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RESEARCH ARTICLE OPEN ACCESS

Evaluating the Sustainability of Local Women's Climate Change Adaptation Strategies in Durban, South Africa: A Feminist Political Ecology and Intersectionality Perspective

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ABSTRACT

This paper employs a feminist political ecology and an intersectionality framework to examine the multiple dimensions of local women's vulnerability and adaptation to climate change impacts in selected locations in Durban, KwaZulu-Natal Province, South Africa. We focus particularly on assessing the sustainability of the gendered adaptive strategies employed by these women. Utilising a qualitative methodology, the study is based on semi-structured interviews and focus group discussions with local Black women, highlighting the local context of the women's adaptation to flood impacts. The findings revealed that adaptation strategies are informed by women's situated knowledge, cultural practices, and agency, illustrating the complex, context-specific nature of responses to climate challenges. We argue that a bottom-up approach, which prioritises the effectiveness and sustainability of women's adaptation strategies, is crucial for fostering longer-term, more equitable, and sustainable solutions to climate impacts. By advocating this approach, the paper contributes to a deeper understanding of gendered adaptation practices that align with global efforts to achieve the Sustainable Development Goals (SDGs) related to gender equality (SDG 5), reducing inequalities (SDG 10), promoting climate action (SDG 13), and sustainable cities and communities (SDG 11).

1 | Introduction

Climate change presents an array of challenges globally, but its impacts are not felt uniformly across all populations. Vulnerable communities, particularly in the Global South, bear a disproportionate share of the burden, with flooding emerging as one of the most devastating manifestations of these climate-related adversities (Tewari et al. 2023; Shackleton et al. 2015; Wahid, Islam, and Raza 2024). Marginalised groups, especially Black African women in flood-prone areas, are acutely vulnerable due to a complex interplay of gender, race, and socio-economic

factors (Shayamunda 2024). These factors are compounded by entrenched socio-cultural norms and systemic inequalities that restrict access to critical resources, limit participation in decision-making processes, and reduce their capacity to adapt to climate stresses (Babagura 2010; Djoudi et al. 2016). In urban spaces, high population density, inadequate urban infrastructure, and frequent flood events particularly exacerbate the vulnerability of Black African women (Gough et al. 2019; Putsoane, Bhanye, and Matamanda 2024). Women often find themselves at the frontline, contending not only with the immediate physical impacts of flooding—such as displacement

[Correction added on 09 December 2024, after first online publication: The third author's name has been corrected from 'Balkissa Daoudiallo' to 'Balkissa Daouda Diallo' in this version.]

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and loss of property—but also with longer-term repercussions, including the loss of livelihoods, heightened health risks, and increased domestic and caregiving burdens (Goldin et al. 2019). The roles and responsibilities culturally assigned to women often position them as primary caregivers and community organisers during and after disasters, thereby amplifying their exposure to adverse impacts (Anwar and Sur 2021; Mgwele, Bhanye, and Mocwagae 2024).

Despite the noted gendered vulnerability to flood disasters, preliminary studies demonstrate that women demonstrate considerable resilience and resourcefulness (Udo and Naidu 2023a, 2023b). They employ various adaptive strategies, leveraging local knowledge and community networks, and often resort to indigenous practices passed down through generations to mitigate the impacts of floods (Adams and Anderson 2019; Clissold, Westoby, and McNamara 2020). These adaptive behaviors highlight the critical role that women play in not only sustaining their households but also in the broader community resilience frameworks.

However, while the global community strives to advance Sustainable Development Goals (SDGs) related to gender equality (SDG 5), reduced inequalities (SDG 10), climate action (SDG 13), and sustainable cities and communities (SDG 11), the specific vulnerabilities and adaptive capacities of Black African women remain underexplored and underrepresented in climate change discourse and policy-making processes. This gap is evident in empirical research from South Africa and the broader Southern African region, where studies frequently fail to capture the nuanced impacts on and the unique adaptive capacities of Black African women, despite their crucial role in both family and community dynamics during climate crises (Udo and Naidu 2023b; Udo and Naidu 2024). This oversight not only impedes the formulation of effective adaptation strategies but also constrains the potential for these communities to fully engage with and benefit from global efforts aimed at enhancing resilience and achieving sustainability.

Despite considerable advances in our understanding of climate change impacts, significant gaps remain in the comprehension and documentation of how specific vulnerabilities translate into adaptive actions, particularly among marginalised groups like Black African women in eThekweni Municipality (Udo and Naidu 2023a, 2023b). The existing literature on climate adaptation often glosses over the granular strategies employed by these women to manage and mitigate the adverse impacts of flooding (Nightingale 2011; Goldin et al. 2019; Djoudi et al. 2016). This oversight extends to a lack of detailed analysis of how cultural beliefs, personal agency, and situated knowledge—elements deeply ingrained in their everyday lives and survival strategies—shape their responses to these climate challenges. Cultural beliefs play a pivotal role in shaping adaptive behaviors and are integral to the community's resilience strategies (Suárez-Orozco et al. 2018). These beliefs, which encompass traditional knowledge about local environments, weather patterns, and historical coping mechanisms, significantly influence how communities prepare for and respond to floods (Moloi, Matamanda, and Bhanye 2024). However, the role of this situated knowledge in formal climate adaptation and mitigation policies is poorly documented and seldom integrated into broader strategies, which undermines the effectiveness of these policies.

