



---

*Research article*

## Vulnerable narratives to drive resilience strategies in Tanzania's island cities

Luca Battisti<sup>1,2,\*</sup>, Giulia Marro<sup>1</sup>, Egidio Dansero<sup>1,2</sup>

<sup>1</sup> Department of Cultures, Politics and Society, University of Turin, Lungo Dora Siena, 100, 10153 Turin, Italy

<sup>2</sup> OMERO—Interdepartmental Research Centre for Urban and Mega-Events Studies, University of Turin, Lungo Dora Siena, 100, 10153 Turin, Italy

\* **Correspondence:** Email: [luca.battisti@unito.it](mailto:luca.battisti@unito.it); Tel: +39 011 0912685.

**Abstract:** Grounded in theories of eco-resilience and inclusive urban governance, this research investigated how participatory and visual methodologies elevate marginalized voices—particularly those of women and persons with disabilities (PWDs)—within sustainable urban development processes in Pemba Island, Tanzania. The study employed focus group discussions (FGD), photo elicitation techniques, and semi-structured interviews conducted in the municipalities of Chake Chake and Mkoani, where socio-economic and environmental pressures disproportionately affect underrepresented communities. Findings show that co-created knowledge and shared decision-making within development cooperation not only reveal local vulnerabilities but also support more equitable urban planning. Participants highlighted critical challenges, including limited access to healthcare and water, inadequate waste management, climate-related risks, and unsafe public spaces. The integration of vulnerable narratives emerges as a strategic tool for enhancing urban resilience and shaping inclusive policy interventions. Methodological reflections emphasize the ethical imperatives of participatory research and its capacity to generate actionable insights for sustainable urban transformation in African coastal island settings.

**Keywords:** participatory methodologies; women's empowerment; disability inclusion; Pemba Island; sustainable urban development

---

## 1. Introduction

On a rapidly urbanizing planet, where urban systems increasingly shape ecological and social dynamics, strengthening resilience becomes essential for advancing sustainability transitions [1,2]. Resilience, a widely debated concept with various interpretations and definitions [3], is understood as the complex connection between humans and natural ecosystems in constant co-evolution [4].

Sub-Saharan African cities face overlapping stressors, including rapid population growth that outpaces infrastructure development, expanding informal settlements, social inequality, pollution, unstable water systems, waterborne diseases, and aging or inadequate infrastructure [5,6]. In both Western and Eastern Africa, coastal areas are particularly vulnerable to flooding from precipitation events and sea-level rise [7]. Therefore, the need for better-quality city environments is particularly pressing [8].

This research relies on the intention to strengthen eco-resilience [9] and promote sustainable urban development in Eastern Africa's coastal island settings, by incorporating the narratives and lived experiences of marginalized groups [10] into urban planning and development processes. The study adopts a methodological approach that combines qualitative methods, such as FGD, photo elicitation, and semi-structured interviews, within a participatory action research (PAR) framework. By doing so, it was crucial to recognize the challenges posed by rapid urbanization, economic vulnerability, inadequate infrastructure, and environmental degradation. These stressors expose communities to harm and thus define their vulnerability, the inability to adequately protect oneself from potential harm, a condition closely linked to social and economic deprivation [11]. Strengthening resilience, therefore, requires a clear understanding of vulnerability as its counterpart, in which power dynamics play a critical yet often overlooked role [12]. While most vulnerability definitions are anthropocentric, the ecology-based environmental literature focuses on ecosystems' susceptibility to irreversible damage [13]. Broadly, vulnerability can be understood as the physical, economic, social, or political susceptibility of a system to harm [14].

In this contribution, the concept of vulnerability, applied to individuals and geographical areas, has been central to formulating an answer to the research question. It is a function of two interrelated elements: the risks agents face and their capacity to cope with them. The distinction between *vulnerability to* something and *vulnerability from* something [15], along with its dual nature as both a condition and a process, is particularly relevant.

Adaptation strategies and collective actions can range from short-term coping mechanisms to broader socio-ecological transformations [16]. More precisely, small developing islands exhibit strong social-ecological interactions and high exposure to climate-related impacts, which can result in intense land-use pressures [17]. People and environments are intrinsically linked, and adaptive capacity is limited due to their small size, degraded natural resources, and geographical isolation [18].

In Tanzania, the juxtaposition of tourism development in the Zanzibar archipelago and the evolution of the urban landscape highlights the growing need to prioritize environmental conservation and the preservation of local cultures. A marked difference exists between the two primary islands, Unguja and Pemba. Specifically, Pemba has been less affected by the rise of tourist economies, as evidenced by the recent emergence of luxury hotels and resorts in areas adjacent to more rural, less affluent regions. These developments may also have been accompanied by a certain degree of oversight concerning catering to the local population's specific needs and characteristics, in contrast to the neighboring island of Unguja.

This paper focuses on the KIJIANI PEMBA project [19], which has been developed to enhance the living conditions of disadvantaged urban and peri-urban communities on Pemba Island through an integrated and sustainable community-based approach to territorial development. Specifically, the initiative, implemented in collaboration with the Lay Volunteers International Association (LVIA), seeks to foster inclusive and sustainable growth in Chake Chake and Mkoani, two cities located in southern Pemba. First, to enhance urban climate resilience; second, to expand access to essential services and socioeconomic opportunities, addressing the current living conditions, water and sanitation services, public and social infrastructure, solid waste management, and integrated urban planning; and third, to promote active participation in decision-making processes. A particular emphasis is placed on addressing the needs of vulnerable groups, including women, youth, and persons with disabilities (PWDs), ensuring an equitable and participatory framework. Therefore, the paper's objective is to explore how marginalized groups' narratives can contribute to enhancing eco-resilience and sustainable urban development models in Pemba Island, Tanzania.

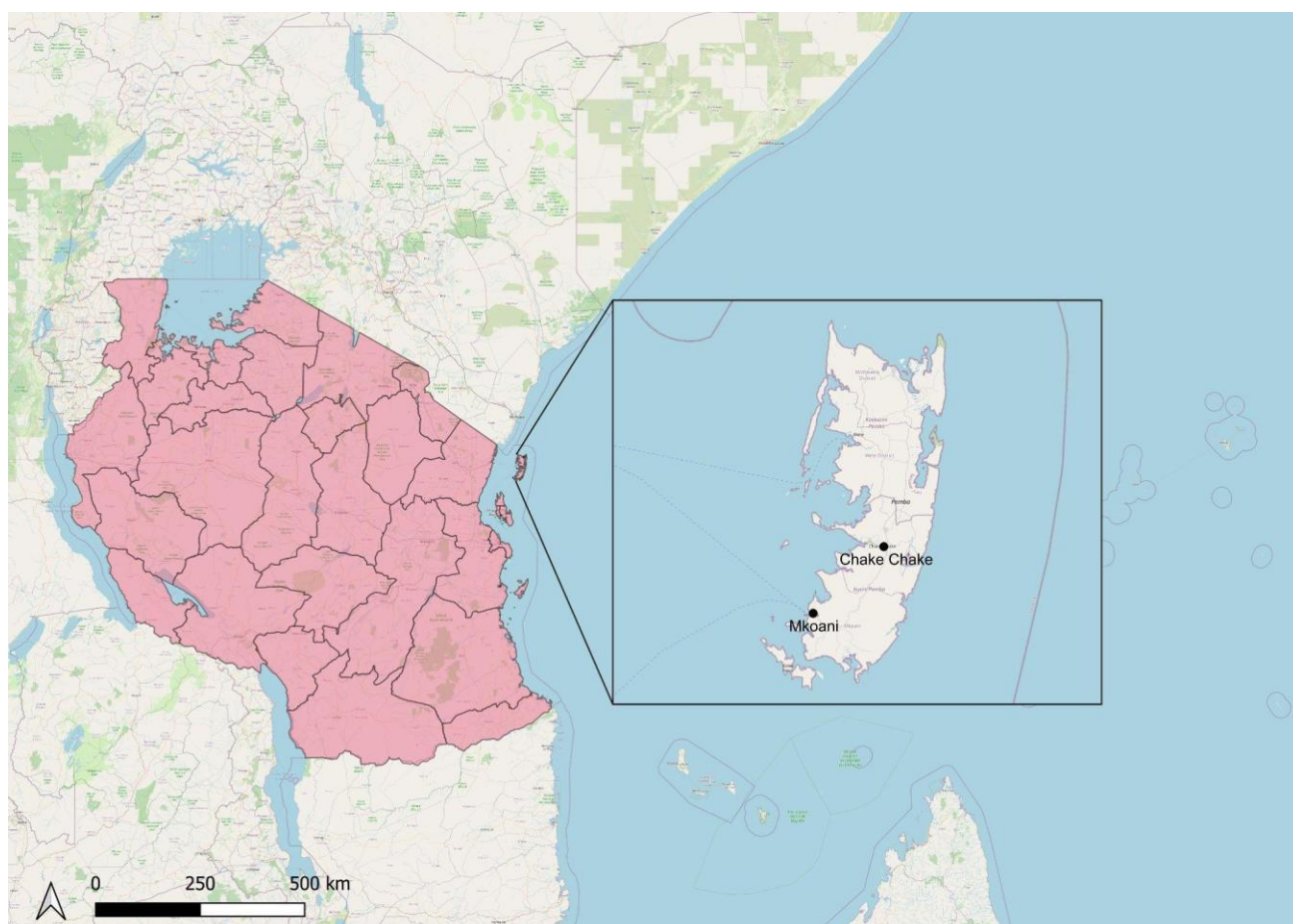
The study aims to illuminate the hitherto unexplored struggles of underrepresented groups and to promote greater community resilience and inclusiveness. The present study is situated within the broader discourse on the evolution of international cooperation for development, focusing on the shift from a top-down to a bottom-up approach. The present paper emphasizes the role of participatory and inclusive methodologies [20] and the necessity of engaging with local cultures to ensure a more sustainable and inclusive progression. It is imperative to amplify the voices of those who are often marginalized and excluded from decision-making processes [21], such as women and PWDs, who can suggest and promote transformative resilience [22] in small island urban contexts. This necessitates highlighting the challenges these groups face, including, but not limited to, restricted access to drinking water [23], effective waste management, and safe, readily available public spaces.

