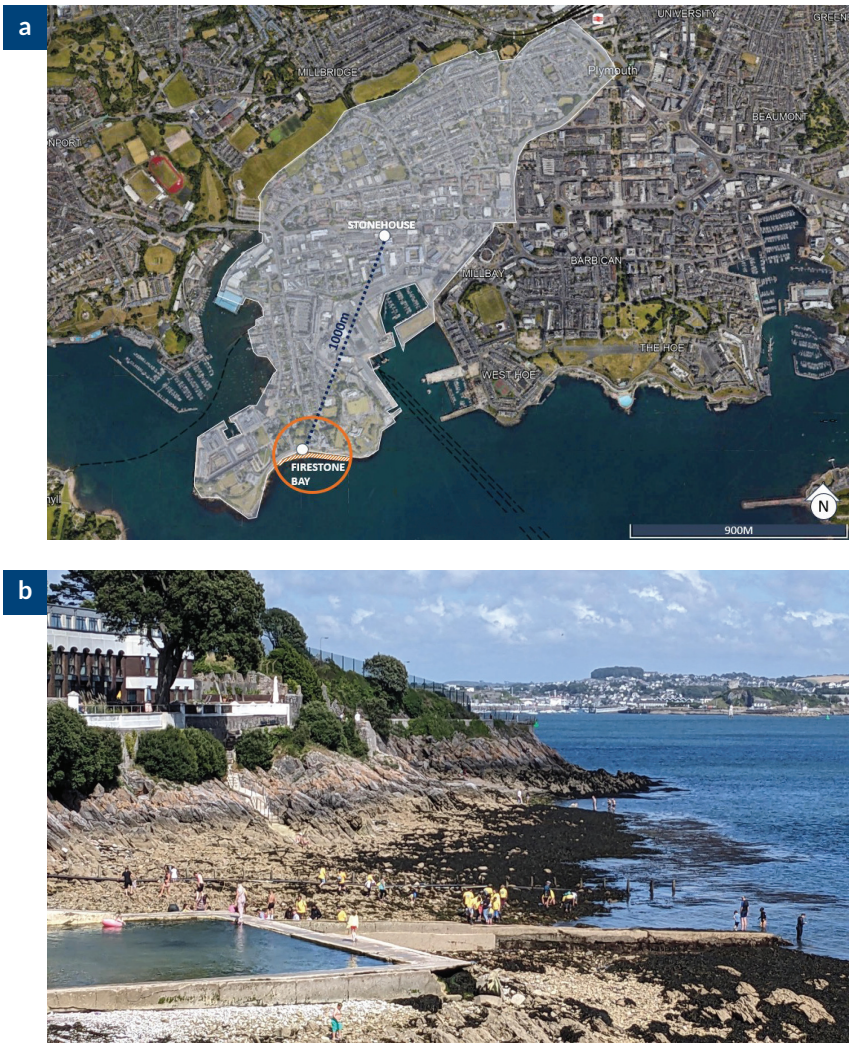


Figure 1. (a) The location of Firestone Bay, Plymouth. The geographical distance of Stonehouse neighbourhood (indicated by blue shading) to Firestone Bay is 1,000m, equating to an average walking distance of 1,500m or approx. 20 minutes on foot. The red circle indicates the location of the beach where the fieldwork was conducted. (b) Firestone Bay beach at low tide.

3.3. Participants

All participants were recruited because they lived in Stonehouse, Plymouth. This stakeholder group was recruited to understand challenges around access to the sea and barriers to participation in its governance as the identified research participants were amongst the most deprived and excluded groups but also lived geographically close to the sea. The recruitment of participants was through TRP, as a part of a funded Heritage Lottery Fund programme: Blue Recovery (https://www.therockpoolproject.co.uk/blue-recovery), which ran activities for local residents in a coastal city to provide access to the sea. One of the funding requirements was that all participants be from the Stonehouse neighbourhood. TRP was the main point of contact for the activities and ensured that the necessary safeguarding measures were in place.

The participants for the baseline survey took part during a one-day activity organised by TRP in July 2024, where residents from the Stonehouse neighbourhood took part in a community day at Firestone Bay, Plymouth. Participants were asked to complete the survey as part of the day's activities. Forty-eight responses were received, with 23 children (aged 7–16) and 25 adults (aged 27–49).

The co-design activities were run during TRP public programme in Plymouth that was held at Firestone Bay over a period of six months (Figure 2). These were held between July and December 2023 and participants consisted of families and children from Stonehouse. There were three workshops: Workshop 1 took place on 9th July 2023 with nine families, workshop 2 took place on 6th August 2023 with eight families, and workshop 3 took place on 28th October 2023 with nine families.

3.4. Activities and Data Collection

Data was collected using mixed methods using both a survey method and a co-design workshop. The aim of the survey was to understand the participants' relationships with the sea as a place, their perceptions of it, and the barriers to access. The workshop aimed to identify the opportunities to connect with the sea that would overcome these barriers and the requirements for digital technology to facilitate this engagement.

3.4.1. Baseline Survey: Understanding the Barriers to Accessing the Sea

An initial baseline survey was conducted in July 2023 at the beginning of the study to establish people's connection with the sea. This baseline survey was formulated based on Natural England's The Children's People and Nature (C-PANS; Natural England, 2022) survey, which provides information on how young people and children (aged 8–15) experience and think about the natural environment. We used a version of the C-PANS survey with three specific questions added around access to the sea.

3.4.2. Co-Design Workshop: Requirements for Digital Engagement Toolkit

The workshop took place at the beach area of Firestone Bay between July and October 2023, with participants consisting of families with children. It lasted between two and three hours. All the events took place on dates timed so that it was low tide, and, therefore, the rockpools were accessible. The workshop aims were to co-design the requirements of the digital engagement; the first part was a citizen science Bioblitz activity, followed by a second part, which was a participatory prototyping activity.

Figure 2. Bioblitz activity at the seashore in Firestone Bay (all photographs provided with permission).

The first part of the workshop was a digital citizen science activity in rockpools on the beach, which was co-led by volunteers from TRP. The citizen science activity was a Bioblitz, a collaborative citizen science effort aimed at documenting as many species as possible in a predetermined area and time frame (Postles & Bartlett, 2018). In this activity, the participants used the iNaturalist app to identify, record, and save data about species found in Firestone Bay using a mobile phone in a dedicated iNaturalist project. iNaturalist (https://www.inaturalist.org) is a widely available citizen science application which enables projects to be created that can be used for Bioblitz activities.

For the second part of the workshop, families were invited individually to create paper prototypes of a digital toolkit (Figure 3). Participants were given an initial briefing session, followed by low-fidelity paper-based prototyping with the participant groups around engaging with the sea. This involved asking

Figure 3. Participants in co-design workshop at the seashore in Firestone Bay.

families with children to use craft materials to respond to prompts about the things that would help them visit the sea and to create a paper prototype of a digital toolkit. The children then talked about what materials they needed to visit the sea, and they responded to prompts from the researcher about how often they visited the sea and what the barriers were. A thematic analysis was then performed to identify needs and barriers in relation to responses around what would enable the participants to access, engage with, and care for the marine environment and outdoor seaside spaces.

3.5. Limitations of the Method

The main limitations of the study were the small participant numbers, the qualitative nature of data collection, and the focus on a specific urban coastal setting. The study was undertaken with participants from a specific disadvantaged neighbourhood in the city of Plymouth over a six-month period. It was focused on families and young people and did not aim to cover a broad demographic that could be generalisable to a wider population. The baseline survey was mapped to national data, but the participant numbers were small and focused on children aged 8–15. The co-design workshops were run with TRP and took place over three dates, but again, they involved small numbers of participants, and the results were qualitative. The focus on qualitative data means that the outcomes of the study are rich and participatory but do not yield definitive or fully quantitative results.

4. Results

We outline our results in two sections: The first is the results of the survey method, and the second is the findings from the co-design workshops.

4.1. Understanding the Barriers to Accessing the Sea (Baseline Survey)

4.1.1. Access and Visits to the Sea

Participants could indicate any amount of time spent in a series of outdoor places in the last week, and the frequency of reported responses was recorded (Figure 4). Of the overall responses (n = 88), Beach or Seaside recorded 14 responses. Despite the physical distance to the city being about 1,500 metres (maximum) for Stonehouse residents, the beach or seaside was perceived as walkable in only 35 of the reported responses.

Therefore, the sea as a place was perceived as walkable by only 14 children, whereas parks were perceived as walkable by almost all children, despite the physical distances to both being fairly similar. This suggests the barriers to accessing the sea were not just physical but also based on perceptions of the sea not being accessible by foot.

In terms of visits to the sea, the response to the question "How often do you visit the sea/natural outdoor spaces by the sea?" revealed that only one respondent reported visiting sea/natural outdoor spaces daily (n = 1; Figure 5). More than half of the children (n = 15) reported visiting the sea/natural outdoor spaces by the sea a few times a month or less. A fifth of respondents reported only visiting the sea a few times a year (n = 7). This again highlights a lack of engagement with the sea/seaside despite participants living within walkable distance.

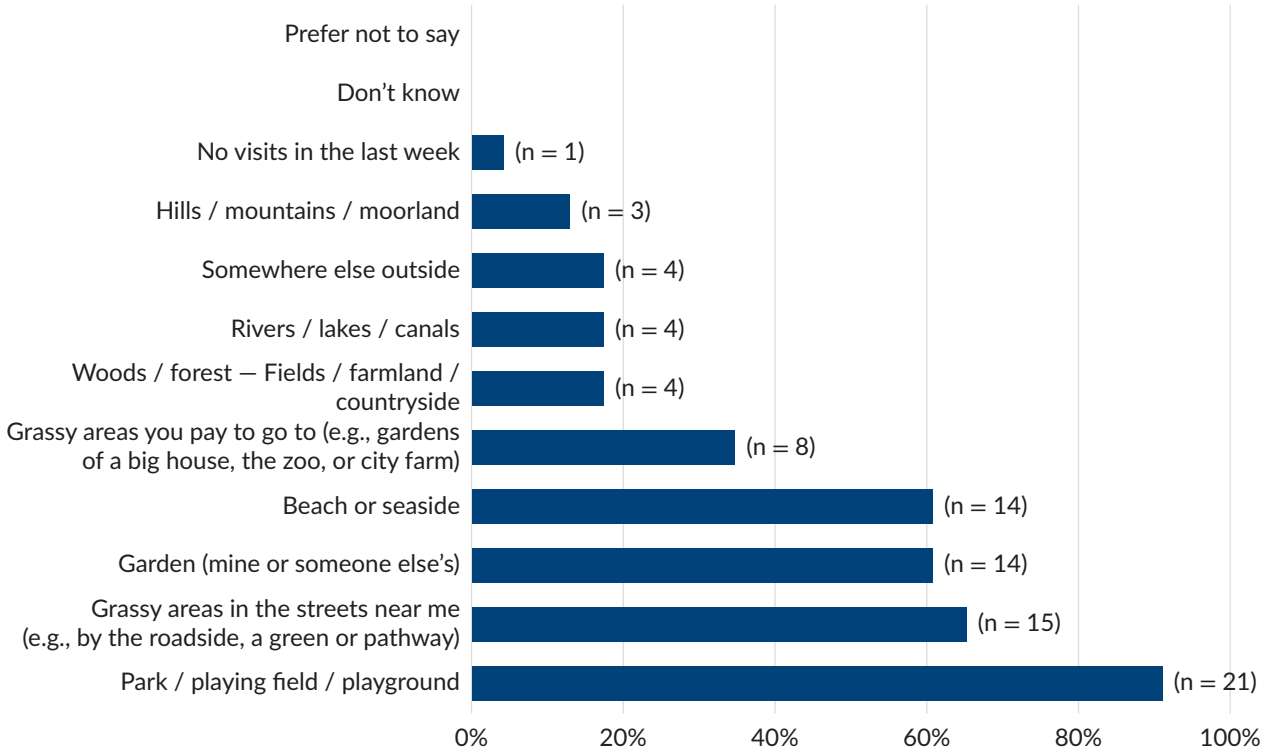


Figure 4. Answers to the question: "Which of these places can you walk to easily from your home (either by yourself or with someone else)?"

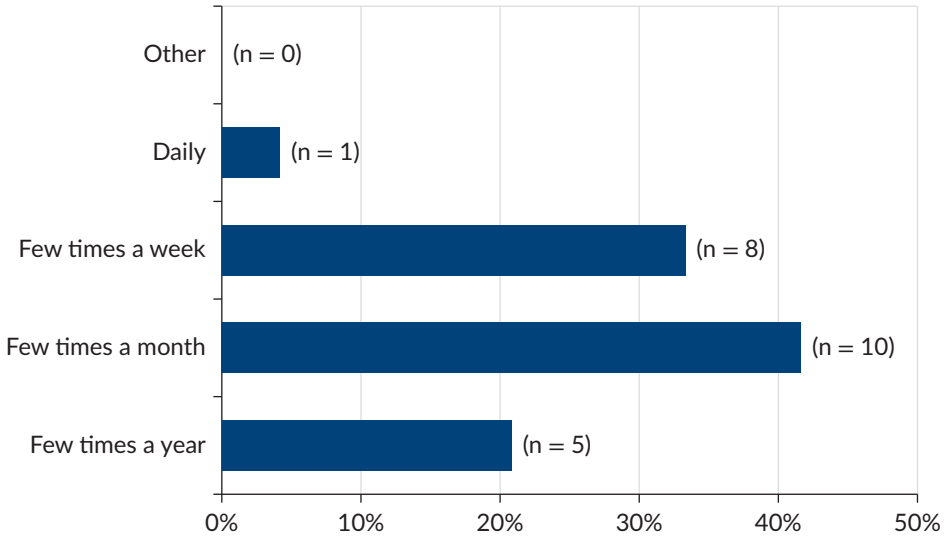


Figure 5. Answers to the question: "How often do you visit the sea/natural outdoor spaces by the sea?"

In response to the question "Have you spent time in any of these places in the last week?" participants could indicate any amount of time spent in these places in the last week, and the frequency of reported responses was recorded (Figure 6). Of the total reported visits ($n = 74$), only 12 responded with Beach or Seaside. Overall, the greatest number of visits were reported for urban greenspaces ($n = 58$), and respondents reportedly visited greenspaces substantially more than the seaside ($n = 12$).

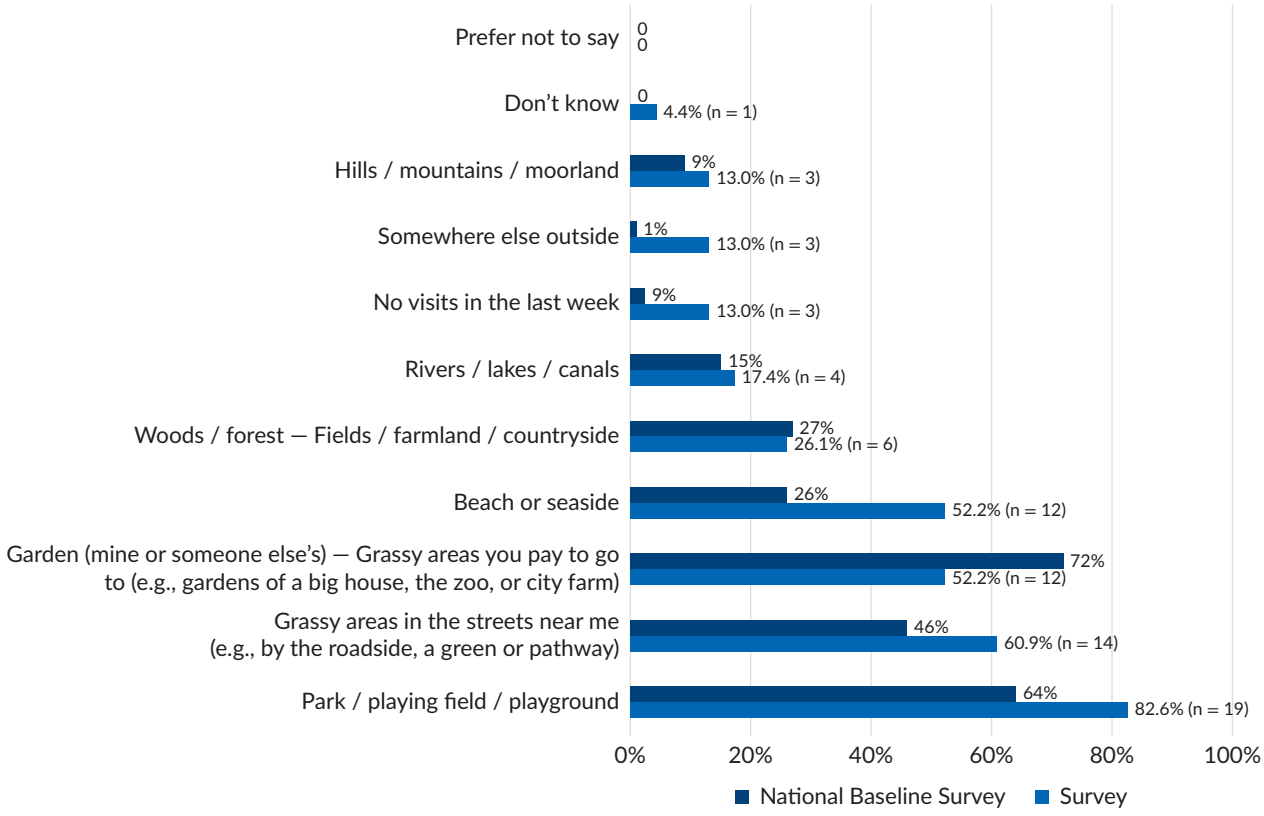


Figure 6. Time spent outdoors by the participants in the last week as compared to C-PANS baseline (based on question: Green and Natural spaces that children and young people said they had visited in the last week [weighted percentage]).

We found that reported visits to the sea in the study (16%, $n = 12$) were lower in comparison to the national dataset (27%). This indicates that although the sea is physically accessible in terms of distance, it is not typically seen as a "natural space" by children in the city.

The question "How connected do you feel to nature?" uses the "Inclusion of Nature Scale," which shows seven diagrams each containing two circles, one with the outline of a person and saying "me" and the other with a nature-filled scene (Kleespies et al., 2021). The highest number of respondents ($n = 7$) indicated a medium nature connection at a mid-point on a 0–6 Likert scale equivalent (Figure 7), followed by $n = 5$ each at a score of 4 and $n = 4$ at 5. Only two responses were recorded with the highest score of six (10%) as opposed to the national average of 14%. Nationally, 26% of respondents reported moderate nature connection at a score of three (Natural England, 2022).

These findings show that children in Plymouth have a lower sense of nature connectedness than the national average, and we propose that this is more closely related to the levels of deprivation in the city than the physical accessibility of the sea.

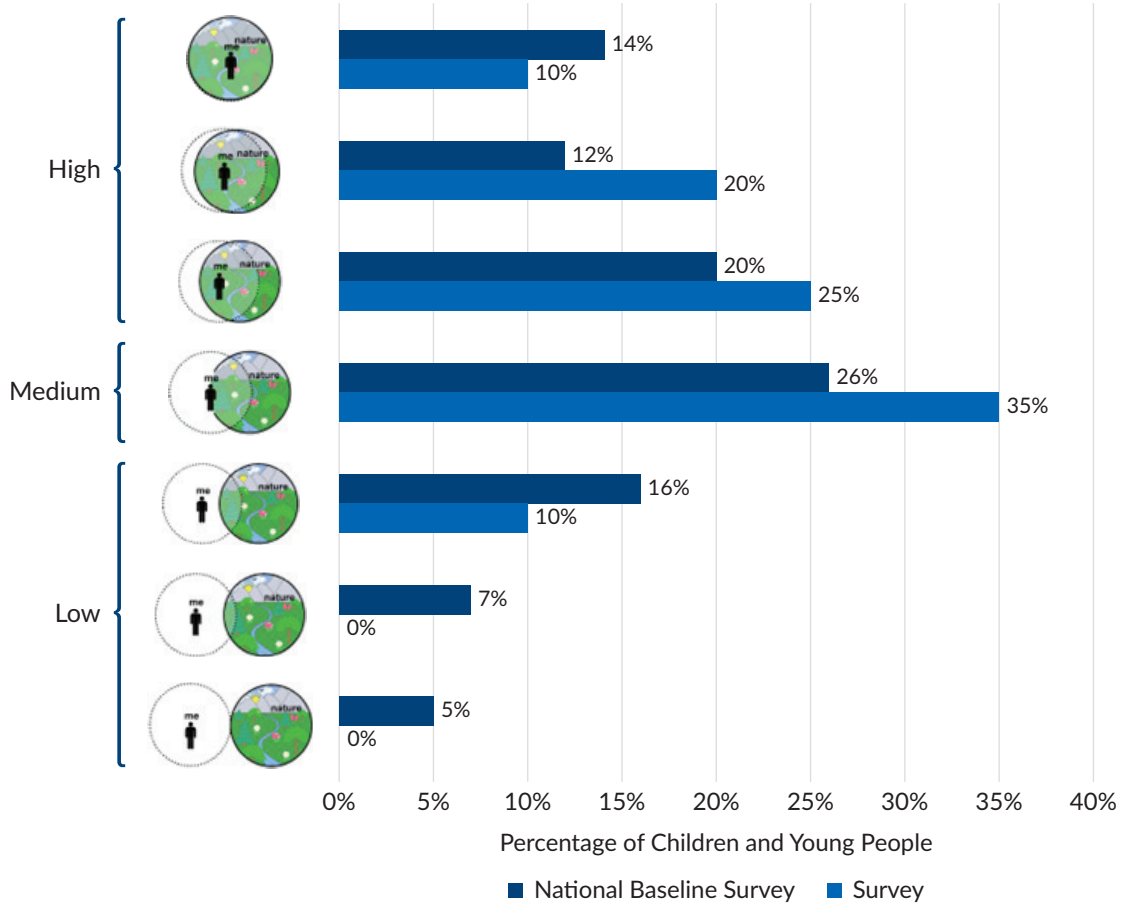


Figure 7. Self-reported levels of nature-connectedness from the C-PANS "Inclusion of Nature in Self Scale" baseline.

4.1.2. Activities at the Sea

In response to the question "What do you like to do when you visit the sea/natural outdoor spaces by the sea?," there were 83 responses overall. Swimming was reported as the most popular activity (n = 22), closely followed by sitting on the beach and having a picnic (n = 17), doing water sports, and rock pooling (n = 13; Figure 8). Participants were given an opportunity to document other activities. However, only one response indicated "other."

The majority of the responses indicated that the seaside was viewed as a place to visit for leisure and engagement with the sea for recreation and physical well-being (n = 35) rather than engaging with nature-focused activities such as rockpooling. This indicates that the sea is primarily seen as a place for physical activities or social ones, such as picnics and relaxing on the beach, and much less as a natural environment.

4.1.3. Barriers to Accessing the Sea

Participants were asked an open-ended question "What things have stopped you from spending more time outside in the last week?" to identify barriers to regularly spending more time outside. Of the responses

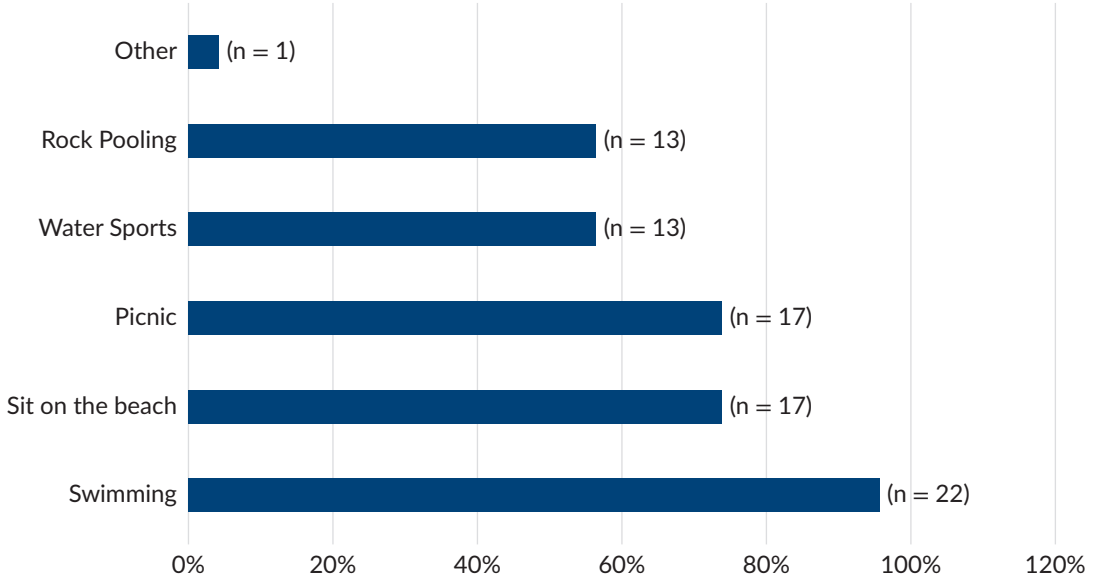


Figure 8. Answers to the question: "What do you like to do when you visit the sea/natural outdoor spaces by the sea?"

recorded, $n = 19$, the highest number of respondents ($n = 7$) indicated in some form that they did not know what barriers prevented them from spending more time outdoors with responses such as "I don't know" or "Nothing," followed closely by time-related reasons after at $n = 6$ (with responses such as "homework," "time schedule," "school," etc.). Both weather- and health-related reasons were mentioned three times in the responses, and one response indicated that transport accessibility was the barrier. Overall, the barriers to participants seemed to struggle to find specific reasons why they did not go to the sea, with the response "nothing" being the most common.

4.2. Co-Design Workshop: Requirements for a Digital Toolkit for Accessing the Sea

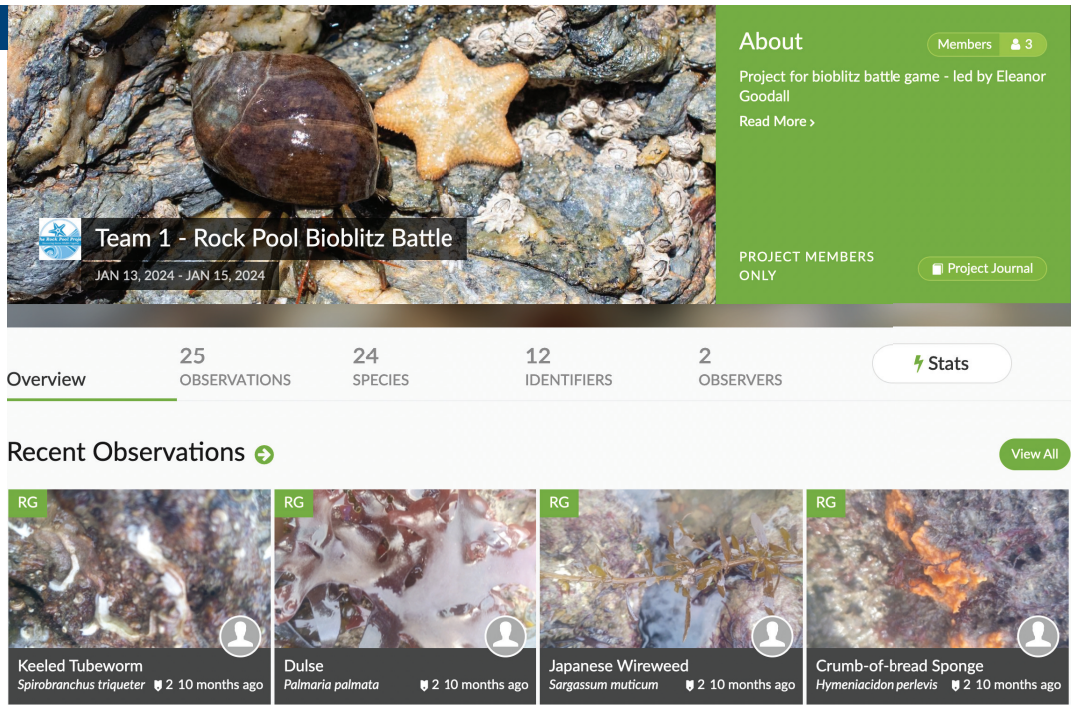
4.2.1. Bioblitz Citizen Science Activity

The second part of the co-design workshop was a bioblitz activity, where families used the iNaturalist app with a dedicated project for the bioblitz activity, to record species found in the rockpools (Figure 9). For many of the participants, this was the first time they had ever been rockpooling, and using the citizen science app was vital for identifying what was found as they had little knowledge of any of the species.

Figure 9. Bibioblitz activity in rockpools at Firestone Bay, with TRP volunteers.

Children took pictures of the species they identified and also learned the importance of leaving the rockpool as they found it by turning back rocks and being careful where they stepped as they moved around. The following day, the participants were sent a summary of the species they had spotted and a series of pictures of the species they had recorded (Figure 10).

a



b

c

At Firestone Bay

	Total	In 2023
furbellow	1	1
Montagu's crab	39	16
bladder wrack	15	8
flat periwinkle	14	4
toothed top shell	11	3
common periwinkle	17	7
purple top shell	8	5
common limpet	22	9
volcano barnacle	8	4
clockwise spiral worm	2	2
shore crab	48	17
breadcrumb sponge	9	3

Figure 10. (a) Results of the Bioblitz from 10th August 2023 in iNaturalist project; (b) examples of species observations made in the Bioblitz in iNaturalist project; (c) summary of species identified as a total. Source: iNaturalist (n.d.).

The Bioblitz activity demonstrated that the existing digital iNaturalist app was a valuable way for children to access nature since it was easy to use and well-resourced. Bioblitzes are, by nature, participatory, and this is what distinguishes them from traditional ways of recording observations. They also have the advantage of a volunteer network of experts who verify species once they have been submitted, giving a wider sense of community ownership.

4.2.2. Paper Prototyping Activity

The child participants created paper or low-fidelity prototypes, which included things they felt they needed to access the sea in the form of a 'toolkit.' We explained to the children that their ideas would help us design the digital toolkit that would be used in the future to access the sea. The creative nature of the exercise was useful in helping them develop their ideas, and it also enabled qualitative conversations about what barriers they had to accessing the sea and what helped them enjoy it once they were there. Over the course of the three workshops, we collected over 25 prototypes from children, and this included 83 "ideas" for the contents or nature of the toolkit (Figure 11).

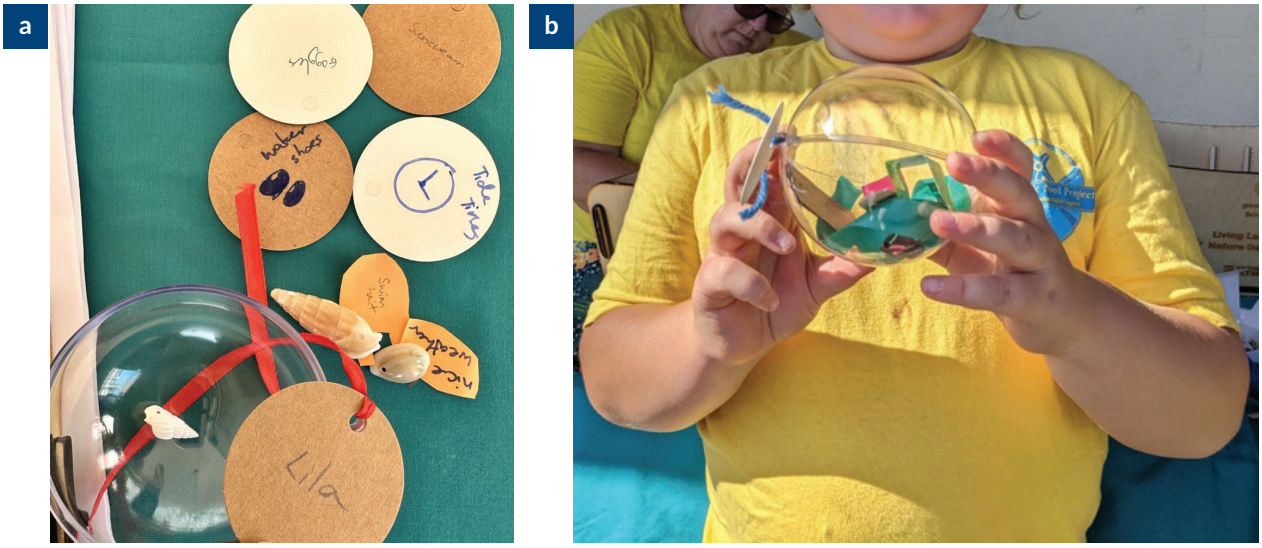


Figure 11. (a) Example of a participant's paper prototype—including ideas for "water shoes, tide times, nice weather, goggles, sun cream"; (b) low-fidelity or paper prototypes developed during the co-design workshop.

4.2.3. Paper Prototype Themes

The responses captured in the paper-based prototyping exercise and dialogue with participants during the co-design workshops are presented in Figure 12.

4.2.4. Accessing the Sea and Activities

One of the main observations of the workshop was that many of the children and adults were unfamiliar with the sea as a place to visit regularly. Although the children were primarily from Stonehouse, within walking distance from the sea, many talked about not having been before or only visiting rarely. This aligned with the results of the baseline survey. Therefore, in many cases, the participants struggled to think of things they required and needed prompting as they simply did not have any regular experience of visiting the sea. Although

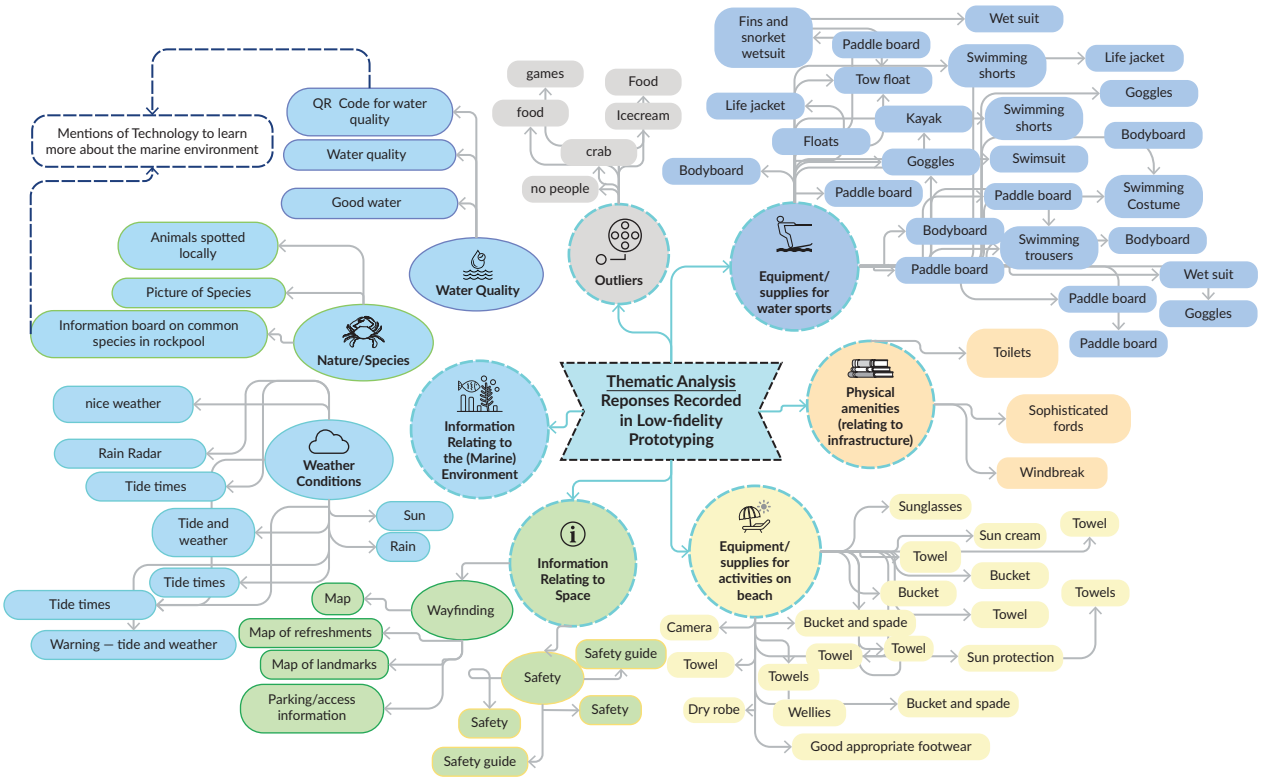


Figure 12. Thematic analysis of responses recorded in co-design workshops (low-fidelity prototyping).

the beach at Firestone Bay is located in the city, the main ideas that emerged were based on activities at the sea that are more typical of stereotypical beach activities, such as water sports, and physical activity and active play were key features of beach visits for children and parents, which aligns with Ashbullby et al. (2013). None of the children had ideas for information related to the sea as a natural space, such as a guide to the species locally or a description of the marine environment.

For example, the prototype by Lila (see Figure 11a) included the following items/ideas: water shoes, swimsuit tide times, nice weather, goggles, and sun cream, all of which were themed around equipment for leisure activities at the beach. Only three ideas across all participants were received for ways to engage with nature, and this suggests that children would benefit from having access to tools or ways for children to engage with the sea as a natural space. Although the participants did not give any references to specific citizen science tools, the children also verbally talked about wanting to identify nature and species on the seashore.

The ideas relating to physical access to the sea related to prompts for maps or wayfinding and also to safety advice or guides. The children reported needing information about the sea as a destination and a physical amenity. Three ideas were stated for information about water quality. This showed that there needed to be some form of guide or information about how not only physically to access the sea but also about the sea in terms of safety, both practically and also in terms of the health aspects relating to water quality.

Ideas for how to get information about weather and tide were the main ones identified in relation to the sea as a natural environment. It became clear that the sea space was inaccessible not only in terms of access to the sea initially but also literally the sea would become a dangerous and physically inaccessible space in ways

that were unpredictable and temporal. Participants identified tide times as useful information that could be provided so that they would know when it was safe to get to the beach. At high tide, the rock pools and most parts of the beach were inaccessible, which meant that the beach became a very different space, and here, the concept of the seas as a natural space was viewed in terms of it being a barrier rather than an opportunity. Ideas for the digital tools, therefore, identified real-time tide information, weather reports, and prompts for when the rock pools would be accessible to allow people to do this safely.

4.2.5. Requirements for a Digital Toolkit for Accessing the Sea

We combined the outcomes from the co-design workshop, the bioblitz, and the paper prototyping activity and mapped these against the barriers to accessing the sea. We had originally planned to develop a new digital stand-alone app, but instead, the outcome of the co-design was the need to provide a digital guide or toolkit that enabled families to visit the sea independently, when not supported by TRP volunteers (Table 1).

Table 1. Toolkit components mapped against marine citizenship.

Digital Toolkit component	Activity	Marine citizenship
iNaturalist app and Bioblitz guide	Citizen science app for digital identification and recording of marine species	Marine Literacy
Mobile phone with magnifying lens attachment	Digital capture of nature	Marine Literacy
Digital map specific to the nearest coastal beach or shore	Digital access to the coastal space with walkability aspects	Access to the sea
Safety guide and live weather, tide times and water quality display	Safety and information about tide and water quality levels and when the beach or coastal site is physically accessible (e.g., at low tide)	Access to sea

5. Discussion

5.1. SDG's and Participatory Methods: Marine Citizenship and Sea as a Public Space

To advance towards SDG's, including the goal of making cities inclusive, safe, resilient, and sustainable by 2030, coastal cities must enhance all aspects of their unique natural and social capital including adjacent marine spaces. Coastal cities have the potential to create a connection between people and the city seascape in a way that will bring positive socio-economic benefits and more inclusive participation whilst simultaneously facilitating greater stewardship of the marine environment. Creating ways to access the sea is seen as one way to achieve this and addresses the challenge that most people only spend a limited part of their lives experiencing ocean environments (Cigliano et al., 2015). Our findings from the baseline survey show that simply living near the sea does not enable access, and in fact, our baseline survey found that participants had lower levels of access compared to the national average despite living near the sea. If we consider that one way to enable marine citizenship is to enable access to the sea, commons, or public spaces through a marine park-type model, then this shows that the challenge lies in fostering feelings of connectedness and stewardship and promoting cultures of urban marine citizenship (Pittman et al., 2019) rather than just enabling access. Our findings from the baseline survey showed that the participants perceived the sea as primarily a

place for physical and leisure activities and not as a space to engage with nature. We also found lower levels of nature connectedness compared to the national average, suggesting a lack of sense of place in living in an urban coastal community. Our co-design workshops found that people lack the tools and experience of accessing the sea as a natural space, and that there is a need for new ways to engage and inform people about the sea where digital tools such as citizen science, information about species and real-time data about water quality and tide times could provide new ways to connect with the sea.