This paper aims to bridge these gaps by exploring the intersectional experiences of Black African women in eThekweni Municipality, South Africa, focusing on how their gender, race, and socio-economic status influence their vulnerability and adaptation strategies. The study builds upon and extends the theoretical frameworks of Feminist Political Ecology (FPE) and Intersectionality to explore the sustainability of climate adaptation strategies of local Black African women in Durban's eThekweni Municipality. While FPE provides a robust lens for examining the links between gender, ecology, and socio-political conditions, Intersectionality further dissects how overlapping identities, including race, socioeconomic status, and gender, compound experiences of vulnerability and resilience (Crenshaw 1989). Integrating these frameworks, the research contributes new insights into the dynamics and sustainability of climate adaptation at the intersections of gender and race, highlighting the specific and compounded challenges women face in these communities. This dual-framework approach not only enriches the academic discourse on gender and environmental studies but also enhances a better understanding of effective and sustainable climate resilience strategies within highly vulnerable populations. The paper argues for the need to place women, particularly those from marginalised communities, at the forefront of climate change adaptation efforts, thus promoting more equitable and sustainable solutions to one of the most pressing challenges of our time—climate change and related disasters.

The paper is organised as follows: the subsequent section presents a literature review that contextualises the vulnerability of local communities to climate disasters, with a focus on Black women in Southern Africa. This is followed by a discussion of the theoretical framework, which bridges sustainability with feminist political ecology and intersectionality theories, highlighting their relevance to Black women's adaptation strategies. The methodology section details the qualitative approaches used to capture the rich, nuanced data on women's experiences and adaptations. Findings from the study are then discussed, showcasing how women in eThekweni Municipality adapt economically, socially, and environmentally. The final section presents the conclusion, theoretical and policy implications, and recommendations for future research.

2 | Women's Vulnerability to Climate Disasters in Southern Africa

The role of women in climate adaptation is increasingly recognised as pivotal, not only because of their disproportionate vulnerability to climate impacts but also due to their vital roles in household and community resilience (Shayamunda 2024; Udo and Naidu 2023a, 2023b). Research has consistently shown that women, especially those in less developed regions, experience the greatest impacts from climate-related disasters due to various socio-economic and cultural factors (Babagura 2010; Denton 2002; Djoudi et al. 2016; IPCC 2014). The Southern African region is particularly susceptible to various climate-related disasters, among which floods are notably devastating due to their frequency and severe impacts on the environment and human communities. The region experiences these floods due to several climatic phenomena, including intense and erratic rainfall, cyclones, and the overflow of major river systems

like the Zambezi and Limpopo. For instance, the catastrophic floods caused by Cyclone Idai in 2019, Cyclone Freddy in early 2023, and Cyclone Filipo in 2024 demonstrate the severe disruptions such events can inflict, affecting nations like Mozambique, Zimbabwe, and Malawi extensively.

Recent years have also seen a surge in climate-related disasters across South Africa, with significant flooding events causing widespread devastation in regions such as Cape Town, KwaZulu-Natal, and Durban's eThekweni Municipality. Durban's eThekweni Municipality has faced torrential rains overwhelming the city's drainage systems, causing urban flooding that disrupted lives and livelihoods, particularly impacting women who disproportionately bear the brunt of recovery efforts in their roles as caregivers and community organisers. The general impacts of these climate disasters are profound and multidimensional, affecting agricultural productivity, infrastructure, human health, and overall economic stability in Southern Africa. Vulnerable groups, particularly women, children, the elderly, and economically disadvantaged populations, bear the brunt of these impacts (UNISDR 2015). Women, due to their roles in agricultural labor and water collection, face particularly acute challenges. Floods not only destroy crops but also wash away fertile topsoil, compromise water quality, and increase the prevalence of waterborne diseases, thereby exacerbating food insecurity and health risks (Putsoane, Bhanye, and Matamanda 2024).

Moreover, the destruction of infrastructure, such as roads and bridges, during floods isolates communities, hampers aid and recovery efforts, and increases the overall recovery time from such events (Kim, Marshall, and Pal 2014). Economic activities are often severely disrupted, increasing the economic vulnerability of already impoverished populations (Zorn 2018). The loss of household assets and livestock can further diminish the economic resilience of these communities, pushing them into a cycle of poverty and dependency on humanitarian aid (Hallegatte et al. 2016). In the aftermath of such disasters, the recovery process is often slow and fraught with challenges, particularly for vulnerable groups who may lack the resources to rebuild or relocate to safer areas. The unequal impact of these disasters is often exacerbated by pre-existing socio-economic inequalities, making certain groups more susceptible to long-term detriment (IPCC 2014).