## 2. Materials and methods

Pemba is the northernmost of Tanzania's three major offshore islands, comprising Zanzibar. It is situated in the West Indian Ocean, just 83 km from Dar es Salaam, and has its own administrative government (Figure 1). Known as "Al Kuh Dra" or "the Green Island", Pemba was not just a rural area, but also a historically thriving urban center with a complex society [24]. Pemba went from being a focal point of the coast to an island in the shadow of nearby coastal metropolises such as Unguja.

The municipalities involved in this research are Chake Chake and Mkoani. The city of Chake-Chake is located centrally within a deep indentation on the west coast known as Chake-Chake Bay, with a population exceeding 136,000 inhabitants. Mkoani, the other significant urban center in the Pemba South region, has a population exceeding 135,000 inhabitants. The population is in constant flux, leading to rapid fluctuations in the precise figures for the number of inhabitants. Both present high socioeconomic vulnerability and exposure to hazardous climatic impacts.

Previous academic research on the island underlines how historiography has constructed a clear separation between urban and rural, treating the two worlds as distinct, with their own logics and temporalities. This perspective has produced a "rural mythology," in which the countryside is seen as static, isolated, and culturally homogeneous, in contrast to the dynamic, modern, and multicultural city. As LaViolette (2009) notes, it is desirable to overcome this historiographical dichotomy through an "urbanization of rural history".



**Figure 1.** Location map of Pemba Island. Lat.:  $-5.2443786$ ; Long.:  $39.7668181$ .

## 2.1. Materials

This study constitutes a specific, in-depth research project that forms part of a broader analysis conducted from January 2024 to March 2025, culminating in a vulnerability assessment of Chake Chake and Mkoani. Participatory and collaborative approaches are crucial in addressing the interdependencies between systems [25], encouraging innovative ideas that could be implemented to develop transformative resilience approaches [22].

For such a reason, the research employed FGD [26], photo elicitation [27], and semi-structured interviews [28] as methods of inquiry to co-create innovative, actionable knowledge with community members [29].

Emphasis was placed on creating gender-sensitive and disability-inclusive interventions, addressing barriers to equitable access to essential services and resources [30], and aligning with broader goals of fostering resilience against climate change and socio-economic vulnerabilities by promoting participatory governance, improving infrastructure, and supporting sustainable economic initiatives [31]. Specifically, the methodological research design has been structured to both inquire about the main struggles the community faces and the immediate solutions that can be implemented, allowing participants to document their lives, challenges, and ideas [32].

Although many individuals were proficient in English, a translator was present throughout all stages of the research. This translator, a member of the local partner organization “The Popular

Inspiring & Relief Organisation (PIRO)”, was responsible for facilitating communication and relaying messages and opinions in Swahili. In doing so, they were able to capture nuances that might have been overlooked in English.

To reflect the diversity of the target population, participants were selected from four categories: young women (20–35 years old), adult women (35+ years old), young PWDs (20–35 years old), and adult PWDs (35+ years old)

Representatives from women’s associations and disability advocacy organizations were included [20]. Invitations were delivered personally three weeks prior to the activities, targeting 16 stakeholders per group. This selection followed a quadruple helix model [33], which integrates actors from four key sectors: the public sector (local and national authorities), academia (researchers and educators), the private sector (business and economic actors), and civil society (community members, associations, and advocacy groups). This structure ensured inclusive and balanced representation across societal domains.

Participation exceeded expectations, with 10 women and 9 PWDs attending in Chake Chake, and 12 women and 10 PWDs in Mkoani. Women with disabilities were included in the PWDs FGDs to streamline the photo elicitation activity, while their unique experiences were later explored through individual interviews. Ethical considerations were prioritized throughout: participants were informed of the research objectives, procedures, and their rights, including confidentiality and safety. The research protocol was reviewed and approved by the Bioethical Committee of the University of Turin (Prot. no. 0589383), and informed consent was obtained in both Kiswahili and English. Particular attention was paid to the ethical treatment of sensitive groups such as women and PWDs [34].

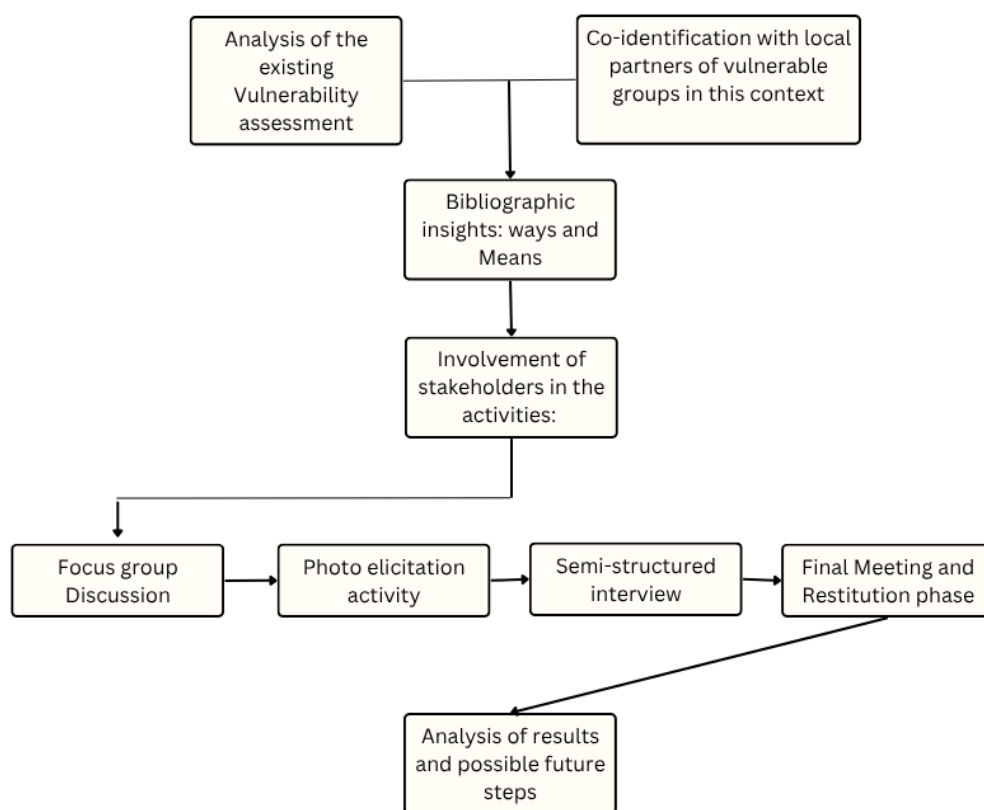
## 2.2. Methods

This participatory research proposal employs a multi-stakeholder approach to analyze the context of urban eco-resilience [35] on Pemba Island. Figure 2 shows the methodological flowchart.

Multi-level engagement and decision-making create an opportunity to leverage stakeholders’ differing roles toward effective policymaking and widespread intervention implementation. For this reason, the stakeholders have been carefully selected to ensure inclusivity and representativeness across key demographic categories and societal sectors. The selection of stakeholders was conducted through a series of meetings between March and August 2024, involving international project partners and local collaborators. This process also included two weeks of on-site field engagements in June and August 2024, during which various stakeholders were met to understand their willingness to participate and to highlight their significance to the project.

The identification of participants was guided by the quadruple helix model introduced earlier [34], ensuring balanced representation across public institutions, academia, private actors, and civil society. This approach supported a comprehensive and inclusive analysis of urban eco-resilience on Pemba Island. Logistical arrangements were made to ensure full accessibility and cultural appropriateness. Venues were located on ground floors without steps, meals were provided for sessions lasting up to four hours, and transportation was arranged when needed, with support from the LVIA. Activities were scheduled to avoid long sessions or multiple engagements per day, minimizing financial incentives and respecting participants’ existing commitments. All activities were planned in accordance with Swahili and Islamic cultural norms, including consideration of prayer times.

## METHODOLOGY



**Figure 2.** Methodological flowchart.

### 2.2.1. Focus group discussion

The FGD sessions, conducted in January 2025, represented the inaugural research activity to involve key stakeholders. Each session was scheduled to last approximately ninety minutes and was meticulously structured around five guiding questions. The purpose of these questions was twofold: first, to stimulate discussion among participants, and second, to facilitate a collaborative process of determining the direction of subsequent research phases. The discourse focused on the experiences of the participants in relation to urban challenges, with specific reference to waste management, water accessibility, and safety in public spaces [36].

Participants were invited to consider the challenges they encounter in accessing fundamental services, including access to uncontaminated and secure drinking water, and to reflect on the health and social implications of inadequate waste management and water scarcity. In addition, the subjects under discussion included issues of accessibility and safety. The participants identified areas that tend to be avoided due to these concerns. Furthermore, they were invited to conceptualize a sustainable and inclusive future for Pemba Island, taking into account the repercussions of climate change and natural hazards on their communities and proposing potential mitigation strategies. The subsequent inquiries

delved into the intricacies of obstacles pertaining to transportation and infrastructure, underscoring the manner in which these constraints impinge upon the daily lives and overall well-being of PWDs.

The FGDs functioned as a medium for identifying key issues and establishing priorities, with the resultant data proving to be of particular significance. These discussions informed the subsequent design of activities and generated significant interest in topics often overlooked, such as accessibility, water and sanitation services, infrastructure, waste management, and urban planning. The majority of the data collected during this stage consisted of informal comments and reflections. In order to further explore these insights, the participants were subsequently invited to take part in semi-structured interviews. The concluding activity pertained to the restitution of findings. In this activity, participants reviewed and discussed the data that had been collected and analyzed, including the photographs.

### 2.2.2. Photo elicitation

The photo elicitation activity was conducted on the same day as the FGDs and involved the same group of participants. The methodological continuity established ensured that the themes and priorities identified during earlier discussions directly informed the visual documentation process.

Over the course of the hour-long session, participants engaged in a collaborative endeavor to devise a walking route through locations imbued with symbolic and personal significance. This process entailed selecting sites perceived to reflect the challenges and aspirations previously discussed. Each group was provided with a single digital device, along with clear instructions to ensure autonomous use during the photo collection process.

The objective of the activity was to identify locations that are frequently disregarded by external observers; namely, sites that symbolize communal struggles, serve as repositories of emotional memory, or embody aspirations for posterity [37]. Participants were invited to photograph sites requiring urgent attention, symbols of progress or resilience, areas of limited access to essential services such as water, sanitation, or healthcare, and everyday resources in need of improvement. This visual documentation complemented the earlier qualitative data enriching the research with grounded, participant-led perspectives.