5.2. SDG's and Inclusion: Overcoming Barriers to Accessing the Sea

Coastal and marine spaces are unique not just in their constraints, but also in their natural assets—the coastal and marine environments—that are available to them and can be an engine for the regeneration of the communities that inhabit them (Balata & Vardakoulias, 2016; Barton et al., 2022; Carpenter & Balata, 2018; Corfe, 2017). Evidence suggests that the sea and the coastal spaces can become a landscape to address these inequalities and cater for the varied needs of the community (Ashbullby et al., 2013; Bell et al., 2015). Our study focused on an urban community that is categorised as deprived and within walking distance of the sea. However, despite living within walking distance of the sea, we found that only 16% of children living in a deprived neighbourhood visited the sea once a week, and anecdotally, we talked to a number of families who reported never having visited the sea. According to the literature, deeper connections to place in the context of marine environments and marine awareness are related to a higher likelihood of pro-marine conservation behaviours, which is needed to build stewardship (Day et al., 2022; Toomey et al., 2023). Therefore, creating pathways to physically access the sea is one of the key first steps. However, the baseline survey results showed that even when the participants did spend time at the sea, they reported almost no activities related to nature. They were primarily focused on leisure or social activities such as picnics or swimming. The opportunities to overcome barriers lie in overcoming perceptual barriers and creating activities that are accessible and easy to repeat and that create engagement with the sea. Through our co-design activities, we found that children's ideas for enabling access to the sea included information about the sea condition and safety, as well as ideas or guides as to what to do, as the main barriers were more perceptual.

5.3. The Potential of Digital Engagement to Create a Sense of Place

According to Kelly et al. (2022, p. 135), the use of technology "has significant potential to enhance sharing and uptake of comprehensible information about the ocean." Whilst there is a public perception that technology separates us from engaging with place, studies have found that digital technology, when used in a place (rather than remotely), can increase engagement with nature and emotionally connect people with their local environment (Crawford et al., 2017). Citizen science and digital tools for nature engagement can be valuable methods for engaging people with nature and developing modes of citizenship (Unger et al., 2021). However, the impacts are underexplored in marine spaces. We propose that there is a current gap in knowledge relating to the role that digital engagement can play in marine citizenship studies and therefore, we seek to define digital marine citizenship as:

> "*engagement with digital technologies that enable participation and access to the sea and foster marine citizenship.*"

Kelly et al. (2022, p. 137) outline how the five interlinked drivers of ocean literacy, education, cultural connections, technological developments, and knowledge exchange "will achieve most impact when applied together in diverse engaging and innovative activities." We found that it is not a single digital tool or app that is needed but a toolkit that brings together a range of information and engagement opportunities which could be undertaken by the sea. A digital toolkit can be a useful method for engagement, if it is part of an activity, and can provide pathways for them to perceive the sea as a place for them and feel a greater sense of ownership. The other aspect of the mode of digital engagement was that it needed to be used in the place, which in this case was the seashore, and this was not about providing information about the seas from remote locations such as at home or school. Our focus on place-based technologies that were used at the shore or marine space, such as the bioblitz activity did create a connection to the marine environment. In particular, the use of the iNaturalist citizen science app enabled the digital information to relate directly to what participants were observing in the real space and create new ways of engaging. According to Toomey et al. (2020), citizen science has the potential to deepen connections between participants and the natural world. Citizen science has the potential to foster further engagement in pro-environmental actions, and Newman et al. (2017) argue that it can be perceived as a type of "place-making" whereby citizen scientists are actively and continually involved in the production of place. In our study, the requirements for the digital engagement identified through the co-design activity related to the desire for live or real-time data about the place, such as the weather and tides. Practically, tide times emerged as a critical piece of data that was often not even understood by the participants as a factor in their visit to the sea. However, the rock pools were only accessible at low tide, so knowing when it was safe to go rockpooling and being aware when the tide was coming in were vital. The use of the iNaturalist app as part of a bioblitz activity provided a valuable and engaging way for children to observe and engage with nature. However, our study identified the need for a digital guide and prompts as to how to get started, and a follow-up with a record of their data was an additional part of the toolkit that would make it accessible to those families who may only have limited experience of visiting the sea.

6. Summary

The SDG11 around Sustainable Cities and Communities sets out the challenge to develop better models of participatory planning and governance of coastal cities and also to address issues of inclusivity and who benefits. We propose that digital technologies offer an opportunity to address these challenges by enabling new modes of participation in connecting to the sea. This article explored pathways to creating marine citizenship using place-based digital technologies in the context of the sea as a public space or "city marine park" (Pittman et al., 2019). It worked with the idea of the seascapes and the coast as a "blue urban commons" which celebrates the sea and the connection between the marine environment and the city facilitating the community's participation in activities cantered around caring, understanding, valuing, and enjoying the city seascapes. Therefore, the city seascape does not treat the coast as a marine park area where human activities are restricted but instead as a place that is embedded in the geographical and socio-economic context. We explored how digital technologies can facilitate engagement with and access to the marine environment by identifying requirements for a digital toolkit.

In the article, we discussed the results of a mixed methods study in Plymouth, given its leading role as the first NMP in the UK, in order to generate findings that can be shared with other coastal towns and cities. The study partnered with a local marine organisation, TRP, to undertake a series of co-design workshops in a

deprived urban coastal area. The findings of this study indicate a range of barriers to accessing the sea and also identify how digital tools can enable access to temporal and biodiverse marine spaces such as rocky shores. In so doing, they can create new ways for communities to access and engage with the sea/marine environment. We propose that an integrated approach using digital technologies in the form of a digital toolkit to build and nurture relationships between people and marine environments. We introduce the concept of digital seascapes, where digital technologies enable participation and access to urban coastal spaces and foster marine citizenship. In this context, it can help contribute to broader challenges around participation by establishing stewardship of city seascapes as a "blue commons."

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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The People and the Fire Tree: Co-Designing a Bushfire Early Warning System to Meet the Sustainable Development Goals

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Abstract

Australian rural communities face significant climate challenges including catastrophic bushfires. In line with the UN sustainable development goals (SDGs), to build resilience in the face of bushfire threats, communities need to increase adaptive capacity while maintaining the community's integrity. To build community resilience, they should harness the hybridity between digital technology and non-technological practices. Building community resilience is gaining attention in rural human–computer interaction to ensure those who are vulnerable to disasters strengthen their ability to address adversity even in the absence of formal government assistance. How they apply digital technology into practice to ensure it meets their needs is crucial. We outline a case study of a rural Australian bushfire-impacted community. A series of co-design workshops was conducted to understand local bushfire preparation activities and the role of digital technologies in these activities. Three creative participatory design activities supported the co-design of an early-warning bushfire system. The workshop participants co-designed and merged two solutions: first The Fire Tree, a conceptual map of a preventative information system fed and validated by the community itself; second, The People System identifies and harnesses government resources to feed and generate a rich, dynamic, and constantly updated information environment. The final solution based on the two concepts is Bushwire, a communication facilitator designed and used by participants in workshops four and five. Bushwire is a co-designed web-based collective platform that leverages citizen-science behaviours, enabling them to share local knowledge and prepare for bushfire threats. The system became a communication facilitator, a space to share detailed local information and connect; fed by locally produced elements including digital technologies, weather/road conditions, and on-the-ground instructions. This case study explores how Bushwire responds to a range of UN SDGs by seeking to build sustainable communities (SDG11), to address climate action (SDG13) for this rural Australian bush-fire-prone community, and

harmonises life on land (SDG15) through multi-stakeholder partnerships (SDG17). We envisage that urban planners may derive value from listening and responding to messages from nature, and from citizen-scientists embedded in rural communities as depicted in this case study.

Keywords
bushfires; climate action; co-design; human–computer interaction; life on land; resilience; sustainable cities; sustainable communities; sustainable development goals

1. Introduction

Bushfires are a fundamental part of the dynamics and cycles of some habitats, as they regulate biomass and renew existing plants. For instance, there are seedpods that require smoke to germinate, native grasses that regenerate following low-intensity fire, and bird species that use strategic opportunities to repopulate (Lavery et al., 2024; Williamson et al., 2023). However, since the appearance of human settlements adjacent to bush areas, fires become a disturbance as they have massive disruptive effects on the coexistence of communities in terms of people's daily activities and interaction with their environment. The costs associated with fires go beyond infrastructure in terms of reconstruction, and mitigation planning, since fires can affect all aspects of everyday life for those who are part of these communities.

Although there are practices and policies developed by governments to solve the primary needs of the inhabitants of rural communities once the disturbance has occurred, they are primarily focused on solving problems of housing and supplies. These measures tend not to properly consider the individual needs of each community, much less prepare the community for a new disturbance. A better understanding of community activities that support living with the bushfire threat has the potential to help communities build their resilience over time.

This research aims to develop more holistic strategies and design solutions, including the use of technologies, to support communities in facing ongoing threats and recovering from bushfire events. It is at this exact point where this work connects with four of the 17 sustainable development goals (SDGs) defined on the website of the Department of Economic and Social Affairs of the United Nations Organisation (United Nations, n.d.). First, SDG 11 (sustainable cities and communities) since rural communities (including the group in this study) demonstrate deep interest and knowledge in sustainable practices to preserve their livelihood and healthy lifestyle. Second, SDG 13 (climate action) since the group of participants had experience facing past bushfire seasons and have been active agents in preserving nature and their environment. Third, SDG 15 (life on land) is relevant since it involves the knowledge the members of the community have about their own environment, and therefore its needs. And fourth, SDG 17 (partnerships for the goals) since the members of the communities understand how important it is to nurture internal relationships and open communication channels with local service suppliers (e.g., the country fire authority) and governmental institutions.

Driving this study was our research question: How can co-designed digital technology support rural communities to build resilience to coexist in the face of bushfires? The aims of the project are: First, to identify what digital communication activities generate rural resilience; second, to determine how these digital communication activities can be harnessed in the face of bushfire threats in rural communities; and

third, to co-design a digital resource with a rural community that builds on local knowledge, and utilises citizen science behaviours, to serve as an early bush-fire warning system. Muashekele, et al. (2019, p. 127) suggest that given its methodological characteristics, "co-design approaches strengthen the emphasis on user's needs, aspirations and limitations." Therefore, to explore and gain accurate, contextual information about these three questions, a series of co-design workshops were conducted with members of a rural Victorian, bushfire-impacted, and bushfire-threatened community. The final outcome from these workshops was a co-designed website named Bushwire, introduced below.

The co-design solutions presented here demonstrate how proficient the participants are in developing flexible strategies and tools to strengthen community resilience using technology. This concurs with Muashekele, et al. (2019, p127) as they explain how "working directly with rural communities allows for their voices to be heard and integrated into the design, anticipating a higher rate of acceptability." Our solution took the form of an early warning system through observation and monitoring of local conditions, and sharing this information, thus creating awareness of the state of nature via a communication tool based on community posts. These early co-design ideas were the foundation for the development of a website called Bushwire where the participants could capture changes in nature and share experiences and knowledge about the local environment, with a view to sustaining a harmonious relationship between the environment, i.e., the wildlife, the bush, and the people residing within it. We discuss how this can also provide learnings for the SDGs.

This article includes several sections related to five workshops conducted in rural Victoria. First, unpacking the background, where we examine existing research and methodologies related to resilience building in communities. The second section is the case study, where the activities were conducted, and the results and solutions are described. Third is the discussion section where the findings are explored and finally, the conclusion where design guidelines are proposed based on the previous sections.

2. SDGs and Community Resilience

The UN 17 SDGs are focused on sustainable cities and communities. As is explained in the Department of Economic and Social Affairs of the UN website (United Nations, n.d.). The 2023 Agenda for Sustainable Development adopted by all UN member states in 2015 provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 SDGs, which are an urgent call for action by all countries—developed and developing—in a global partnership. Specifically, they are concerned with making human settlements inclusive, safe, resilient, and sustainable. While typically the SDGs are more focused on urban rather than rural settlements, some mechanisms identified to support sustainable communities (SDG 11) speak particularly to rural Australian bushfire-prone communities, such as addressing sustainability through risk assessment. This case study illustrates how a rural bushfire-prone Australian community seeks to build community resilience, including through climate action that aims to capture and report disaster risk strategies. We argue that, in Australia, this is leveraged through multi-stakeholder partnerships, including local government, local community members, and the local environment colloquially known as "the bush" (Davis et al., 2020, p. 250). In this case study we highlight the role of a cultural probe and a technology probe (Bushwire) in capturing and supporting this activity for one rural bushfire-prone community.

Resilience is not a static attribute of a system, it changes, adapts, and modifies according to the environment and the type of stressors involved just as a community may do when it is necessary. For Balvanera et al. (2017, p. 142) the concept of resilience arises from the empirical study of the systems that surround us, from the observation of phenomena that operate at multiple spatial and temporal scales, such as environmental phenomena and their consequences. Similar to Southwick et al. (2014, p. 4), this study subscribes to what Panter-Brick and Leckman understand as resilience, since they describe it as "a process to harness resources to sustain well-being." This definition is relevant here since the identification and harnessing of resources has the potential to allow communities to constantly strengthen resilience over time. Such an understanding of resilience is also relevant to the increased interest in urban resilience with citizens facing growing environmental challenges (Meerow et al., 2016). Research on urban resilience promotes nature-based solutions (Bush & Doyon, 2019). We believe our research can play a role in informing such trends as we show rural communities understand and interpret interactions with nature as part of their daily life (Bush & Doyon, 2019).

Research found that a lack of knowledge increases bushfire threats as it leads to unsuitable forest management practices (Gammage et al., 2021). Also importantly, according to Foth et al. (2024), a main issue in bushfire planning and preparation practices is "a focus on human life and property" which:

Does not account for the health of the forest or the natural systems that rely on it. As a result, there is an uneasiness in the communities about the extent to which residents can or should rely on external systems for protection. (Foth et al., 2024, p. 321)

This is where our research aims to enable rural communities through technology to grow and share knowledge and hence increase their resilience.

Technology has been one fundamental tool for the subsistence and development of rural communities. How the characteristics of this tool can be harnessed needs to be understood under a singular lens, this is where human–computer interaction (HCI) becomes relevant for this study. According to McKay and Buchanan (2022, p. 144) HCI is defined as "how people interact with technology, and how technology changes society." This description is relevant to this study since digital technologies are a facilitating agent that keeps these communities connected with the world, a highly necessary link because "the unique socio-economic structure of rural areas makes them particularly vulnerable to incipient or unfolding disasters" (Doke & Yuan et al., 2020, p. 5). This is particularly pertinent when a community must face the challenges of developing its activities in a rural context under the constant threat of natural events like bushfires. Blackler et al. (2024, p. 124) also emphasise the important role and opportunities of technology in preparing communities for natural disasters through increased "situational awareness and risk perception."

According to Hughes and Sarzynski (2015, p. 2), to increase resilience, communities need to increase adaptive capacity to maintain the community's integrity. As Taylor and Cheverst, (2010, p. 218) argue, "Rural areas are a particularly interesting environment for the study of technology," especially for exploring the hybridity between technology and non-technological customs, habits, and practices (Hardy et al., 2019, p. 196). Basak et al. (2020) argue that building community resilience is gaining attention whereby all communities, especially those who are vulnerable to disasters, seek to become empowered to strengthen their ability so that they can address adversity even in the absence of formal government and other external assistance (Basak et al., 2020, p. 2).

It is crucial to explore how rural communities understand and use technology, particularly how they adapt it in practice to meet their needs. Understanding the local knowledge of rural communities is pivotal to the development of strategies that evolve and ensure, sustainable, resilient future communities. As Muashekele et al. (2019, p. 127) suggest, "involving target users, (in this case from a rural context,) provides a better understanding of how best to implement and introduce technologies to rural and co-located communities." Therefore, we call upon the deep knowledge of the local environment in order to develop strategies that resonate with the lived experiences of the community. Williamson et al. (2023, p. 7) provide a good example in the context of Indigenous studies, explaining how "Indigenous environmental data is produced through connections to the earth, cultural identity, language, traditional kinship systems and the valuing of cultural knowledge holders within a community."

In this article, we will review how the contributions of the members of a rural community helped shape a prototype for an early warning system by harnessing the knowledge they have and engaging them in the process of creation in a series of co-design workshops. We value the contributions of the members of the community since we consider their knowledge foundational in building more resilient communities facing the threat of extreme natural events. As Hespanhol (2017, p105) suggest, "By promoting the engagement of citizens, communities can build coping mechanisms that can address potential disturbances with greater preparedness… utilising a wider range of creative input from citizens to ideate future solutions."

In the next section, we will review the methods used at the different stages of the study and describe the activities of the workshops conducted in Regional Victoria, Australia.

3. Methodology

This case study was conducted with members of a community utilising a participatory research approach. The field of participatory design continues to provide a vibrant environment for the discussion and dissemination of new tools and techniques (Sanders & Stappers, 2014, p. 146). The series of workshops were held over 14 months between 2022 and 2023 in Regional Victoria in Australia. Research suggests that there is much scope to apply a participatory design approach within HCI to address the SDGs (Fredericks et al., 2019, p. 3). All the participants were members of one small community, and we were able to work with them in-depth. They completed a short demographic questionnaire at the first workshop. Table 1 summarises the basic demographics of the participant group. Participants' identities have been anonymised for the purpose of this study and pseudonyms are used. The names assigned to the participants are Annie, Diana, Gail, Hank, and Tony. This section, and further, includes participant quotes from the workshops.

Table 1. Demographic description of the participants group.

Name	Age range	Years in the community
Annie	55–66	20+
Diana	65–74	25+
Gail	65–74	25+
Hank	25–34	20+
Tony	75+	25+

The participants in this series of workshops were recruited from a rural community in Victoria, Australia. One of the authors belongs to a neighbouring community and was the initial link between the participants and the research team. All the participants were active members of the community and lived in the region for over 20 years, the age of the participants is typical for this community.

The workshops were conducted in Kangaroo Hills (the area has been anonymised). Established in the late 1800's, it is located in Victoria, Australia. According to the 2021 Australian Bureau of Statistics census, Kangaroo Hills' population is around 360 members. Kangaroo Hills was one of the communities affected by the Black Saturday bushfires which were Victorian bushfires in which 173 lives were lost across several communities and another 414 people were injured, impacting local areas (Country Fire Authority, 2023). The workshop participants have all experienced the Black Saturday bushfires and reside in a rural bushfire-prone area with large areas of dense bush and biodiversity including wildlife such as kangaroos, koalas, wombats, echidnas, and other species.

The workshops were informed by activities including focus group conversations. We designed a cultural probe kit (see Figure 1). McDougall and Fels (2010, p. 58) explain that cultural probes:

> Create insights by going beyond more traditional user study techniques that rely on what people say and do (questionnaires, interviews and observation studies). Probes combine interpretation, ambiguity and fun, inspiring and stimulating probe users, who in turn, stimulate the designers to tell stories about what they get back from the places probed.

A cultural probe activity was conducted in workshops 2 and 3 and participants engaged with the cultural probe in their own time in between these workshops. A digital cultural probe called "Bushwire" (see Figure 5) was discussed in workshops 4 and 5 (see Section 5) and interacted with between the workshops.

Figure 1. The analogue journal kit.

This article includes data from workshops 1 to 5 (see to Figure 2) and activities between them that took place over a year. Cultural probe activities in workshops 1–3 are explored more thoroughly elsewhere (Munoz Rivas et al., 2024). This activity explores workshop participants' co-design, use, and evaluation of Bushwire, a socio-technology probe used to capture the participants' interaction with their environment for bushfire preparedness and response.

3.1. Data Collection and Analysis

The workshops constituted two major sets of activities (see Figure 2) and were planned on a participatory design basis, as "participatory design is a natural partner to community based participatory research, which seeks to incorporate community members as co-researchers and co-developers of projects in order to reflect the lived realities of research populations" (Hardy et al., 2019, p. 196). First, the analogue data collection, which includes the workshops' face-to-face activities and the cultural probe activities (journal entries, briefly described in the next section), occurred both within and between workshops. To process the workshop and analogue journal data, a thematic analysis approach was utilised. As Braun and Clarke (2006, p. 5) suggest, this qualitative method of analysis provides the flexibility compatible with the qualitative character of this study. Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data. It minimally organises and describes data sets in rich detail (Braun & Clarke, 2006, p. 6). The workshops were audio-recorded, and the transcriptions of these recordings were used to employ categorisation of the themes raised during the sessions. Through this initial categorisation of the themes the entries compiled in the journal (cultural probe) helped to shape the categories that finally can be observed in Table 2.

Second, in the digital data collection stage (see Figure 2) participants created entries in Bushwire organically building a collective database with knowledge about the local environment documenting changes, knowledge, and concerns about nature and climate change (described in Section 5). The digital data from the entries was processed by using content analysis. For Sheydayi and Dadashpoor (2023, p. 2) "qualitative content analysis is a systematic analysis of qualitative data in which the latent values and meanings in a text

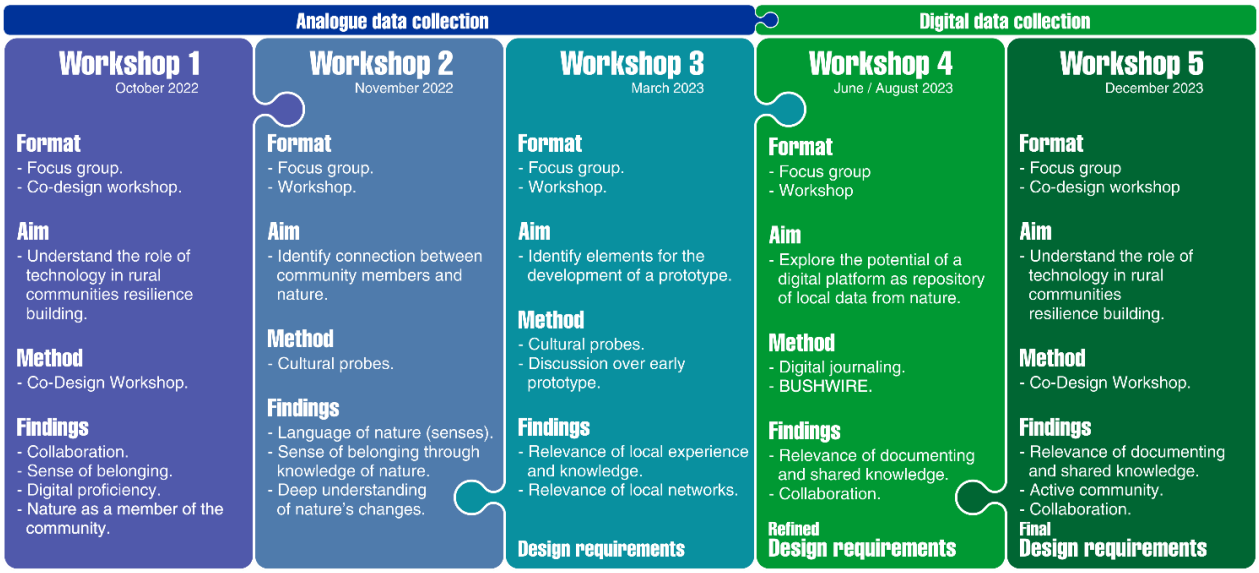

Figure 2. The activities and aims of the workshops conducted in regional Victoria.

are identified, described, and interpreted." For Krippendorff (2019, p. 18), "content analysis is a scientific tool. As a research technique, content analysis provides new insights, increases a researcher's understanding of phenomena, or informs practical actions." This qualitative content analysis approach helped to define and organise categories based on the characteristics of the digital entries as seen in Table 2. This approach helped to develop terminology to identify the different types of entries described in Section 5.

In both cases (analogue and digital) there are five categories but with small differences due to the format (see Table 2). For the analogue data, the categories are: reflection, poem/haiku, drawing, recounting, and found object. The digital categories are: reflection, poem/haiku, uncategorised, recounting/report, and comments.

3.2. Case Study in Rural Victoria, Australia

The first activity aimed to gain insights regarding the meaning of being part of the community. All participants articulated how living in a rural area was and is beneficial for their physical and mental health. Most of them had moved to the area when they retired, and their sense of belonging is strong. In the words of Gail: "Living here for so long makes me feel healthy and that I belong to something bigger than me." The common experience among the participants was that, as they adopted a simpler lifestyle, (or this "lifestyle adopted them") they progressively understood how valuable the environment was for them, and by extension their community.

The second activity concerned the methods of how community members participate and connect within the community (e.g., volunteering, neighbourhood chats, school drop-offs, and social media participation). Participants recognised that technology and social media are important to maintaining a flow of communication between the community members, coping with challenges, and helping to clarify who they consider to be a part of the community. Participants referred to their environment as an important member of their community and discussed the importance of caring for it, as they would other neighbours. Regarding the use of digital technologies, the participants talked about a variety of digital platforms and apps they use for bushfire awareness: "I rely on things like the Emergency Victoria websites, and I usually use meteorology websites" (Tony). Diana is an active user of the local Facebook group, since it allows her to connect with other members of the community: "When we started this up all those years ago, just a few of us talking on Zoom [there were] about half a dozen to 10 people. We've now got over 250 members on Facebook." Annie commented about how relevant Facebook has become important as an online resource for community connectivity "I'm a member of not just the Kangaroo Hills Facebook page, because that helps me know what's happening when it's in the local area."

Concerning bushfire threats the answers focused on digital resources and pointed to some existing governmental resources, but also uncovered a lack of local and up-to-date resources to inform them about the immediate situation. Annie stated: "In terms of online resources, e-mail and phone. I rely on the Country Fire Authority. The Be Safe app on the phone, which tells you when some things [bushfire conditions/activity] are about to blow up." The third activity Draw, Map, or Ideate, aimed to generate a solution for an early warning system to alert community members about bushfire threats. The participants had complete freedom to devise a system according to their own needs, experience, and knowledge.

4. Workshop One: Co-Designed Solutions

4.1. Solution 1: The Fire Tree

A conceptual map was developed and named by the participant, Gail, as The Fire Tree—a preventive local information system, fed and validated by the community itself (see Figure 3a). Gail explains the motivations behind her model: "I'm thinking of something that's gonna give people an advance [warning] so that they know what's happening and whether it's safe to evacuate. [It should be] something like this that is locally based." The system is a communication facilitator, locally based, controlled by locals, and that responds to local conditions. It aims to be a reliable source of information and communication that informs the community effectively about the status of nature locally and a potential natural event so that the community members can make decisions or receive instructions in case of a bushfire.

The concept has information support from the government, which makes it possible to contrast the information, since it may contain details that are beyond what the members of the community can generate. However, the emphasis is on the community knowledge and experience. Each new piece of information is easily received and distributed among the community members.

4.2. Solution 2: The People System

This conceptual map, named by the participants simply as People, largely identifies the resources provided by the government and harnesses these as an integral part of the system, to feed and generate a rich, dynamic, and constantly updated information environment. Diana's group elaborates on the effectiveness of an early warning system: "Ideally this works based on the people of the community. Someone or something to ring them up on the phone and say, 'go away,' 'run away now.' Vic Emergency is good, but they can't do everything." The system becomes a communication facilitator (see Figure 3b), with a space to share information and connect; this idea is shared in both conceptual models. In addition, other elements are

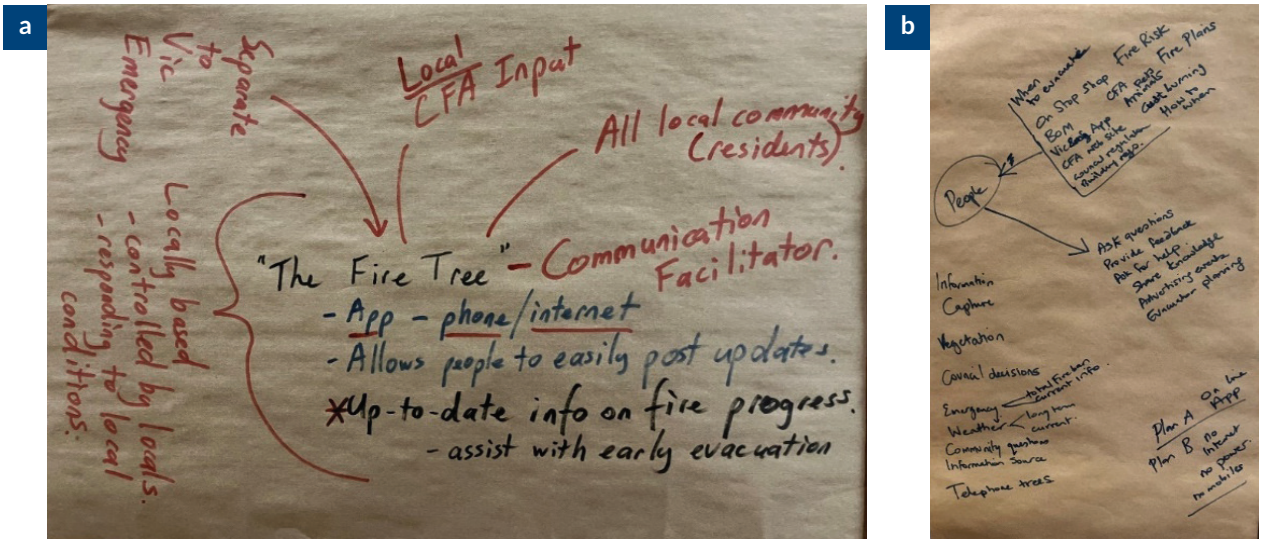

Figure 3. Conceptual maps for the Fire Tree (a) and the People system (b), developed by the participants during the first workshop.

relevant to ensure functionality and reliability such as digital technologies, weather conditions, natural event status, road conditions, and instructions are present in each system.

4.3. Merging the People System and the Fire Tree to Envisage a Socio-Technical System of the Ecosystem

From the conversation in activity one and the presentation of the conceptual ideas of the participants, there is evidence that the participants share a similar perception about how the members of a rural community create and generate their own dynamics with and within their local environment. In both models, (see Figure 4) the information and experience of community members is relevant to keep their members informed. The interaction between the members of the community through these systems puts people first in a synergistic circle of information provision and retrieval. The final solution proposed is a co-designed collective platform hosted on an interactive website called Bushwire that without representing a radical change in the behaviour of community members, enables them to share local knowledge online in a natural and holistic manner.

The workshops provided insights across three specific points. First is the healthy collaborative dynamics observed within the community. There are bonds deeply rooted in years of collaboration and active participation in activities of the members of the community, a space where nature plays an important role and is considered another member of the community because its behaviour impacts the decisions of the participants. Tony pointed out: "Communities like this consider the bush and the environment as part of the neighbourhood. One of us." The relationship the participants have with their environment requires deep knowledge so they can understand and read changes and respond accordingly. Tony elaborates on this idea: "The Bush is a major part of the community."

Secondly, the workshop underscores the important role of digital technologies in fostering healthy social networks. Considering this, a digital platform based on trust could be used for exchanging local knowledge and building resilient relationships in the community. In this regard, a significant finding at this stage is the proactive use of digital platforms such as Facebook by community members, characterised by a keen adaptability to local urgent or important events and cultural customs. This adaptability was particularly evident during activity three when participants were asked to develop the early warning system. When

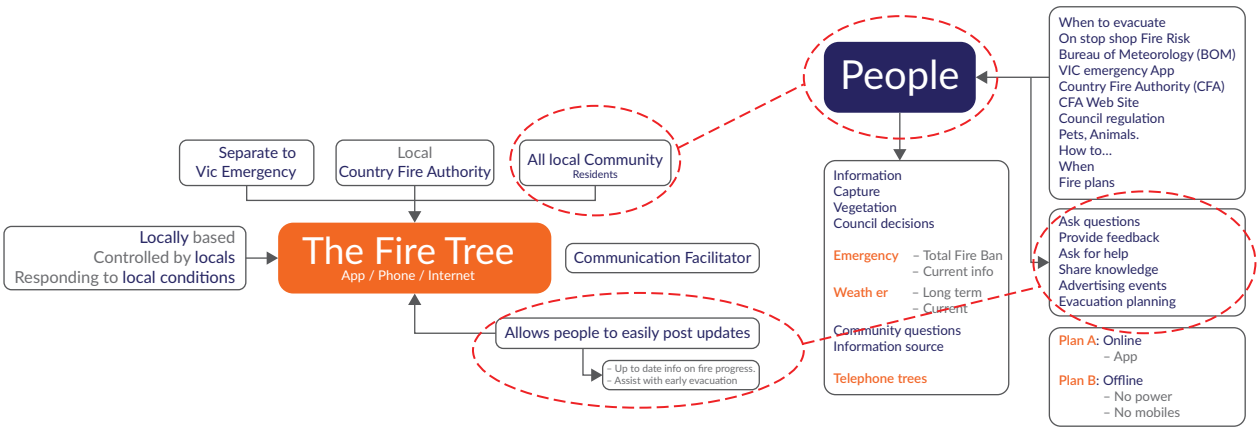

Figure 4. Shared elements in both proposals.

technological and budget restrictions were eliminated, the participants proposed a comprehensive system, based on information generated by the community itself and supported by information from local and federal government.

By using these digital platforms participants converge to collate and disseminate information about their respective environments, generating a collective narrative nurtured by the wisdom of its users. It is through these shared experiences that narratives emerge, enriching the communal identity fostering a sense of belonging, and actively contributing towards a sustainable community. Tony elaborates on this idea: "So, we've been involved with activities that enhance and improve the preservation [of nature] because by living here we realize it can disappear." The participants acknowledged that life in rural areas is good, calm and beneficial. In this regard, Gail stresses that "the opportunity is to prove that you can live in a simple sustainable lifestyle and prove to yourself that you can cope and enjoy living beyond suburbia."

5. Findings From Bushwire: Community Narratives

Based on the information retrieved in this series of co-design workshops and, in particular, the two design concepts, the first author developed an interactive website prototype called Bushwire. Bushwire served as both a research tool and a digital cultural probe (Hutchinson et al., 2003, pp. 17–24) to address and respond to some of the concerns captured in the SDGs (e.g., sustainability, community resilience, and knowledge sharing).

Bushwire's home page, that we can see in Figure 5a, was designed as a repository for hosting valuable information about the local environment, to support the collection and sharing of this knowledge to sustain the local bush environment. The name of the prototype (Bushwire) was chosen since it resonates with the idea of a colloquial source of information. The name comes from the amalgamation of the word "bush" (this is the natural surroundings of an Australian rural community), and "wire" (word used colloquially to state connection among others using technology). Together the word "Bushwire" sounds similar to "bushfire" but evokes more positive images and envisages a sense of community whose information needs are supported to prevent and respond to bushfires. Derived from the elements present in the Fire Tree and the People system developed by the participants, Bushwire was developed to achieve two complementary goals. First, a way to preserve and share local knowledge about nature, registering changes in the local environment. And second to serve as a link between the members of the community, including nature, since it is recognised as a member of the community, too.

By serving as a repository for multimedia content capturing environmental changes, Bushwire enables community members to archive their observations and insights for future reference. Through the act of documenting and sharing experiences on the platform, community members develop a deeper appreciation for their natural surroundings and a heightened awareness of environmental changes. Bushwire is still active (at the time of publication) and available for participants to revisit and provide contributions.

Bushwire's main functions include posting content in various formats: audio (.mp3, .mp4, wav, among others), text, video (.avi, .mov, among others), and images (.jpeg, .jpg, .png, among others) to support sharing of observations about changes in nature. The website is a clean, responsive, up-and-down scrollable design without background music, although videos embedded within the site can play sound.

The design of Bushwire's interface focused on making the user experience as familiar as possible to the participants: "It makes sense to say that the experience of an interactive system of any kind, is heavily influenced by who is experiencing it and hence, the designer has to respect and work with that identity" (Morales Díaz, 2022, p. 2). The posting process is similar to other digital platforms. Uploading media, such as pictures or videos, takes place through a private user account, by dragging or uploading it into place. It can be accessed by any laptop, PC, or mobile device connected to the internet. After a new entry is created, all the members of the community can visit and create comments about it. The website has been designed with four different areas: home, weather, journal, and activities.

Regarding home, the front page of Bushwire (see Figure 5a) is where visitors can explore the latest entries from other members of the community. In the banner, at the right top of Bushwire, the visitors also can find a weather widget with local information on temperature, humidity, wind, and cloudiness.

As for weather, this section is an expanded version of the weather widget in the banner (see Figure 6b). It uses a local map to better illustrate weather conditions. The weather section of Bushwire (see Figure 6a) includes information about wind (speed and direction), humidity (percentage), pressure (in millibars), cloudiness (percentage), precipitation (rain in millimetres), and visibility (in kilometres).

The journal section (see Figure 5b) is the repository of all the digital entries ever posted on Bushwire. Images, videos, audio, and text are stored in this section by date. Using any electronic device with access to the internet and by selecting the entry the visitors can explore it. Additionally, by clicking on "comment" the visitors can review and comment on other participants' entries. This is important as participants wanted to use their own devices.

The activities section (see Figure 5c) was included in Bushwire to serve two purposes. First, as a means to keep the participants engaged with the project through activities between workshops 4 and 5 (such as the recommended number of entries per week and encouraging them to comment on each other's posts). Second, the activities section includes guidance on how to use the website in case the participants needed help remembering the steps to create new entries and comment on other participants' posts.

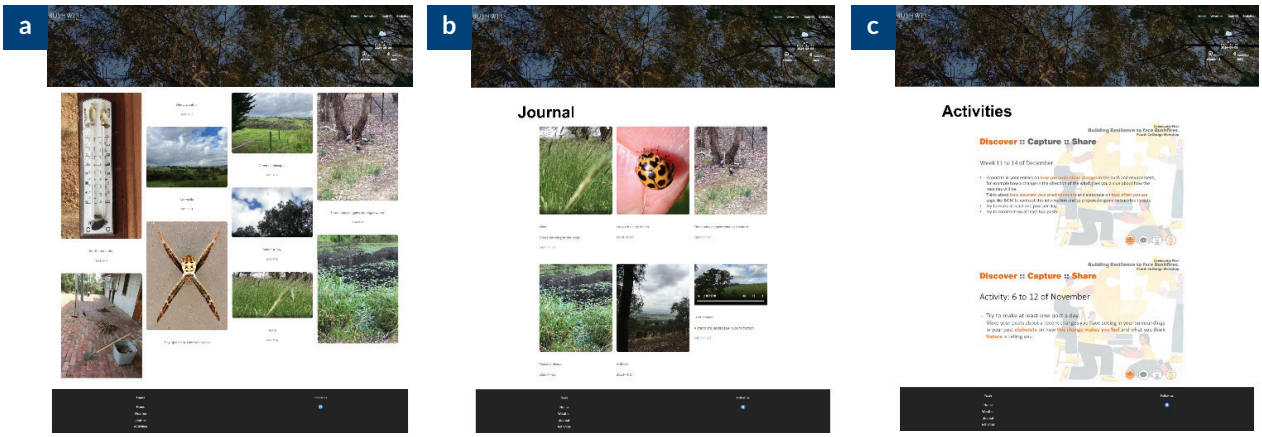

Figure 5. Bushwire's different sections: Home page (a), journal (b), and activities (c).