The vulnerability of women to climate disasters in Southern Africa is a critical issue that has been increasingly highlighted in the academic and development sectors. Research indicates that gender-specific roles and responsibilities, socio-economic status, and cultural norms significantly influence the extent to which women are affected by climate disasters, including floods, droughts, and cyclones (Babagura 2010; Denton 2002; Udo and Naidu 2023a, 2023b). Women in Southern Africa often have less access to resources and decision-making processes at the household and community levels. This disparity limits their ability to effectively prepare for and respond to climate disasters (Djoudi, Brockhaus, and Locatelli 2013). For example, cultural norms may restrict women's mobility, preventing them from accessing emergency services and disaster preparedness and response information. Furthermore, women's responsibilities in household management, childcare, and water collection make them more dependent on natural resources directly affected by climate

variability and extreme weather events (Mgwele, Bhanye, and Mocwage 2024).

Women also face specific health risks from climate disasters, exacerbated by their roles within families and communities. The increase in waterborne diseases following floods, for instance, disproportionately affects women, primarily responsible for water collection and management in many Southern African communities (Akanwa et al. 2022). Additionally, the stress and trauma associated with disaster experiences can have long-term psychological impacts on women, who often bear the burden of caring for injured or displaced family members (Marshall et al. 2020). Studies have shown that climate disasters frequently result in significant economic losses for women, particularly those engaged in subsistence farming and informal employment sectors.

For example, after Cyclone Idai, it was reported that women farmers were among the hardest hit, with many losing their crops and seeds for the next planting season, jeopardising their future food security and economic stability (FAO 2019). The loss of livestock, which is considered a woman's asset in many cultures, further undermines their economic independence and resilience. Women and children are statistically more likely to be displaced by climate disasters. Displacement not only physically uproots them but often leads to increased vulnerability to gender-based violence, exploitation, and abuse in temporary shelters or new communities (UN Women 2015). The lack of secure shelter and adequate sanitation facilities in these settings poses additional risks to women's safety and well-being (Shayamunda 2024). The cumulative effect of these factors is a heightened vulnerability of women to the impacts of climate disasters, which affects their immediate survival and health and has long-term consequences for their social and economic recovery.

While existing literature provides foundational knowledge on the vulnerability of women to climate disasters in Southern Africa, several significant gaps remain, particularly concerning the intersectional impacts of these disasters. For example, most studies tend to generalise the experiences of women without adequately considering how intersectional factors such as race, class, and geographical location amplify or mitigate vulnerability. Intersectionality is crucial in understanding how these layered identities impact women's experiences of climate disasters (Crenshaw 1991). Yet, the literature frequently fails to explore these dimensions, often treating women as a homogenous group with uniform challenges and needs. There is also a notable lack of detailed, qualitative research that explores the personal and communal experiences of women, particularly Black African women, in specific locales such as eThekweni Municipality, South Africa.

3 | Theoretical Framework

This study is informed by two theoretical perspectives: feminist political ecology and intersectionality. As stated earlier, following from previous studies on local Black women's experiences of flood impacts in Durban (see Udo and Naidu 2023a, 2023b, 2024), this paper extends its arguments to illustrate

how sustainability as an approach intersects with feminist political ecology and intersectionality theoretical perspectives to explore the gendered adaptation experiences of the local Black women's adaptation. Feminist political ecology, as described by Rocheleau, Thomas-Slayter, and Wangari (2013), emphasises gender as a crucial factor in shaping women's experiences with environmental change. From a sustainability perspective, various socio-economic, cultural and environmental factors, acting at the individual, community, and macro levels, significantly influence the marginalisation of women, thereby increasing their vulnerability to climate disasters. An appropriate gendered adaptation strategy should, therefore, be sustainable, that is, one that considers the social, economic and environmental dimensions of adaptation while promoting long-term equity and resilience for all (Hossen et al. 2021; Lewis 2016). From this perspective, and combined with the two mentioned theoretical frameworks, this paper further examines how sustainable the women's adaptation practices and responses are and how their situated knowledge empowers them to act as agents of change, not only for themselves but also for the broader community in adapting to the impacts of climate disasters.

3.1 | Contextualizing Sustainability Within Gendered Vulnerability and Adaptation

Sustainability is conceptualised mainly in policy discourses as encompassing three pillars (economic, social, and environmental) (Figure 1), but it essentially intends the maintenance and management of resources in a way that they remain available for future generations (Kuhlman and Farrington 2010). In the literature, sustainability is seen as a concept and approach despite having fragmented definitions and is mainly applied in areas of corporate governance and organizational synergy of environmental, financial and social goals (Giovannoni and Fabietti 2013; Naciti, Cesaroni, and Pulejo 2022). Such



FIGURE 1 | Three pillars of sustainable development. *Source:* Emerald Built Environments (2024).

understanding often adopts top-down approaches that seldom reflect communal contexts. However, sustainability can be fundamentally ethical and involves how humans rationally order experiences and quality of life through ethical concepts such as courage, prudence and temperance, or happiness (Bañón Gomis et al. 2011; Cloutier and Pfeiffer 2015) and can be assessed at individual and communal levels.