### 2.2.3. Semi-structured interviews

The interviews were conducted in January 2025, on the day following the focus group activity. Semi-structured interviews were conducted with participants willing to continue deepening the conversation started in their group. The interview focused on how they perceived their role, needs and expectations in shaping a resilient and inclusive urban environment [38].

The interview was organized into two phases: a written component and an oral component. Participants were presented with three oral and two written questions. This was done to reduce the burden on those participants who experienced difficulty with verbal communication. These questions explored what living in an inclusive urban environment meant to them, including any cultural, social, or physical aspects they considered essential. Lastly, participants were asked to reflect on the opportunities they felt were lacking in their community to improve equity among its members. The oral phase allocated approximately 20 minutes per participant to facilitate in-depth discussion, while the written phase was conducted without any time restrictions, ensuring all participants had ample opportunity to provide comprehensive responses.

During the oral phase, participants were asked whether they felt their opinions and needs were considered in community decisions or urban development initiatives, and what changes could help them feel more involved. They were also invited to describe the types of spaces that would make them feel more included and empowered, as well as the specific improvements they believed would have the greatest impact on their daily lives.

#### 2.2.4. Final discussion and restitution

Ensuring restitution to participants was a central component of the process, and a final meeting was organized to present and discuss the results of the activities. This collective discussion was essential for validating the findings and gathering additional insights into why specific locations and issues hold importance for people and their communities.

During the meeting, participants were invited to reflect on whether they agreed with the main themes and issues that had emerged from the collective discussions and analysis, and to identify any elements they felt were missing or overlooked. During the meeting, participants were invited to present the three most pressing issues their community faced and why they were particularly critical. Finally, participants were encouraged to outline the steps necessary to address these issues and what specific actions they felt they could take to contribute to change.

The meeting allowed participants to engage with and reflect on the results obtained, fostering a collaborative environment for meaningful exchange and dialogue. It served as a platform for participants to compare perspectives, share insights, and critically examine the findings, considering their lived experiences. This dynamic interaction enhanced the depth and richness of the data and ensured that the participants' voices remained central to the research process.

### 3. Results

This section presents the key findings from the activities conducted in Chake Chake and Mkoani (Figure 3).

The results are organized according to the vulnerable groups and the specific characteristics of each case study.

The qualitative data collected through participatory methods in Chake Chake and Mkoani, such as FGDs, photo elicitation, and semi-structured interviews, reveal a deeply interconnected landscape of urban vulnerability shaped by gender, disability, and place. Despite the distinct contexts of the two districts, the voices of women and PWDs converge around shared concerns and aspirations (Figure 3).

The issue of access to fundamental services, including but not limited to clean water, sanitation, healthcare, and education, has emerged as a matter of pressing concern across all demographic groups. These challenges are further compounded by infrastructural deficiencies, including damaged water systems, inaccessible roads, and public buildings that fail to accommodate the needs of PWDs or to ensure the safety of women. It is frequently asserted that schools and hospitals are of paramount importance, yet are not adequately funded. This observation is indicative of a more pervasive systemic issue of neglect.

KEY FINDINGS	
ACCESS TO BASIC SERVICES	GENDER AND EMPLOYMENT
SEVERE WATER SCARCITY FORCES LONG-DISTANCE TRAVEL, ESPECIALLY AFFECTING WOMEN AND GIRLS.	YOUNG WOMEN CALL FOR SYSTEMIC REFORMS TO ADDRESS BUREAUCRATIC BARRIERS IN EMPLOYMENT.
LACK OF CLEAN WATER IMPACTS DAILY ROUTINES AND EDUCATION.	STRONG GENDER BIASES IN THE LABOR MARKET, PARTICULARLY AGAINST MOTHERS.
POOR WASTE MANAGEMENT CAUSES HEALTH RISKS, INCLUDING CHOLERA OUTBREAKS.	RESTRICTIVE GENDER NORMS LIMIT WOMEN'S ENTREPRENEURSHIP AND CIVIC ENGAGEMENT.
INADEQUATE ROADS HINDER WATER AND WASTE TRANSPORT, INCREASING HOUSEHOLD BURDENS.	WOMEN ARE OFTEN CONFINED TO DOMESTIC ROLES; MEN SPEAK ON THEIR BEHALF IN PUBLIC FORUMS.
DISABILITY & INCLUSION	GOVERNANCE & PARTICIPATION
PUBLIC INFRASTRUCTURE (SCHOOLS, HOSPITALS, ROADS) IS NOT PRACTICALLY ACCESSIBLE.	POLITICAL LEADERS ARE SEEN AS SELF-SERVING, NOT ADDRESSING REAL COMMUNITY NEEDS.
SCHOOLS ARE NOT EQUIPPED FOR STUDENTS WITH DISABILITIES; CURRICULUM LACKS INCLUSIVITY.	LACK OF DIRECT ENGAGEMENT BETWEEN POLICYMAKERS AND LOCAL COMMUNITIES.
HEALTH FACILITIES LACK SPECIALIZED SERVICES FOR PWDS.	NEEDS OF PWDS ARE UNDERREPRESENTED IN PLANNING AND POLICY DISCUSSIONS.
SOCIAL STIGMA PREVENTS PWDS FROM PARTICIPATING IN PLANNING AND DEVELOPMENT.	

**Figure 3.** Table of key findings of the research.

The participation of women in the workforce is further constrained by cultural norms and institutional barriers. Women described their exclusion from entrepreneurial and political spaces, while PWDS recounted lifelong experiences of marginalization beginning in childhood. Both groups expressed frustration over being marginalized in decision-making processes, with development initiatives frequently imposed without consultation. However, amid this exclusion, participants also expressed a strong desire for inclusion, calling for community workshops, awareness campaigns, and platforms for advocacy.

The subjects of environmental degradation and climate change were also central to the discussions. Participants in the study linked deforestation, soil erosion, and unregulated construction to increased

health risks and agricultural instability. The photo elicitation activities provided a powerful illustration of these concerns, capturing images of polluted watercourses, unstable housing, and hazardous terrain. Concurrently, participants identified spaces of hope, including libraries, gardens, and schools, as symbolic of resilience and potential.

A shared vision emerged as a unifying element across all engagements, encapsulating the aspiration for inclusive urban environments characterized by enhanced accessibility and equitable conditions.

### *3.1. Women from Chake Chake*

The FGDs and photo elicitation sessions conducted with women from Chake Chake revealed a multifaceted understanding of the quotidian urban challenges that are shaped by gender, infrastructure, and environmental vulnerability. Participants described how the paucity of medical specialists in local hospitals, combined with the deterioration of water infrastructure, often due to insufficient community maintenance, complicates access to essential services and compromises public health.

Poor waste management was identified as a significant concern, with direct links to disease outbreaks such as cholera. Furthermore, participants noted that phenomena such as stagnant water and deforestation contribute to rising global temperatures and the geographical spread of malaria. This observation underscores the environmental dimension of health risks. The effects of deforestation were further associated with salinity intrusion into agricultural lands and air pollution from industrial activities, such as the clove processing plant.

The issues of safety and accessibility attracted considerable attention. Female respondents reported avoiding specific areas of Chake Chake due to concerns about crime and inadequate lighting, particularly at night. In addition, infrastructural barriers were identified, including the absence of disability-friendly features in public buildings and schools. A particularly salient example is the “100 Steps Stair” (Ngazi Mia) in Michakaini, which poses grave risks for elderly and disabled individuals, especially during emergencies.

During the photo elicitation activity, participants documented sites that reflected both the challenges they face and the spaces they rely on daily. As illustrated in Figures 4, 5, and 6, the key concerns are: solid waste accumulation along a watercourse (Figure 4), damaged water pipes (Figure 5), and a neighborhood dumpsite in poor condition (Figure 6). These images visually reinforce the narratives shared during the FGD and interviews.

Generational differences were evident in the semi-structured interviews. As posited by younger women, the necessity for systemic reforms and an augmentation of employment opportunities was emphasized. The argument was supported by evidence of bureaucratic inefficiencies and an over-reliance on government-led initiatives. Participants of more mature years expressed their frustration with the lack of substantial outcomes from the advocacy initiatives undertaken. Notwithstanding these discrepancies, there was a unanimous consensus on the pressing need to enhance access to clean water and to implement more effective waste management systems.

A discussion was held on gender-based inequalities, with particular reference to the spheres of employment and education. It was reported that women have been overlooked for positions for which they were suitably qualified, often as a result of assumptions associated with their roles as mothers. The educational opportunities available to girls were described as being limited, shaped by cultural expectations that prioritize the future of boys and assume that women’s economic roles will diminish after marriage.



**Figure 4.** Picture of solid waste accumulated along the watercourse in Chake Chake, taken by the participants during the photo elicitation activity.



**Figure 5.** Picture of damaged water pipes, taken by the participants from Chake Chake during the photo elicitation activity.