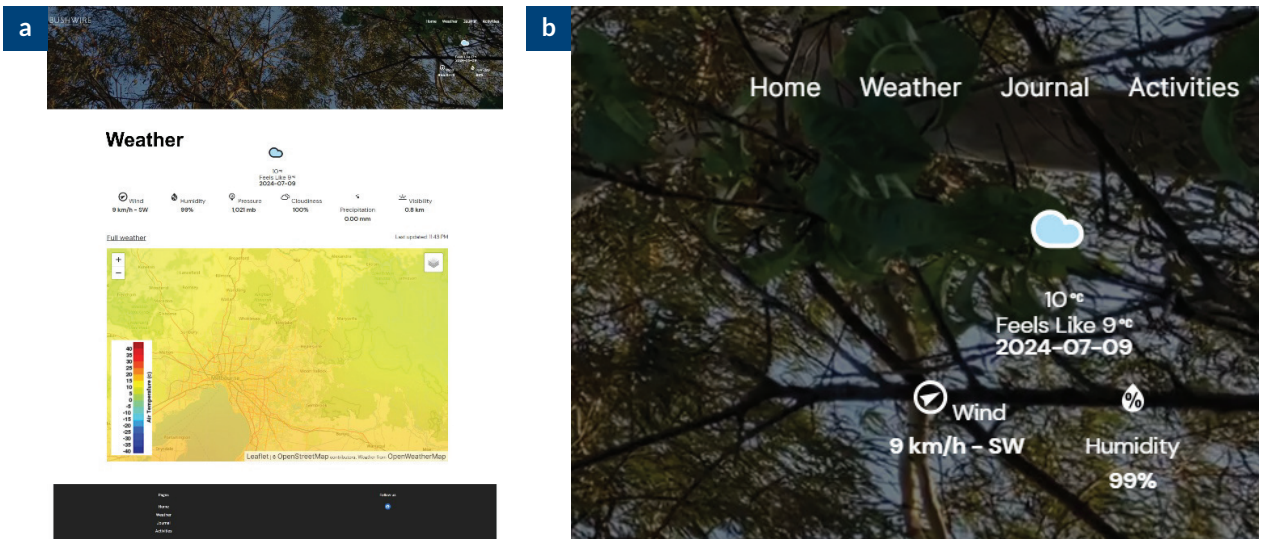

Figure 6. Weather section (a) and widget of Bushwire (b).

5.1. Bushwire: Opening the Conversation About Nature, Conservation, and Sustainability

Based on the data obtained in previous workshops, the Bushwire prototype intended to amalgamate technological advancements with community engagement needs. By creating a user account, all the participants were able to access the website at any time, including from their mobile devices. By integrating multimedia functionalities encompassing photos, videos, and audio recordings, this version of Bushwire aimed to transcend traditional narrative formats such as Facebook, affording users a dynamic canvas to articulate their encounters with nature's capricious elements. This convergence of digital media not only enhances the richness and authenticity of shared narratives but also empowers individuals to provide nuanced perspectives that extend from the confines of text description. Bushwire is still online and available to the community to share changes in nature. It is not expected and is unlikely to be used during bushfighting situations. Locals are more likely to use walkie-talkies and fire brigade links in an acute situation. The exercise of capturing changes in nature and using Bushwire to compile and share this knowledge is an opportunity for the participants to explore their surroundings, rediscover flora and fauna and be sensitive to changes in nature. There was a total of 54 entries during the duration of the activity (see Table 2) with five categories including poems, recounting, reflection, report, and a miscellaneous section of data that did not fall into a category. This section includes images, thoughts, and comments posted by the participants.

Through the platform, participants engaged in sharing recent experiences captured in photographs, some of which intrigued and surprised the group. These initial entries prompted active reflection, with participants writing comments and sharing their impressions.

5.2. The SDGs Through the Lens of Bushwire

Dolejšová et al. (2021, p. 1) state that "increasingly, researchers are pointing to the need for a wider rethink of humanity's impact on the earth as a whole." In line with this idea this collective approach has the potential to "play a pivotal role in bringing us toward more positive sustainable futures" (Dolejšová et al., 2021, p. 1).

Table 2. Number of entries in the analogue journal and on Bushwire.

Analogue data collection overview					
Participant	Reflection	Poem/Haiku	Drawing	Recounting	Found Object
Annie	35	–	8	–	16
Diana	1	1	–	34	–
Gail	6	6	–	10	–
Hank	2	2	–	10	1
Tony	2	2	–	3	–
Total entries	46	11	8	57	17
Digital data collection overview					
Participant	Reflection	Poem/Haiku	Uncategorised	Recounting/Report	Comments
Annie	1	–	10	3	–
Diana	1	1	5	1	–
Gail	2	6	4	1	–
Hank	1	2	2	1	–
Tony	1	2	6	1	–
Total entries	6	11	27	7	82

Bushwire was introduced to the participants to explore the knowledge they have about nature and to understand how they perceive and interpret changes in their local environment. While the Bushwire website was not created to directly respond to SDGs, the context in which the content (entries, images, videos, comments) was created for, and shared within, responds to some of these goals on a community level. The content of Bushwire was analysed to understand the knowledge and needs of the community from their posts and comments. Through their contributions to Bushwire, the members of the community can be viewed as active agents in the process of community resilience building.

It is relevant to consider that while the SDGs do not explicitly mention rural and regional areas, we know these are disadvantaged across a wide variety of criteria, including digital and non-digital infrastructure. According to the Australian Institute of Health and Welfare (2024) website, around 7 million people, or 28% of the Australian population, live in rural and remote areas. These encompass diverse locations and communities all rural communities are not alike, nor do they have the same challenges, however many are impacted by issues of limited or intermittent internet. Doke et al. (2020, p. 5) provide an example relevant to this study, they argue that "large rural constituencies, encompassing vast and sparsely populated areas, lack broadband connectivity and rely predominantly on volunteer-based emergency workforce." In the case of large extreme natural events such as bushfires, these factors "may have effects on rural first responders' ability to access, act upon and disseminate emergency-related information" (Doke et al., 2020, p. 5). This example is important since according to Doke et al. (2020, p. 5) "(this) has an adverse effect on both residents and the agencies that serve them, as it limits residents' ability to prepare for emergencies and compromises the safety of first responders."

In this regard, there are examples captured in Bushwire about concerns (based on experience) and consequences of climatic conditions including heavy rain in rural areas (see Figure 7a and 7b). Regarding digital technologies, residents are quickly coming to recognize the benefits that the internet offers, however, connectivity is always an issue due to inconsistencies with the service. This is consistent with Taylor and

Cheverst's (2010, p. 218) view that "many rural areas are poorly connected broadband not-spots, unable to take full advantage of the latest web applications."

The SDGs are relevant for the sustainable development of vulnerable communities towards a more sustainable future. In the next section, we will review how closely the findings of this study align with four of these Goals.

5.3. SDG 11: Sustainable Cities and Communities

The connectivity of digital technologies becomes relevant in the case of extreme natural events to help the community to better know their environment and potentially prevent consequences, saving lives and time and enabling a more sustainable community lifestyle based on communication. From the workshops it was evident that the community tends to trust the knowledge and experience of its members to make decisions in cases of extreme natural events as a consequence of the ties of constant collaboration within the community over time, which contributes to strengthening community trust. The contribution of community members regarding information before, during, and after a bushfire is relevant since they are the ones who best know the environment, resources, infrastructure, and people within the community.

The entries in Bushwire illustrate how the participants perceived changes in nature and how the participants shared their experiences with their peers. Their early posts (Figure 7a) open up an opportunity for the participants to talk to each other:

> Diana: Hi Gail, is [the flooding] near our front gate?
>
> Gail: Just north of your gate.

Similar to the previous example, reports like these tend to be a simple way for participants to reflect on changes in nature, additionally providing insights about the local environment and the status of the roads before it rains. "Rain" (see Figure 7b) is a good example, posted by Diana, who explains how "Rain is welcome for the tanks and the garden. Thankfully we could still walk this morning and only got a little bit damp!"

Bushfire awareness is a major topic addressed by the participants in the Bushwire prototype. It can be categorised as a contribution to sustainability through shared knowledge. Bushfire in paradise (see Figure 7c)

Figure 7. Flooding on a local road (a), rain (b), and Bushfire in paradise (c). Notes: (a) posted by Gail on 26–10-2023, (b) posted by Diana on 14–11–2023, (c) posted by Hilary on 24–10-2023.

is a video about the aftermath of a bushfire which includes a comment as a reminder to be cautious in our interactions with nature: "This bushfire in Loch Sport is a reminder to put out your campfire!"

5.4. SDG 13: Climate Action

There is an awareness about climate change reflected in the posts, not only as comments, but also as a topic that must be considered and actively addressed by the members of the community. Bushwire played a role as a repository of these impressions by the participants. The season is changing, and the participants know from experience that it brings changes to flora and fauna in "Frog Pond" (see Figure 8a). Gail explains how "it is already drying up. Should be full this time of year. Makes me sad and worried about the impacts of climate change 😢."

The members of the community contribute with knowledge and experience to build a database that works in three areas. First, a testimony of a moment in the community's life; second as a repository of the knowledge of the community regarding changes, in flora and fauna; and third, as a source of information about conservation and sustainability. The fact that this information can be shared is important to the community members since it allows the user to generate a sense of community, connected by common interests. Comments, observations, the possibility of generating a personal database with the discoveries, and particularly the identification of specimens by other users represent an exercise in connectivity that reinforces the sense of community, even when its members are geographically in another place.

5.5. SDG 15: Life on Land

Evidenced in the entries available in Bushwire, the participants demonstrate a sense of belonging not only to the region but also to the entire ecosystem itself and that fact has a deep and lasting effect on the life of the members of the community. Gail explains: "I love living here because, I'm surrounded by the things I love, and wildlife and flora and I feel the need to protect it forever."

The members of rural communities cultivate enduring bonds of trust and collaboration. They draw upon their personal and professional backgrounds to enrich the collective understanding of their environment. Tony explains that the geographical location is relevant for him due to the distance from the urban centre: "It kind of enhances my ability to enjoy wildlife and the bush." During the evaluation of Bushwire, Gail elaborated on this idea by adding: "You live your life here, that makes me feel as if I'm part of nature."

However, not everyone within the local area is considered by the participants to be part of the community. For instance, local people who do not reside within the area, such as those in short-stay accommodation, are not viewed as part of the community. Gail noted they may not consider visitors as part of the community. She provides an example of sporadic visitors who frequently use Airbnb (short-stay rentals) when they visit the area:

> I don't know whether they feel as if they belong to a community because they're renting out these little Airbnbs. Is it everyone who physically lives in Kangaroo Hills, or is it just the people who actually interact with each other?

Further, the participants view the community as being limited to like-minded individuals, and therefore do not include, for example, property developers who are regarded as not being in harmony with nature, and potentially negatively impacting the local environment. This has implications for urban planning. It is evident that these participants view their local environment, the "Bush," as being separate or different to urban settings. They view property developers, and potentially urban planners, as having a limited understanding of the bush and its climate change messages. Further, their activities such as building and planning developments not in keeping with the bush are viewed with suspicion and seen as negatively impacting local fauna, flora, and the community.

Bushwire is viewed by the participants as an opportunity for the community members to contribute to the good practices in the area they coexist in. In Annie's post (see Figure 8b) she explains by giving an example of "making sure the build-up of leaves doesn't create a fire hazard." This is a clear example of the community leaving knowledge for posterity and at the same time a testimony of a specific moment in a significant place for the community which reinforces the need to care about the local environment.

Figure 8. Awareness about nature surroundings from two different perspectives: Frog pond (a); "Making sure the build-up of leaves doesn't create a fire hazard" (b). Notes: (a) posted by Gail on 15–11-2023, (b) posted by Annie on 14–12–2023.

5.6. SDG 17: Partnerships for the Goals, to Address Bushfire Awareness and Response

The fact that the participants consider the environment as another member of the community is relevant since the information obtained from the environment has the potential to be used as a reference point for decision-making in preparing for, and responding to, extreme natural events. This could be interpreted as nature bringing its own knowledge as a valuable input to be considered when the community takes long-term decisions, such as seasonal controlled burning programs, the creation of parks and reserves, and

the selection of crop types. It is at this point that the rural community can start a resilient dialogue with nature, and with other key stakeholders such as local government, to inform policy. Dart (2018, p.7) suggests that place-based partnership is "a collaborative, long-term approach to build thriving communities delivered in a defined geographic location. The approach is ideally characterised by partnering and shared design shared stewardship, and shared accountability for outcomes and impacts." Thus, this represents an opportunity to develop a relationship between nature, local residents, local government, policymakers, and others that transcends individual and community transactions to become an interaction mutually beneficial for all in response to the SDGs call for action.

Direct communication among the members of the community strengthens the bonds between them and the environment where there are values of collaboration and empathy. Annie expanded on this comment during the workshop: "I think one of the positive things of the community is that there's a lot of shared values." Common phrasing from the participants, for example, "love living here in the bush," "calm and comfortable," "privileged," "unique simple lifestyle," and "community," reflect how the participants perceive their environment and the commitment to constantly care for it, which in the case of Bushwire includes knowledge contributions.

Bushwire's interactive features served two purposes. First, participants used the platform to collect, capture, and share their own individual data (images, videos, and text) anytime and in any location that had internet connectivity. Secondly, as part of a collaboration, Bushwire allows members to comment on and engage with each other's contributions, enhancing the sense of community ownership and participation. The Frog Pond (see Figure 8a) shows an example of this interactivity and concern about climate change as Gail commented "I'm sad—and worried about the impact of climate change too! Anything we do now to remedy the situation, will take decades to take effect!"

The workshop participants valued the role of Bushwire as a facilitator for knowledge preservation concerning nature and the immediate environment and therefore nurtured a culture of resilience around that knowledge. There was a deep understanding that the local ecosystem reflects on a small-scale global problem. Gail wondered about the large-scale challenges of the planet in a concrete way. She is part of a climate action group that evolved from people who had experienced and survived bushfires with the aim of creating awareness and the need for climate action. She not only has given interviews to the media but has undertaken several trips to the Australian capital, Canberra, to speak to federal politicians. Her actions show that people living in rural areas can have an impact and visibility that reaches far beyond local rural concerns to building national partnerships from the bottom up.

The participants refer to the environment as another member of the community, with which they can empathise, listen to, and obtain information. Through the entries written in their journals and captured on the digital platform Bushwire, we can observe that the participants know and perceive the changes in their local environment effectively. Further, the participants trust these messages derived not only from their own experiences and relationships with the bush, but also read and respond to messages from the bush itself.

6. Conclusion

Building community resilience is gaining attention in the rural HCI field, as we need to ensure that those who are vulnerable to natural disasters, harness their digital and non-digital resources to prepare for and

respond to them even in the absence of formal government assistance. This case study shows how in one small rural community, community members harness digital and non-digital hybridity to co-design an early bushfire warning system to meet their needs. We outline a case study of a rural Australian bush-fire-impacted community. The workshop participants co-designed and merged two solutions: The Fire Tree and the People system. The final solution was a co-designed web-based citizen-science platform, Bushwire, that participants used to capture, share, and reflect upon local knowledge, alongside messages from the bush, to prepare for bushfire threats. This point is particularly relevant since it involves the active participation of members of a community in the development of an outcome that includes identity and local knowledge. As Herodotou et al. (2024, p. 68) explain, "the term citizen science has been used to denote the inclusion of the general public or non-professionals or volunteers in research practices and the production of scientific knowledge."

This case study explored how a co-designed digital platform such as Bushwire can respond to the UN SDGs. Specifically, Bushwire seeks to build sustainable communities (SDG11), through local citizen science climate action (SDG13) for this rural Australian bush-fire-prone community. Thus, it also seeks to harmonise life on land (SDG15) through multi-stakeholder partnerships (SDG17), including between local residents (both human and non-human) and policymakers.

As discussed in Section 5, the SDGs are relevant for the development of sustainable resilience practices and policies in rural communities. This is particularly the case in communities such as Kangaroo Hills, which are prone to natural disasters, or more heavily impacted by climate change. A good example of this relationship is the need for connectivity and appropriate use of digital technology in preparing for and responding to extreme natural events. While rural communities are often perceived as rustic or disadvantaged, the findings from this case study demonstrate that the members of rural communities adapt and embrace digital technology flexibly when it is relevant to their needs and wants, and when it is culturally and contextually embedded. The participants in this case study harnessed community practice that involved a good understanding of technologies and a deep knowledge of the local environment. This can be observed in how naturally they expressed knowledge regarding bushfire risk mitigation, land care, and in the interest they manifested in their public spaces, including the local flora and fauna, particularly as found on their own properties including cultivated land and native bush.

These two elements (familiarity with the use of technologies and knowledge about the local environment and weather) are actively present in rural communities, and they represent an opportunity for governments to co-design and work with local rural communities to develop policies that more deeply resonate with, and respond to, the needs of these communities. We suggest that despite the complexity of SDGs it is important to encourage and support individuals' and communities' contribution. This case study has shown the relevance of local rural knowledge in reflecting and being actively involved in contributing to a range of SDGs. It is easy to imagine that such efforts could be scaled up—in particular, if similar tools to Bushwire are made available to urban environments for mutual exchange and learning. Urban planners should acknowledge the importance of citizens' relationship with nature through citizen-science and other creative embedded activities. These citizen-science activities and the harnessing, sharing, and reflecting on local knowledge through digital technology provide opportunities to embrace and sustain pockets of flora and fauna beyond the bush, in urban communities and cities. We imagine a world in which urban environments and cities recognise and respond to messages from the bush itself, and the communities that reside within them.

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Conflict of Interests

The authors declare no conflict of interests.

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Urban Beekeepers and Local Councils in Aotearoa, New Zealand: Honeybees Are Valuable Allies in Achieving the Sustainable Development Goals

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Abstract

Beekeeping is a popular hobby, and urban beekeepers make up the largest number of beekeepers in Aotearoa, New Zealand. The ease of purchasing beehives, together with New Zealanders' positive attitude toward honeybees, has meant that hobbyist beekeeper numbers have steadily increased since 2012. The impact of the increasing numbers of urban beehives has meant Aotearoa, New Zealand's local councils have been forced to deal with honeybees and, ultimately, with urban beekeepers. This has, in some instances, led to nonsensical bylaws that the urban beekeepers have largely ignored. However, this article will demonstrate that local councils and, by inference, urban planners should take an alternative approach to urban beekeeping only because urban beekeeping leads to better sustainability outcomes. This article will show how urban beehives and beekeeping link well to the Sustainable Development Goals and provide local councils and urban planners with justifications to engage with urban beekeepers. Finally, this article states that local councils should stop treating honeybees as farm livestock and instead treat them as valuable pollinators and the indicator species that they are.

Keywords

beekeeping and SDGs; councils and honeybees; honeybees and SDGs; urban beekeeping; urban planners and honeybees

1. Introduction

In Aotearoa, New Zealand (AoNZ), beekeeping is a popular hobby even though the number of beehives has declined in recent years (a loss of over 300,000 beehives since 2019). The decline in beehives is largely related to commercial operations that have faced poor honey production due to extreme weather events (Ministry for Primary Industries, 2023; Staff Reporters, 2023). However, where commercial operations are largely found in rural AoNZ, hobbyist beekeepers are mainly found in urban settings. Consequently, it is not uncommon to find beehives in back gardens, on the rooftops of high-rise buildings, and in schools.

Moreover, like many countries in the world, AoNZ recognises the importance of the European honeybee (*Apis mellifera*) for its pollination and impact on food production (both managed and wild ecosystems; Newstrom-Lloyd, 2013). Consequently, the ease of purchasing honeybees, together with the general positive attitude that New Zealanders have toward honeybees because of their benefits on pollination and honey production, has resulted in a steady increase in hobbyist beekeepers across the country.

However, this has resulted in local governments, especially those in urban areas (like cities), being forced to deal with honeybees (this article is limited to the European Honeybee which is kept in beehives). This has led to local government bodies, especially district councils, across AoNZ passing bylaws, which have tried to restrict beehives and, as a result, restrict urban beekeepers. Yet there are good reasons why AoNZ councils should encourage urban beekeeping and that urban planners should be motivated to include beekeeping in their plans. Therefore, this article will provide examples of how urban beekeeping is linked to specific sustainable development goals (SDGs). It will also discuss the challenges faced by urban beekeepers. Finally, it will provide justifications for local district councils to engage with urban beekeepers and why they should treat honeybees as the valuable pollinators and indicator species they are.

The following section discusses the role of local council authorities and urban planners and how they relate to SDGs. So, while it is argued that urban beekeepers can play an important role in helping local councils achieve their SDGs, sustainability reporting (including environmental sustainability reporting) is considered by most as a risk as well as an opportunity (Othman et al., 2017).

2. AoNZ Local Governments, Urban Planners, and SDGs

AoNZ has 11 regional councils and 67 territorial authorities—together, they share the environmental and public infrastructure (development and repairs) for the regions they are responsible for (Local Government Commission, 2024). With the increasing number of hobbyist beekeepers in urban areas, the local councils have faced increasing concerns about honeybees. Moreover, the public's perception (those who are not beekeepers) of honeybees' trend towards fear and anxiety is exacerbated by social media. For example, in Auckland's suburb of Ponsonby, it was reported in the media that "thousands of bees swarmed the skies" (Doyle, 2023) while on X (Twitter) it was reported that "the bees are angry and have taken to the streets in huge numbers" (Morgandonoghue, 2023). In a submission to the Waipa Regional Council, a member of the public claimed swarming bees attacked them. Not surprisingly, swarming honeybees are notably newsworthy and not always in a positive way. As a result, many councils have introduced bylaws or made bylaw changes to manage honeybees (beehives) in their regions.

Nevertheless, there are some very good reasons to have urban beehives and to encourage urban beekeeping. Where in other countries urban populations are declining, this is not the case for AoNZ (Ministry for the Environment, 2010). Furthermore, the central role played by local councils in delivering a quality urban environment for its constituents is critical, and therefore, the role of urban planners is an important driver in this space (Croucher, 2024). When urban planners intentionally approach biodiversity in urban spaces, cities can become specialised pollinator spaces.

This shifts urban planning beyond the traditional focus on human populations and integrates nonhuman inhabitants (Singleton, 2023). It is noted that this approach to urban spaces is not new. A broad spectrum of parties, such as international organisations, academics, scientists and the public, has advocated for nature-inclusive cities (also known as nature-based solutions). Examples include the framework developed by the IUCN (Gionfra et al., 2023) or the seven "lamps" framework (principles) developed by Parris et al. in 2018 (Parris et al., 2018). There is a clear call for a paradigm shift from urban planners because urban spaces offer an opportunity to advance sustainability development goals (Nilon et al., 2017).

3. Sustainability Reporting by Local Councils

Unsurprisingly, AoNZ councils are increasingly being challenged by sustainability issues, yet councils are closer to their communities and can be more effective in promoting local sustainability (Kaur & Lodhia, 2019). It is well-recognised that councils have the power to influence and change the behaviour of their constituents when bylaws and policy decisions are made (Othman et al., 2017). However, when it comes to sustainability reporting, the disclosures made by AoNZ councils tend to be minimal (Schneider et al., 2014). Furthermore, the reports almost always fail to incorporate the basic principles of the sustainability development goals (Hossain, 2018).

In other countries, such as the United Kingdom, for example, the Local Government Association has guided the councils on how to engage, implement and report on their progress towards SDGs (Local Government Association, 2024). However, this is not the case in AoNZ. Instead, there appears to be a hybrid model that combines environmental reporting (as required by the Environmental Reporting Act [2015]) and the guidelines provided by the Global Reporting Initiative (GRI). Where the Environmental Reporting Act requires councils to report on the state of the natural resources (including, air, fresh water, land, marine, atmosphere, and climate), the GRI covers performance-related biodiversity, environmental compliance, and anything relevant to their region's impacts. Consequently, the AoNZ councils will produce reports that are simply called *Sustainability Reports*. In addition, the AoNZ councils will use their own terminologies, selected content and the extent to which they will report, so consequently, the disclosures across the AoNZ councils are not comparable (Othman et al., 2017). From this perspective, it is apparent that the AoNZ councils are tailoring their sustainability reporting to meet their strategic priorities and service delivery imperatives (Thomson et al., 2014). Consequently, there is little evidence directly linking AoNZ council sustainability reports to the SDGs.

This is a missed opportunity by AoNZ local councils and urban planners because, firstly, sustainability publications by local councils improve their relationships with their constituents (Alcaraz-Quiles et al., 2014). Secondly, the literature has established that urban planning that includes SDGs propels local councils towards better and improved sustainable reporting practices (Hossain, 2018).

From this perspective, urban beekeeping should be encouraged because it is a practice that aligns well with the SDGs. Moreover, hobbyist beekeepers can contribute substantially to helping the councils meet their SDGs. With this in mind, the following section illustrates how urban beekeeping practices are linked to specific SDGs by providing practical examples.

4. Urban Beekeeping Meets Many SDGs

Hobbyist beekeepers are individuals with 50 or fewer beehives and are considered recreational beekeepers. However, urban hobbyist beekeepers are more likely to manage less than five beehives on their properties. In 2023, there were 920 registered commercial beekeepers, while in comparison, there were 6,868 registered hobbyist beekeepers (Ministry for Primary Industries, 2023). In fact, the number of hobbyist beekeepers has steadily increased since 2012 (there were 2,463 registered beekeepers) despite a slight drop from 2022 to 2023 (191 beekeepers de-registered). The implications of increasing hobbyist beekeepers are important for a number of SDGs but, more importantly, for councils.

4.1. SDG 1: No Poverty, SDG 4: Quality Education, SDG 8: Decent Work and Economic Growth, SDG 9: Industry Innovation and Infrastructure

With the rise in urban beekeepers, there is also an increased need for beekeeping supplies. Consequently, beekeeping suppliers can now be found across the country, in retail stores (such as Ceracell, Ecrotek, and NZ Beeswax), also online (such as Beequip), and in sections of established businesses (such as Farmlands Co-operative). Hobbyist beekeepers have been vital in driving the growth and expansion of beekeeping suppliers while at the same time becoming an important market for the suppliers.

This expansion of bee suppliers is notably significant because, in the early 2000s, there were only two main beekeeping suppliers in the AoNZ—one in the North Island (Ceracell Beekeeping Supplies Ltd) and the other in the South Island (Ecroyd Beekeeping Supplies Ltd). While there is little research in this area, a Google search for “beekeeping supplies NZ” revealed eight pages of results.

Moreover, while it is generally accepted that the commercial apiculture industry has not had the technological advances of other agriculture industries (Fels et al., 2019), significant research has been conducted and developments have been made in the hobbyist beekeeping space. The most notable would be the flow hive, which was initially developed for commercial beekeepers but has been taken up solely by hobbyist beekeepers (The Bush Bee Man, 2022). Regardless, ergonomic beehive design that focuses not only on the health and the welfare of the bees but also on the health and welfare of the beekeeper is an area of research and development undergoing significant changes (Fels et al., 2019). There are specialist beekeeping suppliers, such as those supporting organic beekeeping, heritage hives, and digital beehives (Foth et al., 2016). This area could benefit from further research; undoubtedly, the beekeeping supplier industry has grown significantly and is a significant employer nationwide.

Furthermore, a hobbyist beekeeper makes a substantial investment in beekeeping equipment (without the bees)—the set-up cost of a single hive is usually more than NZ$350. These costs increase as the hobbyist gains more experience and more hives; moreover, hobbyist beekeepers are deterred from purchasing second-hand equipment because of the bee disease American Foul Brood which can contaminate beehive

equipment. So they are constantly replenishing or expanding their stocks from beekeeping suppliers. Also, there are additional costs the hobbyist beekeepers must source from beekeeping suppliers, such as varroa mite treatments (varroa mite is a beehive pest) and bee nutritional products. Thus, hobbyist beekeepers are an important economic source for the beekeeping supplier industry but also for all its associated industries.

While the commercial honey markets have declined in recent years, AoNZ's commercial apiculture industry continues to grow, with demand for AoNZ's hive products in six different countries increasing (New Zealand Trade and Enterprise, 2023). Thus, despite the current honey price slump (2023), the demand for skilled commercial beekeepers remains an issue for AoNZ's commercial beekeepers. Commercial beekeeping employers report that experienced beekeepers are difficult to recruit, and consequently, skilled beekeepers appear on AoNZ's immigration regional skill shortage list. However, free apiculture courses have helped to attract beekeepers to the commercial apiculture industry to support commercial entities. The AoNZ government has provided fees-free beekeeping courses for many years through industry training organisations (e.g., Land Based Training) or polytechnics (e.g., Otago Polytechnic). Moreover, the students attending these courses tend to be mainly hobbyist beekeepers who want to transition into the commercial side of the apiculture industry. Thus, hobbyist beekeepers are an important resource for the education sector and for recruiting employees into the apiculture industry.

4.2. SDG 2: Zero Hunger, SDG 3: Good Health and Well-Being, SDG 11: Sustainable Cities and Communities, SDG 12: Responsible Consumption and Production

Private urban green spaces such as gardens and allotments constitute a significant portion of total green spaces in AoNZ cities (Blaschke et al., 2017). For generations, the food system for New Zealanders was based mainly around backyard gardens with a focus on growing their own edible fruit and vegetables. However, with the rise of supermarkets, fast food chains, and large agribusinesses controlling food systems, many people have become disconnected from food sources. Urban beekeeping not only creates communities and brings people back to nature but also connects a community to a food source through honey production and hive products (like propolis and beeswax).

Despite the government policy towards boosting urban density to address AoNZ's housing shortage (Ministry of Housing and Urban Development, 2024), the ethic of being self-sufficient remains. More importantly, urban food production offers many economic and environmental gains, and urban gardens are considered by many to be the beginning of their sustainability journey. Paris was one of the first cities to introduce city beehives (in the 1980s), and France was one of the first countries to recognise urban beekeeping as an industry. However, for many councils, beehives are treated as farm livestock; thus, bylaws are created to restrict or ban the keeping of bees. Cities in the USA are examples of this, including New York City. Los Angeles and Boston, however, have changed their positions and now encourage beekeeping since it was realised bee activists were ignoring the bylaws which banned urban beekeeping.

The livestock classification is predicated on the fact that the honeybees are managed (kept in beehives) and they have commercial value by delivering pollination services in agricultural settings (Geldmann & González-Varo, 2018). This is particularly relevant for AoNZ, where pollination services are vital for food production and exports (Newstrom-Lloyd, 2013). Moreover, as honeybees produce food that enters into the human food chain (including honey, pollen, and propolis), there is every justification to treat honeybees the same as any other food-producing animal (American Veterinary Medical Association, 2017).

Yet, in developed countries, urban beekeeping has become part of a larger movement to make cities and the buildings within cities greener because beehives are quickly being recognised for their role as pollinators not just in rural agricultural settings but across all environmental settings. Thus, proper pollination is imperative for the successful production of fruits and vegetables in urban settings, reiterating that honeybees undertake most pollination.

Unfortunately, there is not much research on pollination outside commercial pollination in AoNZ (Newstrom-Lloyd, 2013). Regardless, urban pollination also benefits AoNZ's native insect population and other domesticated and wild animals (like birds and bats) and underpins wild plant production. Honeybees are considered the canary in the coal mine for ecosystem health, or not (Geldmann & González-Varo, 2018). For example, long-tailed bats that were once widespread throughout AoNZ are endangered. Hamilton City, which has a high population of urban beekeepers, is also one of the only cities in AoNZ which has a resident population of long-tailed bats (Waikato Regional Council, 2024). Moreover, the health benefits of private and public green spaces are well-documented and include but are not limited to reducing stress, depression, and anxiety; increasing quality of life; providing a sense of community; positively impacting cognitive function for the elderly; and, finally, increasing commitment to sustainable food sources (Wall Kimmer, 2015).

In countries like the United Kingdom, urban beekeeping has been used as a therapeutic education tool to support refugees (for example, see Ruskin Mill College) and students with disabilities. From this perspective, urban beekeeping creates community-building activities, supports individuals with tacit learning skills and promotes environmental sustainability. It makes sense that the integration of beehives in an urban setting not only adds to the well-being of those who learn/undertake beekeeping, but a single beehive will pollinate flowers up to three kilometres away. Therefore, even if the gardener does not own a beehive, they reap the benefits of having a neighbour who does. Consequently, there is an increasing public tolerance towards beehives as more people recognise the importance of bees not only as a source of food (honey) but also as important pollinators.

The fact that beehives boost crop production in urban areas and encourage urban communities to protect their ecosystems so that pollinators, including honeybees, thrive is well established in the literature. From this perspective, many New Zealanders are trying to reconnect with nature, which has also led to an unprecedented growth in beekeeping clubs. It is a hobby that brings with it personal enjoyment, but membership in beekeeping clubs provides intellectual stimulation (for example, the use of guest speakers such as Dr Mark Goodwin, a New Zealand apiculture scientist, or international guest speakers such as Randy Oliver, a US apiculture scientist), continued learning (such as practical demonstrations at club evenings), and community involvement (such as doing demonstrations in primary schools with viewing hives or providing presentations in shopping malls on World Bee Day, a global event). Moreover, Apiculture NZ makes a list of all the bee clubs available on their website so that new beekeepers can easily locate a club near where they live or if they want to visit another club in another region (Apiculture New Zealand, 2024). Moreover, bee clubs provide free swarm collection services to their local councils.

Consequently, it is not unusual for beehives to be found in AoNZ's schools where the students are beekeepers (Birkenhead Primary School and St Paul's Collegiate are examples of just a few). Beekeeping is a way to engage students in nature-based learning and to demonstrate a commitment to sustainability. Students can engage more fully in pollinator education and honey-themed events. Furthermore, taking care of bees and harvesting

hive products like honey is not only a way to actively help the environment but also to produce food, as many of the schools also have fruit and vegetable gardens.

The misconception that honeybees are aggressive needs to be addressed by AoNZ councils. Urban beekeeping is a way for communities to learn that honeybees (beehives) are not a threat; people can live in close proximity to honeybees and beehives. It is the swarming of bees (a natural way in which bees will replicate) that causes the most attention (as well as fear and anxiety). A queen bee and thousands of worker bees swarm to find a new place to start a new beehive. Unbeknown to non-beekeepers, swarming bees are unlikely to sting because they have filled their honey stomach/crops before leaving the hive of origin, so they are heavy and bloated. However, if communities are actively engaged with beekeeping and beekeepers, there should be less fear and anxiety about swarms and more appreciation of the human/honeybee interaction.

With this in mind, beehives are also found in public gardens (Hamilton Gardens, for example), on the rooftops of major hotels (Crown Plaza Hotel in Auckland, for example), on public conservation lands, and in national parks (Beard, 2015). In Christchurch, land that is no longer inhabitable for housing due to the liquefaction after the 2011 earthquake has been turned into park areas where beehives can be found. Commercial entities are quicker to acknowledge that having beehives on their roofs qualifies them for different types of sustainability/green certifications (Ministry of Environment, 2024) and want to be recognised as having a positive, sustainable impact.

International non-profit organisations, such as Biophilic Cities, partner with global cities in efforts to make cities more natural and greener, and to increase biodiversity in urban areas. The cities are designed so that city residents can see, feel, and experience a diverse range of animals (including honeybees) and trees during their everyday lives (Ziari et al., 2018). Wellington (AoNZ) appears to be the only city that is a member in AoNZ, and its focus brings AoNZ's natural nature into the city, connecting Wellington residents (Biophilic Cities, 2024).

It is from this perspective that honeybees are considered an indicator species because they reflect the condition of their surroundings and are often the first to be affected by adverse changes to their environment (Barmaz et al., 2010). AoNZ councils are committed to creating greener cities, which means introducing different initiatives to see what works best; unsurprisingly, beehive health is an easy and effective measuring tool for such programmes.

4.3. SDG 13: Climate Action, SDG 15: Life on Land, SDG 17: Partnerships for the Goals

The western honeybee was introduced into colonial New Zealand in 1839 and thrived (James, 2022). Feral honeybee populations can be found in AoNZ's native forests, and Māori (the indigenous people of AoNZ) were considered the first commercial beekeepers as they were selling considerable amounts of honey to the colonial settlers (New Zealand History, 2021). Missionaries, such as Reverend William Cotton, took it upon themselves to teach beekeeping to Māori and encouraged Māori to make up beehives from the swarms. Historical records show that Māori had apiaries (for example, bees were kept on Waiheke Island and continued to be kept there by the local hapū, a sub-tribe, usually a related group of families that sits below an iwi, the prominent tribe; Cotton, 1846). Māori beekeepers have existed since the colonial settlers arrived (New Zealand History, 2021).

More importantly, the Māori worldview links everything to the land and is considered sacred (Asher & Naulls, 1987). The link to the land includes the water and the air above it, and Māori consider themselves kaitiaki (guardians). Consequently, Māori hold significant mātauranga (Māori worldview of knowledge) about AoNZ, which has become more widely recognised because of its sustainable approach to environmental management. Moreover, mātauranga Māori drives an intergenerational view of the environment: that care should be taken with natural resources for the generations that follow. It is this worldview that sets Māori beekeepers apart from traditional beekeepers.

Beekeeping has played an important role in the economic well-being of Māori, which is demonstrated in two ways. Firstly, Māori have also suffered from rural-urban migration, similarly to other indigenous communities around the globe. However, beekeeping has allowed Māori to reconnect with their tribal lands. From this perspective, increasing numbers of Māori are undertaking beekeeping courses and engaging in beekeeping to benefit their families.

More recently, there has been greater recognition of the rich cultural and local knowledge that Māori brings to their beekeeping practices. Climate change and how it is affecting AoNZ illustrate this. In the last few years, AoNZ has experienced extreme weather events: storms, flooding, droughts, fires, and landslides. This was demonstrated when the Auckland region experienced epic flooding, and then two weeks later, Cyclone Gabrielle (February 2023) was estimated to have destroyed more than 5,000 hives in Tai Rāwiti (Radio New Zealand, 2023). Many argue that AoNZ's apiculture industry is ill-equipped to deal with climate change, while others argue that there are greater opportunities to work with Māori to face the challenges of climate change.

The local Māori of the regions affected by the extreme weather events were aware of the flooding and rain events that have hit those regions in the past because Māori are renowned for recording historical weather events in place names (King & Skipper, 2006). Therefore, weather events in a region are easily known because clues from the past are found in the historical oral traditions of Māori (King et al., 2008).

Recent research demonstrates that there should be more integration of traditional meteorology together with Māori historical knowledge of regional weather patterns. For example, Ngāti Porou beekeepers are collaborating with researchers from the University of Auckland to investigate whether they can determine a beehive's health using circadian rhythms (University of Auckland, 2023). In keeping with their worldview and tikanga, Māori beekeepers have shown how beekeeping can be diverse, with clear differences in the purpose and context of beekeeping yet aligning closer to sustainability.

Moreover, modern Māori beekeepers are likely to integrate maramataka (the Māori lunar calendar) when beekeeping, illustrating the close connection they have with their honeybees and how they use their traditional mātauranga to enhance their beekeeping practices (Hurkmans, 2020). Maramataka governs activities related to agriculture (planting/harvesting) and environmental and ecological practices.

While AoNZ councils are no longer mandated to have Māori representatives with the elected government of 2023, there are still clear obligations under the Treaty of Waitangi and Local Government Act. But more than that, when it comes to urban beekeeping, the inclusion of Māori, and specifically Māori beekeepers of the region, brings forward indigenous views and aspirations that cannot be known by others (Tiakiwai et al., 2017).

5. Challenges for Urban Beekeepers

The cities in which we live are as varied as the urban environments in which they sit. Factors that affect urban beekeeping are the population density, availability of green spaces (both public and private), location (coastal areas are quite different from inland regions), and this list is not limited to what is found here. So, while it is acknowledged that one size does not fit all, it is apparent that councils have tried to take this approach when looking at urban beekeeping. So, the following are some of the challenges that urban beekeepers face when working with councils.

5.1. Banning Beehives Does Not Work

Los Angeles banned honeybees and beehives for 136 years, until 2015, when a law change occurred. In the past, cities such as New York, Boston, and even Paris attempted to ban urban beekeeping. The ban on beehives was largely based on the perception that honeybees were dangerous, posing a risk to the public, and that they were considered farm stock, which had no place in urban areas. Honeybees were grouped under the same bylaws as pigs, chickens, and dogs, often referred to by many councils as the "keeping of animals, poultry and bees" bylaw. Regardless, urban beekeepers ignored the bylaws and continued to keep beehives; this was demonstrated in New York City, where honeybees swarmed Madison Avenue every season, even though beehives were banned.