As Bañón Gomis et al. (2011) define it, “Sustainability refers to a moral way of acting, and ideally habitual, in which the person or group intends to avoid deleterious effects on the environmental, social, and economic domains, and which is consistent with a harmonious relationship with those domains that is conducive to a flourishing life.” (176). A sustainability perspective is instrumental in assessing the environmental, social, and ecological performance of a reference system (Salas-Zapata and Ortiz-Muñoz 2019). By understanding communal and individual level sustainability practices in Black women's experiences of flood impacts as seen through the lenses of feminist political ecology and intersectionality, the analysis emphasises the agentic roles played by women during floods and shifts our understanding of sustainability, its conception and application at these communal and individual levels. As such, it relies on a combination of feminist political ecology and intersectionality lenses to provide insights into these experiences.

3.2 | Feminist Political Ecology and Climate Change Adaptation

Minch (2011, 24) defines political ecology as the study of “the intersection and relationship between the political, broadly understood, and environmental and ecological phenomena.” In essence, political ecology examines the interconnectedness of politics, culture, and nature. According to Rocheleau, Thomas-Slayter, and Wangari (2013, 4), it focuses on the decision-making processes and the social, political, and economic factors that shape the formulation and implementation of environmental policies and practices. This perspective supports the study's premise that ecological and environmental concerns both influence and are influenced by political, economic, social, and cultural forces. This research investigates the complex relationships between environmental issues—specifically floods and related natural disasters—and social dynamics by analysing how these factors impact access to resources and the implications for people's livelihoods.

Robbins (2004, 116) describes political ecology as a discipline enriched by various theoretical approaches, including constructivism and post-structuralism, which offer ideologies, discourses, and frameworks for deconstructing environmental realities and understanding how “ideas and narratives about nature and society are mobilized.” Bryan and Bailly (1997) highlight two key propositions of political ecology:

1. Environmental changes or disasters do not affect all members of society equally. Political, social, and economic disparities lead to an unequal distribution of costs and benefits.
2. This unequal distribution of impacts often reinforces or reduces existing social and economic inequalities.

Feminist political ecology, a subfield of political ecology, focuses on how gender shapes the experiences of environmental change. Dianne Rocheleau (2013, 4) defines feminist political ecology as “a feminist approach to political ecology, where gender becomes a primary category of analysis to understand how decision-making practices and socio-political forces influence environmental policies and access to and control over resources.” This approach integrates gender into political ecology scholarship by examining how gendered relations, alongside socio-political and socio-economic factors, interact with environmental issues to disproportionately disadvantage women. The strength of feminist political ecology lies in its ability to address the gender dimensions of resource access and control in diverse societies, whether rural, urban, industrial, or agrarian while incorporating insights from cultural ecology, political ecology, and political economy.

Feminist political ecology emphasises the role of gender as a crucial factor in shaping access to and control over resources. It also considers how gender intersects with class, caste, race, culture, and ethnicity to influence processes of ecological change and the struggles of men and women to sustain viable livelihoods. Popularised in the 1990s by Dianne Rocheleau and her colleagues at Clark University, USA, the seminal work *Feminist Political Ecology: Global Issues and Local Experiences* (Rocheleau, Thomas-Slayter, and Wangari 2013) illustrates how specific environmental issues, such as degradation, disproportionately affect women compared to men. The book offers a nuanced perspective on political ecology by introducing gender as a critical variable that intersects with race, class, and culture to shape people's access to resources and their ability to sustain livelihoods amid environmental change (Rocheleau, Thomas-Slayter, and Wangari 2013, 4).

Applying feminist political ecology highlights how social, structural, and political factors interact with environmental issues to shape women's vulnerability. For example, Resurrección (2019) uses this perspective to analyse how everyday gender relations affect women and men's different experiences and vulnerabilities to environmental changes in the Hindu Kush Himalaya. Gender roles and responsibilities, shaped by social constructs, can vary depending on context, including culture, race, class, and geographical location. These categories are dynamic and can change in response to shifts in governance and social structures. Viewing gender as fluid, feminist political ecology challenges the traditional binary notion of gender that portrays men as dominant and visible and women as passive and invisible. As Clement et al. (2019) noted, such constructions of gender result from complex historical processes shaped by economic, social, and cultural institutions, which in turn influence social, political, and economic decisions.

In many societies today, gender remains a key factor determining resource access. This research explores local women's experiences and adaptation to flood disasters in eThekweni Municipality, assuming that these experiences are shaped by the municipality's social, structural, and political factors. MacGregor (2010, 225) argues that social and political contexts shape people's responses to the tangible impacts of climate change. This study will focus on how social inequalities are constructed in relation to flood disasters.

A number of reasons justify the adoption of feminist political ecology in understanding climate change adaptation. Feminist political ecology perspectives highlight how gender, race, and class intersect to shape women's experiences of marginalisation, particularly concerning resource use and decision-making processes (Nightingale 2011; Goldin et al. 2019; Djoudi et al. 2016). Understanding these social realities and the factors that economically, socially, and politically disadvantage certain gender and racial groups is crucial, as these are key determinants of differential vulnerability to climate impacts. These factors are influenced by local social and political dynamics and power relations (Goodrich, Udas, and Larrington-Spencer 2018). As Eriksen et al. (2011) noted, climate change adaptation has increasingly shifted from a structural and techno-centric focus to recognising it as a socio-political process.