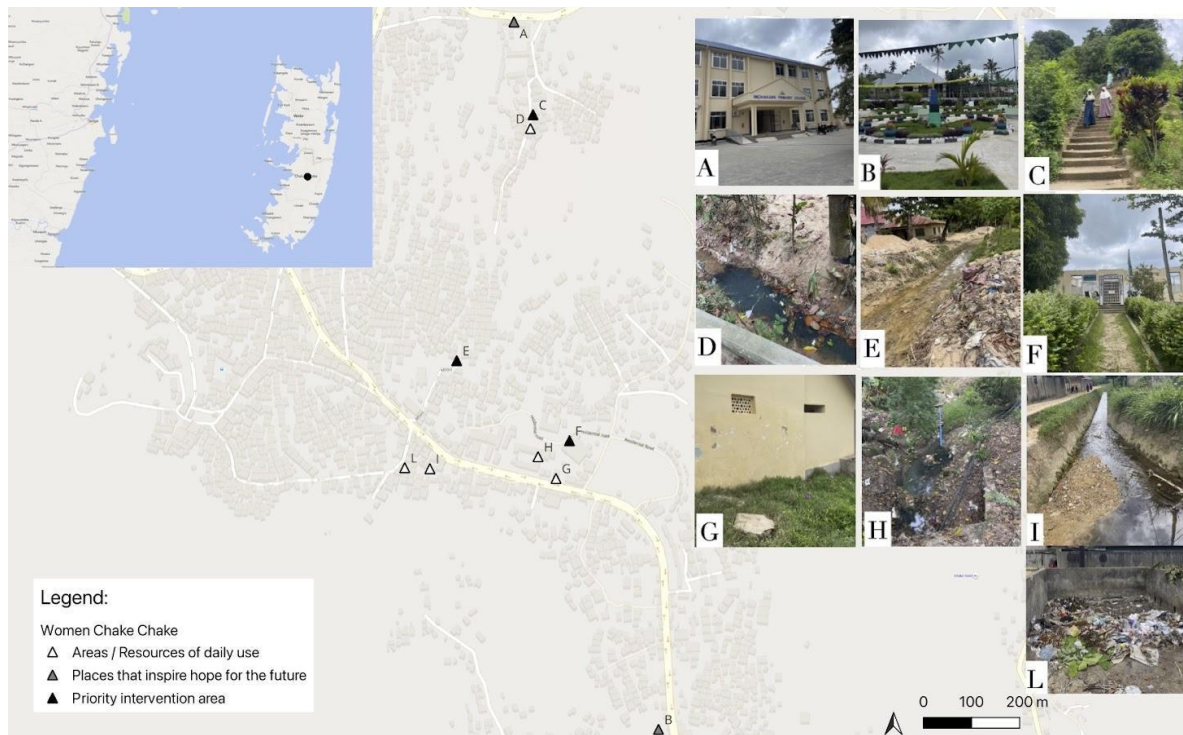


**Figure 6.** Picture of the neighborhood dumpsite in poor condition, taken by the participants from Chake Chake during the photo elicitation activity.

The participants conceptualized an inclusive urban environment as one that fosters active participation, equality, and accessible services. Teachers, municipal officers, and representatives of local organizations asserted that it is imperative for all members of the community to be involved in planning processes to ensure that a range of perspectives is given due consideration. It was posited that the three factors of economic empowerment, cultural preservation, and moral values were of paramount importance in the establishment of a cohesive and resilient community.

Figure 7 provides a visual representation of the locations captured by participants, emphasizing areas deemed to be of paramount importance for intervention and those that hold significance in the participants' daily lives.

These include schools, gardens, watercourses, and hazardous zones such as the Ngazi Mia stairway and contaminated flood-prone areas. Each location is marked with precise coordinates to support future planning and advocacy.



**Figure 7.** Map of the locations of priority intervention areas, places that inspire hope, and resources of daily use in Chake Chake, taken during the photo elicitation activity. The coordinates of the photo locations are as follows: A: Michakaini Primary School, 5,24049° S, 39,77214° E; B: Madungu Garden, 5,25381° S, 39,77472° E; C: “100 Steps Stairs” in Msingini, 5,24425° S, 39,77158° E; D: contaminated watercourse in Madungu, 5,24429° S, 39,77158° E; E: contaminated watercourse in Madungu (opposite side), 5,24661° S, 39,77093° E; F: Kengeja Secondary School, 5,24799° S, 39,77263° E; G: schools’ waste disposal system, 5,24841° S, 39,77196° E; H: polluted water system, 5,24878° S, 39,77350° E; I: neighborhood river flood risks, 5,24870° S, 39,76964° E; L: unsafe waste disposal, 5,24868° S, 39,76950° E.

### 3.2. PWDs from Chake Chake

The FGD and photo elicitation sessions with PWDs in Chake Chake provided a comprehensive account of the structural and social barriers that shape their daily lives. The importance of inclusive decision-making processes, particularly in urban planning and infrastructure development, was a recurring theme among participants. The exclusion of these individuals from the aforementioned processes perpetuates a state of dependency, thereby constraining their autonomy.

The issue of access to healthcare has become a matter of significant concern. Numerous participants reported experiencing difficulties in receiving adequate treatment in the absence of support from a caregiver or advocate. It is evident that even facilities that are officially designated as accessible often fail to meet the practical needs of individuals with disabilities. A survey of such facilities reveals a lack of essential features, including but not limited to adapted restrooms, ramps, and assistance personnel. The absence of mediators in healthcare settings leaves individuals without family support vulnerable to neglect.



**Figure 8.** Picture of a water tank where residents must manually collect water, taken by the participants from Chake Chake during the photo elicitation activity.



**Figure 9.** Picture of a heavily polluted river, taken by the participants from Chake Chake during the photo elicitation activity.

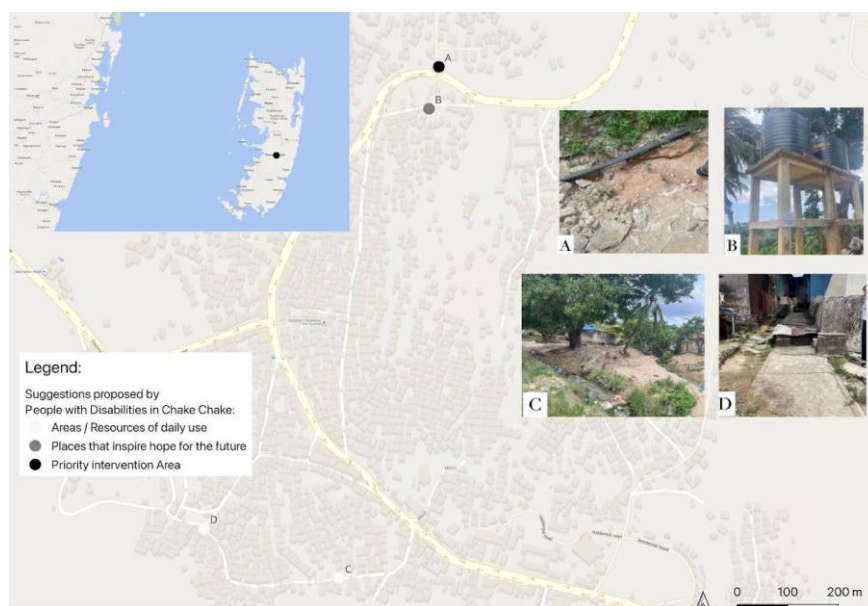
Infrastructural deficiencies are not limited to medical facilities. Participants described the burden on families of transporting waste to landfills and the difficulty of collecting water due to poor road conditions and the lack of inclusive infrastructure. These challenges are further compounded by the absence of specialized equipment and services that are tailored to the needs of individuals with physical disabilities. Figure 8, which illustrates a water tank where residents must collect water manually, and Figure 9, which depicts a heavily polluted river, visually reinforce these concerns.

The photo elicitation activity enabled participants to direct the narrative and emphasize locations that embody both exclusion and resilience. Whilst numerous images captured environmental

degradation and infrastructural neglect, they also revealed the agency of participants in documenting their lived realities and advocating for change.

During the semi-structured interviews, participants discussed barriers to economic participation, including the lack of employment opportunities and inaccessible transportation. It has been asserted that public transport is unreliable and often discriminatory, with drivers often unwilling to accommodate PWDs. This has the effect of forcing individuals to rely on expensive private options, which further limits independence.

Furthermore, participants expressed exasperation about their limited involvement in public meetings and planning processes. Advocacy organizations have been identified as playing a key role in raising awareness, but direct engagement with decision-makers remains rare. Despite this, many participants expressed a strong desire to be fully integrated into their communities, calling for inclusive spaces where they can express themselves and contribute meaningfully.



**Figure 10.** Map of the locations of priority intervention areas, places that inspire hope, and resources of daily use in Chake Chake, taken during the photo elicitation activity. The coordinates of the photo locations are as follows: A: inaccessible roads,  $5,24017^{\circ}$  S,  $39,77020^{\circ}$  E; B: the only way to fetch water in the neighborhood,  $5,24215^{\circ}$  S,  $39,76992^{\circ}$  E; C: contaminated water stream used daily by different households,  $5,24870^{\circ}$  S,  $39,76812^{\circ}$  E; D: dangerously unstable coverage of the water system,  $5,24798^{\circ}$  S,  $39,76626^{\circ}$  E.

The group's vision for an inclusive urban environment is predicated on the principles of accessibility, equality, and participation. The notion of equity in access to education, healthcare, and employment was identified as a pivotal factor in fostering social harmony and dismantling stereotypes. The challenges illustrated in Figures 8 and 9, namely manual water collection and environmental pollution, serve as tangible reminders of the urgent need for targeted reforms. Figure 10 provides a visual representation of the locations documented by participants, including inaccessible roads, hazardous water systems, and daily-use resources. The geolocated images thus provide a spatial representation of exclusion, offering a foundation for future planning and advocacy.

### 3.3. Women from Mkoani

The FGD and photo elicitation sessions conducted with women from Mkoani revealed a multifaceted reality shaped by infrastructural limitations, cultural expectations, and environmental vulnerability. Participants described how access to fundamental services, particularly education and healthcare, is constrained for the general population and nearly inaccessible for PWDs. In the field of education, schools were cited for deficiencies in inclusive infrastructure and in adapted curricula. Meanwhile, healthcare facilities were found to be operating with reduced hours, inadequate staffing, and limited access to medical supplies. It is a common occurrence that expectant mothers seek treatment at private medical facilities due to the unavailability of specialized equipment at public hospitals. Moreover, the implementation of prayer schedules within these institutions further restricts access to healthcare services.

Cultural norms were identified as a significant barrier to women's participation in economic and political life. Historically, entrepreneurial initiatives and public discourse have been predominantly influenced by male voices, who are commonly regarded as the primary representatives of family and community interests. These expectations have the effect of restricting women's ability to pursue self-employment or engage in decision-making processes, thus reinforcing patterns of exclusion and dependency.

The discussion was dominated by concerns pertaining to the environment. Participants have linked inadequate waste management and water scarcity to the propagation of diseases such as cholera, especially in areas where children engage in play in proximity to unsanitary dumpsites. Concerns were raised about the healthcare system's capacity to respond to emergency situations, and public spaces were characterized as hazardous. It is imperative to note that particular attention was given to hillside areas, where construction permits are granted without proper land assessment, thus increasing the risk of soil erosion and landslides. The lack of coordination between municipal authorities and land monitoring agencies was identified as a contributing factor to the exacerbation of these risks.

Another key concern pertained to the influence of diverse pedoclimatic conditions on agriculture.

Participants described the impact of intense, irregular rainfall patterns on vegetation and crop yields, and the resulting threat to food security and local livelihoods. These changes were perceived as part of a broader shift in environmental balance, requiring more adaptive and sustainable land-use strategies.