5.2. Council Bylaws Are Often Difficult to Comply With

Unfortunately, there has been no common standard for councils to use when it comes to beehives. Until only recently, Waipa Regional Council required resource consent under the Resource Management Act, a cost of NZ$1,200 per beehive. Unsurprisingly, the bylaw was ignored by hobbyist urban beekeepers who kept beehives regardless. When the bylaw came up for review, the council members went to the local primary school to view their beehives only to find that they were, for all intents and purposes, illegally placed beehives (the beehives did not have resource consent compliance). In 2021, the bylaw was changed, and urban beekeepers in the Waipa Region no longer require resource consent.

However, this has not prevented other district councils from classifying beehives as livestock, and the perceived threat to the public from beehives persists. Consequently, some councils impose specific regulations on beekeeping, such as requiring beehives to be at least 10 metres from any public place (Kapiti Coast District Council), limiting them to a maximum of two within the urban area (Whanganui District Council), requiring council approval for the hive's location (Manawatu District Council), setting a minimum distance of 20 metres from adjoining properties (Wellington City Council), and obtaining neighbour consent before setting up a hive (Porirua City Council). This list is not exhaustive and it is not long before an urban beekeeper realises that most council requirements are difficult to meet, if not impossible. Urban beekeepers are more likely to ignore the bylaws than to follow them if they do not make sense.

5.3. Honeybees Swarm

No matter how good the beekeeper is or how often they attempt to prevent their beehive from swarming, inevitably, at some time, a beehive will swarm. For cities where the public has been encouraged to have

beehives, swarming can be a problem (for example, Ljubljana has a high beehive population in its city, and every year, swarming is an issue). For the general public, it can cause problems such as bee swarms landing on cars, in neighbours' gardens, or on shop windows. AoNZ is not unlike its international counterparts; swarming in urban areas is also a concern as a swarm in a public place like a shopping area or a school can result in safety issues, but swarms have also landed on parked aircraft and the cages at the local zoo as well.

Most councils in AoNZ lack the resources or services to relocate swarms from public places and will only remove swarms from council-owned land, such as the Horowhenua District Council. Furthermore, the AoNZ councils are not above having the swarm exterminated (pest control) if they believe there is a risk to public health and safety. So, regardless of whether the council embraces sustainability rhetoric or urban beekeepers are eager to remove and rehome swarms, they often do not get the opportunity. The AoNZ councils frame the extermination of swarms, in this instance, in terms of public danger and nuisance.

On the other hand, the local bee clubs usually provide a swarm list. Swarms are typically removed at no cost, and urban beekeepers are encouraged to add themselves to the public list. Moreover, many bee suppliers are keen to see the population of beehives increase, so they also offer free advice on swarm collection (see Ecrotek for example).

5.4. Māori Perspectives on Urban Beekeeping Are Not Included

Even though Māori urban beekeepers exist, councils have committed to partnering with Māori, whose voices are largely unheard and lag behind the rest of the population. The exclusion of Māori worldviews (and the exclusion of their cultural imperatives) means their sustainable beekeeping practices are ignored, and more importantly, the contribution of Māori mātauranga towards environmental knowledge could address the challenges of local environmental policies but is never made or asked for. The literature establishes that the contribution of such knowledge supports sustainability practices, especially tacit knowledge of honeybees and beekeeping.

6. The Role of Councils in Urban Beekeeping

Urban beekeeping is practised across all major cities in developing countries with relative success. The success of urban beekeeping is predicated on the councils taking affirmative action and working with urban beekeepers rather than working against them. So, the following are some practical tools that will normalise beehives in urban areas.

6.1. Councils Should Engage With Local Bee Clubs

The hobbyist beekeeping statistics in AoNZ speak clearly: there are a growing number of beekeepers, and these are mainly urban beekeepers. It is from this perspective that communities need to be more involved in the local decision-making around beehives in urban spaces. Councils need to have genuine relationships with local bee clubs so that they can define the issues they face with beehives in urban spaces and determine intelligent solutions. Community engagement is something touted by nearly all councils; however, when the council consults and engages with the local bee clubs, the solutions are more sensible and urban beekeepers will have a stake in bylaw outcomes. As a result, the council will work more closely with the urban beekeepers,

and the urban beekeepers have the opportunity to contribute more positively to their local council. This simple change could change the language of how honeybees and swarms are perceived by the public.

6.2. Honeybees Should Not Be Considered Livestock

While there are good reasons to consider the large commercial apiaries to be holding livestock of bees (up to 40–60 beehives in an apiary), this is not the case for beehives in urban spaces. In contrast, the apiary of an urban beekeeper will generally contain two or maybe three beehives in their urban section. There is no comparison. The purpose of urban beekeepers is significantly different from that of a commercial beekeeper. Often, an urban beekeeper will keep bees for the pollination services they provide as well as the honey they produce. Therefore, their beehives meet the environmental needs of urban ecosystems by improving the yields of edible fruits and vegetables grown by many backyard gardeners.

For this reason alone, council bylaws need to reflect the domesticated perspective of urban beekeeping rather than the commercial perspective. Furthermore, urban green spaces are essential for the physical and social well-being of communities, yet they cannot thrive without pollinators—particularly honeybees from urban beehives, which play a central role. This change would result in a significant shift in how councils and urban planners perceive beehives in urban spaces. The focus would shift to encouraging urban beekeeping rather than trying to restrain and limit it.

6.3. Urban Beekeeping Aligns Well With the SDGs

Councils in AoNZ are expected to communicate with their constituents about their performance in meeting their sustainability targets. To date, it is evident that all councils are producing some form of sustainability report and most AoNZ stick to the same local authority agendas of the past, which does not allow local councils to truly integrate the SDGs into their sustainability strategies. Moreover, few, if any, are including the integration of urban beekeeping as part of their SDG targets.

The SDGs offer local councils the opportunity to create functional green urban spaces for their communities; however, the needs of urban beekeepers should not be ignored. This article has demonstrated that urban beekeeping aligns well with many of the SDGs, and therefore, local AoNZ councils must not only take more action on how honeybees are perceived in an urban setting but also on how the keeping of bees in an urban setting can transform lives. This shift would allow urban beekeeping to flourish and encourage economic growth and employment opportunities. Moreover, communities would be encouraged to use green spaces—whether public, like parks, or private, like gardens—ultimately improving community health and well-being.

6.4. Māori Need to Be Included in the Decision-Making

Māori beekeepers bring a richness of mātauranga knowledge to the apiculture industry, and the commercial apiculture industry already recognises this. In addition, although researchers and universities are increasingly interested in the contributions of Māori beekeepers, local AoNZ councils do not seem to share this interest.

It seems counterintuitive that local councils would not also tap into this knowledge by including Māori urban beekeepers in their decision-making. The Māori view beekeeping as reconnecting with the land and creating

intergenerational employment, a significantly different purpose and context than traditional urban beekeepers. Therefore, local councils should provide support and encouragement for Māori urban beekeepers to achieve those ends.

7. Conclusion

This article has discussed the role of local councils and urban planners and the part they can play in urban beekeeping. Urban beekeeping links well to the SDGs, yet few local councils in AoNZ engage with urban beekeepers outside of addressing honeybees as a nuisance and a danger to public health and safety.

This article revealed that urban beekeepers play an important role in providing community engagement through clubs and education, greening urban spaces (public and private), and encouraging community health and wellbeing, but AoNZ local councils largely ignore this. Urban beekeepers have witnessed growth in the bee supply sector, along with increased interest in beekeeping education. Furthermore, this article reveals that Māori urban beekeepers have much to contribute to sustainability conversations in both climate change and the local knowledge of regions, but Māori knowledge is currently being overlooked.

Finally, this article encourages AoNZ local councils to collaborate with urban beekeepers to create a more just outcome for urban beekeeping. Urban beekeepers are the most affected by some of the most draconian bylaws, so they should also be heard.

Conflict of Interests

The author declares no conflict of interests.

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Co-Designing Urban Interventions Through the Lens of SDGs: Insights From the IN-HABIT Project in Nitra, Slovakia

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Abstract

Collaborative efforts and vertical and horizontal cooperation of stakeholders representing diverse interests are crucial for the effective achievement of the UN Sustainable Development Goals (SDGs). In urban planning practice, however, coordination of more technocratic and bureaucratic top-down processes and community-driven bottom-up efforts encounters many, sometimes seemingly insurmountable obstacles. The Horizon 2020 IN-HABIT project, implemented in four European cities, brings together universities, the local public sector, and non-governmental partners to co-design, co-deploy, and co-manage integrated solutions, combining technological, nature-based, cultural, and social innovations to promote inclusive health and wellbeing. This article focuses on the participatory co-design process of innovative interventions in the Nitra pilot, utilizing mixed methods—questionnaire surveys and stakeholder interviews—to evaluate the contribution to select SDGs perceived by three groups of stakeholders: process facilitators, experts, and policymakers; urban planners; and target groups. The findings suggest that the co-design process generally contributed to community engagement, strengthened partnerships, and enhanced the inclusiveness of public spaces. However, differences emerged in how stakeholders perceived these contributions, with target group representatives being more optimistic than the remaining participants. The article concludes with implications for urban planners and policymakers in making participatory processes more inclusive and effective for achieving sustainable urban development goals, e.g., incorporating capacity-building and educational aspects into the process or introducing innovative co-design methods like participatory site-specific art residencies or other methods involving direct implementation of co-designed solutions.

Keywords

co-design; inclusive public spaces; public–private–people partnership; sustainable development goals

1. Introduction

The 2030 Agenda for Sustainable Development, adopted in 2015 with 17 Sustainable Development Goals (SDGs), delivered a standalone goal toward urban sustainability (SDG 11): "to make cities and human settlements inclusive, safe, resilient, and sustainable" (UN, 2015). Thus, it reflects the adoption of sustainability goals when designing urban buildings, public spaces, landscapes, transport, etc. (Carmona, 2021). In line with the New Urban Agenda (Tavares et al., 2024), participatory design of urban projects brings diverse opportunities for urban communities. First, it strengthens the tendencies of the local community to participate in efforts to address urban development challenges (Newell & Picketts, 2020). Second, active communities or individuals take the role of initiators of innovative urban solutions (Seyfang & Smith, 2007). However, more diverse stakeholders must be recognized and included in the planning process to support inclusive life in local communities (Katrini, 2018). Co-design as a process and method can potentially represent a tool to ensure the sustainability and inclusiveness of urban design project outcomes (Angelidou et al., 2021). Ansell et al. (2022) introduce several empirical examples of how different co-creation and co-design approaches can be a sound strategy for translating SDGs into local contexts.

Although the scientific literature does include studies focused on evaluating the contribution of urban design projects to the SDGs on the local level (Acharya et al., 2020; Faivre et al., 2017), through bibliometric analysis, Avila-Garzon and Bacca-Acosta (2024) found that only 2 percent of studies on co-design and co-creation directly involved the topic of sustainability. Within those, the impacts of urban design projects related to building green, inclusive public spaces on localized SDGs were one of the topics discussed (Bambó Naya et al., 2023). However, there is still relatively limited scientific debate on comparing the often-conflicting perceptions of various actors involved in the co-design process, such as researchers, facilitators, urban planners, lecturers, and participants. At the same time, it would be beneficial to compare how the degree of involvement in the co-design process shapes participants' attitudes toward its outcomes (Enserink et al., 2023).

The article aims to evaluate the contribution of the Horizon 2020 innovation action project IN-HABIT—implemented in four European cities (Cordoba, Spain; Riga, Latvia; Lucca, Italy; and Nitra, Slovakia) in the 2020–2025 period—to select SDGs at the local level, specifically focusing on Nitra's case and the subjective perception of local stakeholders regarding the contribution of the implemented co-design approach through specific targets. The IN-HABIT (INclusive Health And wellBeing In small and medium size ciTies) project leverages underutilized resources to enhance wellbeing through testing and experimenting with innovative hard and soft solutions, combining technological, nature-based, cultural, and social innovations to promote inclusive health and wellbeing with a focus on gender equality and diversity. Co-creating these solutions consists of co-design, co-deployment, and co-management with the involvement of local institutional and individual stakeholders. In each city, the spatial scale, challenges, and target groups the project seeks to address are different. In Cordoba, IN-HABIT focuses on renaturalizing a marginalized neighborhood with hard solutions concentrated in the public spaces of the neighborhood and the entire population considered vulnerable (Mac Fadden et al., 2024). In Riga, solutions are concentrated in and around a single building (a marketplace), while the target group is the entire surrounding neighborhood. The Lucca pilot seeks to build a hum-animal city, with infrastructural solutions coupled with pet services primarily targeting the elderly and people with mobility challenges (Granai et al., 2022). In Nitra, the pilot area consists of public and semi-public spaces, with interventions aiming to boost healthy lifestyles, social inclusion, and green public space accessibility in general and specifically for vulnerable groups like ethnic minorities and refugees.

The choice of the UN SDGs as an evaluation framework to achieve this aim was informed by several key considerations. Firstly, it aims to contribute to the growing literature showcasing how the co-design and co-creation approaches contribute to delivering SDG targets locally (Ansell et al., 2022). Secondly, it addresses the need to develop and validate frameworks for monitoring and managing the co-design processes, considering sustainability dimensions (Avila-Garzon & Bacca-Acosta, 2024). The need for triangulation between the SDGs, co-design, and the co-creation process as a methodology and specifically nature-based solutions (NbS), which are the cornerstone of interventions in the Nitra pilot, was highlighted by Mahmoud et al. (2022). The authors argue that utilizing SDGs as a basis for measuring the outcomes would, among others, increase the addressability of urban intervention projects. Finally, there is also a pragmatic reason for considering SDGs as an evaluation framework—the IN-HABIT project grant agreement lists specific SDGs and the expected contribution of the project's actions, making it a contractual obligation towards the European Commission. This aspect also informed the selection of SDGs and specific targets to be included in the evaluation framework. While also considering the importance of different stakeholders' perceptions of the co-design outcomes highlighted by Enserink et al. (2023), three research questions were put forward that this study seeks to find answers to:

> Q1: According to the local stakeholders involved, which relevant SDGs did the co-design process in the Nitra IN-HABIT pilot contribute to?
>
> Q2: Does the involvement in specific co-design activities influence the stakeholders' perception of the contribution of the process to relevant SDGs?
>
> Q3: Do stakeholders' perceptions of the co-design process contributions to relevant SDGs differ across different stakeholder groups?

2. Literature Review

One of the most significant re-conceptualizations of procedural urban planning theories (Yiftachel, 1989) within the last decades of the 20th century was triggered by the development of participatory and deliberative democracy (Sanoff, 2011). The emerging participatory theories of urban development criticized planning paradigms that promoted a top-down, ethnocentric, and paternalistic view of development (Waisbord, 2018). These emerging participative approaches were strongly defined against a rationalistic approach to planning that relied exclusively on the opinions of experts or policymakers (Fainstein, 2010). Evolution of participatory local development planning and participatory urban design is closely related (Forester, 1999; Sanoff, 1999). The democratic and inclusive, people-centered concepts of local development planning (Martínez, 2011) evolved in the context of endogenous and neo-endogenous theories of spatial development (Sisto et al., 2018), alongside the processes of governance decentralization and the adoption of bottom-up principles of planning, offering collaborative solutions for complex socio-economic and environmental challenges caused by the speed of the urbanization process (Innes & Booher, 2004).

Participatory decision-making based on "communicative rationality" gained importance also in landscape planning and urban design (Selman, 2004). Urban design projects can be defined as specific interventions for concrete urban site scales like an urban block, broader public space, or specific objects within such sites (Oosterlynck et al., 2011). It means that urban design projects can focus only on a limited number of

needs and functions, as the implementation of projects takes place in a limited area and affects only a particular part of local stakeholders (Bafarasat, 2023). Participatory design is an approach that is more process-oriented rather than guided by specific aesthetics (Lee, 2008). In this context, Roe and Rowe (2007) noted that a part of the landscape architect's role is to become a facilitator and build consensus among those who make decisions and those who are affected by them.

Collaborative approaches involving multiple actors in the urban design process aiming to improve the solutions of urban design projects are often referred to as the approaches of "co-design." Co-design approaches contribute to enhancing the legitimacy and context-specificity of solutions, promoting inclusion within affected communities, and supporting the sustainability, resilience, and innovativeness of urban design outcomes (Basnou et al., 2020; Gaete Cruz et al., 2022; Hansen et al., 2020; Lang et al., 2012). Co-design as an approach based on negotiation, common problem-solving, and decision-making is very complex, dynamic, and multi-sectoral (Carra et al., 2018; Huybrechts et al., 2017). It is based on negotiation, integrating formal and informal knowledge from different backgrounds, skills, values, and attitudes of diverse local actors with diversified positions toward outcomes (Baibarac & Petrescu, 2019).

From a procedural point of view, the co-design of a solution utilizes various methodologies. These methodologies represent relatively complex tools involving multiple stages, iterative cycles, and deep stakeholder engagement. These include, for example, participatory action research (Cruz et al., 2022), critical design (Johannessen et al., 2019), or living labs (Lupp et al., 2021). Concrete techniques for managing the co-design process include various techniques and methods of joint decision-making, such as transect walks, emotional maps, participatory mapping, or visual collaborative methods, including GIS or 3D decision-modeling platforms (Brookfield, 2016; Chassin et al., 2022, 2023; Pontrandolfi & Scorza, 2016).

Several studies evaluating the co-design approaches and their outcomes describe the benefits of shared decision-making in urban design in the context of sustainable local development (Bossen et al., 2016; Valladares, 2017; Wang et al., 2022). The methodology for evaluating participatory design implemented in these studies is considerably heterogeneous and fragmented and offers a flood of predominantly qualitative, subjective, or normative methodologies applied to evaluate approaches, processes, or outcomes of urban design. Methods evaluating a co-design approach usually cover the assessment of co-design methods, tools, and activities designed before the workshop. Methods evaluating the co-design process focus on assessing participants' experience, engagement, and collaboration during the co-design workshop. Methods evaluating the outcomes of co-design assess the design outputs, implementation, and reached impacts after the co-design (Wang et al., 2022). The evaluation of approaches or processes of co-design is usually based on the designer's, the researcher's, or the facilitator's reflections through questionnaire surveys, semi-structured guided interviews, or focus groups (Halar et al., 2020; Whicher & Crick, 2019). The most significant volume of available studies evaluating co-design processes applied a measurement framework based on scaling questions in semi-structured questionnaires (e.g., van Beusekom et al., 2021). Some measurement frameworks evaluating the participants' satisfaction levels with the workshops have already been developed (e.g., Peters et al., 2024; Roemer et al., 2020; van Beusekom et al., 2021). Wang et al. (2022) also mention various alternative approaches to this type of data collection (e.g., observational field notes, experimental comparison studies, or social media comments).

Urban design projects and interventions give physical form to the ideas of sustainable development and represent on-the-ground delivery of the SDGs since they generate diverse impacts of social and economic

nature or contribute to the environmental sustainability of the built environment (Ansell et al., 2022; Carmona, 2021; Zabaniotou, 2020). This, along with the growing need to address the delivery of SDGs at the local level (Bambó Naya et al., 2023), opens space to consider how these goals can be integrated into the measurement framework for evaluating the outcomes and delivery of these interventions.

There are not many examples of studies utilizing SDG goals and targets as a basis for an outcome-focused measurement framework for evaluating the impacts of urban design projects and interventions. Design Council (2020, p. 38) proposes incorporating SDGs into a self-assessment framework for urban project designers; they argue that such an assessment can "nudge designers to tell their stories" but also "provide them with tools to show and communicate the social and environmental impact of their work." Mahmoud et al. (2022) have already demonstrated the use of SDGs as an assessment framework in the case of the Horizon 2020 project CLEVER Cities. The study explained how local NbS contribute to achieving the SDGs and how co-creation can help achieve these global goals at the local level. They conclude that it appears to be beneficial to embed SDGs as an integral part of a co-creation evaluation framework. Debele et al. (2023) investigated 547 case studies on NbS, most of which declared local impacts on the fulfillment of SDG 15, followed by SDGs 13 and 6. The study also proves that NbS spur diverse co-benefits of an economic or social nature. Sharifi et al. (2024) focused on elaborating smart city solutions that tend to primarily impact SDGs 11, 12, 7, and 6. Some studies pointed to the need to evaluate the contribution of market-based activities to the SDGs. Izzo et al. (2020) conceptualized the "SDG disclosure index" and the "SDG compliance index" for this purpose.

3. Methods and Data

3.1. The Case Study

The Nitra pilot area is highly diverse, encompassing a peripheral residential neighborhood (Dražovce) with a significant marginalized Roma minority community, an industrial park, a cultural and community outdoor center (Hidepark), the largest urban green space (City Park), and the corridor connecting these spaces (the newly built bike-path and Nitra River; Figure 1). This area presents challenges and opportunities for innovative redesign of public and semi-public spaces. Nitra, the fifth-largest city in Slovakia, with 78,489 inhabitants (2021 population census), is considered an important growth pole in the regional context, significantly enlarged in the previous socialist regime during planned urbanization processes through the development of satellite housing estates and the incorporation of villages into the city (Ira & Boltižiar, 2021). This included incorporating villages—like Dražovce (the residential part of the pilot area)—which retained rural characteristics and now face physical and social isolation due to industrial expansion. Dražovce hosts one of Nitra's largest Roma communities, experiencing spatial segregation, poor living standards, and underfunded public services, such as a Roma-dominated elementary school lacking basic facilities.

Nitra's industrial growth, fueled by foreign investment, has drawn a diverse immigrant population and, recently, Ukrainian refugees, creating additional pressure on infrastructure, housing, and public services (Filipec & Vargová, 2019; Moroń et al., 2024). Vulnerable groups often frequent public spaces like City Park (managed by the municipal office) and Hidepark (a grassroots cultural and community hub revitalized from a former landfill). While offering safe spaces for social interaction, Hidepark faces infrastructural limitations exacerbated by the high demand from the refugee community.

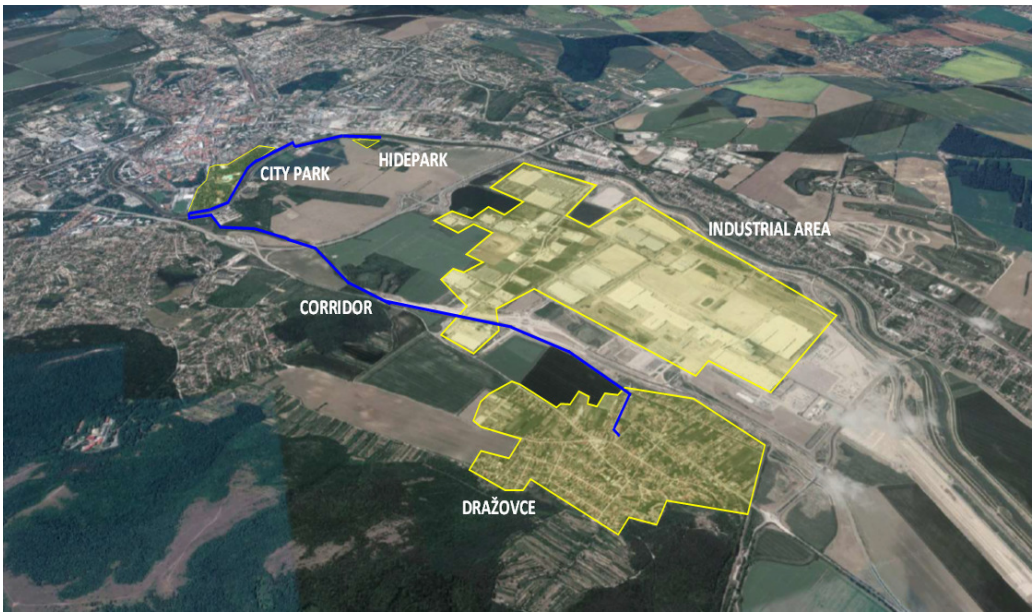

Figure 1. IN-HABIT pilot area in Nitra (Slovakia), based on imagery from Google Earth.

In Nitra's case, the undervalued resources that are the building blocks of innovative solutions of the IN-HABIT project are art and environment. Hence, most solutions combine NbS and cultural and social innovations. They are implemented in public and semi-public spaces to improve healthy lifestyles, social inclusion, and cohesion by redesigning specific urban areas to encourage active living and social interaction and create safe, accessible public spaces. In each city, three local project partners lead the process: a university, a local public authority, and a non-governmental partner.

Piloting different co-design methodologies in urban interventions is important to the local context. Schöffel et al. (2014) identify Slovakia-specific challenges in managing participatory processes that stem primarily from its post-socialist context, which lacks a strong tradition of participatory planning. According to the authors, this historical backdrop often leads to skepticism or resistance from both the public and the authorities regarding inclusive approaches. At the same time, the institutional frameworks in place are frequently rigid and do not adequately support participatory methods, with bureaucratic hurdles impeding the integration of public input. Furthermore, public awareness about the importance of participation in planning remains low, and diverse and sometimes conflicting stakeholders' interests in urban areas necessitate skilled facilitation, which is often lacking. However, Slovakia's urban development has undergone significant transformations since its integration into the European Union, with substantial decentralization efforts and a shift toward multilevel polycentric governance (Finka & Husár, 2021). The latest key step in this process was the adoption of the Urban Development Policy of the Slovak Republic by 2030 (Ministry of Transport and Construction of the Slovak Republic, 2019), which outlines a framework for fostering sustainable and inclusive urban environments, emphasizing strategic decision-making, integrated approaches, and collaboration across hierarchical and sectoral boundaries. Although it does not mention "co-design" as a specific method, it highlights the role of cities as economic and societal growth engines while addressing challenges like suburbanization, social inequality, and environmental impacts, while participatory planning is one of the pathways to do so. This connection within Slovakia's urban planning regulatory framework lends further legitimacy to the use of an SDG-based evaluation framework for the co-design process.

The participatory planning framework implemented in each IN-HABIT pilot city was based on polycentric governance principles and the concept of public–private–people partnerships (PPPPs; Majamaa, 2008; Maraña et al., 2020) to create a more inclusive governance structure. In Nitra's case, the IN-HABIT project brings together relevant actors from different stakeholder groups: vulnerable populations (primarily ethnic minorities, migrants, and refugees, but also persons with disabilities, children, the LGBTQI+ community, etc.); relevant institutional stakeholders (public sector authorities having jurisdiction in different parts of the pilot area or thematic field of intervention; civic sector organizations operating within the pilot area, at the city level and also working with or representing various disadvantaged or interest groups); and groups of specific user profiles (e.g., cyclists, fishermen, visitors, employees of the industrial park). The key milestone in this process was the establishment of four local "IN-HUBs" in each city:

> [An IN-HUB is] a laboratory of social innovation where people coming from different public and private organizations or as individual citizens work together for social change. It is a networking strategy for the enhancement of cooperation aimed at the co-design and co-management of spaces and a platform for structural dialogue and collaboration. IN-HUBs are both physical places for meeting and sharing, and organizational structures to facilitate the transformative process. (IN-HABIT, n.d.)

3.2. Data and Methods

The literature background was compiled using a narrative approach. We filtered the available literature of both Scopus and Web of Science, which led to the identification of a low number of available documents concerning the novelty of the topic (consider that searching for the terms "co-design" and "sustainable development goals" within the title, keywords, and abstract of documents provided only 26 records within the Scopus database, and the majority were out of our research framework scope). Thus, we manually searched these databases to identify (a) studies evaluating the co-design process, (b) studies focusing on linking urban design project outcomes with SDGs, and (c) studies proposing the use of SDGs as the basis for outcome measurement methodology. Results presented in this article were obtained through a questionnaire survey and interviews of three groups of participants of the co-design process: co-design process facilitators; experts, urban planners, and policymakers involved; and representatives of the target groups and other stakeholders.

The first set of respondents (N = 52) was given a short semi-structured questionnaire consisting of three sections. The first inquired about their basic demographic characteristics, role in the process, and stakeholder profile (as summarized in Table 1). The second section focused on collecting information on their participation in specific activities within the first two phases of the project (co-design and co-deployment) and participation in other activities. The final section was devoted to a short evaluation of the process.

Based on the responses of the first set of respondents, 24 key informants were selected from those reporting a higher degree of involvement in the co-design stage of the process. They were asked to fill out an additional questionnaire and rate the extent to which they agree that the planning process of the IN-HABIT project and co-designed solutions contributed or will contribute to relevant targets of select SGDs at the local level. They rated the statements on a scale from 0 to 5, where 0 = *strongly disagree* and 5 = *strongly agree*. They were grouped into four thematic focus groups of outcomes: (a) sustainable cities; (b) sustainable growth and resource stewardship; (c) equity, empowerment, and inclusion; and (d) inclusive governance.

Table 1. Characteristics of study participants.

Stakeholder type	All respondents ($N = 52$)	Key informants ($N = 24$)
Co-design process facilitators	5	5
Experts, policymakers, urban planners	9	7
Target groups (individual and institutional representatives)	38	12
Stakeholders' location of interest within the pilot area	**All respondents ($N = 52$)**	**Key informants ($N = 24$)**
Residential district Dražovce	10	7
Industrial Park North	2	2
Cultural and community center Hidepark	45	21
City Park	39	18
River and cyclo-corridor	38	20
Stakeholders' involvement in the process as…	**All respondents ($N = 52$)**	**Key informants ($N = 24$)**
Representative of institutions, groups of stakeholders	16	11
Individual	38	18
Expert	9	7
Subcontractor	4	3
Indirectly, as a visitor and/or participant of activities	5	1
Stakeholders' affiliation with target groups	**All respondents ($N = 52$)**	**Key informants ($N = 24$)**
Families	15	8
Students	16	2
Migrants and refugees	9	4
Elderly	5	3
Persons with disabilities	5	3
Cyclists	14	9
Roma community	2	1
Persons living alone	8	5
LGBTGQI+	6	3
None	3	2
Gender	**All respondents ($N = 52$)**	**Key informants ($N = 24$)**
Female	30	14
Male	21	9
Prefer not to say	1	1
Age	**All respondents ($N = 52$)**	**Key informants ($N = 24$)**
18–25	12	1
26–35	16	11
36–55	18	8
56–65	3	1
66+	3	3

Table 2 introduces the proposed SDG-based evaluation framework, listing select SDGs and specific targets corresponding to the four thematic groups. The selection of SDGs and targets to include in the framework was informed by several considerations. First, the grant agreement of the IN-HABIT project already lists a set of SDGs that the project commits to contribute to and a description of the expected outcome. The key one listed in the grant agreement is SDG 11—Sustainable Cities and Communities—while the rest are secondary. These were supplemented by additional SDGs, most notably SDG 10, where we can expect contributions primarily due to the focus of the Nitra pilot on specific vulnerable populations (Roma ethnic community, Ukrainian refugees, economic migrants, etc.). Additional targets were included that are also Nitra specific, e.g., 11.a—strengthening economic, social, and environmental links between urban, peri-urban, and rural areas—the argument for inclusion stemming from the peri-urban, or transitional character of the pilot area. We also consider SDG 16—Peace, Justice, and Strong Institution—and SD17—Partnerships for the Goals—which can benefit from the co-design as a process.

After completion of the quantitative evaluation, the 15 most involved key informants were selected for an in-depth interview: all five co-design process facilitators, three experts, policymakers, and urban planners, and seven representatives of target groups and community stakeholders.

Table 2. SDG-based evaluation framework aligned with the IN-HABIT project and Nitra pilot.

SDGs-based evaluation framework aligned with the IN-HABIT project			Rationale for goal/target consideration		
Thematic focus	SDGs	SDG targets/evaluation scales	Expected contribution per grant agreement	Linked to objectives and solutions of Nitra pilot	Linked to the co-design process
Sustainable cities	SDG 11: Sustainable Cities and Communities	(11.3) Enhancing inclusive and sustainable urbanization and planning	x		x
		(11.4) Protecting and safeguarding cultural and natural heritage	x	x	
		(11.6) Reducing the environmental impact of cities, air quality, and waste management	x	x	
		(11.7) Providing access to safe, inclusive, and accessible green and public spaces	x	x	
		(11.a) Strengthening econ., soc., envir. links between urban, peri-urban, and rural areas		x	
Sustainable growth and resource stewardship	SDG 12: Responsible Consumption and Production	(12.2) Promoting sustainable management and efficient use of natural resources	x	x	
		(12.5) Substantially reducing waste generation through prevention, recycling, and reuse	x	x	
		(12.7) Adopting sustainable public procurement practices	x		
		(12.8) Raising awareness for sustainable development and lifestyles	x	x	
	SDG 8: Decent Work and Economic Growth	(8.3) Supporting job creation, creativity, innovation, and entrepreneurship	x		

Table 2. (Cont.) SDG-based evaluation framework aligned with the IN-HABIT project and Nitra pilot.

SDGs-based evaluation framework aligned with the IN-HABIT project			Rationale for goal/target consideration		
Thematic focus	SDGs	SDG targets/evaluation scales	Expected contribution per grant agreement	Linked to objectives and solutions of Nitra pilot	Linked to the co-design process
Equity, empowerment, and inclusion	SDG 4: Quality Education	(4.7) Promoting education for sustainable development and global citizenship	x	x	x
	SDG 5: Gender Equality	(5.5) Ensuring women's participation and equal opportunities in leadership	x		
	SDG 10: Reduced Inequality	(10.2) Promoting social, economic, and political inclusion for all		x	x
		(10.3) Ensuring equal opportunities and reducing inequalities of outcome		x	
		(10.7) Facilitating safe and responsible migration and mobility of people		x	
Inclusive governance	SDG 16: Peace, Justice, and Strong Institutions	(16.6) Developing effective, accountable, and transparent institutions			x
		(16.7) Ensuring inclusive and participatory decision-making at all levels			x
	SDG 17: Partnerships for the Goals	(17.16) Fostering multi-stakeholder partnerships to support SDG achievement			x
		(17.17) Encouraging public, private, and civil society partnerships		x	x
		(17.9) Enhancing international support for capacity-building			x

4. Results

4.1. The IN-HABIT Co-Design Process in Nitra

The process began with extensive stakeholder mapping and engagement efforts in the pilot city, followed by capacity-building activities for community activators who facilitated the project. These community activators, trained through sessions led by transversal project partners, were responsible for coordinating the co-design process and engaging local target groups. After Nitra's IN-HUB was established, specific activities included the initial co-design workshop, where participants identified key locations in the pilot area for development, and a transect walk to assess these sites. The project also piloted the IN-HABIT Co-Design Atelier. In this elective university course, students conducted field research and co-developed some of the solutions for urban spaces and technical documentation based on inputs from the IN-HUB. These activities aimed to identify and implement interventions such as a community kitchen, a community and experimental garden, and therapeutic urban picnic meadows. Additional workshops were conducted to engage specific communities, such as the Roma community in Dražovce, through activities like art therapy and landscape architecture workshops in the local segregated school. The project also included the Mindset Change workshop, which trained local educators in the Design for Change methodology to equip them for the co-design process. The co-design process concluded with validation meetings to align proposed interventions with city policies, followed by developing technical specifications and budget allocations again with the help of the Co-Design Atelier. Figure 2 illustrates some of these activities.

Within the pilot area, the Hidepark location proposed a community kitchen, an experimental garden, and a DIY workshop. The Dražovce residential district focused on revitalizing an elementary school yard to create an outdoor education space to attract residents beyond the Roma community. A cycling corridor that connects

Figure 2. Co-design activities in the Nitra pilot. Source: IN-HABIT (n.d.).

these spaces would feature reversible urban furniture and art installations. Additionally, two experimental and therapeutic urban picnic meadows were planned. These initiatives would be supported by training in urban gardening, culinary events, therapy gardening, vocational training, and cultural and art activities.

4.2. Co-Design Activities and Their Contribution to Select SDGs

As is evident from the questionnaire survey results (Table 3), different stakeholders were involved in the co-design process in different stages and through different means. Most participated in general planning meetings and workshops organized within IN-HUB, held onsite at the public spaces being addressed, and in various other thematic workshops and educational activities. Most co-design activities also served multiple purposes. In some instances, incidental, unplanned results emerged. For example, additional data was collected during certain educational activities, capacity-building activities for the representatives of local target groups, during workshops with expert panels, and the pilot of participatory site-specific art residency.

To analyze the subjective perception of the contribution of listed co-design modes, the overall scores for each SDG group were obtained by adding up each participant's grading of individual targets (see Section 3.2). The final quantified contribution indicator can take values ranging from 0 to 25. The difference in subjective perception of contribution indicated in Table 3 represents a difference in the median perceived contribution of those who participated in a given co-design activity versus those who did not. In the case of primary data collection activities, we can observe that those participating in more innovative or participatory ones (transect walks, behavioral games) consider the entire process more beneficial towards advancement across almost all groups of SDGs analyzed. However, those engaged in the analytical fieldwork primarily focused on traditional data collection consistently scored the process contribution lower across all SDG groups. On the other hand, this does not seem to carry over to the planning stage of the process as participants who engaged in co-design workshops directly in public green spaces that were being redesigned scored the contribution to sustainable growth and resource stewardship significantly lower and SDGs targeting equality and education moderately lower than the rest of the interviewed. They had a slightly more positive view of the contribution to sustainable cities and communities. Surprisingly, similar views can be identified within a group participating in co-design workshops in the community garden, with moderately lower scoring of targets representing inclusive governance and institutional change within SDGs 16 and 17. This finding contradicts the information we obtained through an interview with the facilitator working with the gardeners and managing the garden:

> In the garden, people became closer because of the interventions. As they prepared it and dismantled everything, people came together and wanted to make some change. As the garden expanded, they helped clean it up because they wanted it to be for more people so that more people would participate in creating edible greenery. And then, gradually, as they also attended the workshops, they educated themselves and then applied it in their small plots, these small green solutions like using renewable resources and waste materials. (Facilitator interview, 2024)

The contribution of the IN-HABIT co-design process to the SDGs pertaining to reducing inequality was also seen significantly more unfavorably in the groups of participants that attended meetings with expert panels. One of the reasons can be found in an interview with a representative of the Dražovce community:

Table 3. IN-HABIT co-design methods, their purpose, participant involvement, and perception of contribution to select SDGs.

IN-HABIT co-design methods, activities, and processes	No. of participants involved		Purpose of activity					Difference between the median overall scores of the SDG groups between participants and non-participants			
	All respondents (N = 52)	Key informants (N = 24)	Data collection	Capacity-building	Planning and making decisions	Co-design in situ	Co-deployment of interventions	Inclusive governance	Equity, empowerment, and inclusion	Sustainable cities	Sustainable growth and resource stewardship
Analytical fieldwork (atelier, data collection, evaluation)	8	6	xxx					–1.5	–2	–0.5	–1
Behavioural games	14	9	xxx					3	2	2	2
Analytical and planning meetings with an expert panel	12	9	xx	x	xxx			1	–4	0	0
IN-HUB planning and co-design meetings	22	19			xxx			3	3	2	0
Interactive corridor transect walk	10	9	xxx			xx		1	3	1	0
Co-design workshops in green public spaces	18	15			xxx	xxx		0	–1	1	–4
Co-design workshops at Dražovce Elementary School	8	6		xxx	xx	xx	xx	1	2	0	0
Co-design of specific solutions with individual stakeholders	12	11			xx	x		1	3	–1	1
Design for Change workshops	4	4		xxx				1	2	1	1
Other workshops and educational activities	22	16	x	xxx		xx	xx	4	7	0	4.5
Community garden workshops	13	8		xx	xx	xxx	xxx	–1	0.5	0	–0.5
Participatory site-specific art residency	11	10		x	xx	xxx	xxx	4.5	2.5	1.5	1.5

Notes: xxx = primary purpose; xx = secondary purpose; x = incidental.