Recent analyses of gender and climate change adaptation have adopted a critical realist perspective, which posits that the world is structured, differentiated, stratified, dynamic, and changing (MacMahon 2017; Nightingale 2011; MacGregor 2010). This perspective helps to unpack the underlying factors behind gender differences in experiencing climate disasters. To fully understand these differential experiences, it is necessary to go beyond surface-level analysis and explore the complex intersectional factors that shape adaptation to climate disasters. This paper extends beyond feminist political ecology by employing the intersectionality approach to analyse how local women's situated knowledge, beliefs, agency, and experiences influence their adaptation to flood impacts.

3.3 | Intersectionality, Gender, and Climate Change Adaptation

Intersectionality is the complex, cumulative manner in which the effects of different forms of discrimination combine, overlap, or intersect. It means that different forms of discrimination do not exist in a vacuum—for those who embody different marginalised identities, these often overlap and amplify each other to create a unique experience of discrimination that is more than just the sum of its parts. Figure 2 shows overlapping bubbles showing various intersectional identities, including race, gender, sexual identity, relational status, trauma, class, [dis]ability, and religion.

Kimberle Crenshaw, a feminist activist and scholar, introduced the concept of intersectionality in identity politics in her 1989 paper, *Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory, and Antiracist Politics*. In this paper, Crenshaw critiques mainstream liberal discourses for treating issues of race, gender, and other identity categories as separate, mutually exclusive experiences. She argues that this approach fails to consider the intersectional nature of these identities (1989, 133). According to Crenshaw, “because the intersectional experience is greater than the sum of racism and sexism, any analysis that does not take intersectionality into account cannot adequately address the specific ways in which Black women are subordinated” (1989, 140).

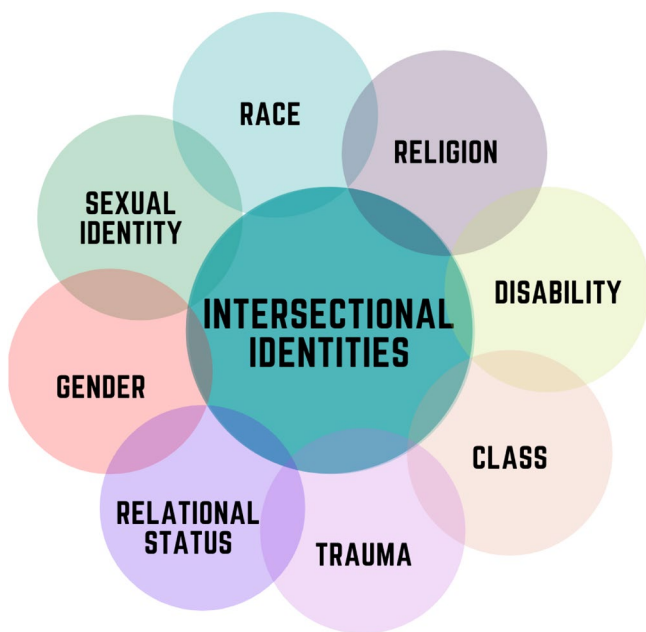


FIGURE 2 | Overlapping bubbles showing various intersectional identities. Source: Hassler (2020).

Crenshaw's analysis primarily focuses on the experiences of Black women in the United States, critiquing how U.S. anti-discrimination laws—reflected in feminist theory and antiracist politics of the 1980s—perpetuated injustice by treating all women as a single homogeneous group. In an interview published by the National Museum of African American History and Culture (NMAAHC), Crenshaw uses an analogy to explain intersectionality:

Imagine an intersection made up of multiple roads. Each road represents a different structure—race, gender, gender identity, class, sexuality, and disability. The traffic on these roads symbolizes the various practices and policies that discriminate against people. If an accident occurs at this intersection, it could be caused by cars coming from any direction—or from all of them simultaneously. If a Black woman is injured at this intersection, her harm could result from discrimination from any or all of these directions (cited in Hayet 2015, n.d.).

Intersectionality helps to illuminate how power dynamics and knowledge production shape local women's capacity to adapt. Social inequities and biases in governance, service delivery, or daily practices can perpetuate the marginalisation of already disadvantaged groups (MacGregor 2010). Social structures based on race, nationality, ethnicity, and sexual orientation significantly influence individual and group vulnerability to climate change impacts. For example, Black women in rural settlements around Durban experience heightened vulnerability due to limited access to resources that could enhance their adaptation to flooding.

The central argument of this paper is that addressing the vulnerability of local women to floods requires understanding the various

intersectional ways in which they adapt. These adaptive experiences are often shaped by underlying socio-cultural and socio-economic mechanisms embedded within a broader socio-cultural, socio-economic, and socio-political context. These mechanisms can only be fully understood through critical engagement with the women who experience them. For Black women in eThekweni Municipality and similar contexts, vulnerability to natural disasters is shaped by the intersectional factors of gender, race, and class. Analysing these mechanisms through an intersectionality and feminist political ecology lens, the study uncovers the multiple dimensions contributing to heightened vulnerability among women and understanding why their experiences of climate disasters are often distinct and relatively severe.