Figures 11, 12, and 13 illustrate the environmental and infrastructural challenges discussed: a poorly constructed house built on a slope (Figure 11), a damaged and unpaved road connecting villages to the main road (Figure 12), and residential areas built on unstable terrain prone to landslides (Figure 13). These images highlight the precarious conditions in which many residents live and underscore the urgent need for a coordinated approach to urban planning.



**Figure 11.** Picture of a poorly constructed house built on a slope, taken by participants from Mkoani during the photo elicitation activity.



**Figure 12.** Picture of a damaged, unpaved road connecting local villages to the main road, taken by participants from Mkoani during the photo elicitation activity.



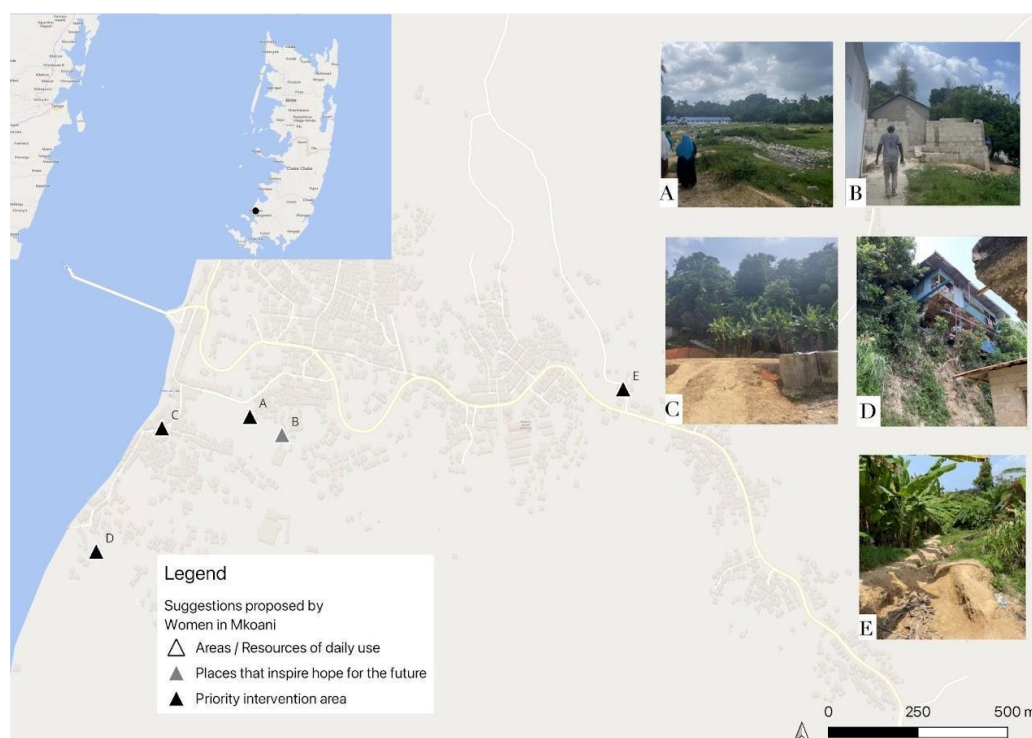
**Figure 13.** Picture of houses built on unstable terrain prone to landslides, taken by participants from Mkoani during the photo elicitation activity.

Despite pervasive skepticism about government-led improvements, often attributed to bureaucratic inefficiencies and unregulated development, some participants expressed optimism regarding projects that engage communities and study local conditions. Community workshops and awareness activities were described as rare but valuable opportunities for dialogue and collective problem-solving.

The semi-structured interviews reinforced the necessity of inclusive development practices. The participants placed significant emphasis on the need to incorporate women into the planning and implementation processes. They also voiced criticism of the delivery of “finished products” without prior consultation. The identified employment opportunities were considered integral to the process of empowerment, and the establishment of cooperative groups exclusively comprising women was recognized as an effective means of providing economic support and training. The concept of implementing “suggestion boxes” in public institutions was proposed to foster communication and address the perceived disconnection between communities and decision-makers.

In addition, the participants engaged in discourse on the function of education in the reconfiguration of gender roles. The recommendation of awareness programs targeting young men was proposed to encourage more inclusive attitudes and promote shared responsibility. A future of gender equity was envisaged, characterized by equal collaboration between men and women for the well-being of their families and communities.

Figure 14 provides a visual representation of the locations documented by participants, including sites of waste disposal, symbols of improvement, and areas affected by erosion and substandard housing. The geolocated images provide a spatial representation of the community’s expressed priorities and aspirations.



**Figure 14.** Map of the locations of priority intervention areas, places that inspire hope, and resources of daily use in Mkoani, taken during the photo elicitation activity. The latitude and longitude coordinates are reported as follows: A: waste disposal near the school,  $5,36279^{\circ}$  S,  $39,64650^{\circ}$  E; B: taken by participants as a symbol of improvement,  $5,36313^{\circ}$  S,  $39,64765^{\circ}$  E; C: impacts of soil erosion and landslides,  $5,36420^{\circ}$  S,  $39,64350^{\circ}$  E; D: hazardous living conditions and unsafe housing,  $5,36171^{\circ}$  S,  $39,65163^{\circ}$  E; E: inaccessible roadways,  $5,36240^{\circ}$  S,  $39,65612^{\circ}$  E.

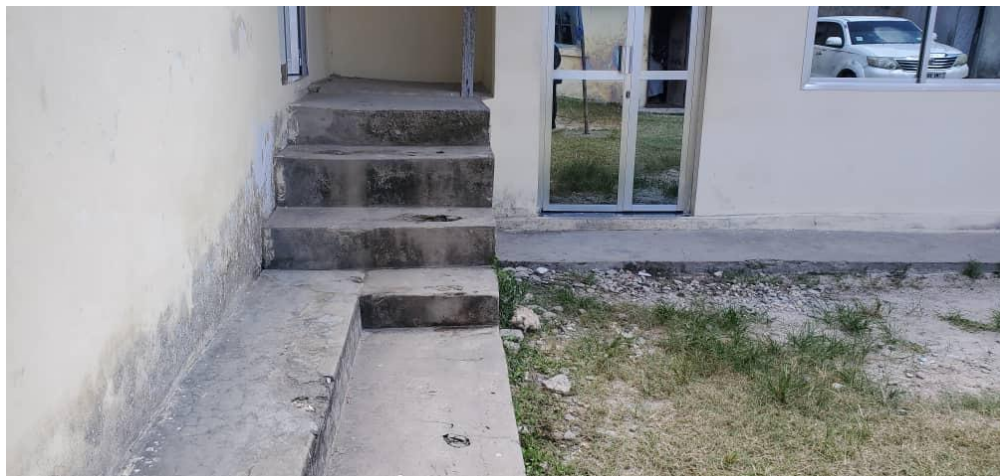
### 3.4. PWDs from Mkoani

The FGD and photo elicitation sessions conducted with PWDs in Mkoani revealed a daily reality characterized by significant physical hardship, infrastructural neglect, and limited institutional support. One of the most pressing concerns was that of access to water. In the absence of structured services or contingency plans, individuals must collect water manually, often navigating unsafe terrain. For those suffering from impaired mobility, the task in question is known to be both exhausting and dangerous. Indeed, completing the task often depends on the goodwill of neighbors or family members.

Participants described how, for many PWDs, simply leaving the house is a challenge. The lack of adequate road infrastructure, transportation options, and public amenities often leaves individuals confined to their homes or immediate surroundings. This spatial limitation has been demonstrated to reinforce social isolation and to restrict access to education, employment, and community life.

It was once again determined that educational institutions were not accommodating PWDs. This was determined not only in terms of infrastructure but also in the nature of classroom activities. The issue of accessibility remains a significant concern, as evidenced by the prevalence of schools that lack essential amenities such as ramps, elevators, and inclusive facilities. Beyond the physical environment, the curriculum and teaching methods frequently fail to accommodate diverse learning needs, further

alienating students with disabilities. Institutional shortcomings experienced during early childhood established the foundation for a prolonged period of marginalization. One participant shared how her parents decided against sending her to school due to the logistical challenges and lack of support, a reality captured in Figure 15, which shows the entrance of a public building with stairs but no ramp.



**Figure 15.** Picture of the entrance of a public building with stairs but no ramp or alternative access, taken by participants from Mkoani during the photo elicitation activity.

Furthermore, public facilities, including lavatories in government buildings, were found to be inaccessible, thereby undermining basic dignity and autonomy. Transportation emerged as a pivotal concern, with participants reporting recurrent instances of rejection by public drivers, who were often reluctant to accommodate their needs. This predicament compelled individuals to rely on costly private transportation alternatives. This paucity of accessible mobility assumes even greater significance in emergency situations, where prompt access to medical facilities is paramount.

Notwithstanding the challenges encountered, participants were able to identify areas of potential for positive change. The local library, as illustrated in Figure 16, has been characterized as an inclusive and welcoming environment, serving not only as a place for learning but also as a space for social connection and community engagement. It was a rare example of a public space where PWDs felt seen and valued.

The semi-structured interviews reinforced the expressed desire for full integration into community life. The participants expressed their discontent with the selective nature of their participation in public meetings, emphasizing their exclusion from the planning and decision-making processes. The demand for inclusive spaces in which to engage with diverse groups, advocate for their rights, and contribute meaningfully to collective efforts was also voiced.

A discussion was held on environmental concerns, with particular reference to changing pedoclimatic conditions. Participants noted the impact of irregular rainfall and soil instability on infrastructure and access to services. The combination of these shifts and inadequate land-use planning exacerbates the risks faced by PWDs, particularly in areas susceptible to flooding or erosion.

Employment was identified as a transformative aspiration. Participants emphasized that meaningful work is not only a path to financial independence but also a means of affirming their place in society. The proposed improvements included upgrades to infrastructure, such as roads, water

systems, and hospitals. Additionally, there was a call for enhanced waste management and inclusive economic policies to support autonomy and dignity.

Figure 17 presents a geographical representation of the locations captured by participants.

As shown in Figure 17, the area includes the district commissioner's office and the library, highlighting both existing challenges and potential opportunities.



**Figure 16.** Picture of the local library as an inclusive space, taken by participants from Mkoani during the photo elicitation activity.