> That rhetoric should be, basically, plain. Because using scientific words did not work. Here, it is important to choose a simple language. And simple and constructive, what they will get out of it. (Target group representative interview, 2024)

Overall, we can observe the most positive impact on participants' subjective perception of the advancement of analyzed SDGs with their involvement in capacity-building activities, whether the capacity-building was their primary or secondary purpose. This also holds, albeit to a lesser extent, concerning those who participated in activities that merged co-design and co-deployment of real physical solutions. The highest positive impact can be seen with participation in training workshops, educational activities, and the site-specific art residency. This was also reflected in the sentiments of all groups of stakeholders in the process of interviews:

> You see, participation naturally carries with it another significant outcome, which is precisely the education of the community…for example, regarding the meadow in the floodplain, the solution and the technical side of the solution were really demanding and still are. (Facilitator interview, 2024)

> One of the most important points is the education about the need to approach public spaces in this way. (Facilitator interview, 2024)

> And that is why I really thought that when something is realized, it should be tangible, they should see that yes, it was not just promised, but it actually happened. (Target group interview, 2024)

> It is, for example, important to have a budget for prototyping and experimenting with these solutions. If we want to introduce participatory methods…it is good to have external resources to kickstart it through them. (Interview with public authority representative, 2024)

4.3. Stakeholders' Evaluation of the Contribution of the IN-HABIT Co-Design Process to Specific Targets of Select SDGs

To better understand the mechanisms of how the IN-HABIT project's approach did or could potentially advance the select SDGs, we compared the individual scoring of specific chosen targets by different stakeholder types involved in the co-design process. The following analyses illustrate the scoring of individual targets corresponding to the four thematic groups of SDGs across three groups of stakeholders. Box plots are used to visualize the average score and the variability in the scores, illustrating the degree of agreement among individual stakeholders regarding the perceived contribution of the process to different SDG groups. Figure 3 depicts the assessment of contribution towards the "Sustainable cities" thematic focus.

The contribution to the "Sustainable Cities and Communities" goal was perceived as less significant by process facilitators, experts, and policymakers than by community representatives. What they mostly agreed on is a significant contribution to the safety, inclusiveness, and accessibility of public green spaces, which is one of the key objectives of Nitra's pilot and also came up in interviews with policy representatives:

> Even public spaces are coming to life. We can see it, whether it is the park, Hidepark, or those unused spaces that were suddenly filled with life. The community is starting to use them; they are becoming part of the city's life. (Policy representative interview, 2024)

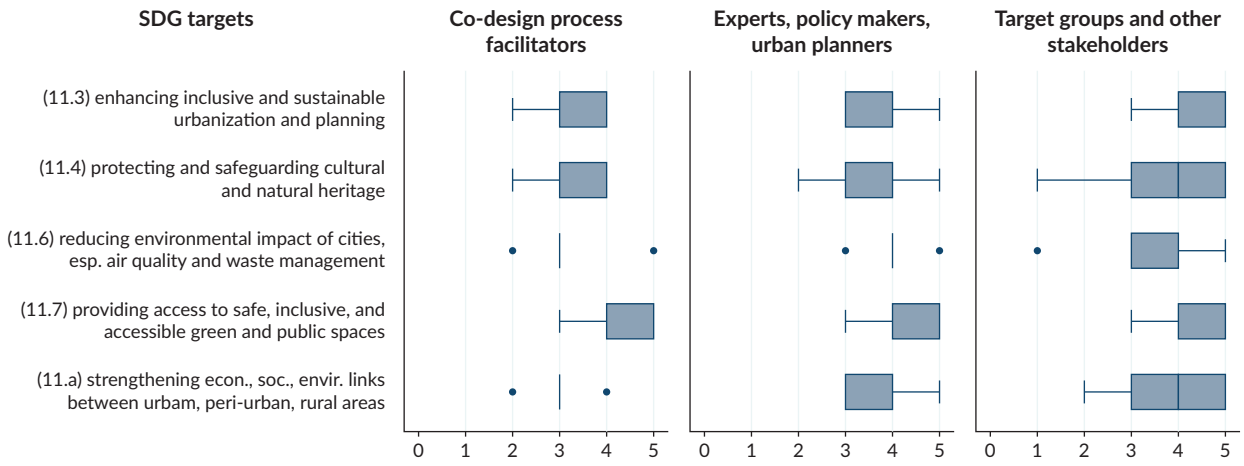

Figure 3. Evaluation of the IN-HABIT co-design process contribution to the "Sustainable Cities" thematic focus.

On the other side of the spectrum, they also seem to be more in agreement with each other regarding a lesser contribution to reducing the environmental impact of the cities (relative to other targets in this group). The opinions of community members varied most regarding whether the approach could help protect cultural and natural heritage and whether it could strengthen the economic, social, and environmental links between urban, peri-urban, and rural areas. Some of these findings are explained by one of the interviewed community representatives as follows:

> When you plan something, anything, and it should somehow contribute to, for example, green interventions, that is in the hands of people at higher levels of leadership. The fact that we meet as a community group or do some participatory planning, I think will not influence that. However, just from the principle that when something is done in a participatory manner, the community is more connected to it…it is somehow more connected with local thinking and awareness. Moreover, people are more interested in the sustainable maintenance of their locality and community. (Target group representative interview, 2024)

Their subjective perception was different from the opinions of facilitators and experts in their contribution to inclusive and sustainable urbanization and planning. More pessimistic facilitators and local public authority representatives explain:

> It is an innovative methodology and something that we are introducing on a smaller scale; it seems to me that it will not change such rigid institutions as the city because, for formal institutions, the project is short. It is necessary to either ensure the continuation of the next Horizon, which would bind us to that, or to ensure the project's sustainability through implementation through the city so that it expands more broadly. Ideally, these solutions should be long-term. Although this project spans five years, it may need to continue with another Horizon project to become more anchored here. (Public authority representative interview, 2024)

This notion of building on these experiences in subsequent projects and initiatives to ensure the effective integration of participatory methods into urban planning also resonated with facilitators:

> But I have more of a feeling that within this project, we were dealing with the basics of how such mechanisms work or do not work. I think it has contributed more to improving these processes for future projects. (Facilitator interview, 2024)

Based on Figure 4, we can see that stakeholders involved in the process view it as slightly more impactful towards the institutional change in inclusive governance than the previous thematic focus. Co-design process facilitators seem to be the ones who were less optimistic overall. In their words:

> What I think we were very successful in was supporting partnerships among various NGO stakeholders; those partnerships have been strengthened. But I think that residents are definitely not used to it….I think the biggest barrier is the expectation that the participatory process itself will solve a problem. However, it cannot solve the problem without their direct involvement. (Facilitator interview, 2024)

> There was always the expectation that we would be the ones who would eliminate or solve the problem that had been there for 20 or 30 years. There is also a certain degree of expectation that some communities have and quite a few misconceptions about what all the other sectors should solve for the residents. (Facilitator interview, 2024)

Representatives of the target groups and local community rated the co-design process as having great potential to advance most of the targets but with some variability of perceptions regarding the contribution to the inclusiveness of decision-making on all levels and in PPPPs. On the other hand, experts mostly agreed about the process's strong positive impact on encouraging PPPPs. However, they could not agree on the contribution towards making local institutions effective, accountable, and transparent and ensuring inclusive and participatory decision-making at all levels. According to a local public sector representative, the issue is specifically with the "at all levels" part:

> Collaborations that are happening horizontally, because Nitra is not a big city, and more or less the organizations that exist here, we know each other. So, I see that as good. I see more bureaucratic

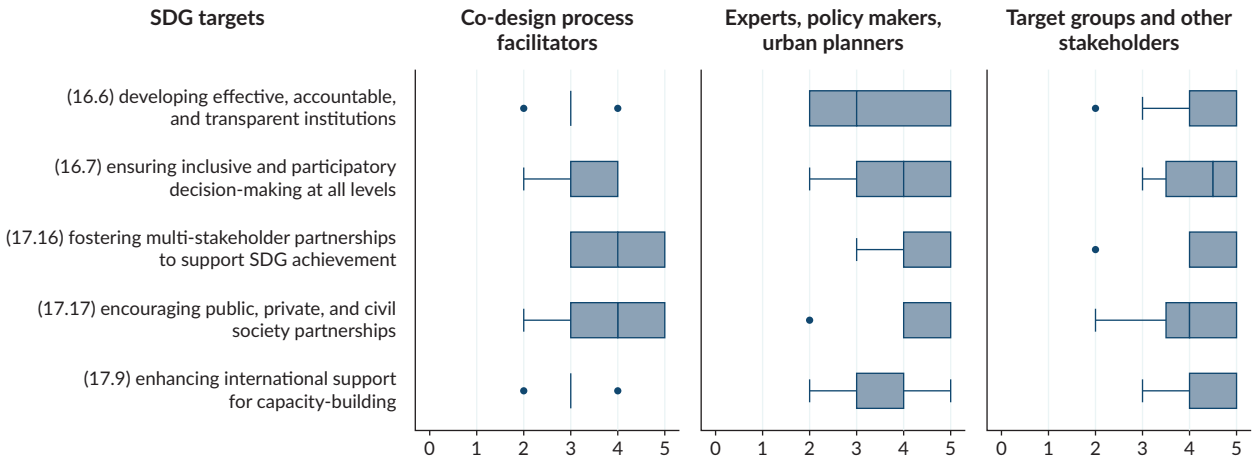

Figure 4. Evaluation of the IN-HABIT co-design process contribution to the "Inclusive Governance" thematic focus.

> obstacles between formal institutions that are vertical. It is worse, the cooperation at the level of state institutions. (Public authority representative interview, 2024)

Interviews with multiple participants from all stakeholder groups revealed a prevalent theme regarding barriers to promoting community participation in urban planning: mistrust, which seemed to run in all directions. This included mistrust from people toward formal institutions, from public authorities toward citizens, and even among people themselves, as illustrated by the following responses:

> There was a significant reluctance to participate in some communities, with many people feeling that their input would not matter or that they were not relevant players in the process. (Facilitator interview, 2024)

> There is significant mistrust in institutions, and many community members do not believe that their participation will lead to real change due to past experiences where promises were not fulfilled. (Facilitator interview, 2024)

> No matter how reasonable, willing the people that represent these institutions are, there are still those barriers of processes that cannot be overcome at all. (Facilitator interview, 2024)

> They lack trust in people and do not believe they can take care of these interventions and see them through. There are doubts, not only about inviting citizens to a participatory meeting but also about not giving them the tools to really participate and implement these solutions. However, they would need guidance, especially when it is their first project; they definitely need facilitators. You need people for that. (Facilitator interview, 2024)

Regarding the contribution towards gender equality targets, quality education, and reducing inequalities (Figure 5), we again observe differing evaluations in the expert group. Even though they agree that the process promotes inclusion for all, they do not agree on its impact on promoting women's participation in decision-making and leadership. Conversely, the community representatives seem to agree that it

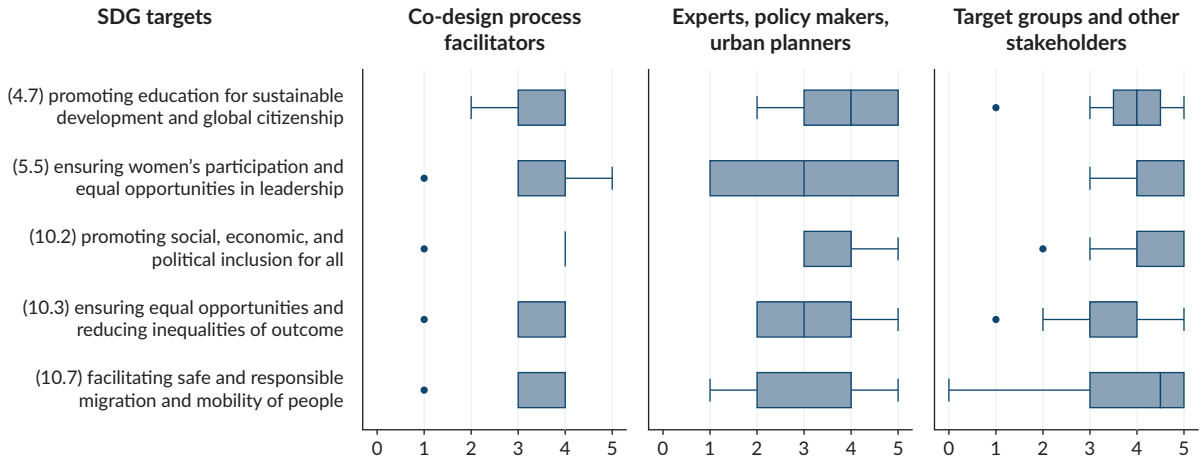

Figure 5. Evaluation of the IN-HABIT co-design process contribution to the "Equity, Empowerment, and Inclusion" thematic focus.

significantly contributed to this target and inclusion in general. Facilitators rated all targets slightly above average. Migrants and refugees represent one of the key target groups of the project, and the positive impact it has on some of those involved can be observed through one of the interviews with a person from the Ukrainian refugee community involved not only in planning but also volunteer activities in implementing the co-designed solutions:

> Before, I perceived Slovakia and Nitra completely differently. Because, truthfully, I never felt such communication, such help, such…understanding, perhaps. You see, after the injury, it is not just about not having arms; it is about the psychological state. That is why every job that involved people from Hidepark and every activity helped me. It was like psychological rehabilitation. (Target group representative interview, 2024)

Overall, education in the context of advancing sustainable development was seen as one of the more positive outcomes to come out of the process by experts and target groups alike. According to facilitators, there is a gap in the cultural and educational background of different communities, particularly in understanding their role in participatory processes:

> In the beginning, there was a lack of basic education and awareness, and even the idea of what citizens themselves are capable of solving. (Facilitator interview, 2024)

> Through workshops and educational activities focused on sustainability topics and civic engagement, we tried to instill knowledge and skills, and we achieved something. (Facilitator interview, 2024)

The last group of SDG targets (Figure 6) is one where community representatives agreed the least regarding the impact of the co-design process they were a part of. Although experts disagree, the potential for job creation, supporting innovation, and creativity was observed by both facilitators and target group representatives as above average. Although the contribution to all targets was perceived as strong, promoting sustainable management of natural resources was not as evident. Also, while raising awareness for sustainable development was a major positive point of the process, transposing the experiences into a

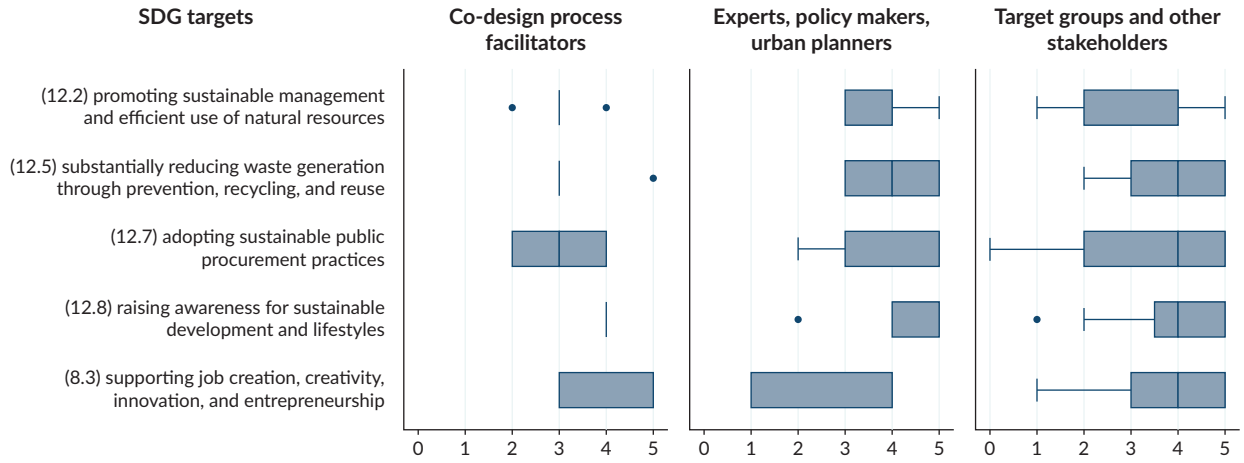

Figure 6. Evaluation of the IN-HABIT co-design process contribution to the "Sustainable Growth and Resource Stewardship" thematic focus.

more sustainable public procurement practice did not happen. The facilitators shared an example of using recycled materials in their community projects, saying:

> We used waste wood to create public park furniture, which not only reduced waste but also served as an educational tool for the community about the importance of recycling and reuse. (Facilitator interview, 2024)

The public authorities' representative was, however, skeptical about the potential of scaling up such solutions on the city level primarily due to procurement process regulations:

> The office, as a formal institution, is still bound by the threat of quite high fines from the office for public procurement, so it is more inclined to avoid these things because there is either a risk of misunderstanding or retrospective checks….Basically, the whole national legislation is set up in such a way that if you do something, you get punished, and it does not support people in finding solutions that would be ultimately more sustainable and even cost-effective. (Public authority representative interview, 2024)

Most facilitators agreed that local public authorities do not need to engage in these types of interventions themselves. It would suffice to provide physical space, sometimes facilitation if necessary, and funds through small grants, and the communities would be able to achieve this more effectively by themselves.

5. Discussion

This study contributes to the discussion on the perceived benefits of the co-design process as a participatory planning approach in the context of the SDGs (Ansell et al., 2022; Debele et al., 2023; Sharifi et al., 2024), bringing a better understanding of how different modes of involvement within co-design of innovative urban solutions shape the perception of the outcomes. The process and the outcomes are measured using the SDG-based self-evaluation framework.

Indeed, the SDGs and SDG targets proved to be a meaningful framework for evaluating local outcomes of urban design projects. The co-design of the IN-HABIT project interventions in Nitra contributed to a different degree to several SDGs (4, 5, 8, 10, 11, 12, 16, 17), indicating that interventions aimed at developing innovative, green, and inclusive public spaces in combination with participatory planning and co-design can yield wide-ranging co-benefits (Bambó Naya et al., 2023; Debele et al., 2023). The role to be played by partnerships and communities of various stakeholders at the local level in solving the "wicked problems" of the sustainable development of cities is explicitly expressed in the 17th goal of sustainable development (Mariani et al., 2022). Based on our findings, this role appears to be twofold. Firstly, our results suggest that using co-design as an urban intervention tool strengthens the contribution to SDG 17 by supporting the forming of viable active local communities and PPPPs (Avila-Garzon & Bacca-Acosta, 2024). Facilitators, experts, policymakers, and participants involved in co-designing IN-HABIT solutions agree that the co-design approach strengthened community members' sense of ownership and involvement (Debele et al., 2023; Mahmoud et al., 2022). At the same time, forming such partnerships is a decisive precondition for mobilizing local capacities and resources to deliver sustainable solutions addressing other SDGs, which means that the advancement of certain SDGs can actively support and enhance progress toward others (Bennich et al., 2023).

The study also addressed the gap in the literature concerning the differing attitudes toward project outcomes resulting from different modes and depths of participant involvement within the co-design process (Enserink et al., 2023). Previous studies concluded that participation in the co-design process, in general, increases the chance that participants can recognize the project's positive outcomes (Hughes et al., 2023), while our study showed that rather the mode and depth of the participation shape perceptions. Generally, it appears valid that those participating in more innovative participatory and co-design processes (transect walks and site-specific art residencies) consider the entire process to be more beneficial towards advancement across almost all groups of SDGs analyzed. This claim can be supported by the fact that participants engaged in the traditional analytical fieldwork and more common data collection methods consistently scored the perceived contribution lower across all SDGs. This is of importance for urban planners looking to make the process more inclusive since these traditional methods of public involvement still dominate in Slovakia (Finka & Husár, 2021; Ladzianska et al., 2019), but also in the urban planning of other post-socialist countries of Central and Eastern Europe (Poljak Istenič & Kozina, 2020).

It seems helpful to compare our study with the study of the stakeholders' perceptions in central government-led Scottish Urban Partnerships conducted by Hastings (1996) almost 30 years ago. Although these were some of the earliest partnership-based community engagement approaches in modern urban development policies, we can see clear parallels in the positions of specific stakeholders. As for our co-design process facilitators, among the public sector representatives in Hastings' study, aside from the suspicion towards the process, "there was a strongly held perception…that the Partnerships presented local authorities with the opportunity to 'educate' resident representatives" (Hastings, 1996, p. 265). Similarly, community representatives reported they had limited decision-making power within the partnership in both studies, with a relatively strong feeling of mistrust. This comparison is useful because it "calibrates" the state of preparedness of the local institutional landscape to introduce the 4P concept into urban planning procedures. Combined with hints of institutional rigidness of public sector institutions identifiable from interviews with all three groups of respondents, it suggests that as a post-socialist country, local authorities and communities in Slovakia still lack specific capacities to effectively implement PPPPs as a model to include the end-users and vulnerable communities in the co-design of public spaces. However, our study also shows that it is possible to promote capacity-building efforts on both sides through the process itself. Coupled with that, according to the public sector representatives involved in our study, continuity is crucial for the gradual transformation of public institutions to accommodate more inclusive and participatory approaches (Ng et al., 2013).

Based on participants' perceptions, results suggest that the co-design process itself supports the achievement of SDGs at the local level through capacity-building activities, strengthening of the sense of community cohesion, and awareness of sustainable practices. However, if the co-design process is to be a source of sustainable change in itself, it requires well-thought-out communication, avoiding the use of technical language (Carra et al., 2018), sensitive facilitation that leads to building trust and a more accommodating learning environment between experts and target groups, and ensuring multi-stage involvement of participants, whose "degree of participation" (Martínez, 2011) will potentially affect the perception of the outcomes (Enserink et al., 2023)—especially methods where co-design is merged with implementation, like in the case of participatory site-specific art residencies.

However, this study is not without limitations. Our sample of participants may not fully capture the diversity of opinions within the community, limiting the generalizability of the findings to broader urban contexts. The subjective nature of stakeholder evaluations introduces potential bias, as perceptions could be influenced by personal experiences or predispositions toward the project, its facilitators, or their subjective attitudes toward individual SDGs (Bautista-Puig et al., 2024). While providing valuable insights, qualitative data may lack the objectivity offered by quantitative measures, potentially impacting the robustness of the conclusions drawn about the project's effectiveness in advancing SDG-related targets. Another limitation is the relatively short project timeline, which may not be sufficient for fully embedding changes in institutional practices or ensuring the sustainability of the interventions.

There are also limitations to the transferability of the knowledge and the policy implications to other local and national contexts. They may be more beneficial to other post-socialist and low-trust settings, where institutional capacity and public participation are still evolving, but less informative in other settings. The context may also change the validity of findings regarding the effectiveness of specific co-design tools and methods analyzed here. This is why, in further research, it would be beneficial to conduct comparative studies between cities with different socio-political backgrounds, which could provide insights into the adaptability of these methods and the conditions needed to ensure their success across diverse urban contexts. Another important research direction should involve developing more robust frameworks for evaluating the effectiveness of participatory processes in general and advancing local SDGs in particular (Avila-Garzon & Bacca-Acosta, 2024).

6. Conclusions

The study provides insights into the process and challenges of implementing participatory co-design processes in urban planning. While the project successfully engaged a diverse range of stakeholders, including marginalized communities, the outcomes reveal both strengths and limitations of the approach. On the positive side, the project contributed to a sense of ownership and involvement among community members, particularly through capacity-building activities and direct engagement in the co-deployment of interventions. These aspects were positively received and contributed to greater community cohesion and awareness of sustainable practices. However, the results also highlight significant challenges. There were notable differences in how different stakeholders perceived the contribution of the co-design process to specific SDGs. Despite efforts to engage participants, some stakeholders remained skeptical, particularly regarding the integration of participatory methods into formal urban planning processes. A recurring theme of mistrust between the community and formal institutions hampered the project's collaborative potential.

Overall, while the IN-HABIT project in Nitra made advancements toward creating more inclusive and sustainable urban spaces, the results underscore the need for more tailored and context-sensitive approaches in participatory urban planning. The challenges highlight the importance of addressing communication barriers, building trust, and ensuring that participatory processes are genuinely inclusive and capable of influencing formal planning decisions. These lessons are crucial for future projects aiming to achieve similar goals. What we can learn from the IN-HABIT approach is that proper and inclusive capacity-building and creating room for prototyping and experimenting can help bridge this gap.

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Conflict of Interests

The authors declare no conflict of interests.

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Reshaping Social Spaces After Socialism Through Citizen Participation: The Case of Novo Sarajevo's Post-Conflict Neighborhoods

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Abstract

Architecture embodies the social context from which it emerges. In the countries of the former Yugoslavia, architects and planners have played a pivotal role in translating the ideals and values of political systems into physical space. The socialist programs of "brotherhood and unity" and "worker self-management" were articulated in various public architectural typologies, open and accessible to all, and shaped a new social framework. Less emphasized but equally present is the historical continuity of self-organizing architecture, representing the shared goal of population survival and adaptability to forthcoming changes. In the aftermath of the 1990s war, Bosnia and Herzegovina is undergoing a multifaceted transition: from socialism to capitalism, from conflict to peace, from post-war recovery toward sustainable development and democratic governance. More than 30 years later, this radical paradigm shift has significantly impacted the urban landscape of Sarajevo, affecting both new developments and the approach to the urban legacy of previous epochs. By correlating the socio-spatial factors of transition, this article explores the post-socialist residential neighborhoods of Novo Sarajevo that were once divided by the frontline during the siege of Sarajevo, particularly their current status and the potential for the transformation of the remaining indoor and outdoor social spaces. The model employed for redefining social spaces in vulnerable areas emphasizes user participation, and was tested through an academic research project to address collective issues. This research has shown the role of the participatory approach as an instrument for the reinvention of existing, even contested, social assets to create an inclusive, sustainable urban environment in post-conflict conditions. The approach may be able to heal the remnants of the collapsed system, its neglected legacy, and the damaged urban and social structures.

Keywords
citizen participation; post-socialist society; social spaces; sustainable development; urban transformation

1. Introduction

The transition from socialism to capitalism in Bosnia and Herzegovina is a complex process that has significantly shaped the country's socio-economic landscape since the dissolution of Yugoslavia in the early 1990s. It is an ongoing process influenced by its unique historical context, political landscape, and socio-economic conditions. Ex-Yugoslavia, including Bosnia and Herzegovina, operated under a unique form of socialism that blended self-management and a market economy. The breakup of Yugoslavia led to a brutal war from 1992 to 1995, devastating the economy and infrastructure and necessitating extensive reconstruction. The economic transition involved privatizing state-owned enterprises, often marred by corruption and favoritism, resulting in economic challenges and social inequality (Jović, 2001). Establishing a market economy required new legal and institutional frameworks to support private property, market competition, and foreign investment (Donais, 2005). Bosnia and Herzegovina's political system, established by the Dayton Peace Agreement in 1995, created a complex governance structure based on ethnic quotas and power-sharing, sometimes hindering economic and political reforms (Pugh, 2002). Three decades after the war, the current political and social conditions can be described as "politics as the continuation of war." Indeed, Bosnia and Herzegovina's transition since the mid-nineties, following the war's end, has proven exceedingly complex. The fragmentation of society caused by the war resulted in a loss of social cohesion and trust, while the consequences of the conflict in society can be defined as comprising the following three elements: (a) a power-sharing regime, (b) a deficit of social capital, and (c) social inequality and exclusion (Blagovčanin, 2024).

The political and socio-economic complexities of the transition have manifested in the city of Sarajevo in a particular way. While the new developments reflect the features of neoliberal urbanization, accompanied by informal housing developments in the city's periphery, the urban legacy of socialist modernism has been subject to neglect and decay. Differing from the other capital cities of the former Yugoslav republics, Sarajevo experienced severe destruction and urbicide during the 1992–1995 siege. As a result, the ongoing transformation of post-socialist society in Sarajevo also encompasses the urban phenomena of post-war recovery and the social processes of dealing with *collective trauma* (Table 1).

Table 1. The distinct case of transition in Bosnia and Herzegovina: from socialism to capitalism, war to peace.

Yugoslav Socialism Brotherhood and unity Self-management	Transition to Capitalism Introduction of a liberal market economy Democracy	Post-Socialist Urbanism and Society Privatization Neoliberal urbanism Urban decay of socialist neighborhoods
	1990s War Conflict Destruction Urbicide	Post-War Urbanism and Society Post-war reconstruction Collective trauma

In this research, the described urban and societal processes are observed in the residential neighborhoods of the municipality of Novo Sarajevo (New Sarajevo). Two study areas, namely Grbavica and Trg Heroja, were selected as they embody features of a post-socialist and post-conflict urban environment. Constructed in the post-World War II period, they epitomize the ideals of socialist modernism. However, during the 1990s war, these areas were divided by the frontline within the besieged city. As in other Yugoslav cities, mass urbanization and a housing boom in Sarajevo represented the socialist projects of self-management and social ownership (Mrduljaš, 2018).

During socialism, the political system and state ideology acted as critical cohesive factors for establishing a collective identity and producing social spaces within residential neighborhoods, as observed in the Novo Sarajevo municipality. After the collapse of socialism and after the war, with the advent of capitalism, these former cohesive factors were no longer relevant, and the private realm dominated over the public, which is reflected in the private appropriation, fragmentation, and decay of social spaces, as well as in the break in community links. The term *social spaces*, referring to indoor and outdoor areas for collective use, is intentionally placed alongside *socialism* in the title of this article to highlight the hypothesis addressing the prospects of social spaces in post-socialist society. This article examines the tension between the abandoned collective values of the past and the uncritical embracing of new values and searches for new cohesive factors in the post-socialist transformation of social spaces. It recognizes post-conflict society as a problem and a significant obstacle in the renewal of cooperation. However, it is argued that broken bonds can be restored even in sensitive post-socialist and post-conflict contexts, such as the neighborhoods in Novo Sarajevo, by employing participatory approaches to create an inclusive and sustainable urban environment. This hypothesis will be explored by referencing the relevant theoretical concepts of post-socialist urbanism, supported by an in-depth study of the neighborhoods of Novo Sarajevo and the findings of the participatory project. The analysis will be correlated to the United Nations (UN) Sustainable Development Goal (SDG) 11, focusing on the role of participatory approaches in fostering vibrant public spaces, inclusive urban development, and enhancing sustainability and resilience.

The methodology of this research involves a theoretical background study encompassing critical concepts concerning *socialist urbanism* and *post-socialist urban transformation*, focusing on *social spaces* in residential housing, urban and social aspects of *post-war recovery*, and concentrating on *social capital* and *citizen participation* as the critical assets aligned with the specific targets of UN SDG 11. Moreover, a historical analysis and mapping of the study areas are accompanied by an interpretative and comparative exploration of the two selected areas. Finally, detailed case studies of participatory initiatives from the architectural studio course Community Architecture Studio are presented to highlight the impact of these initiatives on urban development and community cohesion. The article concludes with broader implications for reshaping social spaces, emphasizing resource coordination, knowledge sharing, and sustainable urban policies, and offers recommendations for future citizen participation efforts and potential replication in other contexts.

2. Theoretical Background

Socialist urbanism in Yugoslavia can be portrayed as a marriage between the communist ideological values of self-management and collective ownership with modernist architectural principles and aesthetics. In the first two decades post-World War II, the capital cities of the former Yugoslav republics turned into large-scale construction sites. Today, residential complexes like New Belgrade in Serbia, New Zagreb and Split 3 in

Croatia, Novo Sarajevo in Bosnia and Herzegovina, and many others embody the critical features of Yugoslav socialist housing projects. These areas showcase diverse residential typologies, including freestanding apartment blocks, cascading structures, towers with standardized layouts, prefabricated constructions, and expressive modernist forms, epitomizing the architectural and social ideals of socialist urban planning (Bjažić Klarin, 2018). Despite these residential dormitories being critiqued as modernist mono-functional and homogenized environments lacking public life (Lefebvre, 2014), the socialist residential neighborhoods encompassed various indoor and outdoor *social spaces*, such as public areas, green zones, and community facilities like kindergartens, schools, local centers, sports amenities, and workers' clubs. These spaces were integrated with varying degrees of success, resulting in both effective and unsuccessful spatial solutions. Although *self-management* and *social ownership* policies implied the ideal of social justice, formal participation was often destabilized due to informal hierarchies (Dragutinovic et al., 2022) From the 1970s onward, the country focused on creating spaces of representation (Kulić, 2012) to epitomize significant political and sporting events, including the 1984 Winter Olympics in Sarajevo. The 1990s war marked the radical shift from socialism to capitalism, with urbicide taking place in the cities of Bosnia and Herzegovina. In the decades following the war, Sarajevo underwent essential reconstruction and economic privatization. The rise of a liberal economy was accompanied by new urban developments mainly comprised of commercial architecture and real estate projects in urban voids throughout the city while disregarding the public domain. In parallel, informal housing continued to sprawl on the city's slopes (Islambegović, 2020). The interaction of these processes resulted in the loss, deterioration, and fragmentation of existing public spaces, as well as in the neglect of the social infrastructure built by the socialist regime throughout the city (Zagora & Samic, 2021).

In post-conflict societies, collective trauma significantly impacts social dynamics, often leaving deep psychological scars and disrupting communal ties. This trauma can hinder reconciliation efforts, perpetuate mistrust, and complicate rebuilding social cohesion (Volkan, 1997). Indeed, the shift from conflict to peace requires more than just the end of violence; it necessitates establishing systems that promote long-term stability and reconciliation (Lederach, 1997). Essential for this process are: inclusive governance, trust-building, and the reintegration of marginalized groups (Doyle, 2000). Moreover, the social and psychological effects of collective trauma manifest in widespread distress, intergenerational transmissions of trauma, and impaired social functioning (Hirschberger, 2018). Rebuilding social cohesion in post-conflict settings thus presents significant challenges due to deep-seated mistrust, social fragmentation, and enduring ethnic or political divides (Putnam, 2000). However, opportunities for cohesion arise through inclusive dialogue, community engagement, and the creation of shared goals that transcend past grievances. In this context, solidarity plays a crucial role in post-conflict recovery, enabling collective action, mutual support, and rebuilding trust within communities. It allows individuals and groups to unite around common goals, overcoming divisions and working together towards a more just and peaceful society (Jabri, 1996). Strengthening solidarity through grassroots initiatives and inclusive policies is essential for the long-term success of post-conflict recovery efforts (Lederach, 1997).

Citizen participation and social capital can theoretically be a powerful means to overcome collective trauma, particularly in post-conflict societies. High levels of social capital can facilitate collective action and cooperation, which is essential for addressing the psychological and social consequences of collective trauma (Putnam, 2000). Citizen participation enhances a sense of agency and empowerment among individuals and communities affected by trauma. When citizens actively engage in decision-making

processes, it can restore a sense of control and collective efficacy, often undermined by traumatic experiences. This engagement fosters social inclusion, which is vital for rebuilding trust and reducing the sense of alienation that can accompany collective trauma (Lederach, 1997). Building strong social connections and actively participating in the community enhances social capital, aiding healing by providing emotional support and access to resources. This shared identity helps create a collective narrative that includes all community members, reducing the risk of further social disintegration (Hirschberger, 2018). In addition, citizen participation in post-conflict reconstruction efforts can help address the root causes of trauma by promoting inclusive and participatory governance. This approach ensures that the voices of those affected by trauma are heard and their needs are met, fostering a sense of justice and reconciliation (Fung, 2004). Theories of deliberative democracy suggest that participatory processes can lead to more legitimate and widely accepted outcomes, which are essential for long-term peace and stability.

All these theories and studies addressing social capital suggest that citizen participation and social capital can overcome collective trauma by fostering social cohesion, trust, and a sense of collective agency. By creating safe spaces for dialogue, civil society organizations can bridge divides between communities and offer support systems for individuals affected by trauma. They contribute to accumulating bonding and bridging social capital (Leonard, 2004). Rebuilding social capital in post-conflict cities involves social networks and the physical infrastructure which enables social interaction. Research shows that the design of public spaces, availability of social services, and urban planning all impact the restoration of social capital by facilitating interactions and fostering a sense of safety and shared ownership among citizens (Colletta & Cullen, 2000).

Social capital is a multidisciplinary concept with numerous definitions and theoretical assumptions that differ based on the perspective from which the phenomenon is observed. It is “the association of individuals in interactions and networks to generate profit” (Lin, 2008). James Coleman defines social capital as the ability of people to work together in groups and organizations for common goals (Coleman, 1988). This means that social capital is an organized and directed form of individual action with pre-formed common goals. Traumatic events, such as armed conflict and massive and systematic human rights violations, can have profound and long-lasting, even transgenerational effects on trust and social capital. According to the renowned regional public opinion survey Balkan Barometer, trust in Bosnia and Herzegovina institutions is among the region’s lowest (Blagovčanin, 2024). Trust in certain Bosnian citizens is notably low, with more than two-thirds of people expressing distrust in the judiciary, government, and parliament. This skepticism extends to the belief that institutions cannot effectively tackle social issues, as reflected in the low engagement in civic and political activities (Blagovčanin, 2024). The UN and the World Bank stress that an effective management system is essential for conflict prevention, addressing interconnected issues like citizen participation, exclusion, marginalization, and weak state capacities. Participatory urbanism is vital for creating urban spaces that are responsive and adaptable to local needs and priorities, fostering social trust and collaboration, which is essential for rebuilding social capital. Participatory methods, such as community-based workshops and co-design sessions, can help reconcile diverse community needs while reinforcing social cohesion (Gebhardt, 2020). The mechanisms of effective citizen engagement in urban regeneration emphasize that participatory practices must be inclusive and context-sensitive, especially in communities with historically low institutional trust (Wilson & Tewdwr-Jones, 2021). If adequately supported, participatory processes can strengthen social capital by fostering relationships and mutual support, which is essential in post-conflict city dynamics.

Encouraging citizen participation in urban redevelopment involves involving residents in planning and decision-making. In alignment with the UN SDGs, particularly SDG 11, local governments in Bosnia and Herzegovina should commit to enhancing "inclusive and sustainable urbanization and [the] capacity for participatory, integrated and sustainable human settlement planning and management" (UN, 2024). This can be achieved through various methods such as public consultations, community workshops, participatory budgeting, and collaborative design processes, which can contribute to UN SDG 16 in promoting peaceful and inclusive societies for sustainable development, accessible to all, and accountable and inclusive institutions at all levels (UN, 2024). Citizen involvement helps identify local priorities and provides valuable insights that planners and developers might overlook (Arnstein, 1969). Moreover, citizen participation fosters a sense of ownership and empowerment among residents. When people are involved in shaping their surroundings, they are more likely to support and take pride in redevelopment outcomes. This involvement can lead to greater social cohesion and a stronger sense of community identity (Innes, 2004). Moreover, involving citizens in the planning process can help to build trust between the community and local authorities, which is essential for the long-term success of urban redevelopment initiatives (Fung, 2004). Citizen participation enhances transparency and accountability in redevelopment. Open, collaborative decision-making increases the chances of public-focused outcomes and helps reduce conflicts, as residents feel their concerns are acknowledged (Forester, 1999).

3. Novo Sarajevo in Transition

Sarajevo is a linear city that has been chronologically developed along the river Miljacka from east to west, with its urban morphology acting like a timeline and narrating the city's history from its origins to its most recent developments (Figure 1). The typical urban panorama associated with the image of Sarajevo stretches along the main boulevard's linear path of 9.5 km, from City Hall in the east to the crossroad at Stup, rhythmically punctuated by transversal streets and bridges across the Miljacka every 500 m. This study focuses on areas at the midpoint of this city line, the point of encounter between the historical and modern Sarajevo. Still, it is not the typical image usually included in tourist guidebooks. Grbavica and Hrasno (including the local community of Trg Heroja, translated as Heroes' Square) are two socialist residential areas in Sarajevo, each with a distinct historical and social background. Both neighborhoods consist of modernist mono-functionalist residential blocks developed during the Socialist Yugoslav era in the first waves of post-World War II urbanization and population growth. Situated in the most densely populated municipality of Novo Sarajevo, below the central administrative, commercial, and business district of Marijin Dvor, the residential neighborhoods of Grbavica and Hrasno sit in a quiet zone delineated by a green promenade along the river Miljacka to the north and a longitudinal road to the south. The area of the municipality of Novo Sarajevo at 9.9 km^2 makes it the smallest municipality in the Canton of Sarajevo; however, it has a population density of 7,449.3 inhabitants per km^2, which is 21.6 times higher than the average of all other municipalities (Zavod za Planiranje Kantona Sarajevo, 2012). In administrative terms, the analyzed areas are called "local communities": The local community of Grbavica 1 measures an area of 36.5 ha with 10,100 inhabitants, and Grbavica 2 measures an area of 30.7 ha with 7,100 inhabitants. The local community of Trg Heroja is part of the Hrasno neighborhood, and measures a total area of 24 ha with 7,115 inhabitants. This study area was selected due to its strategic location, socialist heritage, and challenging history, which have affected social cohesion and the use of social spaces.