Moreover, the study argues that, beyond the structured and stratified world that increases women's vulnerability to climate impacts, women possess situated knowledge, agency, and internal beliefs that influence their adaptation strategies. Despite structural constraints, these attributes offer opportunities for individuals to make choices about how to respond to environmental or climate disasters. In line with Goldin et al. (2019, 21), this paper advocates for a vulnerability assessment framework that captures the narratives and experiences of relatively impoverished local women. Such an approach would highlight the nuanced concerns they have regarding climate adaptation. Ignoring these nuances and the multidimensionality of adaptation factors may hinder the development of effective, gender-responsive climate adaptation policies and strategies.

3.4 | Women, Environmental Change and Development

Recent attention to the roles and contributions of women in economies, culture, and politics has led to a convergence of interests in environment, gender, and sustainable development issues at both global and local levels. Different scholarly perspectives offer varying views on how gender influences people's relationship with and vulnerability to environmental changes and how adaptation interlinks with sustainable development. Ecofeminists such as Wangari Maathai (2008) adopted an essentialist stance, arguing that women's connection to the environment is innate, that is, women are inherently more attuned to nature than men, and as a result, environmental degradation disproportionately affects women (Also see Maathai 2003; Shattuck 2022). Through her various empowerment initiatives with the environment and Kenyan women, Wangari Maathai had shown that women have the capacity to influence decisions through their situated knowledge and, thus, contribute to sustainable development through their daily interactions with nature. While her claim of women's contributions to sustainable development is plausible and self-evident, particularly in various women's contributions and advocacy for the environment and climate change (e.g., see Resurrección 2013), her notion of a women's intrinsic connection to nature is contentious and is usually seen as essentialist and resulting from social construct.

Thus, other ecofeminist scholars, such as Stoddart and Tindall (2011), argue that women's association with nature is

not innate but rather a social construct perpetuated by patriarchal institutions and dominant Western culture to sustain the oppression of women (see also Rocheleau, Thomas-Slayter and Wangari 2013). Studies on gender and climate change adaptation, such as Vincent, Cull, and Archer (2010), Babagura (2010), and Resurrección (2019), have shown that women's heightened impacts from environmental change are rather caused by socially constructed gender roles, gendered divisions of labor and other socio-cultural institutions.

Feminist Environmentalism, as advocated by Agarwal (1998), and also cited in Rocheleau, Thomas-Slayter, and Wangari (2013, 3), posits that women's interest in nature and natural resources is rooted in their material reality, that is, it stems from their daily roles and responsibilities. In many societies, traditional gender roles assign women tasks such as cooking, fetching water, and caring for the household, which creates a unique dependence on the environment. This point is further backed by feminist post-structuralists' perspective. For instance, Harding (1986) emphasises that gender-differentiated experiences of environmental change are shaped by "situated knowledge," which varies across dimensions of identity, such as gender, race, class, age, and ethnicity (cited in Rocheleau, Thomas-Slayter, and Wangari 2013, 4). Put differently, this implies that how people experience environmental issues is influenced by their unique social positions. Still along this line of argument is the social feminist view that women's connection to the environment is linked to the political economy of production and reproduction, where roles in the production economy differ between men and women (see Braidotti 1994). This way, women's roles as child-bearers position them as natural nurturers, reinforcing their environmental involvement and contributions to development.

4 | Research Methodology

4.1 | Research Design

This paper adopted a qualitative approach to untangle the intersectional experiences of vulnerability and adaptation of Black African women to flood impacts. The participants consisted of 25 local Black African women purposefully selected from the four study sites: uMlazi, Ntuzuma, Inanda, and KwaMashu. These women had personal experiences with flooding in these areas in recent years. Of the participants, eight (32%) were aged 25–30, while the remaining 17 (68%) were elderly and middle-aged women between 35 and 65 years old. One participant worked as an administrative officer at a university and another as a high school teacher. The rest were local residents of low socioeconomic status, including street vendors, retail store cashiers, cleaners, and the unemployed, who relied on social security grants for sustenance. Many of the participants were single mothers, and many came from female-headed households who lived in the study sites for most of their lives. Figure 3 shows the map of the study sites.

In 2001, the three townships of Inanda, Ntuzuma, and KwaMashu were merged into a single administrative zone known as the INK township under the eThekweni Municipality. Both INK and uMlazi face similar socio-spatial and socio-economic

challenges, such as inadequate infrastructure and susceptibility to flooding, which negatively impact residents' quality of life. Historically, in the apartheid policy of the Group Areas Act of 1950, these areas were reserved for Black populations, which entrenched spatial and socio-economic conditions, including high susceptibility to various incidents of flooding in the past years, particularly the severe flood that hit parts of the KwaZulu-Natal province in April 2019. These areas also face inadequate infrastructure, such as housing, roads, sanitation, and water supply. These deficiencies, coupled with inadequate urban planning, severely undermine the quality of life for residents. The eThekweni Municipality, in the context of the post-apartheid area-based development, has since prioritised these townships for development, focusing on improving infrastructure and living conditions, particularly for local Black women who, arguably, are disproportionately affected by these socio-economic challenges.