**Figure 17.** Map of the locations of priority intervention areas, places that inspire hope, and resources of daily use in Mkoani, taken during the photo elicitation activity. The latitude and longitude coordinates are reported as follows: A: DC office from outside, 5.360789° S, 39.647182° E; B: DC office entrance staircase, 5.360789° S, 39.647182° E; C–D: Mkoani library, 5.362173° S, 39.645243° E.

#### 4. Discussion

Building on previous works [39–43], this study deepens the understanding of vulnerability as a multidimensional and relational condition. Rather than treating material deprivation (e.g., poverty, food insecurity, inadequate housing) and relational exclusion (e.g., stigma, social isolation, limited access to education and healthcare) as separate domains, our findings show how these dimensions co-produce spatial marginality in ways that are historically embedded and context-specific. Their mutual reinforcement underscores the need for inclusive policies that address not only symptoms but the structural roots of urban marginalization.

This relational framing of vulnerability becomes particularly salient when examining the uneven distribution of power within participatory processes, especially in small island contexts. Echoing earlier research [40], our fieldwork reveals how barriers to inclusion are shaped by intersecting constraints, poverty, asymmetrical power relations, and gendered roles that persist even within inclusive frameworks. This dynamic surfaced during community dialogues, where men tended to occupy leading roles, while women's contributions, though present, were less frequently voiced or fully acknowledged. Their participation, while meaningful, often unfolded within subtle constraints shaped by prevailing social norms. These imbalances reflect broader governance dynamics and reaffirm the persistence of gendered exclusion in urban planning.

The findings also expand existing knowledge linking vulnerability to limited access to essential services, substandard housing, and social exclusion in informal urban settings—particularly among women and PWDs [41]. These groups, often excluded from formal decision-making, possess critical experiential knowledge that is epistemically valuable. Their involvement is not merely desirable but essential for identifying overlooked issues and ensuring that territorial transformation initiatives are both contextually grounded and socially equitable [42].

In Pemba, several factors were identified as contributing to low levels of community participation in development projects, including the imposition of externally designed initiatives, limited explanation and comprehension of project goals, and constrained capacity to engage with complex planning processes [43]. These barriers have led to ineffective implementation and underutilization of alternative land uses, such as the Tibirinzi market. Addressing these challenges requires dismantling institutional obstacles and closing capacity gaps through targeted empowerment strategies. Local government authorities and civil society organizations must proactively enhance community skills and knowledge to foster meaningful engagement and improve project outcomes.

Drawing on data collected by local organizations [44], the study further identifies key drivers of vulnerability in informal urban contexts: inadequate access to water; poor sanitation and hygiene; insufficient infrastructure; ineffective land management, and the exclusion of informal settlements from official planning frameworks. These findings support bottom-up governance as a transformative strategy for building inclusive and adaptive urban systems.

This need for context-sensitive governance becomes even more urgent when considering the cultural transformations triggered by tourism growth. The case of Unguja illustrates how rapid tourism development reshapes traditional practices and everyday life, generating tensions between market-oriented values and place-based social structures rooted in kinship, reciprocity, and cultural continuity [45–47]. These tensions manifest in altered spatial arrangements, shifts in gender roles, and the commodification of cultural expressions. In contrast, Pemba seems less exposed and institutionally less prepared to absorb such transformations. Its relative isolation, slower pace of development, and

stronger attachment to customary land tenure systems contribute to a form of cultural resilience but also to heightened vulnerability should tourism growth accelerate without adequate safeguards. This contrast suggests that cultural erosion is not inherent to tourism itself, but emerges when development is externally driven, poorly regulated, and misaligned with local values and capacities [48,49]. Thus, inadequate tourism development can be a vector that amplifies existing inequalities, reconfigures social norms, and reshapes territorial imaginaries. The comparison between Unguja and Pemba underscores the need for participatory planning and cultural reflexivity. As Abreu and colleagues [50] argued, inclusive governance must empower communities to co-design development trajectories that reflect their lived realities and aspirations, rather than imposing homogenizing models of urban futures.

Participants also emphasized the importance of developing sustainable waste management systems alongside educational initiatives to raise awareness about proper disposal practices. This aligns with the World Resources Institute's [51] recommendations for enhancing water resilience in rapidly urbanizing African cities [52]. Establishing platforms for community members to voice concerns and actively participate in decision-making processes [53] emerged as a key condition for fostering engagement and ownership.

The findings also reinforce the role of ecological infrastructure in enhancing urban resilience, as documented in previous studies [17]. Participants identified several opportunities currently lacking but essential for fostering equity, particularly for PWDs. These individuals often face isolation and significant barriers to accessing services, including physical obstacles to public offices and reliance on intermediaries for administrative procedures. Such conditions deepen social exclusion and hinder meaningful participation.

To strengthen urban resilience on Pemba Island, an inclusive approach is imperative—one that integrates vulnerable groups, especially women and PWDs, into land-use planning and urban strategy development. These groups face challenges that require targeted actions and empowerment initiatives. Ensuring equal access to services and infrastructure, promoting scenario planning, and raising awareness about climate phenomena are vital components of this strategy [54]. Simultaneously, dignified livelihoods must be prioritized to reduce vulnerability and improve quality of life. Supporting women and PWDs in leveraging their assets and developing long-term economic opportunities is essential. Strengthening community organizational structures will enhance social capital and facilitate active involvement. Empowerment-focused interventions can increase adaptive capacity and enable meaningful contributions to land-use planning and resource management.

The existing multi-level co-management framework in Pemba offers a promising foundation for inclusive development. However, to ensure equitable participation, development processes must be fully accessible to women and PWDs. Enhancing their involvement in decision-making will contribute to greater urban resilience, social equity, and sustainable territorial governance. Finally, the results demonstrate a strong individual commitment among participants to drive change within their communities. Many pledged to disseminate environmental knowledge within their families, plant trees to combat soil erosion, and promote ecological awareness. These actions reflect a grassroots dynamism and a willingness to break with past practices, reinforcing the transformative potential of community-led adaptation and multispecies resilience.

#### 4.1. Visual evidence analysis

The photo elicitation activity provided a visually grounded account of environmental, infrastructural, and social challenges as perceived by Chake Chake and Mkoani participants. In Chake Chake, the images strongly focus on environmental health hazards, particularly water access and waste management. A polluted watercourse in the Madungu neighborhood (Figures 4 and 9) was documented as a key concern, serving over 150 families despite severe contamination. The site, often frequented by children, highlights the health risks posed by unsafe water sources and is cited as emblematic of the urgent need for sustainable water management. Participants also captured the deteriorated condition of water pipes (Figure 5), highlighting the inefficiency of the current distribution system and its limited reach, especially for PWDs. Waste disposal emerged as a parallel concern, with photos showing garbage accumulation near schools and homes (Figure 6), often directly adjacent to water sources, contributing to flooding, contamination, and disease spread.

Beyond environmental concerns, the activity revealed the daily challenges faced by PWDs, documenting inaccessible roads and thereby emphasizing how physical barriers hinder basic mobility and access to essential services. Some water projects (Figure 8), while promising, were also shown to have significant limitations, as many of their pipelines remain inactive. These photographs underscored the resilience and agency of participants and the systemic gaps in infrastructure and inclusion for marginalized groups.

In Mkoani, the visual narratives capture the central theme of the community's exposure to geological risks and housing insecurity. Participants guided the walk to areas severely affected by soil erosion and landslides, emphasizing the frequency and consequences of these events. These risks were further documented in Figure 13, which portrays dense residential development in high-risk zones, and poorly constructed homes vulnerable to collapse during extreme weather events in Figure 11.

Infrastructure challenges also emerged as critical in Figure 12, showing a deteriorated road connecting the village to the main street, described as repeatedly undermined by neglect and weather events, affecting daily mobility, access to services, and emergency response.

The accessibility theme was further explored by deliberately juxtaposing two key public spaces. The District Commissioner's Office (Figure 15) was presented as an emblem of exclusion, characterized by staircases and the absence of ramps or elevators, which effectively prevents access for people with limited mobility. On the other hand, the Mkoani Library (Figure 16) was celebrated as a space of inclusion and social participation. Participants praised its barrier-free atmosphere, portraying it as a model of how thoughtful planning can foster empowerment and community engagement.

These participant-generated images not only validate previously identified structural issues but also illuminate the emotional and symbolic dimensions of spatial exclusion and belonging. The photo elicitation process highlighted participants' agency in identifying challenges and solutions, affirming the value of participatory visual methods in elevating community voices in research and planning.

#### 4.2. Limitations

Despite the use of participatory and inclusive methods, certain limitations regarding sample selection and data interpretation must be acknowledged. Participants were primarily identified and invited through the local partner organization, The Popular Inspiring & Relief Organisation (PIRO). As previously mentioned in the methodology, the selection of individuals was based on a quadruple

helix approach, and individuals were identified through the LVIA and PIRO records. The PIRO association served as a point of reference for local individuals during this research phase. While this collaboration was essential for building trust and ensuring cultural and linguistic considerations, it may have introduced a sample-selection bias, potentially excluding the most marginalized individuals who are not connected to formal or informal networks.

Sixteen representatives per category were invited to participate across both municipal areas. In total, 40 participants participated in the FGD. However, not all could participate in the photo elicitation activity due to family obligations or mobility-related difficulties that led to fatigue. Additionally, 36 individuals participated in the semi-structured interviews, while 31 attended the final discussions during the feedback sessions.

The reasons for non-participation or partial involvement were not systematically recorded. However, observations suggest that logistical and physical barriers, such as caregiving responsibilities, chronic fatigue, or unreliable public transportation, played a significant role. Additionally, the presence of PIRO members as interpreters and facilitators, while beneficial for communication and contextual understanding, may have introduced a response bias. Participants may have been inadvertently influenced by how they expressed their views to the research team. Although neutrality and transparency were prioritized throughout the process, this dynamic must be considered when interpreting the results.

Future studies should consider expanding recruitment strategies to reach more isolated individuals and ensure broader representativeness.

### *4.3. Challenges and steps forward*

As evidenced in the results, there is a clear need to allocate financial resources to children's education, with particular attention to preventing gender-based violence and promoting respect for rights and freedoms. Developing inclusive curricula is essential to address diverse learning needs, especially for students with disabilities. Alongside strengthening healthcare infrastructure, extending operating hours, and ensuring the availability of essential medical equipment, it is crucial to remove barriers to maternal healthcare and prioritize the needs of women and children.