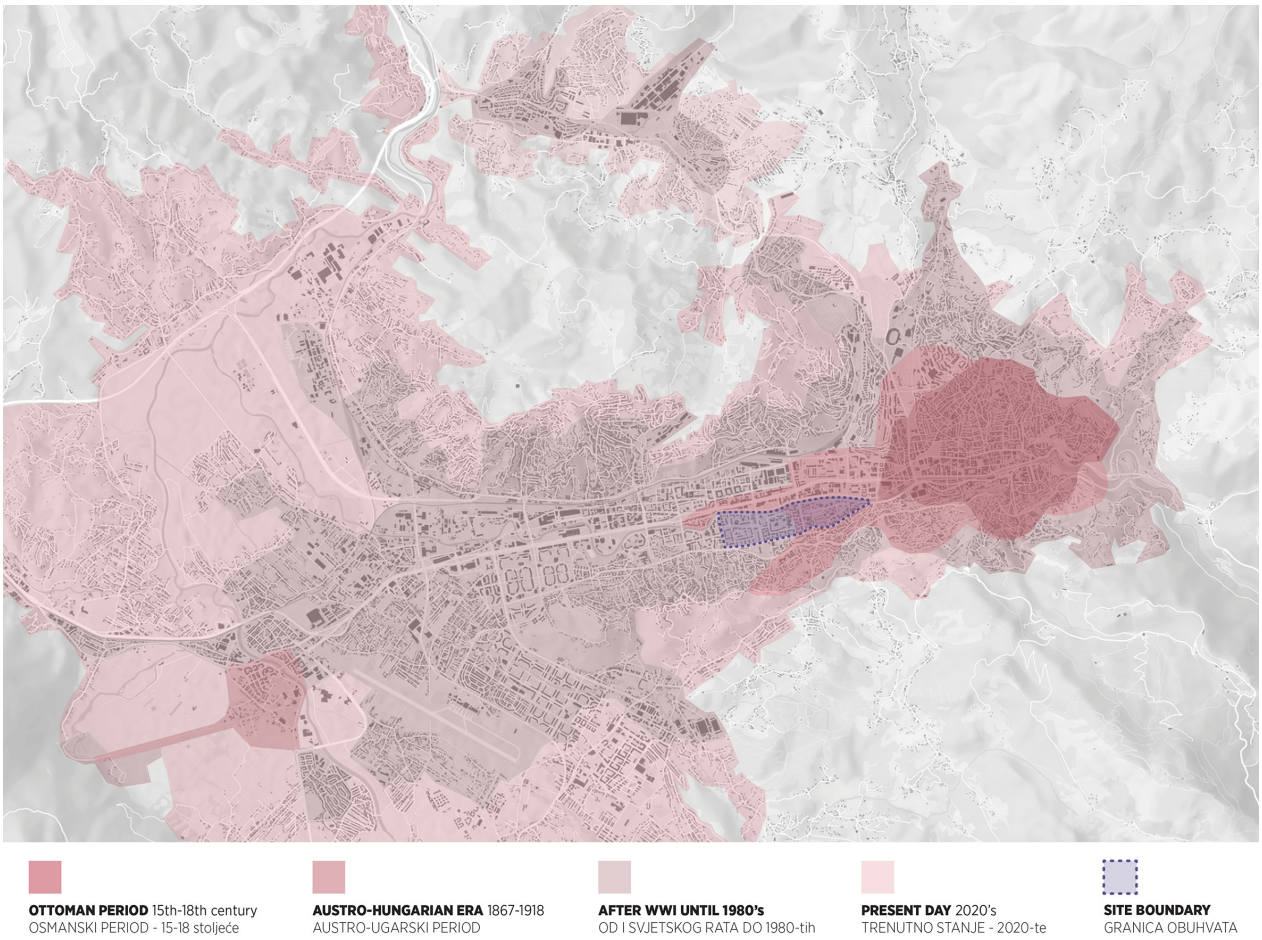

Figure 1. The city map of Sarajevo indicates the historical development of the neighborhoods in a chronological manner from east to west, as well as the location of the study areas in the municipality of Novo Sarajevo.

3.1. First Period: Construction Boom and Socialist Utopia

In the first decade after World War II, housing development in Sarajevo was marginalized to sporadic small-scale projects which, despite the insufficient number of dwelling units, could not respond to the increasing population. According to housing fund statistics, housing standards in Sarajevo were less favorable than those in the capital cities of other Yugoslav Republics (Finci, 1964). The ruling communist regime of the epoch finally addressed these housing issues and in 1955 major construction projects were launched. From 1958 to 1962, the number of dwellings made to accommodate the increased population rate set a record, and the neighborhood of Grbavica was the symbol of this first wave of residential development. However, a quality assessment of the large-scale development shows that the projects had not been based on studies on the actual needs of the inhabitants, and that the newly built estates prioritized rational floorplans which merely adhered to minimal standards, and addressed only economic and technical factors (Finci, 1964). The urban plan of the Grbavica neighborhood was developed in 1948 by architects Zdravko Kovačević, Milivoj Peterčić, and Branko Kalajdžić and is composed of two areas: Grbavica 1 was planned for 12,100 inhabitants, 378 inhabitants per km^2; Grbavica 2 for 11,200 inhabitants, 520 inhabitants per km^2 (Društvo Arhitekata Sarajevo, 1963). The subsequent wave of construction continued toward the west from 1967 to 1969, when the adjacent residential quarter of Hrasno was developed. According to the

General Urban Plan from 1963, Hrasno was planned for 9,900 inhabitants, 471 inhabitants per km2 (Društvo Arhitekata Sarajevo, 1963). In the General Urban Plan of 1963, Grbavica and Hrasno were designated mono-functional residential areas, with a small share of mixed-use and public functions.

Under socialism, the neighborhoods of Grbavica and Hrasno were symbols of Sarajevo's multi-ethnic and socialist identity, characterized by communal living and social harmony. The urban concepts of these neighborhoods were designed as fragmented, modernist blocks consisting of residential buildings with parking and green areas on the periphery, gravitating towards communal public facilities, including shops, cafes, community centers, schools, and kindergartens located in the center. In the original urban plan, the built area and street footprint make up 60% of the area, while the remaining 40% are open, green spaces (Aganović, 1977). The building density increases westwards, from Grbavica 1 towards Hrasno. The urban composition of these blocks was defined by a typical free-form orthogonal arrangement of two typologies of residential buildings surrounded by green areas, including modernist apartment buildings (up to five floors) and residential high-rises (more than eight floors). The area of Grbavica 1, first developed, features a linear arrangement of residential high-rises along the river Miljacka. In contrast, the adjacent regions of Grbavica 2 and Hrasno are also accentuated by residential towers in the block's interior. The main feature of the westernmost region of the Hrasno neighborhood, specifically of its local community named Trg Heroja, is the square placed in the heart of the block, with its urban morphology defined by five-story apartment blocks and emphasized by four 20-story residential towers. The project involved using a prefabricated construction system to develop five different housing types, with half of the units being one-room apartments ranging from 38 to 42 m^2. Unlike the Grbavica neighborhood, where the parterre is inactive, the ground floors of the residential buildings in the Hrasno block were designed to host public functions and are linked with the surrounding public spaces. The critical public facilities within Grbavica that contained indoor social spaces were primary schools, a music school, kindergartens, two youth centers, and a commercial center. In addition to kindergartens and a primary school, the local municipality of Trg Heroja during the socialist period also included more commercial zones, especially ones concentrated in the parterre spaces surrounding the main square. Open public spaces in Grbavica and Trg Heroja were typically sparsely equipped green areas arranged in free-form layouts intertwined with parking zones.

3.2. Second Period: Sarajevo Under Siege. Reunification of the City

During the 1992–1995 aggression on Bosnia and Herzegovina and the siege of Sarajevo, the Grbavica neighborhood was under occupation. The frontline between occupied and liberated territory passed along the transversal road, which separates the neighborhoods of Grbavica and Hrasno (Figure 2). This road, together with the Miljacka River and Vrbanja Bridge on the eastern side, represented the division lines of the city for four years. Grbavica remained under occupation until March 1996, making it one of the last areas in Sarajevo to be reintegrated into the city after the war. The occupation turned Grbavica into a site of severe conflict and suffering. Many of its residents faced violence, forced displacement, and persecution. The war had a profound impact on Grbavica, resulting in devastated physical infrastructure and a torn social fabric with eroded trust among neighbors. The defense operation at Trg Heroja was one of the most complex operations in the Sarajevo area in 1992, preventing the last attempt to divide the city into two parts.

There is a strong community of Trg Heroja veterans who have been active members of the local community since their victorious battle. In March 1996, Grbavica was reintegrated back into the city, leading to the

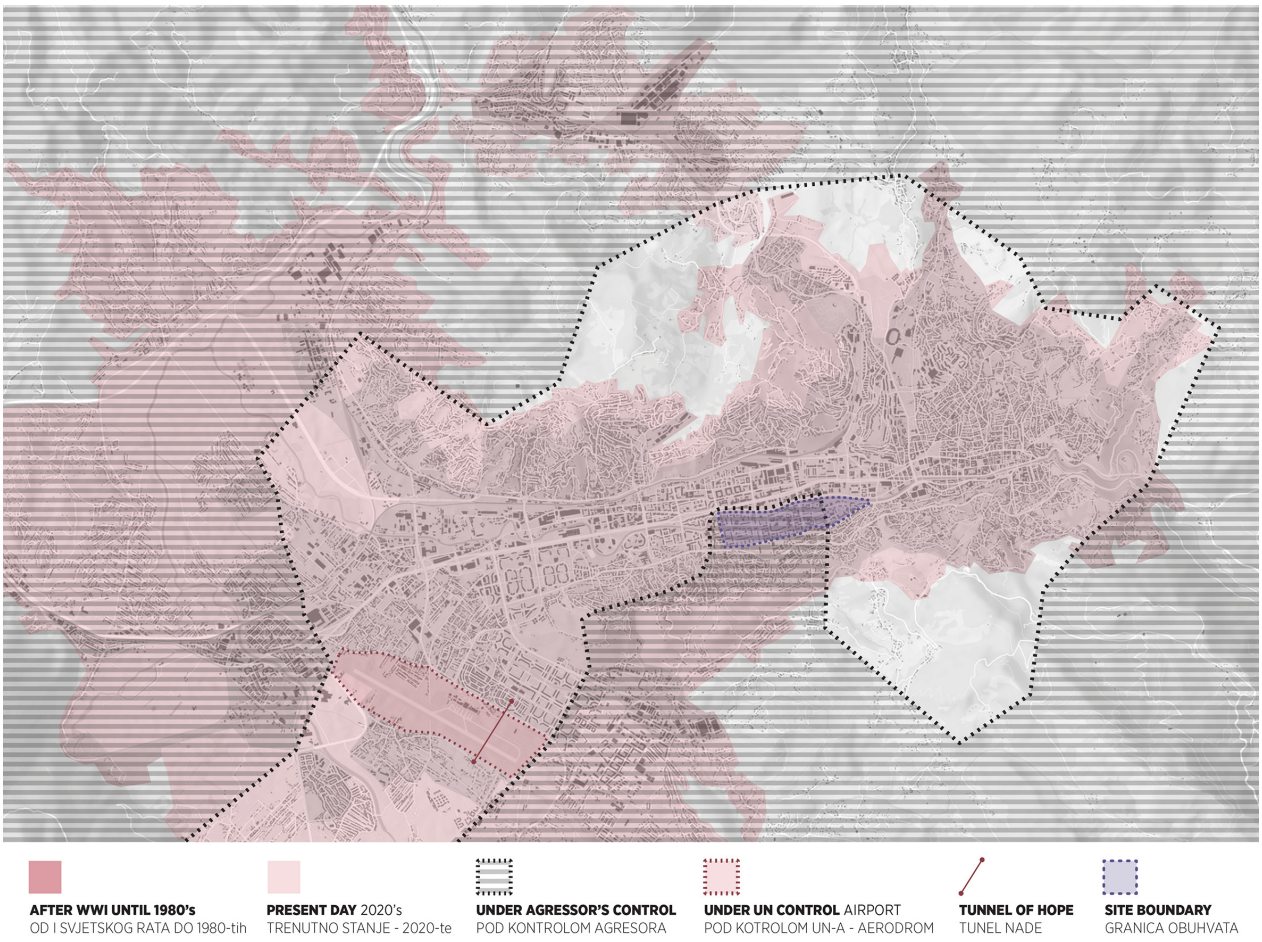

Figure 2. City map of Sarajevo under siege 1992–1995, showing areas under occupation by the aggressor army and the study areas of Grbavica and Hrasno divided by the frontline.

reunification of Sarajevo; this was followed by the removal of barricades from the bridge of "Brotherhood and Unity," a name both symbolic and ironic, reminiscent of the famous slogan of the communist party of the collapsed socialist system. All the buildings which stood on the frontline were destroyed by fire and bombshells. In contrast, the ones in the interior of the quarter were primarily vacant, the streets full of garbage and rubble, evocative of post-apocalyptic scenery. Significant demographic changes occurred before, during, and after the siege, from mortalities to population migration to and from the areas in focus.

3.3. Third Period: Post-War Transition. Citizen Activism and Participation in the Post-Socialist Period

In the case of the study areas in Novo Sarajevo, most of the buildings on the frontline sustained severe damage, and their primary structural refurbishment became a priority in the first decade after the war. Moreover, post-war recovery included rooftop extensions on the existing apartment buildings and structural refurbishment to accommodate the incoming population. In the last decade, the municipal administration supported, launched, and implemented energy efficiency projects, focusing mainly on public buildings and providing subsidies for the energy refurbishment of collective and single-family housing (Ured za Energetsku Efikasnost, 2024). Residential buildings, together with public facilities, primary schools, clinics, kindergartens, and cultural centers, have been, for the most part, refurbished in the past two decades. There are also two

marketplaces, one in Hrasno and the other in Grbavica, the Faculty of Forestry (university building) and a Franciscan student dorm, several newly built commercial buildings, and two mosques (Figure 3). Fortunately, the completeness of the urban layout in the two analyzed areas left little room for ambitious post-socialist commercial developments, which largely preserved the character of the quiet and safe residential neighborhoods. The green areas, especially in the neighborhood of Grbavica, were initially preserved in the post-war period; however, they later became endangered by a significant increase in parking spaces and appropriated by private, illegally built, and subsequently legalized single-story provisional commercial facilities to compensate for the passive ground floors of the residential buildings (Zagora & Samic, 2021). Moreover, due to unresolved legislative issues regarding the jurisdiction of communal services over the management, supervision, and enforcement of maintenance, public spaces have continued to deteriorate (Jusić, 2013), which is reflected in the urban decay of social spaces originating from the socialist period. Social research on the maintenance of common spaces in residential areas has shown the decline of collective activism, social cohesion, and trust in general among the citizens of Sarajevo (Jusić, 2013).

On the other hand, the law guarantees official public participation in urban development matters. According to the 2017 Sarajevo Canton Law on Spatial Planning, the participatory process is obligatory once spatial planning documentation is drafted. However, citizens are not included in preparing the planning documentation. The official public consultation period lasts from 30 to 90 days, depending on the level of planning documentation, and takes place in the so-called "Local Communities." This is another piece of legacy from the socialist period, representing local governance units known as the "Mjesna Zajednica" (Local Community), the relevance of which has even been promoted by international organizations and NGOs. Similar to European models of sub-municipal or neighborhood-level governance, this structure has the potential to support the democratization of society (United Nations Development Programme [UNDP], 2024). However, civic activism and responses have only emerged recently in urban issues and remain insufficiently expressed. One of the first citizen initiatives was the City and Nature project launched in 2013. This initiative included Gradology, an online activist platform that assists Sarajevo's citizens in identifying and mapping urban open spaces, such as parks, squares, abandoned buildings, and underutilized areas

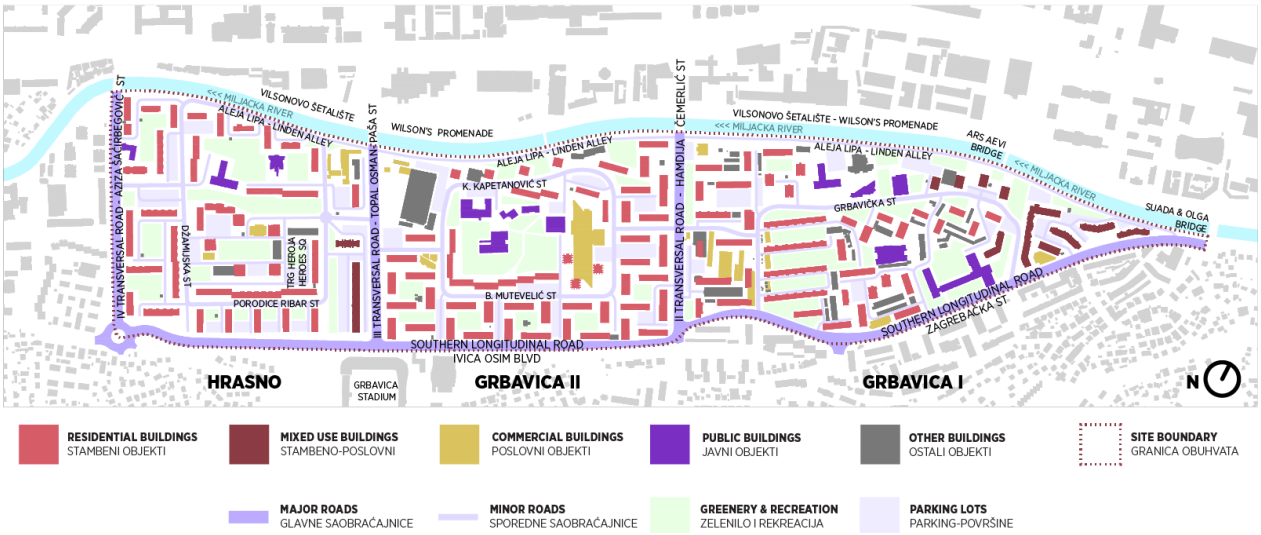

Figure 3. Map showing the current urban layout of the Grbavica and Hrasno (Trg Heroja) study areas within the municipality of Novo Sarajevo.

(LIFT, 2015). Similarly, a self-organized group of young activists known as Dobre Kote has focused on transforming neglected and uninviting urban areas into gathering places for the local community, particularly children, through collaborative efforts (Association of Architects of Bosnia and Herzegovina, 2017). Since 2019, an informal group of citizens has been active in civil revolts against appropriating and converting part of Hastahana Park in Sarajevo into a construction site. This citizens' initiative was a signal to initiate a collaborative planning approach on this and other significant sites in Sarajevo. In response, in July 2021, the UNDP in Bosnia and Herzegovina and the municipality of Centar, in partnership with both the Faculty of Architecture of the University of Sarajevo and the City of Sarajevo, launched a pilot sustainable urban transformation initiative titled "Re-Imagine My Street." The initiative focused on five selected public micro-locations within the municipality of Centar, Sarajevo, organizing urban labs—interactive, outdoor, and creative workshops—to gather place-based ideas and visions from citizens and businesses for the sustainable future of their streets and neighborhoods, accompanied by the launch of an online digital platform (Municipality Centar & UNDP, 2022). After the Urban Lab Hastahana event and a digital survey, an international competition for the "Hastahana – Public Space for Everyone" design was held. The winning concept was chosen through public voting, and by June 2023, the detailed design was in the process of being finalized, with implementation set to begin soon. Today, social consciousness and civic activism around key urban issues have slightly increased, thanks to various activities like urban walks, workshops, and participatory actions led by organizations such as Crvena, LIFT (organizer of the Days of Architecture in Sarajevo), and DKC Sarajevo (a socio-cultural center). A recent collaborative project that has brought together multiple institutional and municipal partners, and includes participative mechanisms in urban planning, is the Urban Transformation Project Sarajevo (ETH Zurich et al., 2024). Participatory activities of this project include the establishment of the Urban Design Studio Sarajevo as a collaborative workshop space open to the public, and The Studio Mobil as a visionary outdoor city laboratory which invites citizen participation.

Although case studies of citizen activism and participatory projects in Sarajevo are few and relatively recent, they, alongside international examples of the best practices, illustrate that the benefits are multidirectional. Such initiatives add value for all stakeholders, including for the public and private sector, civic organizations, the broader community, researchers, and educators, mitigating the negative impacts of transition and striving towards a more inclusive and sustainable transformation of the post-conflict and post-socialist environment.

4. Case Studies: Citizen Participation in Grbavica and Hrasno (Trg Heroja)

4.1. Methodology of the Citizen Participation Project "(Re)Construction of Community"

In line with local and international good practices striving to achieve UN SDGs 11 and 16, Community Architecture Studio, conducted by the Faculty of Architecture of the University of Sarajevo, was designed to educate students in critical spatial action within the contemporary political, ideological, artistic, and philosophical context of architecture at a micro-social level in the community. The course aimed to unlock the community's potential by fostering shared spatial and social interests. The three-year project was based on the hypothesis that utilizing the potential of the ex-socialist community and its values could change the narrative of community disengagement, manifested in general distrust and "learned helplessness." Indeed, to strengthen micro-social forms of community, it is crucial to build upon the collaborative practices and traditions of the ex-socialist community. These practices are seen as a foundation for regenerating,

reconstructing, adapting, and sustainably managing community structures (Hardt & Negri, 2017). The methodology was developed based on research on user participation in the design and use of social resources in architecture (Tatlić, 2017). The (Re)Construction of Community project in Sarajevo was an integral part of the Community Architecture Studio course at the Faculty of Architecture through which local communities were engaged by means of a participatory spatial and architectural planning approach. This initiative was developed in conjunction with the NOVO! Novo Sarajevo (NEW! New Sarajevo) research project organized by the Faculty of Architecture focusing on the methodology of a comprehensive, sustainable, and inclusive urban transformation of this municipality (Zagora et al., 2024). The course was divided into several phases and organized through interdisciplinary activities and alternative teaching methods. The (Re)Construction of Community project unfolded in three stages: expert panel discussions, social activism, and participation in design, all organized through multidisciplinary activities and alternative teaching methods.

The (Re)Construction of Community project, part of Community Architecture Studio, utilized a participatory action research approach to engage residents and students in a collaborative planning process. This model actively involves the community in research and design, emphasizing user participation and architectural planning within a shared social context. Deriving from Lewin's work on action research, participatory action research combines elements of community-based research, popular education, and action for social change (Brydon-Miller & Maguire, 2009). In our project, data collection methods included surveys, interviews, case studies, workshops, and panel discussions. Initial surveys were conducted with residents to understand their spatial needs and preferences. These internet and written surveys aimed to capture demographic data and specific requests for community enhancements. Questions addressed aspects such as the use of community spaces, desired facilities, and levels of engagement with local initiatives. Municipal employees and local community leaders were interviewed, focusing on administrative roles, budget constraints, and challenges in implementing citizen suggestions. Structured questions allowed insight into the municipality's procedures for receiving and handling citizen feedback. The project used a case-study approach focused on two settlements in Sarajevo's Novo Sarajevo municipality. This area was chosen for its socialist background and history of conflict, making it ideal for exploring participatory urbanism. A series of panels and workshops (e.g., the first and second citizen panels) were organized as interactive sessions where community members discussed their priorities and mapped their needs on physical models. Using the Charette procedure, small groups could contribute iteratively to the discussions.

The methodology used for the study areas of Grbavica and Trg Heroja was the same. It began with interdisciplinary lectures featuring faculty from various fields, including architecture, political science, sociology, and cultural anthropology. The lectures focused on community architecture, social research methodologies, decision-making processes, and the social context of spatial interventions. The goal was to encourage students to move away from traditional technical thinking and adopt a more socially responsible approach. After the lectures, student groups researched to define their goals for public participation. They surveyed the local community to understand the needs of its citizens better. Using spatial analyses and mapping techniques, they identified potential social spaces. This information informed the communication plan for the first citizen panel, which focused on promoting social activism and community engagement. Additionally, students developed an interactive 3D model to help participants visualize their needs and suggestions. This model served as a "communication starter," encouraging open dialogue without imposing spatial decisions (Figure 4). The Charette procedure was used to organize the panel and promote open

communication. Participants were divided into small groups to discuss the needs of the neighborhood and potential social spaces. The input from community members was then synthesized to identify critical spatial potentials and issues (Figure 5). The project's final phase involved the community in the design process. Students identified the needs discussed in the initial panel and created a spatial model to represent the panel's conclusions. The visual representations were designed to remain open-ended, encouraging ongoing citizen engagement in future panels. During the second citizen panel, students presented their findings and proposals. They focused on mapping user needs, identifying problems, and suggesting opportunities.

Figure 4. The Charette procedure applied to the case study of Grbavica.

Figure 5. Mapping the needs of citizens on a 3D model in the Trg Heroja case study.

The communication throughout the process was flexible, fostering a sense of openness and creativity to encourage ongoing dialogue. In the final phase, the students divided themselves into groups to develop spatial solutions for the issues identified by the community. These solutions were later presented to the local community, the municipality, and the Faculty of Architecture for final consideration.

Throughout the project, various stakeholders played crucial roles. The students were central to the initiative, conducting research, facilitating discussions, and developing spatial proposals. They collaborated closely with local community members, municipal officials, and experts from various disciplines. As the project progressed, the municipality became a critical stakeholder, recognizing the importance of community participation and expressing satisfaction with the communication and design outcomes. Experts from various faculties and NGOs provided valuable insights, helping to shape the students' approach to community engagement and spatial planning. The project faced challenges due to the limitations of traditional technical education, which often overlooks communication and social studies in architecture. Additionally, the established nature of architectural and city development posed obstacles to implementing the project's open methodology and participatory approach. Moreover, Sarajevo's post-war political transition has led to a sense of "learned helplessness" among the community, making it challenging to foster active participation. However, the project successfully engaged the local community in spatial planning, creating a new habit of citizen participation with positive feedback from community members and officials. The project signified a shift in the students' experience from a traditional architectural education to a more socially engaged approach. The municipality acknowledged the project's significance and engaged the Faculty of Architecture to develop participatory approaches further, with one student's Trg Heroja project currently in the executive design phase, and another's Grbavica project in the municipality's budget proposal.

4.2. Case Studies and Their Influence on Community Cohesion in Urban Development

The initial stage of the project focused on the Local Community Center of Trg Heroja. It involved 12 students who aimed to explore the hypothesis of expanding or adapting an existing local community center into a new, functional community facility. Several NGOs were active on location, but veterans' and pensioners' associations also actively participated in local politics; indeed, there are ongoing efforts to restore local self-governance, and local community members and administration have appealed to the European Union to regain powers lost following the collapse of the socialist system, during which local communities had more authority and managed their funds through accounting systems (interview with Z. Babić, Secretary of the Local Community Office of Trg Heroja, March 2023). Following an expert panel's guidance, students mapped current social spaces and explored the potential for new ones. They surveyed 59 participants, most aged between 15 and 30. The survey was conducted through various methods, including oral interviews, written questionnaires, and online surveys within the local community. In conclusion, the data highlight diverse engagement patterns within community spaces such as Trg Heroja Square. Some individuals, though a minority, actively engage in local community initiatives, suggesting potential for collaboration. Key findings show a preference for outdoor recreation, highlighting the need for improved amenities such as green spaces and seating areas. The results of the survey showed also a greater desire for community involvement in decision-making (Tatlić, 2024). Although the students were actively engaged in the project's transparency, social media, and communication with the community, the primary role of engaging citizens in panels was assigned to a local community secretary. In the first panel, there were 19 participants. Almost half of the participants were seniors (52.63%), with adults constituting the other half (47.37%). Most seniors returned

to reclaim the space for gatherings the municipality had taken from them a few years ago. Although they had actively participated in discussions during the first panel, mapping out the problems and needs in their community and offering their vision for local spaces, they reappeared at the following two. Their needs were mapped onto the model and synthesized into a needs map (Figure 6). They were highly engaged in creating new social spaces alongside students. The local community in Trg Heroja was actively involved in the decision-making process, especially during the citizen panels, where their input played a crucial role in shaping the project's outcomes. Many older residents who lived there during socialism asserted their right to access public spaces, and although initially skeptical about the project, they expressed satisfaction with the process after three meetings and demonstrated a strong sense of community cohesion. Students frequently changed their groups based on the tasks and their interests but, ultimately, organized themselves into five groups to work on the final designs for a central park, a seniors' area, a youth area, an inclusive playground, and a dog park. The project was recognized as a valuable achievement of research and established communication with the local community, and as such, it was further included in the municipality's budget proposal. Subsequently, the municipality of Novo Sarajevo has contracted the Faculty of Architecture at the University of Sarajevo to develop a proposal for a Central Park design.

Due to the established cooperation, the municipality proposed to address the problematic and "lost" public spaces in Grbavica. The architects in Novo Sarajevo anticipated that the Community Architecture Studio and its students would tackle the problem of deteriorating public spaces while engaging with the community to create new social spaces. The course included 15 students. They had an example from Trg Heroja and a presentation of a previous project, which allowed them to learn from past mistakes and improve the project

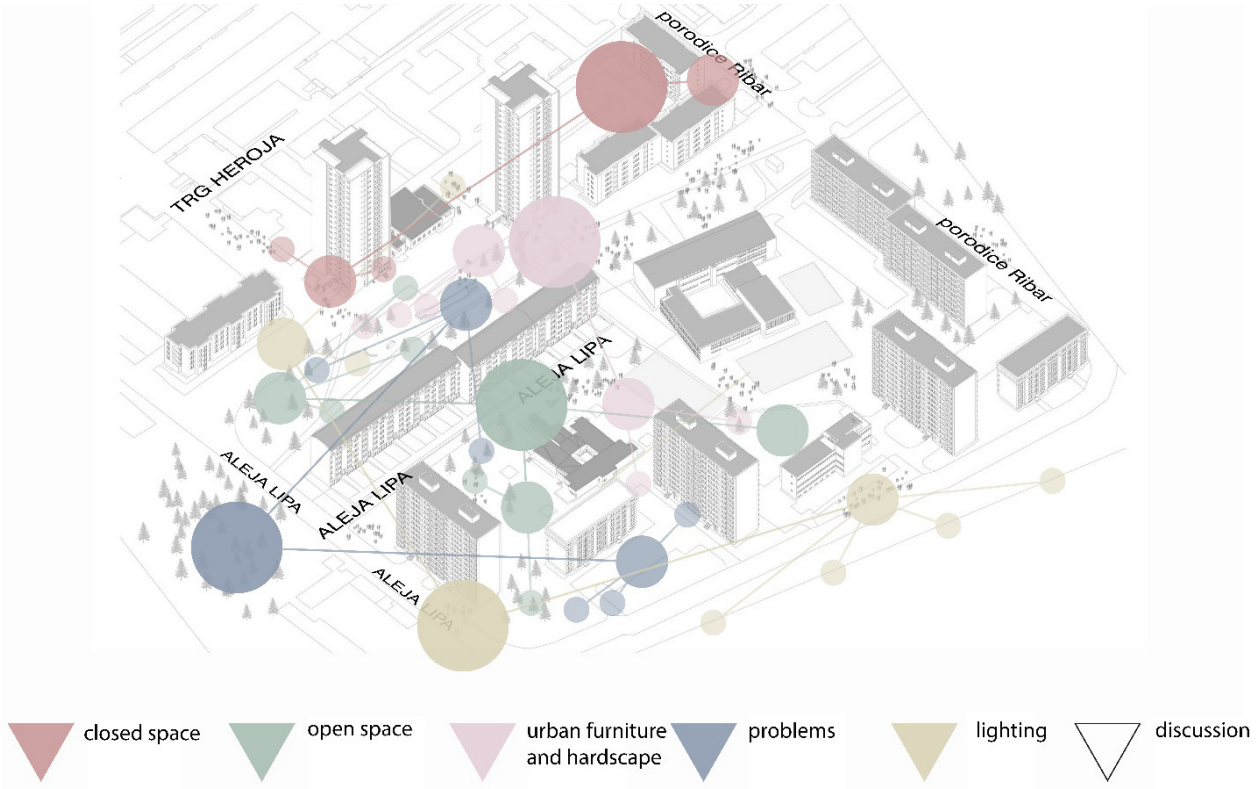

Figure 6. Map of citizens' needs.

and their communication with the community. The students conducted a thorough spatial analysis to identify issues and potentials within the designated area. This analysis focused on four main categories:

1. Identification of Problems: The students identified several problematic areas, including abandoned buildings that contribute to spatial degradation, unmaintained structures that pose safety hazards, and the privatization of green spaces, which restricts accessibility and undermines communal use. These factors create a fragmented and less cohesive urban environment.
2. Assessment of Potential: Opportunities for improvement were highlighted, emphasizing the addition of community amenities such as parks, kindergartens, inclusive recreational and sports spaces, and improved landscaping. These interventions aim to enhance the overall accessibility and quality of life, creating an inclusive environment that caters to diverse community needs (Figure 7).
3. Analysis of Open and Closed Social Spaces: The spatial layout was examined to assess both open, publicly accessible spaces and restricted or privatized spaces. The presence of closed spaces limits movement and social interaction within the neighborhood, indicating the need for more integrated and open environments to support community connectivity.
4. Review of Municipal Spaces: The study also identified existing municipal spaces that are currently occupied or underutilized, proposing that these could be repurposed or redesigned to meet communal needs better. This would enable a more efficient use of public resources and enhance the functionality of the urban fabric. The students effectively identified critical spatial issues alongside actionable recommendations through this analysis (Figure 7).

A survey of 114 participants showed a diverse user base, with 60.4% of respondents female and 39.6% male. The age distribution was balanced, with 33.9% aged 18 to 34 and 26.8% aged 55 and above. Most participants were employed (53.2%), followed by students (29.7%) and retirees (13.7%). A significant number (47.7%) reported visiting the area "continuously," while 17.1% said "often," indicating its importance in daily life. However, 43.2% expressed dissatisfaction with community engagement in development decisions. Support for activating the space is strong, with 73.9% favoring improvements. Key concerns included a lack of parking (37.8%), waste management issues (19.8%), and insufficient recreational facilities (17.1%). Respondents particularly prioritized additional walking paths (30.6%), parking improvements (27%), and community interaction spaces (18%) as crucial projects for enhancing quality of life. These findings emphasize the community's interest in functional and social enhancements to foster a more inclusive and interactive environment. In conclusion, the survey highlights a clear community interest in improving the Grbavica 1 area through increased public engagement, enhanced recreational facilities, and better infrastructure, which collectively could contribute to a higher quality of life for its residents.

Figure 7. Analysis of location character and identification of problems and potentials.

The Grbavica community experienced a management change which was reflected in subsequent panels. The new secretary was a young employee unfamiliar with the neighborhood and viewed the secretary position merely as a job. As a result, he did not attend or actively participate in the organization of any panels. The panels were primarily promoted through student posters and social media, resulting in 18 citizens from various age groups attending the first panel (Figure 8). Attendees were adults (70%), seniors (15%), and young people (15%). The attendees were strangers to each other and came out of curiosity, with their own interests or specific expectations. Some of them attended subsequent panels, resulting in different people being involved in each panel. This situation prevented the formation of a cohesive group and community but also led to a larger group being involved. Most people primarily came to listen and observe the process. It was more challenging to involve them in a collaborative process than it was to involve the seniors at Trg Heroja. However, the young and adult groups showed they were well-informed about participation practices in other European countries and displayed particular interest in the process. The case study of Grbavica demonstrates the significant potential for citizen participation, but requires more time and examples to establish it as a regular practice.

After the second panel, students participated in the KuliSa workshop, organized in collaboration with the faculties of architecture of the University of Zagreb, the University of Sarajevo, and the University of Split. During and after the workshop, they implemented the conclusions of the second citizen panel into six project design groups: (a) activation of above-ground garages; (b) activation of passages; (c) sensory fence; (d) Grbavica 1 square; (e) art line; and (f) activation of green areas between residential buildings. They presented their proposals at the third citizen panel at Children's House, a youth center in Grbavica. Following this, the project to activate green areas was included in the budget of the Novo Sarajevo Municipality.

The primary achievement of both projects was the enhancement of citizen engagement in the decision-making process for creating social spaces in their neighborhoods. The university served as a moderator for communication between the local community and the municipality, addressing the administrative barriers of the current communication system. All the processes included gathering data and

Figure 8. Visual identity of Grbavica created by the (Re)Construction of Community design studio.

reaching conclusions which were then presented to the city; in the case of Grbavica, municipality employees even participated in the panels. The local community presented this information to the students as necessary, reflecting systematic and organized community demands. The students then acted as moderators between the local community and municipality, effectively representing the neighborhood and its residents' needs. Members of the local community expressed their satisfaction with both the process and the outcome. The municipality members, particularly the architects, recognized the potential to enhance the living conditions of local communities efficiently and realistically. Strengthening solidarity and fostering collective action and mutual support among community members and students played a significant role in rebuilding trust during this period of post-conflict recovery. The disparity in social cohesion between the two neighborhoods, however, indicates that communities like Grbavica, due to a necessary demographic change after the city's reunification, need more time and intervention to encourage cooperation, compared to more coherent local communities like Trg Heroja. The project (Re)Construction of Community was the first step towards sustainable and inclusive change through community participation. The (Re)Construction of Community project in Trg Heroja greatly enhanced community cohesion and urban development. Residents actively participated in the decision-making process, which fostered a sense of ownership and engagement within the community. This engagement was crucial in rebuilding trust and promoting collaboration in the post-war context. In contrast, the impact on social cohesion in Grbavica was less immediate. The residents were from diverse age groups, and there was a lack of local community organization or leadership. However, the project did succeed in establishing new social spaces through the collaborative efforts of the community.

5. Conclusions

This research focused on citizen participation in the post-socialist and post-conflict neighborhoods of Grbavica and Hrasno (Trg Heroja) in Sarajevo, areas that historically symbolized socialist ideals and modernist urban planning. Selected for their sensitivity, these neighborhoods were divided by the front line during the siege of Sarajevo. The article provides a historical overview and examines the impact of this context on community dynamics and urban development. Two participatory projects were conducted in these neighborhoods as part of a studio by the Faculty of Architecture of the University of Sarajevo in collaboration with the Municipality of Novo Sarajevo.

Even though the impact of creating and participating in new social spaces varied significantly between the two neighborhoods, the participatory approach encouraged dialogue among community members, municipal officials, and students in both locations. This interaction strengthened social ties and promoted a more inclusive atmosphere. The project enhanced community perceptions of the municipality and encouraged participation in public affairs while altering the administrative process for citizen engagement. Regarding urban development, the project demonstrated how community input could directly shape the planning and design of public spaces. The active involvement of citizens led to the identification of critical issues and needs within the neighborhood, which informed the development of more responsive and sustainable urban interventions. The project's success also highlighted the potential for participatory approaches to become standard practice in local governance, as evidenced by the municipality's decision to continue supporting such initiatives. This approach addressed immediate spatial concerns and laid the groundwork for long-term, community-driven urban development, ensuring that future projects align with the needs and desires of the residents.