The primary data for the study were collected through one-on-one semi-structured interviews and focus group discussions with the 25 selected local Black African women. Given that this is an exploratory qualitative study grounded in an interpretivist phenomenological paradigm (Creswell 2013; Frechette et al. 2020; Qutoshi 2018), the sample size was deemed sufficient to generate rich qualitative data for analysing the phenomenon under investigation (Sandelowski 2001). Participants for the focus groups were drawn from those who had previously participated in semi-structured interviews. The interviews, often conducted in IsiZulu, were supported by a local female research assistant who facilitated communication and helped build rapport. To ensure inclusivity, interview materials, including interview schedules and informed consent forms, were translated into IsiZulu, and the interviews were later transcribed and translated into English.

4.2 | Reflexivity and Positionality During the Research Process

Fieldwork for the study was conducted between December 2019 and March 2020, with appropriate gatekeeper's permission obtained from eThekweni Municipality's Institute of Learning (MILE). The data collection for this research was conducted by the first author, a foreign Black male researcher researching local Black women. Thus, certain power dynamics were encountered during the interviews and the analysis stage of the research. First, regarding the interviews, as stated earlier, the presence of a female research assistant helped create a much more comfortable environment for participants to share their experiences openly. Throughout the fieldwork, the researcher continuously reflected on the potential influence of personal biases that could arise from these power dynamics. Some participants shared emotionally charged lived experiences that deeply affected the researcher.

Second, while there was a risk that these emotions could interfere with the critical analysis of the data, careful reflection and a deliberate effort to dissociate personal feelings from those of the participants helped maintain a neutral and objective stance. The data was analysed thematically, and throughout the process, careful attention was maintained

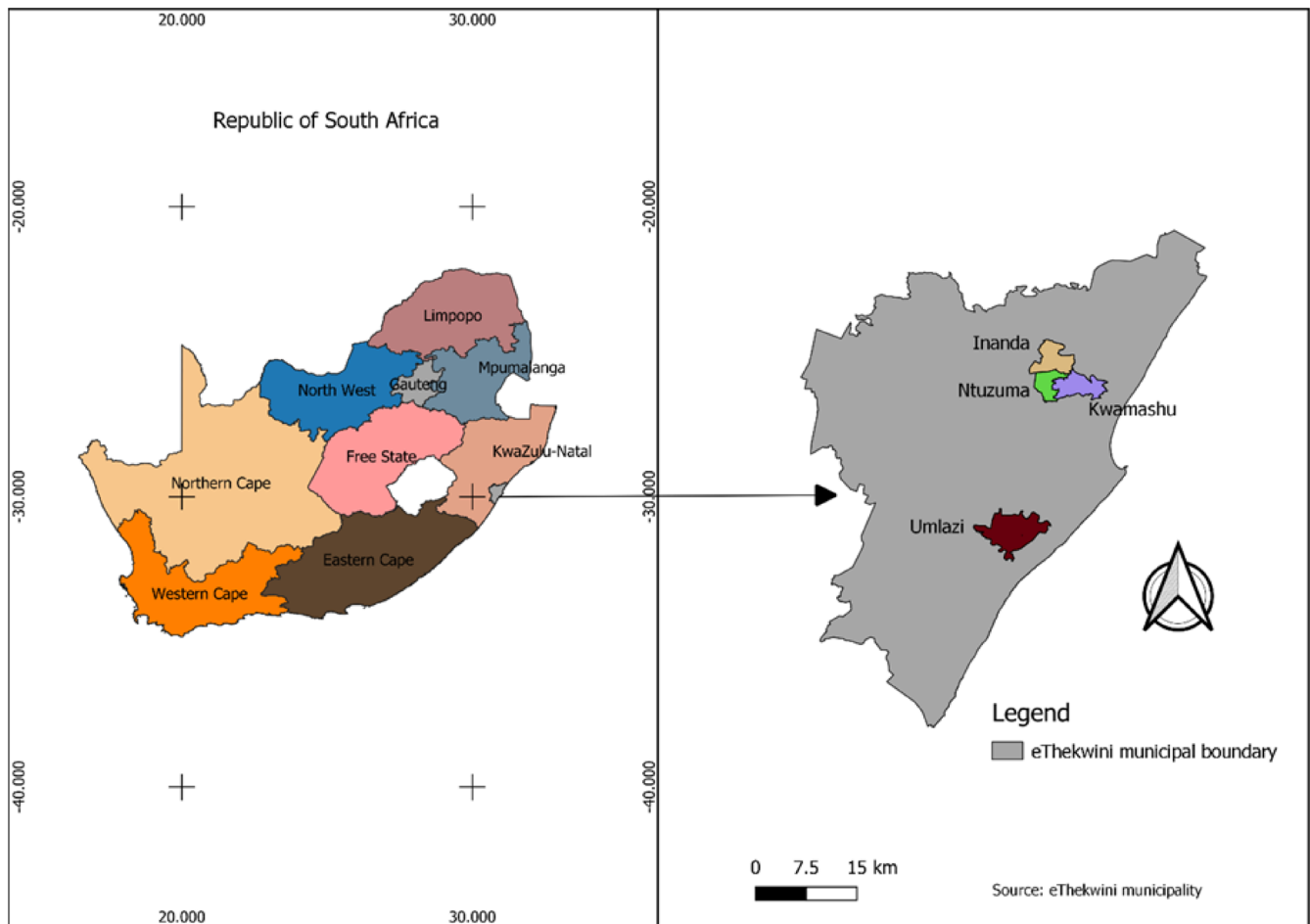


FIGURE 3 | Map showing the study sites. *Source:* Udo and Naidu (2023a, 2023b).

to ensure accuracy and reflect participants' perspectives. The researcher attempted to maintain objectivity by continuously reflecting on possible biases, particularly considering the cross-cultural and gender power dynamics involved in the research, what Dhillon and Thomas (2019) describe as insider-outsider perspectives. This self-awareness allowed the researcher to analyse the participants' experiences from an outsider's perspective.