Several insights also emphasized the importance of creating safe spaces where women can articulate their needs and develop actionable agendas for institutional advocacy. Participants further highlighted the value of inclusive initiatives that encourage civic participation and representation.

Awareness campaigns targeting young men were proposed as a means to challenge restrictive gender norms and promote more equitable attitudes. Participants also stressed the importance of fostering collaboration between men and women in pursuit of shared development goals. Water accessibility was a prominent theme in our study, which revealed that women frequently assume responsibility for fetching water from wells. This task becomes particularly challenging for women with disabilities who also need to care for their children. The time commitment required for this activity is a significant challenge. A minimum of two hours per day is required for fetching water when it is not delivered directly to the home. In addition to the time commitment, accessing wells via uneven roads poses physical challenges that become even more problematic during the rainy season.

The region's challenges are further compounded by population growth and the risk of excessive tourism expansion. A recent study has highlighted the pressing issue of water security on the islands of Unguja and Pemba, where various pressures, including population growth, urbanization, tourism, and

increased climate change, contribute to this problem [55]. Whilst the implementation of piped water infrastructure has enhanced sanitation and reduced the time required to collect water, such systems remain susceptible to power outages and inadequate maintenance. Consequently, well water is an essential backup resource, though its quality is increasingly compromised due to overexploitation and contamination.

In our research, the participants unanimously agreed that water scarcity remains one of Pemba's most pressing issues. One participant poignantly asked, "*When will we have access to drinkable, running water? Will it ever be possible?*" This burden disproportionately falls on women, who must prioritize fetching water over pursuing education or personal interests. As one participant noted, "*Water collection is a woman's chore, leaving little room to live according to one's own will*". This dynamic underscores the structural inequalities that impede women's empowerment.

Cultivating a culture of self-effort and mutual support was deemed essential to fostering positive change. Policies and legislation aimed at improving the lives of PWDs must be implemented to ensure equitable access to basic services. Participants underscored the need for individual and collective efforts to support PWDs. Raising awareness within the community about the rights and needs of PWDs, promoting inclusive practices, and fostering a bias-free environment.

A primary challenge encountered during the research process was identifying fully accessible locations for all participants, which posed significant logistical difficulties. This issue stemmed from the physical characteristics of potential venues and the need to create an inclusive environment that addressed the diverse requirements of the individuals involved. Ensuring ease of movement and guaranteeing equal opportunities for participation necessitated meticulous planning and coordination. Language barriers were a further challenge encountered during the research process [56]. It became imperative to engage an interpreter to ensure the subtleties of conversations and the articulation of locations were accurately conveyed.

The role of interpreters in this context is considerable. They serve as cultural mediators between individuals who need to communicate but do not share a common language. However, challenges occasionally arise, particularly with less experienced interpreters, who are more prone to errors. Also, a concern and logistical difficulty arose when the decision was made to request support from the local partner to interpret the dialogues among participants during various research activities. Interpretation errors were frequently encountered, especially in oral translations. To address this issue, the interpreter reviewed the English-written text to validate the content and reduce potential inaccuracies.

A further insight from this experience, particularly relevant for future research, is the need to collaborate with key community figures, such as religious leaders. Their involvement is crucial in fostering trust and building rapport within the community, as they often serve as influential mediators between researchers and the local population. The active engagement of such figures facilitates a more direct connection with community members, thereby encouraging their participation and investment in the project. This approach has the potential to enhance the overall impact of the research, aligning with a bottom-up methodology that brings the primary beneficiaries closer to the implementation of the initiatives being developed.

## 5. Conclusions

Individuals who are socially, economically, culturally, politically, institutionally, or otherwise marginalized are particularly susceptible to adaptation and mitigation responses, which are informed by gender, class, ethnicity, age, and disability discrimination [57].

The present paper illustrates how inclusive approaches, active listening, and community involvement can suggest and promote transformative resilience in small island urban contexts. In particular, integrating gender- and disability-sensitive perspectives [29] alongside employable methods across diverse contexts offers a replicable methodology for urban planning in vulnerable coastal island areas.

The importance of co-designing policies and strategies to enhance urban eco-resilience with communities cannot be overstated. Effective public participation in climate change adaptation requires an inclusive system that incorporates all relevant stakeholders, particularly vulnerable groups [58]. The study highlights the value of participatory methodologies in addressing the urban and environmental challenges confronting marginalized groups, notably women and PWDs, on Pemba Island. Incorporating their narratives and lived experiences into the urban development process has generated critical insights into the systemic barriers that limit accessibility, economic opportunities, and social inclusion.

The use of participatory methods enabled stakeholders to share novel perspectives, thereby fostering a deeper understanding of the challenges faced by vulnerable groups in the local context.

The findings emphasize the pressing necessity for targeted policy interventions, enhanced infrastructure, and community-driven solutions to bolster eco-resilience and social equity. Participants from Chake Chake and Mkoani repeatedly highlighted significant concerns, including inadequate waste management, water scarcity, unsafe urban planning, and limited access to essential services. If these challenges are not addressed, it is predicted that social and environmental vulnerabilities will continue to worsen. The participants articulated unambiguous visions for a more inclusive and sustainable future, proffering concrete policy recommendations and practical suggestions. These include the need for inclusive infrastructure, urban planning sensitive to gender issues, and participatory governance.

To move beyond general recommendations, a structured implementation framework is required. In the short term (within one year), establishing advisory committees for PWDs at both Chake Chake and Mkoani City Halls is essential to ensure their direct involvement in urban planning decisions. In the medium term (within three years), integrating the Photovoice methodology into the appendix of the Zanzibar Urban Planning Ordinance is recommended as a formal tool for community engagement and empowerment. Over a five-year horizon, the creation of an interdepartmental working group dedicated to water resource management on Pemba Island would enhance cross-sectoral collaboration and sustainable service delivery. Additionally, the active involvement of religious leaders in community dialogues should be prioritized to foster broader participation and awareness, ensuring local ownership and long-term sustainability of interventions. The translation of these findings into actionable policies and initiatives that promote equity, accessibility, and sustainability is imperative. The adoption of inclusive governance, gender-sensitive policies, and accessibility measures is imperative for the future of Pemba Island, as it will help develop a more equitable and resilient urban environment.

As Ribeiro and Gonçalves (2019) [59] affirmed, there is no universally accepted definition of resilience. Nonetheless, local resilience can be strengthened through bottom-up processes that position residents as co-leaders in planning and governance, thereby reinforcing local identity [60]. Such actions can support the development of resilient urban systems [61], capable of adapting to socio-environmental challenges over the long term.

## Author contributions

L.B.: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Supervision; Validation; Visualization; Writing—original draft; Writing—review & editing. G.M.: Data curation; Formal analysis; Investigation; Validation; Visualization; Writing—original draft; Writing—review & editing. E.D.: Funding acquisition; Project administration; Resources; Supervision.

## Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

## Ethical approval of the research and informed consent

The research protocol of the paper was reviewed and approved by the Bioethical Committee of the University of Turin (Prot. no. 0589383).

## Acknowledgments

This research is an outcome of the project “KIJANI PEMBA—Strengthening Urban Eco-resilience in Chake Chake and Mkoani” NDICI\_AFRICA/2023/447-205, and was funded by the European Union. Its contents are the sole responsibility of the SASA Programme Team and do not necessarily reflect the views of the European Union.

A heartfelt thanks to the LVIA Team for their hospitality and technical support. Gratitude is also extended to PIRO for their assistance with the translation. A sincere thank you to all the participants, who consistently ensured their presence and, with kindness and determination, shared their opinions, actively contributing to the research.

## Conflict of interest

The authors declare no conflict of interest.

## References

1. McPhearson T, Pickett STA, Grimm NB, et al. (2016) Advancing Urban Ecology toward a Science of Cities. *BioScience* 66: 198–212.
2. Rosenzweig C, Solecki W, Hammer S, et al. (2010) Cities lead the way in climate-change action. *Nature* 467: 909–911. <https://doi.org/10.1038/467909a>
3. Sharifi A (2023) Resilience of urban social-ecological-technological systems (SETS): A review. *Sustain Cities Soc* 99: 104910. <https://doi.org/10.1016/j.scs.2023.104910>
4. Ostrom E (2009) A general framework for analyzing sustainability of social-ecological systems. *Science* 325: 419–422. <https://doi.org/10.1126/science.1172133>