The transition from socialism to capitalism in Bosnia and Herzegovina has profoundly impacted the country's social, political, and economic landscape. The legacy of conflict and the complexities of its political structures and economic privatization have led to challenges in rebuilding social cohesion and trust. Moreover, the fragmentation of society and the development of a liberal democracy and market economy have created a hybrid regime. This research has shown that encouraging citizen participation and urban redevelopment in line with UN SDGs 11 and 16 offers a way to tackle some existing challenges. By building social capital and involving community members in decision-making, local communities can address the underlying causes of collective trauma and work toward rebuilding trust among residents. The case studies in post-socialist neighborhoods in Sarajevo demonstrate the potential of community-driven projects and offer hope for a more democratic and socially cohesive future. The engagement of citizens and the commitment of local governments to participatory processes can substantially contribute to Sarajevo's post-conflict recovery and development towards a more sustainable, resilient, and inclusive future (Bjažić Klarin, 2018).

Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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Local Voices, Global Goals: Participatory Planning for Localizing the UN SDGs in UNESCO Heritage Site Management

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Abstract

The research detailed here has explored the role of local actors in integrating SDGs into World Heritage Site Management Plans, within a polycentric governance framework. It highlights how SDGs can be localized in the context of World Heritage cities management and urban development. The Medieval Town of Toruń, Poland, serves as a case study here. Empirically, this research was based on three types of data collection, entailing: qualitative analysis of key documents facilitating the pursuit of the SDGs in urban planning; semi-structured expert interviews with representatives of the city administration, members of the Revitalization Committee, members of local NGOs, urban activists, as well as individuals officially designated as experts in city administration documents for projects related to World Heritage; participant observations of Revitalization Committee meetings. In the context of Toruń, the Revitalization Committee emerges as a key actor contributing substantially to the formulation of the World Heritage Site Management Plan and the integration of SDGs, despite not being initially designated for these functions. Toruń's proactive approach, which expands periodic reporting and utilizes the Committee to enhance social participation in decision-making, seeks to ensure the integration of sustainable development principles into the urban planning framework, optimizing financial and human resources without the need to create new structures. The committee's influence is evident in the integration of elements from the Revitalization Plan into the World Heritage Site Management Plan, underscoring a strong connection between participatory planning and the pursuit of SDGs in the context of World Heritage site management.

Keywords

heritage expertise; participatory planning; polycentric governance; Revitalization Committee; Sustainable Development Goals; UNESCO; World Cultural Heritage; World Heritage Cities; World Heritage Site Management Plan

1. Introduction

The 2030 UN SDGs, established in 2015, were designed to address key global challenges (Bowen et al., 2017; Cernev & Fenner, 2020) in an initiative that marked a significant shift, as cultural considerations had been largely omitted from development discussions in preceding decades (Rössler & Lin, 2018). However, integrating the SDGs with established heritage-conservation practices, as delineated by earlier conventions such as the Convention on the Protection of the World Cultural and Natural Heritage, established by UNESCO in 1972, presents substantial challenges (Pereira Roders & Van Oers, 2014). Implementing the SDGs requires that complex issues be addressed, with coordinated efforts across various institutions.

The sustainability principles have been progressively incorporated through a landscape-related approach that underscores the context-specificity of heritage conservation and resource management (Aimar, 2024; Landorf, 2011; Van Oers & Pereira Roders, 2014). World Heritage cities of historical significance may experience a particularly pronounced challenge in balancing the preservation of their historical landscapes with SDGs. That balance is complicated further (with extra layers of complexity added) in urban settings where urban growth and sprawl pose a threat, alongside lucrative business opportunities (Monteiro et al., 2015; Zhang et al., 2015). Problems may be yet further exacerbated in contexts of fragmented ownership of World Heritage sites. Where multiple actors are involved (as they are in cities designated as "world heritage sites"), it is typical for ownership of heritage assets to not reside with a single entity—as would be the case observed frequently among cathedrals and churches—being instead distributed among various actors (Eremenko, 2020; Vahtikari, 2016). This ensures the emergence of a unique mosaic in which each part can impact the entire site; in this context, conflicts arising among actors must be resolved in advance of any development work.

To better navigate this complexity and ensure effective implementation of the SDGs, a deeper analysis of decision-making contexts is essential. This includes examining the capacity of government institutions, the planning processes in place (Engström et al., 2021), and the role of local actors in localizing the SDGs and participatory planning (Bandari et al., 2024). A comprehensive understanding of these factors is crucial for identifying potential areas of conflict, aligning the priorities of different stakeholders, and promoting more inclusive governance models that accommodate both conservation and development needs.

Recognizing these challenges, it is evident that more research is needed to understand how local actors can influence the integration of SDGs into urban planning policies in World Heritage cities. Addressing this gap, the present study focuses on the city of Toruń, Poland, to examine through which institutions and documents within a polycentric governance framework such integration is possible. By analyzing the implementation of participatory planning and the roles of various actors, we aim to understand how SDGs can be localized in the context of World Heritage cities management and urban development.

As various actors can influence the implementation of SDGs in World Heritage cities, this article employs a framework relating to polycentric governance—a self-organizing system by which multiple actors coordinate activities across various decision-making venues and policy issues (Jordan et al., 2015; Kim, 2020). Processes under such governance foster self-organization and create cross-sector linkages among actors, thereby enhancing public participation and engagement (Gatto, 2022; Gould, 2017; Morrison et al., 2023). These actors are not necessarily related, are varied, and can be guided by national and state laws, international

recommendations, and other mechanisms acting in support of public participation processes. The approach is thus one of complex governance characterized by multiple centers of semi-autonomous decision-makers who are in relationships both cooperative and competitive, and resort to conflict-resolution mechanisms when necessary (E. Ostrom, 2009; V. Ostrom et al., 1961). This permits a transcending of traditional hierarchical decision-making systems to include diverse international, national, and local actors capable of exerting a direct or indirect influence on SDG integration decisions (Cordery & Manochin, 2021).

2. Materials and Methods

This research employs a case study method involving the Polish city of Toruń, whose historic center was designated a World Heritage site in 1997, under the name "The Medieval Town of Toruń." The site covers 48 hectares and is surrounded by a 300-hectare buffer zone. Toruń traces its origins back to the Teutonic Order, which established a castle there in the mid-13th century, with a view to its serving as a base for the conquest and evangelization of Prussia (ICOMOS, 1997).

The selection of Toruń as the case study for this research is grounded in the city's unique intersection of historical significance and contemporary governance challenges. As a UNESCO World Heritage site, the Medieval Town of Toruń exemplifies the complexities of integrating the SDGs into urban planning. The city's proactive governance framework, particularly through its Revitalization Committee, offers a valuable lens through which to examine polycentric governance in action, a model essential for navigating the multilayered challenges of sustainable development in heritage contexts (Pereira Roders & Van Oers, 2014). Toruń's approach to participatory planning, particularly in expanding the roles of local actors in SDG integration, further underscores the relevance of this case for broader applications in World Heritage cities facing similar governance and sustainability dilemmas (Gould, 2017). This research thus uses Toruń as a model to highlight how localized efforts can effectively contribute to global sustainability objectives.

Our research methodology incorporated different types of data collection engaged between April 2023 and April 2024, in Toruń. A descriptive analysis of key documents was conducted to facilitate the localization of the SDGs in urban planning. This method focuses directly on the content, enabling the highlighting of specific guidance for localizing the SDGs while ensuring a clear interpretation of the document's original intent (Mutiarani & Siswantoro, 2020; Triatmanto & Natsir, 2019). In the case of Toruń, this is grounded in three critical documents, i.e., the Revitalization Plan, the Local Spatial Development Plan, and the World Heritage Site Management Plan (City of Toruń, 2024a). This method highlights how urban planning in Toruń integrates global sustainability objectives into local policies.

Another source of information for this study was semi-structured expert interviews. In this study, a total of twenty-six interviews were conducted with participants selected based on their involvement in the planning and implementation of Toruń's World Heritage Site Management Plan and Revitalization Committee activities. The interviews were conducted with representatives of the city administration, members of the Committee, members of local NGOs, urban activists, as well as individuals officially designated as experts in city administration documents for projects related to World Heritage. This allowed the research to capture diverse viewpoints, particularly those of actors working at different governance levels, ensuring a comprehensive understanding of how the SDGs can be localized in the context of Toruń.

The semi-structured nature of the interviews allowed for flexibility in accommodating the respondents' expertise and perspectives. Furthermore, this study utilized observations collected from participants at meetings of Toruń's Revitalization Committee, with these seen to facilitate an in-depth understanding of the decision-making processes crucial to effective revitalization as part of the management of a World Heritage site. Furthermore, this study utilized participant observations collected within the framework of the meetings of the Committee in Toruń. These observations facilitated an in-depth understanding of the decision-making processes that are crucial for effective revitalization efforts in the context of World Heritage site management. Participant observations offer a direct glimpse of the Committee's operational dynamics. This approach is particularly useful in participatory governance studies, where the roles of various actors can be complex and interdependent (Gerrard & Sosa, 2014).

The authors are aware of the limitations of this study and selected approach. This study's focus on the case of Toruń limits the generalizability of the findings to other World Heritage cities with different governance structures. Additionally, by emphasizing formally recognized actors, the study may potentially overlook non-institutionalized actors that can impact the integration of SDGs through local actions.

3. Participatory Planning in Toruń and the Leading Role of the Revitalization Committee

The conducted study has demonstrated that participatory planning plays a significant role in decision-making within the polycentric governance framework in Toruń. The method alluded to was developed to create more equitable, sustainable, and effective urban environments through the harnessing of local knowledge, building of community trust, and ensuring planning decisions are more responsive to the actual needs of the community—and thus perceived as more legitimate (Forester, 1999; Smith, 1973). Participatory planning involves the active involvement of users, local communities, and professionals in the development process, at stages from that involving the initial design ideas through to implementation. It is acknowledged as a bridge between decision-making processes and society, aiming to increase the capacity of planners towards more informed participatory planning-tool selection (Denney et al., 2018). This involves participatory processes that "are ultimately about co-creating new forms of blended knowledge where the traditional hierarchies of knowledge dilute" (Roura, 2021, p. 781). The goal is to empower communities and regulate social change, allowing individuals and communities to develop solutions per their conditions and aspirations (Gerrard & Sosa, 2014). Such an approach poses certain challenges; and, in the context of this article, the most notable of these concerns implementation of participatory planning where there are insufficient legal frameworks as regards urban design and participation (Thinyane et al., 2020).

Although the decision-making system regarding World Heritage sites in Toruń can be described as polycentric, interviews show that only institutionally organized actors can exert direct influence on decision-making. This is confirmed by the opinions of various actors, including the city administration and members of NGOs. The analysis shows that even within a polycentric governance framework, individuals without formal affiliations often struggle to engage with the system:

> There are no people acting alone. It's more likely that they're involved with either a district council, an NGO, or a group, because if someone has influence over specific officials or is someone important, then they have more sway. Let's not fool ourselves; the city administration structures are sometimes hard to navigate, and it can be difficult to get things done. (Member of a local NGO)

Our work demonstrates that, in this case of polycentric governance, it is the Toruń Revitalization Committee that plays the most significant role among actors influencing the implementation of SDGs in urban planning. The Committee is a formal advisory body for social consultation at the local government level which is foreseen within the Polish legal system. Its creation was mandatory in the pursuit of revitalization processes under Poland's Revitalization Act of 9 October 2015. Notwithstanding the legal status, the literature on its functioning remains scarce, with most academic texts on the Polish system focusing on the role of the revitalization process in general (e.g., Kołsut, 2018; Przywojska, 2019; Strzelecka, 2011). The most relevant article—a case study of such a Committee's work in the Polish city of Łódź—offers a conceptual summary of the role played "indicating the necessity to combine social, economic, technical and spatial activities in revitalization projects" (Przywojska, 2018, p. 23).

The Revitalization Act of 9 October 2015 specifies the tasks assigned to the Revitalization Committee and envisions its structure by defining the stakeholders to be included in its composition. A committee of this profile and status does not necessarily deal with the protection or management of historical monuments. In the case of Toruń, the subject matter intersects, as Old Town was identified and designated as one of three areas in the wider city experiencing decline, and thus targeted for revitalization. Meanwhile, national law assigns six tasks to the Committee in such a way as to offer a baseline remit. Said tasks include: (a) the identification of the needs and expectations of stakeholders, with effort made to ensure that planned activities are consistent with these; (b) the pursuit of educational and informational activity on the revitalization process addressed to stakeholders; (c) the initiation, enabling, and support of activities that favor dialogue between stakeholders and are at the same time integrated around revitalization processes; (d) assurance of the participation of stakeholders in the preparation of documents regarding revitalization; (e) support for initiatives seeking to increase the influence of stakeholders as revitalization programs are prepared and pursued; and (f) the ensuring of possibilities for dialogue and the voicing of opinions among stakeholders as that preparation work is being done (Republic of Poland, 2015).

The main role of such a committee is to serve as a platform for articulating the voices of various stakeholders connected to the revitalization process and making them aware of each other's interests and goals. To this end, the law further defines the baseline categories of stakeholders to be included in the Revitalization Committee's structure. However, it does not specify the number of persons to be included in each category, leaving the choice to the municipality in charge of organizing the committee. There are seven mandatory categories of stakeholder, delineating the representation of interests of residents—both from the revitalized area and the rest of the city, owners of real estate within the revitalized area, entities engaging in economic activity within the area, entities engaging in social activity within the revitalization area, including NGOs and informal groups, and, as a last group, representatives of both local and national governments.

In the case of Toruń, the Revitalization Committee was established by the Mayor of Toruń. The vision for its role was further specified within the Revitalization Plan itself, going beyond the obligations mandated by national law. The difference is subtle, but here the Committee gains the power to monitor and evaluate the results of the revitalization program, which is not required by national law. Similarly, the Committee consults on planned actions and recommends solutions through the revitalization process (including its implementation). The structure of stakeholders is also expanded beyond the national-law requirements—as a prominent academic center, the city in our study chose to include representatives from the Nicolaus Copernicus University in Toruń within the structure of its committee. All members representing the university

come from the Urban Planning Department rather than the Monument Conservation Department, which has contributed notably to the university's renown in Poland. The Revitalization Plan in Toruń does not deal solely with the Old Town area. Two additional urban districts fall equally under the scope of its work. However, in the context of this article, our analysis will focus exclusively on the area of the World Heritage site.

4. The Role of the Revitalization Committee and SDGs in Urban Planning in Toruń

Three local urban planning documents are relevant to the pursuit of the SDGs in Toruń: the Revitalization Plan (the only one within the formal scope of responsibility of the Revitalization Committee), the Local Spatial Development Plan, and the World Heritage Site Management Plan. These urban and spatial planning documents are the most prolific tools for implementing sustainable development at the local government level in Poland.

Firstly, the Local Spatial Development Plan is a zoning plan for an urban area in Poland defined by legal scholars as "an act of local spatial policy of a normative nature" (Szlachetko, 2017). In the most general sense, it regulates the "rules applicable in the future of development and principles of harmonization of new development with existing buildings" (Szlachetko, 2017). This is not a strategic document in the sense of defining goals and envisioning ways in which they will be implemented, but rather a normative and property-specific plan. This leaves this document as the one least applicable to our analysis, as its connection with the SDGs is that it should be integrated into the details of spatial planning, aligning with the strategic goals of sustainable development set out in other documents.

Among the three urban planning documents, only the World Heritage Site Management Plan is explicit in incorporating the SDGs. This plan prioritizes sustainable development as a core objective for the future management of the Medieval Old Town of Toruń. It designates the SDGs as foundational principles for planning and management. The integration of the SDGs within UNESCO's management framework is attributed to the international regulations governing the UNESCO World Heritage system. The plan elucidates this connection, stating that:

> Due to the adopted principle that the World Heritage Convention is to set standards in the field of heritage protection, its implementation takes into account key international obligations and guiding documents, such as the United Nations Agenda for Sustainable Development presented in the document entitled Transforming Our World: the 2030 Agenda for Sustainable Development. (City of Toruń, 2024a, p. 41)

This linkage is further reinforced by the 2023 Operational Guidelines for the Implementation of the World Heritage Convention, which assert that "states parties are encouraged to mainstream into their programmes…the 2030 Agenda for Sustainable Development" and later directly connect this mainstreaming to a site management plan, stating that, in its creation, "sustainable development principles should be integrated into the management system" (UNESCO, 2023, p. 13).

The World Heritage Site Management Plan for Toruń provides a detailed analysis of specific SDGs, creating a legal and contextual framework for their localized implementation. Particular emphasis is placed on goal no. 11, which aims to "make cities and human settlements safe, stable, sustainable, and inclusive," while

addressing the protection of World Heritage directly through subgoal no. 11.4—on "strengthen[ing] efforts to protect and safeguard the world's cultural and natural heritage" (United Nations, 2015). The indicator for the achievement of this goal reiterates the UN Agenda's focus on financial commitment, specified as "the total per-capita expenditure on the preservation, protection, and conservation of all cultural and natural heritage" (United Nations, 2015).

The Plan also establishes a direct link between "creating safe and comfortable conditions for the use of the World Heritage site by residents and visitors of the city" and the focus on implementing the SDGs. It emphasizes that particular attention should be given to "climate, environmental protection, and social aspects" (City of Toruń, 2024a, p. 44).

Interestingly, the City of Toruń has proposed establishing accountability for its implementation and pursuit of the SDGs. Under its World Heritage Site Management Plan, the city suggests expanding the periodic reporting questionnaire to include, among other items, "the assessment and planning of management actions aimed at implementing the main obligations arising from the adopted World Heritage protection policy, including the implementation of the Sustainable Development Goals." This proposed reporting obligation extends beyond the requirements of the standard UNESCO reporting questionnaires.

It is worth noting that Polish national law also mandates consideration of sustainable development. As the management plan itself observes, even the Constitution of the Republic of Poland obliges public authorities under Article 5 to "guard the national heritage and ensure environmental protection, guided by the principle of sustainable development." However, the national legal framework for sustainable development is limited to declaratory commitments rather than introducing a system for assessing implementation methods.

The local government of Toruń offers a clear definition of its role in heritage management, envisioning itself as an actor that, on the one hand "fulfills tasks related to the protection and management of the historic urban organism—both as the owner of legally protected historic buildings and areas (responsible for their care)," and on the other, is "a local community association authorized and obliged to independently perform public administration tasks" (City of Toruń, 2024a, p. 42). The local government must carry out such tasks with its funds and budget. However, the document emphasizes that "the local government has the opportunity to obtain external funds (including subsidies) for the implementation of tasks in the field of cultural heritage protection, spatial order, conservation of monuments, promotion and education" (City of Toruń, 2024a, p. 42). The proper functioning of those urban structures responsible for heritage protection and sustainable development, as defined above, is underlined as being "crucial for the proper performance of management functions" (City of Toruń, 2024a, p. 42).

Both the internal structure of the city's administration and division of tasks relating to World Heritage Site management and the implementation of the SDGs are deemed crucial for the successful execution of the above responsibilities. The plan stipulates that:

> Achieving the mission adopted in the strategy is only possible with the involvement of all key entities. Therefore, the perspective adopted for the management plan has the following wording: We harmonize activities to maintain all the features of Toruń that build its status as World Heritage. (City of Toruń, 2024a, p. 78)

This pertains to all activities, including educational initiatives, aimed at preserving the city's heritage while ensuring its sustainable development. For example, educational activities are undertaken by Toruń's schools located within the World Heritage zone. These schools participated in events like the UNESCO Days, during which students familiarized themselves with documents like the UNESCO 2030 Agenda for Sustainable Development.

Lastly, the plan establishes a strong connection between the sustainable development of the World Heritage Site and efforts to ensure the sustainability of its tourism. The documents state that:

> The effects of monitoring the tourist traffic in Toruń conducted in 2013–2020 indicated that Toruń has a developed tourist function and demonstrates the need for actions to balance tourist development (sustainable tourism) to implement this function at the correct level while maintaining cultural, natural, and social resources at a high level. (City of Toruń, 2024a, p. 51)

The current Tourism Development Program for the City of Toruń through 2030 focuses on Toruń's historical and cultural heritage being promoted to develop its sustainable tourism.

However, this strong focus on sustainability was implemented under the significant influence of the third planning document—the Revitalization Plan—and the work of the Revitalization Committee. Although the agenda for the Committee is often set by the city administration, the Committee has the autonomy to introduce its own issues and modify those assigned to it, fostering a degree of bottom-up decision-making. This frequently occurs in practice and highlights the participatory nature of the planning process. The Revitalization Plan bridges the gap between the strategic character of the World Heritage Site engagement plan and the zoning mechanisms of the Local Spatial Development Plan. According to Polish national law, it is considered a form of Local Spatial Development Plan (Szlachetko, 2017). However, it emphasizes the social aspects of improving and boosting living conditions within the revitalized area, and sets out a strategic vision for its development. It also requires the participation of the Revitalization Committee, a social consultative body, in its creation and implementation in Toruń's case. Due to the structure of the Committee and the strong engagement of various stakeholders in its creation, the city administration perceives it as a socially legitimate document.

Analysis indicates that in Toruń, the dual nature of the Revitalization Plan—both strategic and implementable—and its strong social legitimacy are reflected in the incorporation of elements from the Revitalization Plan into the World Heritage Site Management Plan. As participant observation revealed, city officials perceived the Revitalization Committee to be a social-participation actor enjoying a high level of social legitimacy. This perception was stated explicitly by the city's Deputy Mayor during the meeting, at which he explained their desire to utilize the expertise of the Committee in the World Heritage Site Management Plan consultations. This integration enhanced the emphasis on SDGs in both documents. The work of the Committee exerted a significant influence on the formulation of key aspects of sustainable development within the World Heritage Site Management Plan, indirectly through their involvement in developing overlapping parts of the Revitalization Plan, and directly through their participation in social consultations as an institution.

5. World Heritage Site Management Plan and Localization of SDGs

Although there is no statutory requirement for social consultations over a World Heritage Site Management Plan, both the Operational Guidelines for the Implementation of the World Heritage Convention 2023 and the Polish UNESCO Committee strongly recommend such consultations. The latter stipulates that, during the development of the World Heritage Site Management Plan, "a draft document should be formulated after consultations with the primary stakeholders, and the final version should be approved and adopted for implementation by all partners. Public consultations should be conducted at each preliminary stage of the plan's preparation" (Polish UNESCO Committee, 2024).

As evidenced by interviews conducted for this study, the city authorities of Toruń presented their efforts in terms of this being the first Polish World Heritage Site to implement an extensive social consultation process in the creation of a document. However, the structure of those consultations was taken directly from an existing format of the Revitalization Plan, and the working methods of the Revitalization Committee. Firstly, consultations were not conducted at a single meeting but were instead divided into separate meetings, supplemented by the results of questionnaires. The categories of division echo those of stakeholders from the Revitalization Committee, with four separate meetings for members of academia, business actors, and residents of the different revitalized areas. Such a construct has not arisen by coincidence. For the present research, a meeting of the Committee was observed during which members who were representatives of the City administration stated that the Committee is used as a "ready, legitimate body to have influence over consultation" (City Administration Representative 1). They further elaborated that the Committee is asked for broad engagement in the World Heritage Site Management Plan consultation process, as "UNESCO is an imaginary, abstract concept for the people living in Toruń, so connecting it with revitalization will get more people involved, and it will make it more concrete as an idea" (City Administration Representative 2).

The use of the Revitalization Committee (as an advisory body that has already had experience with successful co-working) also helped with the avoidance of significant challenges often faced by other consultative bodies, e.g., as regards the ensuring of adequate representation and the maintenance of strong links between consultation and decision-making (Chu et al., 2018). Decisions approved by the Committee gained direct integration into the World Heritage Site Management Plan, rather than remaining as mere discussion points.

The Revitalization Committee was asked to complete questionnaires for the social consultation of the World Heritage Site Management Plan and to participate in all meetings constituting its social consultation, including research walks around the Old Town. Therefore, the connection and influence are not only direct but also initiated by the city authorities. As "effective governance in UNESCO World Heritage sites demands a reframing of the role of management plans as a tool to significantly improve community engagement at the local level" (Ripp & Rodwell, 2018, p. 251), the city of Toruń decided to attempt an approach of repurposed established institutions of social participation for engagement with a broader spectrum of stakeholders in planning for the World Heritage site. Such a connection seems to have the potential to be bi-directionally beneficial, as "at the level of local communities, heritage allows us to build a satisfying reality in a lasting way. The goal of sustainable urban development can, therefore, be most effectively achieved through local communities and heritage" (Kłosek-Kozłowska, 2011, p. 300). Therefore, participatory planning is connected and World Heritage is made a closer and less abstract idea relating directly to the quality of life within the World Heritage zone, the

improvement of which is the purpose of the Revitalization Plan. This is further supported by the Revitalization Plan for Toruń itself, which stipulates that "an important element of the heritage management process is social participation understood as an awareness of the value of the protected heritage/space and involvement in the process of caring for and managing it" (City of Toruń, 2024b, p. 73).

The localization of SDGs within urban planning documents in the context of the World Heritage site is limited to particular goals. The World Heritage Site Management Plan has achieved extensive incorporation of elements from the Revitalization Plan as regards sustainable development, sometimes repeating the text verbatim. SDGs only gain explicit mention in the World Heritage Site Management Plan—an inclusion attributed to legal and institutional intertwinement between the SDGs, World Heritage status, and the planning obligations arising out of the Convention on the Protection of the World Cultural and Natural Heritage. The Revitalization Plan does not reference the SDGs, as it is not required to adhere to that framework. However, it addresses sustainable development for the Old Town of Toruń in detail, and establishes principles later expanded upon by the World Heritage Site Management Plan.

In its introduction, the Revitalization Plan states that this is "a multi-year program of activities in the social, economic, spatial-functional, technical, and environmental spheres, aimed at bringing revitalization areas out of crisis, and creating conditions for their sustainable development" (City of Toruń, 2024b, p. 4). The vision for the Old Town portrays the area as "a sustainable area—not just a tourist attraction, but a place to live for residents, where projects important for the development of the community in the revitalization area are implemented" (City of Toruń, 2024b, p. 159). These projects are primarily cultural and social, working to meet the needs of tourists and residents without endangering World Heritage, thereby creating a vision of a successful revitalization process as one achieving sustainability. This relates indirectly to the SDGs, such as subgoal no. 11.3 on "enhanc[ing] inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries" and, due to Toruń's World Heritage status, subgoal no. 11.4, on "strengthen[ing] efforts to protect and safeguard the world's cultural and natural heritage" (United Nations, 2015).

In detail, examples of strategic goals relating implicitly to SDGs are plentiful: The goal of creating "recreation and relaxation zones available to everyone," relating to subgoal no. 11.7, aims to "provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons, and persons with disabilities"; the goal of establishing a community of residents that are "socially and professionally active," relating to subgoal no. 8.3, aims to "promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services"; or the strategic striving for the World Heritage zone, in which "people who, for various reasons, experience problems of social exclusion are provided with professional support from public institutions and non-governmental organizations working for social inclusion," relating to subgoal no. 11.B, aims to "substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion" (United Nations, 2015).

On a more general level, all future revitalization projects will be assessed and implemented to "take into account the needs of sustainable development" (City of Toruń, 2024b, p. 163). The parts of the Revitalization Plan connected by their thematic areas to the implementation of SDGs are copied directly into

the World Heritage Site Management Plan. Our research shows that such instances are sustainability intersections of those urban planning documents. Matters regarding population decline and rising unemployment, as well as the measurement of satisfaction with life in the area, all underline the need for planned sustainable development actions in both documents. The strategic vision for the managed or revitalized area is another, just as are the conclusions of social studies and goals for the documents.

While the World Heritage Site Management Plan is more detailed in explicitly connecting its goals to specific SDGs, it lacks specific indicators of their successful implementation. The only indicator referenced is the Agenda 2030 indicator for subgoal no. 11.4—total expenditure per capita on heritage protection (United Nations, 2015), which provides little insight into the specific implementation of the World Heritage Site Management Plan. However, the Revitalization Plan foresees the construction of indicators relating directly to its development goals and connecting to its sustainability. Examples include the "number of facilities adapted to people with special needs," the size of "modernized or developed public spaces, green areas, or play and recreation areas," or the "number of facilities adapted for socially useful purposes" (City of Toruń, 2024b, p. 384). As the role of the Revitalization Committee in Toruń is expanded to overseeing and assessing the implementation of the Revitalization Plan (and not only consulting on its creation), the Committee's crucial role in the implementation and pursuit of the SDGs within the urban planning system of Toruń is cemented further.

6. Conclusion

Our research highlights the role of a polycentric governance framework, wherein various stakeholders may, through participatory planning, exert a significant influence in integrating the SDGs into urban planning within World Heritage cities. This approach is especially crucial for effective participatory planning in these cities, as it ensures that local voices gain fuller incorporation into the decision-making processes essential to localizing SDGs. However, only a limited number of goals are addressed in local urban planning documents related to the World Heritage site.

In the context of Toruń, the Revitalization Committee has emerged as one of the most influential actors in facilitating the integration of SDGs into urban planning. The Committee was not explicitly designed for this particular function at the outset, and it is under no legal obligation to participate in the development of the World Heritage Site Management Plan. Nevertheless, the Committee has made a substantial de facto contribution to the formulation of the World Heritage Site Management Plan and the inclusion of the SDGs within its framework.

The Revitalization Committee's significant influence on the World Heritage Site Management Plan has brought about a profound change in the governance of the World Heritage zone. The Revitalization Plan bridges the strategic vision of the World Heritage Site Management Plan with the zoning regulations of the Local Spatial Development Plan. It emphasizes social aspects of development and requires the participation of the Revitalization Committee, making it a socially legitimate document in the eyes of the city administration. This shift now mandates that future revitalization projects will need to take the incorporation of sustainable development principles into account in their planning. This integration will ensure that all urban planning and revitalization efforts align with global sustainability objectives, promoting a more inclusive and resilient approach to heritage management and urban development.

The city's initiative involves expanding the scope of the periodic reporting questionnaire. This expanded questionnaire would include the standard elements and incorporate additional items specifically aimed at assessing and planning management actions. These actions are designed to fulfill the main obligations arising from the adopted World Heritage protection policy, with a particular focus on implementing SDGs.

Toruń is seeking to create a more detailed and effective monitoring system through a broadening of reporting requirements. The said system would provide a clearer picture of how well the city integrates SDGs into its strategies for urban planning and heritage management. Such an approach, ensuring that all relevant activities are evaluated thoroughly, with any gaps in implementation identified and addressed promptly, can be viewed as demonstrating Toruń's commitment to the achievement of the SDGs.

In this sense, the case of the city of Toruń utilizing a novel strategy to leverage the previously established Revitalization Committee to increase social participation in sustainable development within various strategic urban planning documents can be viewed as an attempt to mitigate system complexity, while fostering its polycentricity and legitimacy. Such a strategy can allow for the intricate and concrete integration of the SDGs into the city's urban planning documents. By employing such innovative methods, Toruń enhances the participatory nature of its governance and ensures that sustainable development principles are embedded deeply within its urban planning framework, thus fostering a holistic and effective approach to achieving the SDGs.

For World Heritage cities aiming to integrate SDGs into their heritage management, considering the participation of existing advisory bodies can be highly beneficial. By engaging these established and legitimate entities, city administrations can harness local knowledge and stakeholder participation without creating new structures and optimizing financial and human resources.

In the absence of officially mandated and clearly defined indicators for World Heritage cities to follow in implementing the SDGs, the City of Toruń has taken a proactive approach to ensure accountability in the achievement of those goals. Recognizing the need for a robust framework to guide and evaluate the progress of SDG integration, Toruń has proposed the development of comprehensive measures within its World Heritage Site Management Plan. Through these efforts, it aspires to align its urban planning and heritage-management practices more closely with global sustainability objectives, thereby promoting a more inclusive and sustainable urban environment.

Future research should explore comparative studies across World Heritage cities to examine how diverse governance structures influence the integration of SDGs. Long-term studies are also needed to assess the sustained impact of SDG implementation and to evaluate the effectiveness of participatory planning processes in different contexts. To strengthen SDG integration in heritage management, cities should develop clear indicators for tracking progress and ensure inclusive participation by involving a broad range of stakeholders. Expanding the role of advisory bodies like the Revitalization Committee and enhancing public engagement can improve the effectiveness and legitimacy of urban planning processes.

The case of Toruń illustrates how leveraging existing advisory bodies within a polycentric governance framework can effectively integrate SDGs into urban planning and heritage management. The Committee's role in bridging top-down strategic directives with bottom-up community input demonstrates the city

administration's commitment to optimizing the impact of limited resources. The city achieves that and strengthens participatory planning and accountability by proactively involving the Revitalization Committee and enhancing monitoring mechanisms. Toruń's approach could serve as a potential model for other World Heritage cities, emphasizing the importance of promoting local actions that advance sustainability goals while ensuring that these efforts contribute to global progress.

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Conflict of Interests

The author declares no conflict of interests.

Data Availability

Eremenko, I., & Kraski, T. (2024). *HERIEXPERT Dataset: Local experts in Polish and German World Heritage Cities: understanding their role in polycentric governance of heritage sites* [Data set]. Zenodo. https://doi.org/10.5281/zenodo.14185640

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Co-Creating Change: Seedbed Interventions as Catalysts for Equitable Urban Planning—The Case of Umeå

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Abstract

The ongoing urbanisation and densification at the intersection with increasing environmental and health crises demand a holistic, equitable, and inclusive approach to urban planning, which has also been highlighted in the EU Green Deal's inclusive approach to sustainable urban planning aligned with the UN SDGs' "Leave No One Behind." This article introduces the seedbed intervention as a novel, community-driven, co-creative approach to Nature-based Solutions (NbS) that addresses gaps in equitable and inclusive urban planning frameworks. On the case of Umeå (Sweden), the article introduces the seedbed intervention approach and demonstrates how the approach facilitates the development of locally appropriate and sustainable NbS. The results show that the seedbed intervention approach improved the alignment between local needs and NbS design, connected diverse user groups, and catalysed curiosity, interest, and participation among citizens with the help of applying art-based methods. By demonstrating the practical application of a seedbed intervention, this research contributes to the development of scalable frameworks for more equitable and inclusive urban planning.

Keywords
art-based methods; co-creation; equitable cities; inclusivity; Nature-based Solutions; SDG 11; seedbed intervention; sustainable planning; urban green spaces

1. Introduction

Increased population density in cities, coupled with climate, environmental, health, sociocultural, and socio-political challenges shape discussions about the future of urban areas (Dilk, 2019; Kraas et al., 2016). But urban space is also anticipated to serve as the critical arena for negotiating (Kuge, 2020) and addressing these challenges: "The challenges of global change are particularly evident in urban spaces. However, they also hold special potential, as cities, with their communicative and neighbourhood immediacy, can become engines for sustainable development" (Janko et al., 2019, p. 12). With the establishment of the SDGs in 2016, the UN has specified the need to monitor and ensure sustainable developments on ecological, economic, and social levels by 2030. Goal 11 (SDG 11) aims for an inclusive, safe, and resilient development of cities, ensuring secure and inclusive access to green spaces, as well as more co-creative urban planning (The Global Goals, n.d.). The "Leave No One Behind" principle is the central, transformative promise of the 2030 Agenda for Sustainable Development (UN, 2015) and the EU Green Deal (European Commission, n.d.), which furthermore highlights the need for inclusive planning solutions.

As a way to address these challenges, the article introduces the seedbed intervention as a novel, community-driven, co-creative approach to address gaps in equitable and inclusive urban planning frameworks. These interventions aim to strengthen connections between people and urban spaces, enhancing local belonging, well-being, and resilience—key to building future cities with better quality of life and addressing challenges highlighted by the SDGs (UN, n.d.). Closely tied to SDG 11, the seedbed intervention focuses on inclusive and safe spaces through participation and mediation (Forum Umwelt und Entwicklung, 2016). By promoting adaptable green spaces, they mitigate climate impacts and boost social cohesion, aligning with global sustainability goals. They draw insights from the UN Department of Economic and Social Affairs database on SDG good practices, which ranked SDG 11 as a top-performing goal in successful implementation (UN Department of Economic and Social Affairs, 2020). The seedbed intervention aligns with SDGs 5, 10, and 11, addressing targets like 11.3, 11.6, 11.7, and 11.9 (The Global Goals, n.d.). Rooted in the "Leave No One Behind" principle, inclusive frameworks are used to engage diverse stakeholders. This inclusivity emphasises empowerment, ensuring equal participation and decision-making opportunities through safe, inclusive civic mechanisms (Mensah et al., 2022).

In the case of Umeå in Sweden, this approach is implemented to facilitate the co-creative planning and implementation of Nature-based Solutions (NbS). As a form of ecosystem-based adaptation that is oriented toward enhancing resilience, NbS have received increasing interest in research and practice (EU, n.d.; UN, 2015). In essence, NbS are actions to protect, manage, and restore ecosystems, simultaneously providing human well-being and biodiversity benefits (IUCN French Committee, 2016). The European Commission defines NbS as "solutions that are inspired and supported by nature" (European Commission, n.d.), which are cost-effective, simultaneously provide environmental, social, and economic benefits, and help build resilience. Such solutions bring more diverse nature and natural features and processes into cities, landscapes, and seascapes, through "locally adapted, resource-efficient and systemic interventions"

(European Commission, n.d.). Good examples of NbS in urban spaces are for instance green roofs, green walls, connected parks, or also processes which enhance or regain a better quality of natural habitats.

The seedbed intervention presents a novel approach to inclusive planning for sustainability that addresses key limitations to co-creation processes. Traditional co-creation approaches often struggle with issues such as power imbalances, limited stakeholder engagement, a clear structure of processes to follow (Franz et al., 2015), and a lack of adaptability to local contexts. The seedbed intervention offers a structured yet flexible approach to overcome these limitations, thereby aiming towards equitable urban solutions. By bridging the divide between top-down and bottom-up planning, the approach proposes a "third way" of inclusive urban planning, grounded in participatory flexibility and iterative learning.

Previous studies have highlighted the significance of local knowledge for sustainable city planning, but also recognised the challenges associated with its incorporation into planning practices (Berglund, 2022; Calderon et al., 2022). Next to tapping into local knowledge, it is crucial to foster a sense of personal resonance and engagement so as to ensure the sustainability and suitability of the proposed changes to urban spaces. One way to foster a sense of personal resonance and engagement and tap into existing situational knowledge is the use of art-based methods, as art-based methods "have the capacity to communicate complex and nuanced understandings of neighbourhood" (Carpenter, 2022, p. 359). While the significance of art-based methods is often underestimated in urban planning, we argue that the example of the seedbed intervention, which is introduced in this article, is a promising approach to foster equitable and inclusive planning for urban sustainability. The article thus discusses in what way the integrated seedbed intervention approach, exemplified by the case of Umeå, can foster equitable planning processes for more sustainable cities.

This research and the introduced seedbed intervention approach represent an effort to: (a) address socio-cultural challenges associated with urbanisation by ensuring early, differentiated engagement of stakeholders; (b) systematically connect the potential of artistic methods with co-creation processes; and (c) create places with which stakeholders can better identify. As a result, we aim to contribute to the development of practical, scalable frameworks for creating more liveable and sustainable cities.

2. Background: The Seedbed Intervention as an Alternative Co-Creative Approach for Sustainable City Planning

The seedbed intervention approach discussed in this article was developed as part of the H2020 GoGreenRoutes project, which aimed at promoting health and well-being through the design and implementation of NbS. Within this project, the approach served as a preparatory step for the implementation of a NbS intervention in Umeå (and other cases, not further investigated in the frame of this article). The aim of the approach was to function as a co-creative and experimental intervention strategy to establish foundational conditions for subsequent NbS implementations. The seedbed intervention approach draws on the following key components, which are integrated under a unified concept: art-based methods to tap into local knowledge, method triangulation to foster a holistic approach, and the experimentalism of temporary urbanism for designing actor-focused, adaptable temporary interventions (Franz et al., 2015).