5. World Bank, Global risks report. Washington, DC. 2019. Available from: <https://weforum.org/reports/the-global-risks-report-2019>.
6. Cambaza E, Mongo E, Anapakala E, et al. (2019) Outbreak of cholera due to Cyclone Kenneth in northern Mozambique, 2019. *Int J Environ Res Public Health* 16: 2925. <https://doi.org/10.3390/ijerph16162925>
7. Rohat G, Flacke J, Dosio A, et al. (2019) Projections of human exposure to dangerous heat in African cities under multiple socioeconomic and climate scenarios. *Earth's Future* 7: 528–546. <https://doi.org/10.1029/2018EF001020>
8. Roy M, Shemdoe R, Hulme D, et al. (2018) Climate change and declining levels of green structures: Life in informal settlements of Dar es Salaam, Tanzania. *Landsc Urban Plan* 180: 282–293. <https://doi.org/10.1016/j.landurbplan.2017.11.011>
9. Feng X, Zeng F, Loo BPY, et al. (2024) The evolution of urban ecological resilience: An evaluation framework based on vulnerability, sensitivity and self-organization. *Sustain Cities Soc* 116. <https://doi.org/10.1016/j.scs.2024.105933>
10. Abbott J (1995) Community participation and its relationship to community development. *Community Dev J* 30: 158–168. <https://www.jstor.org/stable/44252839>
11. Allotey P, Verghis S, Alvarez-Castillo F, et al. (2012) Vulnerability, equity and universal coverage—a concept note. *BMC Public Health* 12: S2. <https://doi.org/10.1186/1471-2458-12-S1-S2>
12. Zarowsky C, Haddad S, Nguyen VK (2012) Beyond ‘vulnerable groups’: Contexts and dynamics of vulnerability. *Glob Health Promot* 20: 3–9. <https://doi.org/10.1177/1757975912470062>
13. Guimarães R (2007) Searching for the vulnerable: A review of the concepts and assessments of vulnerability related to poverty. *Eur J Dev Res* 19: 234–250. <https://doi.org/10.1080/09578810701289063>
14. Birkmann J (2006) Measuring vulnerability to promote disaster-resilient societies: Conceptual framework and definitions. In Birkmann J, Ed., *Measuring vulnerability to natural hazards: Towards disaster resilient societies*, United Nations University Press. 9–54.
15. Sumner A, Mallett R (2011) Snakes and ladders, buffers and passports: Rethinking poverty, vulnerability and wellbeing (IDS Working Paper 83). Institute of Development Studies. Available from: <http://www.ipc-undp.org/pub/IPCWorkingPaper83.pdf>
16. Moser SC, Ekstrom JA (2010) A framework to diagnose barriers to climate change adaptation. *Proc Natl Acad Sci U S A* 107: 22026–22031. <https://doi.org/10.1073/pnas.100788710>
17. Newman RJS, Capitani C, Haji T, et al. (2024) Community-centred scenarios development for water–energy–food security on Zanzibar. *Sustain Sci* 19: 575–593. <https://doi.org/10.1007/s11625-023-01443-9>
18. Pelling M, Uitto JI (2001) Small island developing states: Natural disaster vulnerability and global change. *Environ Hazards* 3: 49–62. <https://doi.org/10.3763/ehaz.2001.0306>
19. KIJANI PEMBA—Rafforzare l’eco-resilienza urbana a Chake Chake e Mkoani, 2024. Available from: <https://lvia.it/portfolio-articoli/kijani-pemba-rafforzare-leco-resilienza-urbana-a-chake-chake-e-mkoani/>.
20. Ahmad MS, Abu Talib NB (2015) Empowering local communities: Decentralization, empowerment and community-driven development. *Qual Quant* 49: 827–838. <https://doi.org/10.1007/s11135-014-0025-8>
21. Maldonado-Villalpando E, Paneque-Gálvez J (2022) Grassroots innovation in alternatives to development: A review. *Nord Geog Publ* 51: 80–102. <https://doi.org/10.30671/nordia.111293>

22. Gim C, Miller CA (2022) Institutional interdependence and infrastructure resilience. *Curr Opin Environ Sustain* 57: 101203. <https://doi.org/10.1016/j.cosust.2022.101203>
23. Makame MO, Kangalawe RYM (2018) Water security and local people sensitivity to climate variability and change among coastal communities in Zanzibar. *J Sustainable Dev* 11: 23–32.
24. La Violette A, Fleisher J (2009) The urban history of a rural place: Swahili archaeology on Pemba Island, Tanzania, 700–1500 AD. *Int J Afr Hist Stud* 42: 433–455.
25. Olsson L, Opondo M, Tschakert P, et al. (2014) Livelihoods and poverty. *Climate change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects*, Cambridge University Press, 793–832. <https://www.ipcc.ch/report/ar5/wg2/>
26. Bloor M, Frankland J, Thomas M, et al. (2001) *Focus groups in social research*, SAGE Publications. <https://doi.org/10.4135/9781849209175>
27. Copes H, Tchoula W, Brookman F, et al. (2018) Photo-elicitation interviews with vulnerable populations: Practical and ethical considerations. *Deviant Behav* 39: 475–494. <https://doi.org/10.1080/01639625.2017.1407109>
28. Karatsareas P (2022) Semi-structured interviews, In: Kircher R, Zipp L, Eds., *Research Methods in Language Attitudes*, Cambridge University Press. <https://doi.org/10.1017/9781108867788.010>
29. Pauwels L (2015) ‘Participatory’ visual research revisited: A critical-constructive assessment of epistemological, methodological and social activist tenets. *Ethnography* 16: 95–117. <https://doi.org/10.1177/1466138113505023>
30. Newman RJS, Thorn JPR, Haji TA, et al. (2023) A people-centred framework for exploring water, energy and food security in a small developing island. *Popul Environ* 45. <https://doi.org/10.1007/s11111-023-00427-2>
31. Newman RJS, Capitani C, Courtney-Mustaphi C, et al. (2020) Integrating insights from social-ecological interactions into sustainable land use change scenarios for small islands in the Western Indian Ocean. *Sustainability* 12: 1340. <https://doi.org/10.3390/su12041340>
32. Richard VM, Lahman MKE (2015) Photo-elicitation: Reflexivity on method, analysis, and graphic portraits. *Int J Res Method Educ* 38: 3–22. <https://doi.org/10.1080/1743727X.2013.843073>
33. Battisti L, Cuomo F, Manganelli A (2024) Collaborative governance arrangements: What makes nature-based solutions endure? *Territ Polit Gov* 13: 1421–1441. <https://doi.org/10.1080/21622671.2024.2355317>
34. Barron K (1999) Ethics in qualitative social research on marginalized groups. *Scand J Disabil Res* 1: 38–49. <https://doi.org/10.1080/15017419909510736>
35. Adger WN (2000) Social and ecological resilience: Are they related? *Prog Hum Geogr* 24: 347–364.
36. Kreuger RA (1988) *Focus groups: A practical guide for applied research*. Sage Publications.
37. Gautam A, Shrestha C, Tatar D, et al. (2018) Social photo-elicitation: The use of communal production of meaning to hear a vulnerable population. *Proc ACM on Hum-Comput Int* 56: 1–20. <https://doi.org/10.1145/3274325>
38. Ruiz-Mallén I, Corbera E (2013) Community-based conservation and traditional ecological knowledge: Implications for social-ecological resilience. *Ecol Soc* 18: 12. <https://doi.org/10.5751/ES-05867-180412>
39. Hölscher K, Frantzeskaki N (2021) Perspectives on urban transformation research: Transformations in, of, and by cities. *Urban Transform* 3. <https://doi.org/10.1186/s42854-021-00019-z>

40. Wittmayer J, Hölscher K, Wunder S, et al. (2018) Transformation research: Exploring methods for an emerging research field. TEXTE 01/2018 Environmental Research of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety Project No. (FKZ) 3714 17 100 0.
41. Karuga R, Steege R, Njoroge I, et al. (2022) Leaving No One Behind: A Photovoice Case Study on Vulnerability and Wellbeing of Children Heading Households in Two Informal Settlements in Nairobi. *Soc Sci* 11: 296. <https://doi.org/10.3390/socsci11070296>
42. Brown G, Kytä M (2018) Key issues and priorities in participatory mapping: Toward integration or increased specialization? *Appl Geogr* 95: 1–8. <https://doi.org/10.1016/j.apgeog.2018.04.002>
43. Karuga RN, Kabaria C, Chumo I, et al. (2023) Voices and challenges of marginalized and vulnerable groups in urban informal settlements in Nairobi, Kenya: Building on a spectrum of community-based participatory research approaches. *Front Public Health* 11: 1175326. <https://doi.org/10.3389/fpubh.2023.1175326>
44. Durose C, Beebeejaun Y, Rees J, et al. (2012) Towards co-production in research with communities (Connected Communities). Arts and Humanities Research Council.
45. Salum J, Malipula M (2023) The Community Participation Rhetoric in Development Projects in Zanzibar: Experiences from Tibirinzi Market Construction in Pemba. *J Asian Afr Stud* 54: 55–83.
46. Richmond A, Myers I, Namuli H (2018) Urban Informality and Vulnerability: A Case Study in Kampala, Uganda. *Urban Sci* 2: 22. <https://doi.org/10.3390/urbansci2010022>
47. Anderson W (2015) Cultural tourism and poverty alleviation in rural Kilimanjaro, Tanzania. *J Tour Cult Change* 13: 208–224. <https://doi.org/10.1080/14766825.2014.935387>
48. Salazar NB (2012) Community-based cultural tourism: Issues, threats and opportunities. *J Sustain Tour* 20: 9–22. <https://doi.org/10.1080/09669582.2011.596279>
49. Scheyvens R, Biddulph R (2018) Inclusive tourism development. *Tour Geog* 20: 589–609. <https://doi.org/10.1080/14616688.2017.1381985>
50. Abreu A, Sulcaj-Gura A, Gutierrez-Camps A (2024) Inclusive governance: Empowering communities and promoting sustainable social justice. *Front Polit Sci* 6. <https://doi.org/10.3389/fpos.2024.1478126>
51. World Resources Institute, Water resilience in a changing urban context: Africa’s challenge and pathways for action. WRI Africa. 2022. Available from: <https://africa.wri.org/research/urban-water-resilience-africa>.
52. Timothy VL, Said SK (2023) Perception of residents on the impacts of beach tourism: The case of Nungwi village in Zanzibar, Tanzania. *Heliyon* 9.
53. O’Farrell P, Anderson P, Culwick C, et al. (2019) Towards resilient African cities: Shared challenges and opportunities towards the retention and maintenance of ecological infrastructure. *Global Sustainability* 2. <https://doi.org/10.1017/sus.2019.16>
54. de la Torre-Castro M, Lindström L, Jiddawi NS, et al. (2022) Women and adaptive capacity to climate change in East African seascapes–Zanzibar as an example. *Front Mar Sci* 9: 931883. <https://doi.org/10.3389/fmars.2022.931883>
55. IPCC, Summary for policymakers. *Climate change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects*. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, 2014. 1–32. <https://doi.org/10.1017/CBO9781107415379>

56. Köksal O, Yürük N (2020) The role of translator in intercultural communication. *Int J Curric Instr* 12: 327–338.
57. Sibiyana N, Sithole M, Mudau L, et al. (2022) Empowering the voiceless: Securing the participation of marginalized groups in climate change governance in South Africa. *Sustainability* 14: 7111. <https://doi.org/10.3390/su14127111>
58. Kuran CHA, Morsut C, Kruke BI, et al. (2020). Vulnerability and vulnerable groups from an intersectionality perspective. *IJDRR* 50: 101826. <https://doi.org/10.1016/j.ijdr.2020.101826>
59. Ribeiro PJG, Gonçalves LAPJ (2019) Urban resilience: A conceptual framework. *Sustain Cities Soc* 50: 101625. <https://doi.org/10.1016/j.scs.2019.101625>
60. Gunduz C, Oner AC, Knox PL (2016) Social resilience in Aegean slow cities: Slow city Seferihisar. *Univ J Manag* 4: 211–222.
61. Suomela M (2019) Sustainable urbanization: Developing an informal settlement into a resilient urban centre in Zanzibar, Tanzania.



AIMS Press

© 2026 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0>)