As a co-creation approach, also the seedbed intervention differs from other common forms of participatory communication. While other forms of participatory communication cover a wider spectrum of different

possible levels of engagement (Arnstein, 1969; International Association of Public Participation, 2017), co-creation aims for the higher end of the participation ladder due to its "active involvement of end-users in various stages of the production process" (Voorberg et al., 2015, p. 1335). This means that in co-creation approaches, end-users are significantly more involved, not only in the planning stages but also in the subsequent creation of, for example, a new green space, where they can engage in specific ways (Timpe & Christenn, 2022). It moreover stands out as an iterative process that allows for ongoing learning, reflection, and adjustment (Leask et al., 2019), thus rejecting a "predefined and linear pathway" of knowledge production (Følsgaard Grønvad et al., 2017, p. 6). In line with the circularity of co-creation processes is the attempt to overcome the divide between top-down and bottom-up approaches. Instead, the focus is on achieving a potentially high level of engagement in all stages, mutual learning, and co-ownership of the co-created knowledge and solutions. Mees et al. (2019) suggest distinguishing between public and governmental participation. The former arises when citizens participate in and contribute to policy-making that remains, however, both initiated and structured by the government. Governmental participation occurs when governments contribute to initiatives and projects that are independently originated, organised, and led by citizens and other non-state actors in response to an emergency or policy issue. Both forms can make use of co-creation approaches. Finally, compared to other forms of participatory engagement, co-creation "does not stop at actionable knowledge" but "requires practical outcomes," which is not necessarily foreseen in a typical participatory process (Prager, 2016). Wiek (2016) notes that practical outcomes can be "emotional, behavioural, physical and other changes in the real world." This means that ideally co-creation results in not just the development of a joint action plan, but also its implementation.

Several benefits are associated with the application of co-creation approaches in the field of NbS implementation. The idea of wide inclusion of different stakeholders is seen as beneficial for the joint definition of intervention objectives by taking a "step away from pre-defined issues and solutions towards reframing problems that open up the view on what interventions are needed" (Hölscher & Reil, 2019). It also allows for those stakeholders to be engaged who are often left out by expert-based decision-making or conventional participatory approaches, but whose input is highly needed, for the usability of the joint solutions (Brink et al., 2018) as well as to address the complexity and wickedness of environmental challenges by pooling and co-owning different kinds of knowledge (Schneider et al., 2019; Torfing et al., 2016; Wamsler, 2017). In the field of urban ecology and urban greenery, participatory processes are seen as crucial to overcoming a lack of environmental awareness and estrangement from nature (Dunn et al., 2006; Remme et al., 2021). A main challenge that has been identified, however, is related to the inclusive ideal of co-creation processes which are often challenged by power, knowledge, and trust imbalances, difficulties of including different groups and keeping them engaged throughout the process, the resource-intensive investment in good relationships, the facilitation of group dynamics, as well as the communication flow (Noppenberger et al., 2021). For NbS in particular, this entails also the question of balancing participatory knowledge and expert knowledge and suitable ways of gaining valuable insights into and being able to incorporate local situational knowledge (Brink et al., 2018; Nightingale, 2017; van den Hove, 2006).

The seedbed intervention seeks to overcome these limitations of traditional co-creation processes by offering a structured yet adaptable framework tailored to local contexts, which integrates art-based methods and triangulation to ensure addressing power imbalances and fostering comprehensive stakeholder engagement. Former research has shown that involving art-based methods can help to tap into local knowledge, thereby unfolding hidden knowledge or desires of citizens by the "capacity of art to make

present and not just represent" and reveal "what might be relevant" but difficult to retrieve with more conventional participatory methods such as surveys or focus groups (Berglund, 2022, p. 146). As Berglund (2022) aptly describes in her chapter "Science, Art and Other Ways of Knowing: A Proposal From a Struggle Over a Helsinki Green Space":

> There's no way of producing an adequate understanding of what might happen in a particular human *milieu* without paying attention to an infinity of details about all the other human and nonhuman elements, living and non-living, that populate, animate, and motivate that lifeworld. (Berglund, 2022, p. 149)

The seedbed intervention moreover follows the principle of flexibility and experimentation embedded in the theoretical framework of temporary urbanism, which has garnered attention within the realm of urban planning and design as a method to trial urban spaces, involve communities, and instigate favourable transformations with minimal investment and risk (Madanipour, 2017). This approach facilitates agility and adjustability in addressing dynamic urban issues and potentials. Additionally, pilot projects serve as a prevalent mechanism within temporary urbanism strategies to trial, for instance, novel policy endeavours or designs, and to solicit input prior to implementing permanent alterations. According to current debates on future urban development, it is emphasised that particularly flexible strategies are necessary to ensure resilient cities with a high quality of life (Carr & Dionisio, 2017). Carr and Dionisio combine aspects of flexibility and the involvement of diverse stakeholders and propose a "third way" of planning. Here, they start from a specific category of places which they describe as flexible spaces, such as e.g., "abandoned" or "vacant" spaces (Carr & Dionisio, 2017, p. 73). Carr and Dionisio (2017) interrogate the possibility of using such "flexible spaces" as tools for pursuing a third way of engaging in urban planning for shared space, instead of conventional expert-led and procedural-participatory frameworks. They also highlight that through participatory approaches and a shift in traditional roles, where planners act as mediators rather than decision-makers, there is an opportunity for citizens to openly share their knowledge and desires (Carr & Dionisio, 2017). For the seedbed intervention, this meant that the application of an iterative testing and flexible process was necessary. This process allowed us to refine in detail the sequences of various steps and establish an effective feedback loop to ensure that the interventions were well-calibrated and functional. It included planning workshops, participatory events, and an iterative feedback loop in which the local taskforce—identified with the help of the stakeholder analysis mentioned above—played a central role.

While these principles and methods in themselves are not entirely novel on their own (see Figure 1), the strength of the seedbed intervention approach lies in its integration into a cohesive and comprehensive framework. The goal is to develop locally appropriate and adapted equitable NbS interventions from the very early start together with stakeholders and see them in an even more active role than defined in co-creation approaches (Timpe & Christenn, 2022).

3. Methodology

The seedbed intervention is inspired by the principles and elements of temporary urbanism, such as temporary interventions, art installations, and the experimentation with various, art-based methods, including the photovoice method. Additionally, it is crucial that analytical activities are conducted prior to each seedbed intervention. These include an urban morphological analysis to understand the local context, a

SWOT (strengths, weaknesses, opportunities, and threats) analysis to identify strengths and potentials, and several planning workshops. Ultimately, after a detailed co-creative planning process, the actual event of the temporary seedbed intervention takes place—a time-limited event in which context-specific art-based methods are applied. In the case of the seedbed intervention, all steps are organised and guided by planners/researchers. A local taskforce, consisting of representatives from various user groups, is established at the outset and municipalities are involved from the very beginning. Following the seedbed intervention event, the results are summarised and presented by the planners/researchers and discussed in iterative feedback loops. These feedback loops were crucial as they provided further local knowledge even after the seedbed intervention event through for example questionnaires on a digital whiteboard (www.miro.com), comments on the report, or discussion after one of the often-recorded meetings.

As shown in Figure 1, a seedbed intervention systematically integrates, in addition to the survey method, art-based methods into the planning process, allowing implicit or commonly "unknown" knowledge to inform the design of locally relevant NbS, rather than relying solely on consciously accessible knowledge usually sought with sole reliance on more conventional methods like surveys or interviews (Berglund, 2022, p. 146). This aims to ensure a more user-oriented and inclusive NbS design, thereby ensuring that a wide range of diverse voices are heard (Morello et al., 2018).

The methodology of the seedbed intervention cannot be adequately explained merely by describing the implementation event and the application of its three methods: photovoice, canvas, and survey. Instead, it is

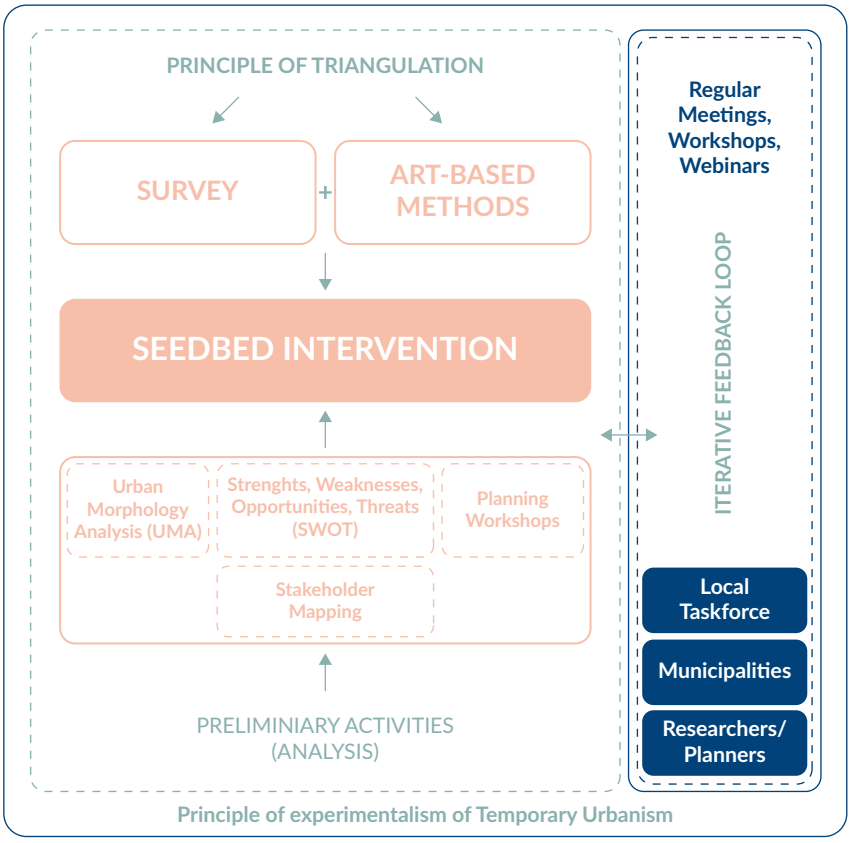

Figure 1. Graphic explaining the concept of a seedbed intervention and its interdependencies.

essential to delineate the process into distinct stages: the pre-stage, the main seedbed intervention event, and a forward-looking perspective on the introduction and implementation of the NbS intervention (see Figure 2). This structure is necessary to clarify the overarching aim of the seedbed intervention, which is intrinsically linked to the subsequent NbS. The intervention is conducted to facilitate a more effective integration of the NbS. While the focus of this article is not on elaborating on the subsequent NbS, this interconnectedness must be acknowledged to fully comprehend the purpose and scope of the seedbed intervention.

3.1. Pre-Stage

After the preliminary research in the form of different analyses (e.g., stakeholder analysis, urban morphology analysis), the local taskforce for Umeå and the final NbS intervention area were selected. The stakeholder mapping was conducted in close collaboration with Umeå's municipality (Bah et al., 2021) and identified diverse actors and led to the formation of a local taskforce. This taskforce, representing various citizen groups, participated in workshops and planning activities to ensure inclusive implementation of the seedbed intervention. Since 2020, preliminary activities leading up to the implementation of the seedbed intervention in 2022 have included initial meetings to prepare city partners for the co-creative approach to developing the interventions. A co-creation workshop was held in early 2021, followed by a stakeholder analysis and an urban morphology analysis. The analyses provided intensive local knowledge of spaces in Umeå, culminating in the selection of suitable sites along the pre-chosen Bölevägen route for interventions. The Bölevägen corridor in Umeå was selected as the focal area for both the seedbed intervention and subsequent NbS initiatives due to its significant potential to encourage active, non-motorised mobility and to foster the development of safe and inclusive urban spaces. This 1.6-kilometre-long street offers considerable opportunities for the integration of small parks and green interventions in its vicinity, making it a prime location for advancing urban sustainability and accessibility. Umeå is recognised for its robust foundation in equitable urban planning and its progressive implementation of planning strategies and legal frameworks. The principles outlined in the Comprehensive Plan for Umeå Municipality highlight that sustainable urban development is achievable only when all stakeholders are granted equal rights and when urban spaces are designed to ensure safety and inclusivity for all groups.

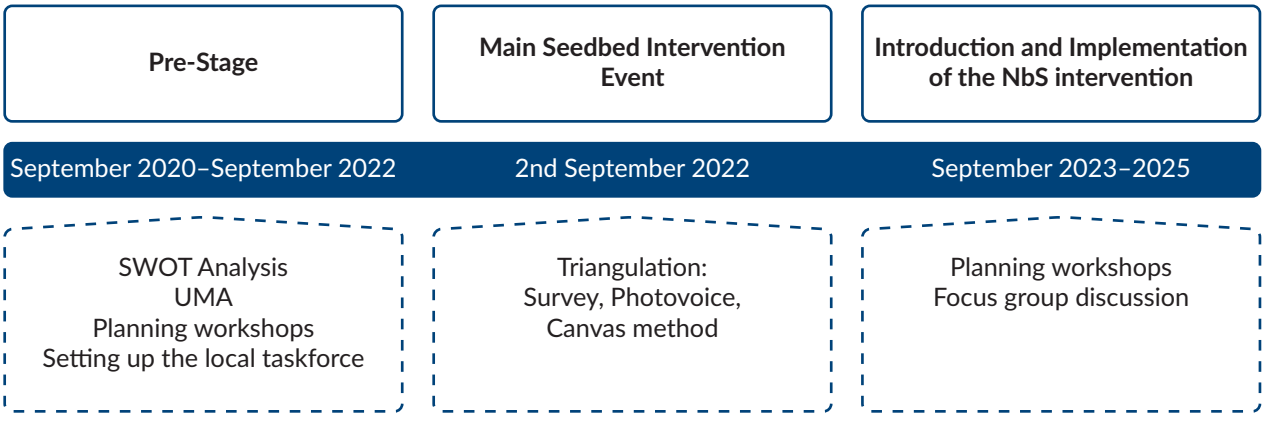

Figure 2. Graphic explaining the process of a seedbed intervention. Note: UMA = urban morphological analysis.

An overview of the seedbed intervention process is presented in Figure 2. Stakeholders were categorised into different user groups and a local taskforce was established to voluntarily represent diverse community opinions. The seedbed intervention was further concretised through a co-creative planning intervention workshop. The planning intervention workshop was promoted through a joint action (Co-Design With Citizens: The DIY Green Area) in the Aspgärdan area, emphasising the importance of clear communication with the public and creating incentives to motivate voluntary participation.

3.2. Main Seedbed Intervention

On September 2, 2022, the main seedbed intervention event was held along Bölevägen, attracting approximately 200 participants (see Figure 3). The event featured activities such as a concert, discussion groups, and interactive chalk drawings, all designed to stimulate public engagement and foster interaction among participants and organisers. These activities served as a catalyst to enhance participants' enthusiasm for three key participatory methods integral to the intervention: photovoice, canvas, and survey. The results were analysed and subjected to iterative feedback loops of discussions between the municipality, the local taskforce, and the researchers. The final outcome was afterwards presented to the public in the form of a short report.

As outlined above, the seedbed intervention approach builds on the principles of triangulation and experimentalism. To accumulate and understand the desired situational and new local knowledge as best as possible, a mixed-methods approach and triangulation were applied. The use of qualitative and quantitative methods can compensate for the weaknesses or biases of any single method, leading to more robust and credible findings. Methodological triangulation was also seen as the best way to understand the different

Figure 3. Collage of the seedbed intervention in Umeå.

perspectives of the participants in-depth and to gain a more comprehensive understanding of the research problem (Alele & Malau-Aduli, 2023; Turner et al., 2015). In particular, next to the preliminary preparatory studies mentioned above, the study employs a combination of the survey method and art-based methods. Among the latter are the canvas and the photovoice methods. Figure 4 explains the methodology of the study and the combination of all three methods.

The integration of art-based methods allowed us to gain a deeper understanding of local knowledge and user desires. Additionally, the objective was to elicit tacit knowledge from users, also referred to as "wordless knowledge" (Hoppe and Holmegaard, 2022, p. 327) and particularly to bring to light the emotions that users associate with the respective locations in the context of the seedbed intervention (Hoppe & Holmegaard, 2022).

As art-based methods, a seedbed intervention integrates the photovoice and canvas methods (see Figure 4). This use of art-based methods aims to tailor NbS interventions to local contexts as effectively as possible, fostering more locally appropriate and adapted solutions, and enhancing the acceptance and sense of connection between public spaces and their users. It also embodies a fundamental revaluation of the roles of users and planners, wherein planners increasingly guide processes and developments, facilitate art-based methods, analyse the resulting data and user narratives, and feed these insights back to users for discussion (Fenge, 2022; Thorpe, 2017). The art-based methods are triangulated with other sources of knowledge, following a mixed-methods framework and the principle of holistic triangulation (Turner et al., 2015). Rooted in the social sciences, the concept of triangulation has become established as a framework for combining multiple methods to gain a better understanding of a problem or situation; in the context of the seedbed intervention, it is used to generate the most comprehensive and holistic understanding of the on-site situation or local knowledge (Turner et al., 2015) and cross-validate if all voices have been heard. For the seedbed intervention, this means that the art-based methods are combined with survey data, predated by a stakeholder mapping, a SWOT analysis, and morphology analyses. Delbaere et al. (2024) highlight that it is crucial for developing more equitable open spaces that planners ask themselves who are key users and "with whom," in this case, NbS are developed. To better understand the local conditions and gain access to new local knowledge, it is essential to involve people and give them a voice (Morello et al., 2018), for which a stakeholder analysis is a crucial pre-step. According to Morello et al. (2018), this also leads to a greater engagement of people with the local activities and the place itself, potentially resulting in the establishment

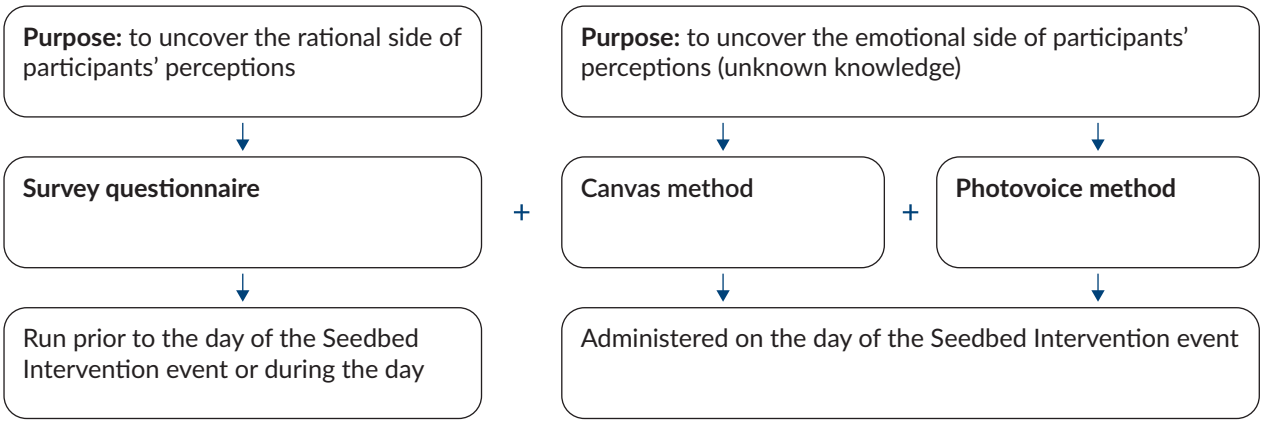

Figure 4. Methodology applied for the seedbed intervention in Umeå.

of new networks and, consequently, fostering innovation (Morello et al., 2018). An extensive urban morphological analysis was conducted to select and understand the location for the interventions as fittingly as possible (Bruen et al., 2021).

3.2.1. Canvas Method

Jointly with the local taskforce and the municipality of Umeå, the canvas method (Miller, 2020) was chosen as one of the art-based methods to be applied in the seedbed intervention. Approximately 200 people were part of the seedbed intervention event and an estimated number of 100 people joined the canvas method. The method is easy to use in a field context. It is economical, inexpensive, and needs no electricity. It allows for creativity and spontaneity. In addition, it is reliable and doesn't require any special skill to use. In Umeå, it consisted of a canvas placed somewhere near the site, usually in a tent, accompanied by project personnel or city partners. Above the canvas hung a banner with the question participants were supposed to answer through drawings and notes. The input question "If you had 3 wishes for the site, what would you wish for?" was used to initiate discussions (see Figure 5).

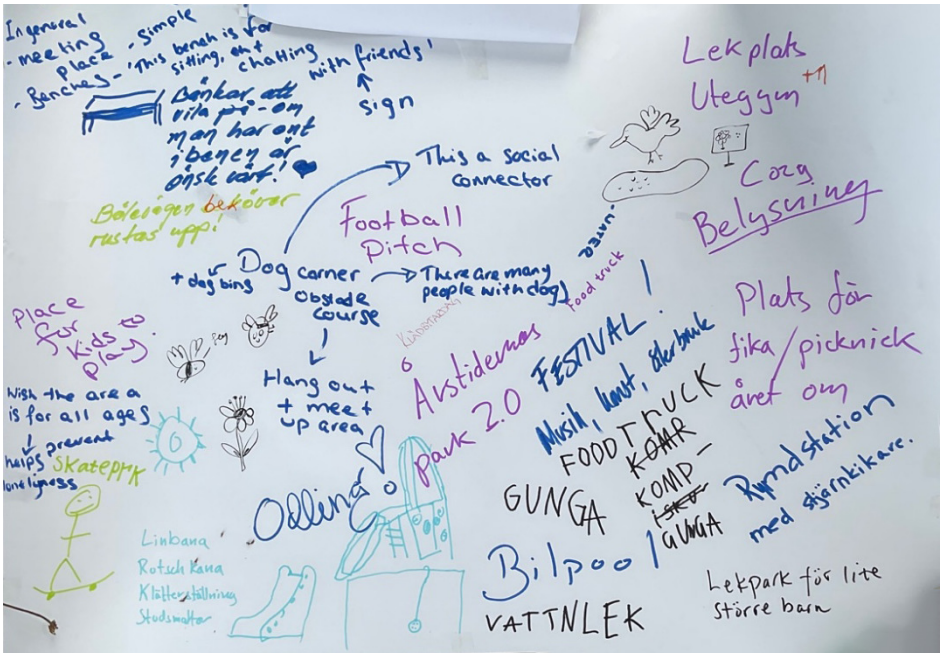

Figure 5. Ideas by participants joining the canvas method.

At the beginning, the canvas was just a white sheet of paper for many people, and no one wanted to start. After a question was added to the canvas and a lot of drawing was done, more and more participants joined and contributed. Especially discussions on people's wishes helped to enrich the process. Passers-by were encouraged to discuss, visualise, and write their opinions and wishes for the green spaces on the canvas. Then the next persons could add to those ideas (see Figure 5). During the process, participants were thus able to discuss intensively with the researchers and among each other and, if needed, walk through the area and further address what changes they would like to see. Often this led to valuable insights into the shared local knowledge. Afterwards, word clouds were used to summarise the results. The word cloud illustrates how frequently certain words have been mentioned by participants on paper as well as verbally (see Figure 6).

Figure 6. Summary of written ideas by participants joining the canvas method. The larger a word is displayed, the stronger the approval of the topic and the more frequently the topic was represented in drawings and texts.

3.2.2. Photovoice Method

Like other art-based methods, photovoice "uses artistic modes of expression (using imagination to create objects, environments, or experiences that can be shared with others)" (Carpenter, 2022, p. 353) to engage participants in creative processes that transcend linguistic and cultural barriers. These methods share a common ethos of democratising knowledge production and privileging diverse voices. What distinguishes photovoice is its unique integration of visual storytelling and participatory action. By combining photography with collective dialogue and advocacy, photovoice bridges the gap between individual expression and collective action. The photovoice method, first termed by Wang and Burris (1994, p. 172) as "photo novella," is a "powerful tool" (Kile, 2021, p. 30) for research and advocacy:

> Photo novella does not entrust cameras to health specialists, policymakers, or professional photographers, but puts them in the hands of children, rural women, grassroots workers, and other constituents with little access to those who make decisions over their lives. (Wang & Burris, 1994, p. 171)

Kile (2021) describes photovoice as "a form of participatory action research and community-based participatory research," but it is also common to approach photovoice in the context of art-based methods (Carpenter, 2022). Emerging from the intersection of art and social science, photovoice empowers individuals to narrate their stories through the lens of photography, amplifying voices often marginalised or unheard. This method extends beyond mere visual representation—it fosters dialogue, understanding, and social change (Wang & Burris, 1994). At its core, photovoice invites participants to capture images that reflect their lived realities, experiences, and aspirations. These images become catalysts for discussion, enabling participants to articulate their views, experiences, challenges, and aspirations. The photovoice method transcends traditional research paradigms by prioritising participant agency and empowerment. By centring on the lived experiences of participants, photovoice fosters a sense of ownership and agency, challenging dominant narratives and fostering empathy and understanding (Carpenter, 2022; Kile, 2021; Ruggeri, 2013; Wang & Burris, 1994).

Of the 200 people who participated in the seedbed intervention, 20 participants joined the photovoice method process. They were provided with instant cameras and were asked to choose from a list elucidating

various emotions to connect their discoveries with a one-word emotion from the list. The following guiding sentence were written on a paper above the table presenting the cameras: "Pick up the camera, take a photo of a spot-on site, and choose an emotion: active; distressed; interested; excited; upset; strong; guilty; scared; hostile; inspired; proud; irritable; enthusiastic; ashamed; alert; nervous; determined; attentive; jittery; afraid." The utilisation of this method within the project aimed to shed light on aspects that might otherwise remain unnoticed by urban planners and participants alike, aspects that were not previously apparent but could be brought to attention through the use of this visual method (see Figure 7). In general, visual methods tend to present the opportunity to uncover hidden insights in one's mind and function in this way as a direct channel to, in our case local, knowledge (Ruggeri, 2013).

Figure 7. Pictures taken by participants during the photovoice method describing the slide with the words "Happy" and "Inspired."

3.2.3. Survey Method

Surveys are used as a central method in studies related to NbS (Anderson et al., 2021), human–nature relationships (Kuldna et al., 2020), green space benefits and accessibility (Boyd et al., 2018; Mak & Jim, 2019), and health and environment (Nieuwenhuijsen et al., 2022). A survey was also used as part of the seedbed intervention's framework and applied in Umeå in order to gather valuable insights into citizens' perspectives on nature connectedness and well-being, as well as to identify the proximity and perceived nearness of natural spaces or levels of perceived safety in local natural spaces.

The survey questionnaire was developed collaboratively with the flexibility for the municipality of Umeå to include additional questions based on their specific contexts and interests. For the majority of questions, the Nature Relatedness Scale (NR-6; Nisbet & Zelenski, 2013) was applied. Participants were requested to evaluate the following six statements on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*): "My ideal vacation spot would be a remote, wilderness area"; "I always think about how my actions affect the environment"; "I take notice of wildlife wherever I am"; "My relationship to nature is an important part of who I am"; "My connection to nature and the environment is a part of my spirituality"; "I feel very connected to all living things and the earth."

Additionally, supplementary items from the Eurobarometer survey conducted in 2015 were included, specifically focusing on the multifunctionality of green spaces and NbS (Alves et al., 2024; EU, 2015). In total, 47 participants in Umeå responded. The survey aimed to collect descriptive data on residents' experiences with green spaces, their perceptions of safety, and their connectedness to nature. Participants in Umeå were asked to assess their proximity to green spaces within a five-minute walk of their residence. The Umeå survey was conducted online prior to the event and on the day of the event and relied on self-reported data, providing a more personal understanding of residents' experiences and perceived access. Additionally, the survey included questions on safety and inclusivity, recognising the importance of these factors in public space usage. Gender-specific perceptions were explored, with particular attention to how women and other social groups experience safety in green spaces. This focus aligns with Umeå's commitment to gender-sensitive urban planning and highlights the role of safety in fostering inclusive green spaces.

3.2.4. Analysis of Data

Researchers and planners carried out an initial summative content analysis, which involves identifying specific elements in the data to interpret their contextual meaning (Hsieh & Shannon, 2005). All relevant data, including sketches and photographs, were gathered, digitised, and systematically organised. The data were then separately analysed and categorised according to the distinct methodologies employed. Subsequently, the results were presented on a dedicated platform accessible to city partners and local citizens, including the local taskforce.

This approach allowed participants to review the data in advance of a workshop, during which all findings were collaboratively discussed, and another round of summative content analysis was conducted. The workshop outcomes played a pivotal role in enabling municipalities to design tailored NbS interventions.

This process underscores the importance of early and continuous stakeholder engagement, fostering a shared sense of purpose and ownership while ensuring that urban interventions address both practical needs and community aspirations. By combining data preparation with open, participatory dialogue, the methodology effectively bridges the gap between technical planning and local knowledge, thereby promoting more inclusive and sustainable urban development.

3.3. Introduction and Implementation of NbS

The knowledge gained from the seedbed intervention informed the design and implementation of the NbS, which was partially implemented in 2023 and will be finalised in 2025. A report presenting the NbS intervention will be presented to the public by the beginning of 2025 and a draft version was already sent to the municipality of Umeå beforehand. The NbS will be a reconstruction of a street to make it more attractive for pedestrians and cyclists to use. While the street and a large bike lane are being built, four pocket parks are being developed to enhance nature connectedness, welcoming passers-by to take a break. Citizens of different ages are actively included to create the spaces and to emphasise their ideas. The multifaceted social benefits arising from innovative NbS interventions should be communicated more explicitly and with greater nuance. These strategies harbour the potential not only to enhance the climate resilience of our cities but also to fortify their social resilience, fostering more inclusive and sustainable urban ecosystems for the future (Vale, 2014).

4. Findings

The application of the canvas, photovoice, and survey methods in Umeå revealed nuanced insights into the community's aspirations and concerns for the Bölevägen route transformation. The canvas method captured a range of needs across different demographics, with specific suggestions—such as a community garden and traffic calming measures—providing actionable insights for urban planners. The photovoice method facilitated an emotionally resonant engagement with the space, particularly among children, whose photos and associated emotions highlighted the importance of playful, interactive elements in public areas. Furthermore, the photovoice method demonstrated significant potential for helping people perceive their environment anew and communicate their feelings through a different medium. The canvas method (see Figure 5) was highly effective, fostering lively conversations between participants and project partners, with participants writing and occasionally drawing their wishes. The survey added a structured perspective, linking local experiences to broader health and safety standards, though its limited response rate highlights the need for supplementary engagement strategies. Furthermore, it was necessary that consent forms were distributed online and on paper to stakeholders both prior to and on the day of the event for them to provide their consent to answer the survey questions and that the data gathered from the canvas and photovoice methods would be used for example for research and publications.

4.1. Canvas Method Results

In detail, the canvas method revealed distinct needs and desires for the transformation of the Bölevägen route across different demographic groups. Adults with young children showed minimal demands for personal amenities, focusing primarily on facilities for their children, such as a playground. Analysis of the canvas drawings showed that the most frequently expressed wish was for an interactive playground, closely followed by requests for a skatepark and climbing areas. These features indicate a strong preference for active, engaging spaces that can support children's physical activity and social interaction, reflecting parents' desire for safe, stimulating environments for their children. Some participants additionally mentioned that a café near the playground would enhance their experience by offering a place to relax and socialise while their children are playing.

Older participants (50+), on the other hand, demonstrated a broader and more community-oriented vision. Specific examples of suggestions included a community garden where residents could grow vegetables, promoting self-sufficiency and local food production. Another proposal was a dog obstacle course, with the participant noting that this feature could help address loneliness, providing an interactive space for dog owners to connect. These ideas highlight an interest among older adults in creating spaces that foster social interaction, well-being, and community resilience. Teenagers, however, struggled to articulate specific needs or ideas for the space, which may reflect their limited opportunities for input in urban planning contexts.

The canvas findings underscore the necessity of intergenerational design thinking and the value of actively soliciting and incorporating ideas from all age groups, especially those who might feel overlooked. Furthermore, a teacher from a neighbouring school emphasised the safety issues posed by high-speed traffic in the area. He reported that Bölevägen serves as a shortcut for commuters heading to the headquarters of Volvo, leading some drivers to exceed safe speed limits. His suggestion to lower the speed limit to 20–30 km/h underscores a critical safety concern, especially for young students, and provides actionable

feedback for traffic management interventions. This insight from the canvas method highlights the importance of engaging local stakeholders who are directly affected by the infrastructure.

4.2. Photovoice Method Results

The photovoice method provided unique insights by enabling participants to capture elements of the site that evoked emotions. Initially, participants were encouraged to explore independently with Polaroid cameras, documenting their emotional responses to different aspects of the site. However, managing equipment proved difficult, particularly with groups of young people and children. Twenty Polaroid photos were collected, successfully representing perspectives across age groups. Among these photos, eight images were directly associated with specific emotions. Participants linked these emotions to elements such as the temporary climbing structures and play areas, describing these as "inspiring" spaces that invited active interaction. For example, several children expressed enjoyment and excitement when using the temporary play structures, indicating that such installations could enhance the attractiveness of the route for young users. In another case, some participants noted that the act of drawing their ideas (linked to the canvas method) inspired them to think creatively about the space. This overlap between methods indicates that physical activities in a space, combined with creative exercises, can deepen engagement and foster a sense of ownership. The photos were not only expressive but also served as discussion catalysts, e.g., when the same object caused very different emotions, as shown in the pictures in Figure 7. The photovoice method thus facilitated an intuitive, emotionally driven engagement that provided insights beyond what structured questions might reveal.

4.3. Survey Method Results

The results of the survey are limited by the low number of responses (47 participants), which sets clear boundaries for statistically analysing the results. The higher scores indicate a stronger self-reported connection with nature. The results show a need for spaces that are universally perceived as safe and welcoming to all demographics, emphasising the role of environmental design in addressing these perceptions. The survey also used the NR-6 Nature Connectedness Scale to measure participants' relationship with nature. This scale, which assesses affective, cognitive, and experiential connections to the natural environment, revealed cultural differences in how residents connect with nature. Consistent with previous research, it was observed that participants from Nordic regions tend to view nature as more integrated with their lives, whereas other cultural groups may see it as more distinct (Gäckle et al., 2023). This insight is crucial for urban greening initiatives, as understanding cultural attitudes toward nature can inform the design of spaces that resonate with the local population.

4.4. Overall Understanding of the Findings

The findings underscore the importance of employing a multi-method approach in urban planning, as each method contributes unique and complementary insights. The canvas and photovoice methods, by fostering active participation and emotional engagement, addressed some of the limitations of the survey, which struggled with engagement despite yielding valuable data on nature connectedness and safety perceptions. By integrating descriptive data from surveys with the richer, narrative-driven data from the canvas and photovoice methods, Umeå can better tailor its urban interventions to address both the expressed needs

and the underlying emotional and cultural contexts of its residents. This holistic approach to community engagement not only supports the creation of inclusive, health-promoting spaces but also strengthens the community's connection to and stewardship of their environment. The principles of triangulation applied during the seedbed intervention led to a shift in the self-perception of the end-users, as they were surprised to be consulted "so early" in the process and were able to respond very freely. The participants emphasised the critical importance of early dialogues in clarifying the purpose and expectations of the NbS implementation process. Participants highlighted outcomes such as enhanced community engagement, improved safety, enriched educational opportunities, and strengthened community connections, underscoring the necessity of early involvement in effectively addressing these issues (Gäckle et al., 2024).

The results also show that the seedbed intervention approach improved the alignment between local needs and NbS design, connected diverse user groups, and catalysed curiosity, interest, and participation among citizens with the help of applying art-based methods. Despite prior co-creative experiences, Umeå found it novel to involve the public so early in the planning process. The planning and implementation steps for the proposed NbS interventions had to be organised sooner than usual to accommodate public concerns.

5. Discussion and Conclusion

The integrated seedbed intervention approach, as demonstrated in Umeå, fosters equitable planning processes by prioritising inclusivity, adaptability, and early stakeholder involvement, which are essential for more sustainable urban development. The approach addresses key limitations in traditional urban planning, such as power imbalances, limited engagement, and the exclusion of local knowledge, by integrating co-creative planning with art-based and participatory methods.

At its core, the seedbed intervention builds on the principles of experimentalism and triangulation with a specific focus on the inclusion of art-based methods. As the analysis showed, the triangulation of methods in general and the inclusion of art-based methods in particular, benefit the NbS planning process in multiple ways. First, this approach elucidates situational knowledge. As understanding the needs and preferences of citizens interacting with the proposed solutions is paramount to sustainable city planning, this holistic approach is preferable to "usual" participatory methods, as it allows to shed light on tangible but also more tacit knowledge. The initial irritation and novel experience of being asked in "unusual" ways, such as via the canvas and photovoice method, encouraged deeper interactions and reflections on the surroundings—an effect that has also been observed in former studies (Carpenter, 2022; Ruggeri, 2013). The seedbed intervention thus provides an approach to elucidate local knowledge more deeply, including also emotional accounts, which former studies have pinpointed as crucial to place-making and human–nature relations in the city (e.g., Berglund, 2022) and to ensuring diverse voices are heard in the planning of NbS interventions—a central challenge to equitable and more just planning processes. Also, key findings reveal that engaging stakeholders early and continuously fosters a stronger sense of ownership and collaboration, critical for sustainable outcomes. The process helped bridge top-down planning with local insights, ensuring that proposed solutions, such as playgrounds, traffic calming measures, and community gardens, were inclusive and aligned with residents' expectations. Additionally, art-based methods, particularly the photovoice method, allowed participants to express their emotions and ideas creatively, capturing complex social dynamics often overlooked by conventional planning tools.

Following principles of experimentalism common to temporary urbanism, a seedbed intervention involves stakeholders from the outset, which sets it apart from more conventional participatory and co-creation processes, which may engage stakeholders at later stages. By establishing a local taskforce at the outset, a seedbed intervention ensures that varied voices are engaged continuously, thereby enhancing trust and mutual understanding among stakeholders. This early and sustained engagement fosters a stronger sense of ownership over proposed solutions, bridging the gap between top-down governance and local needs. The iterative nature of the approach allows for real-time feedback, learning, and adaptation, ensuring that evolving conditions and community insights are continuously integrated into the planning process. This contrasts with more conventional, linear urban planning models, which are less responsive to stakeholder feedback and contextual changes.

Additionally, the facilitation of low-risk experimentation enables municipalities to test potential solutions—such as playgrounds or green spaces—before making permanent commitments, further ensuring that implemented solutions are both equitable and effective. The inclusion of art-based methods enriches the process by promoting creativity and deeper engagement, fostering innovative outcomes aligned with the lived experiences of residents. These elements collectively contribute to more just and inclusive planning processes that can accommodate diverse urban challenges.

Moreover, by offering a clear yet adaptable framework, the seedbed intervention approach is applicable across different urban contexts. Its flexibility in accommodating various stakeholder group sizes and types of interventions makes it a replicable model for other cities seeking to promote sustainable development. Ultimately, the approach not only strengthens urban resilience but also aligns closely with international sustainability goals, particularly SDG 11, by advancing inclusive and equitable urban transformation processes.

Overall, the seedbed intervention approach catalysed a shift in Umeå's municipality and citizens' collaboration, promoting inclusivity and equity in urban transformation. By systematically integrating community engagement, iterative co-creation, and diverse knowledge sources, the approach supports the development of liveable, resilient urban spaces, directly contributing to the realisation of SDG 11 and the "Leave No One Behind" principle. Now adapted to the era of sustainability planning, studies of NbS and green infrastructure alike have aimed for deeper participation from below (Wilker et al., 2016), based on the principle that the knowledge and agency of citizens could actively contribute to more sustainable outcomes. A seedbed intervention aims to deeply understand participants' perspectives and actively use strategies to effectively organise co-creation processes, which is indicated as central to creating more targeted, acceptable, valuable, and enduring outcomes, improving the credibility of the results and the chance that new innovations will be adopted in practice (Stevens et al., 2020; van Dijk-de Vries et al., 2020). As such, the approach also aligns with the pursuit of UN's SDG 11, which aims to establish "inclusive, safe, resilient, and sustainable cities and human settlements" (UN, 2024), and offers a promising pathway toward greener, fairer, and more resilient urban environments.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

Data used in this article is available in Gäckle et al. (2023) and Gäckle et al. (2024).

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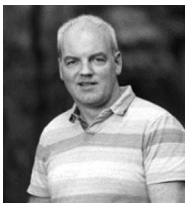

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