5 | Study Findings

5.1 | Sustained Poverty, Unequal Social Mobility, and Gendered Adaptation to Climate Impacts

Flooding presents a significant challenge in Durban's eThekweni Municipality, causing serious damages, including destruction of homes, loss of livelihoods, and exacerbation of existing social and economic inequalities. Figure 4 shows a flooded area in Durban during the 2019 heavy rains, with the eThekweni Municipality calling on residents to join the fight against climate change.

The study findings demonstrate how sustained poverty, and unequal social mobility exacerbate the vulnerabilities of Black African women in Durban's eThekweni Municipality to

climate-induced disasters. Sustained poverty can hinder social mobility for individuals and household members and, consequently, pose a significant influence on their ability to recover from climatic risks. This is particularly relevant in the South African context, where poverty is significantly interlinked with race and historical injustices. Since the establishment of democracy in South Africa, Black people, including women, have been afforded development opportunities. Those who were disadvantaged by the apartheid regime's discriminatory policies now have access to equal opportunities. In particular, as reflected in recent affirmative action principles enshrined in employment policies, Black South Africans appear to have been granted more opportunities than other racial groups to address the many disadvantages they faced due to apartheid. For instance, the principle, as defined in South Africa's Employment Equity Act No. 55 of 1998, states as follows:

Measures designed to ensure that suitably qualified people from designated [designated group here referring to black people, women and people with disabilities] groups have equal employment opportunities and are equitably represented in all occupational categories and levels in the workforce of a designated employer (Republic of South Africa, Department of Labour 1998, 18).



FIGURE 4 | A flooded area in Durban, eThekweni Municipality, during the 2019 heavy rains. *Source:* Magubane (2023).

Although equity policies such as the one above might have impacted some residents of previously disadvantaged backgrounds and settlements, for instance, some have the advantage of getting bursary schemes to schools, and others now have the chance to acquire government-built houses through the Reconstruction and Development Programme (RDP), many still live in extreme poverty due to various, arguably unsustainable, circumstances. One participant from Ntuzuma (N1) highlights the difficult conditions faced by women in the area, particularly in times of severe disasters that affect their houses:

I come from a shack, and my sister and I are responsible for building the former house that we stayed in. You look around, and you see people who were battling and are still battling, and it is usually households headed by women. Some of those women were there when I was growing up. They have kids, but their kids did not have opportunities that I had, maybe because they did not know. You have to be closed or live in the community to realise that those people are really suffering. The grant money [referring to social grant allowance] is never enough. You cannot use the grant money to pay school fees, buy food, pay for water and stuff like that (N1, a middle-aged woman who is an administrative staff in a University).

The statement above highlights the structural changes in the Ntuzuma community over the years, particularly the opportunities for children of poor Black women to receive formal education. While some individuals and households have managed to break free from poverty due to these opportunities, many others, particularly those from poor, relatively uneducated Black women, remain excluded. Despite a strong sense of community and social capital among residents in areas like Ntuzuma and KwaMashu, disparities seem to persist.

For some, their socio-economic conditions have arguably improved, and their children, with the help of education, have moved up the social mobility ladder, while for some, either due to lack of awareness, empowerment or any other similar factor(s) (which arguably are dimensions of poverty), are still stuck in their initial poverty level. During times of floods, these poor households, as stated, majorly headed by women, become unequally impacted.

5.2 | Sustainable and Inclusive Information as Necessary Resources for Adaptation in the Local Context

Scarcity or lack of relevant or necessary resources—whether financial, social (such as connections), or human (such as education or knowledge)—reduces people's capacity to adapt to disasters. Poverty often arises from unequal rights and opportunities between men and women. For example, a 2019 UN Women study highlights that, globally, women perform three times as much unpaid care and domestic work as men. Lack of resources, which is arguably described as poverty, also has an intersectional dimension. In some cases, inequalities exist not only between men and women but also among women within the same communities, intersecting with other factors like age, disability status, and education level. These intersections, as evident in the findings of this study, further limit women's ability to secure stable livelihoods.

In the study areas, while some individuals, including certain women, demonstrate a high level of knowledge that improves their livelihoods and strengthens their capacity to adapt to disasters, many others lack critical knowledge in specific areas essential for enhancing their adaptive capacity. For example, previous research by Udo and Naidu (2023a, 2023b) revealed that a lack of awareness among women about insurance policies significantly increased their vulnerability, as they had no recovery plan when floods destroyed their homes. The study also noted that local women were eager to receive education on various topics that

could improve their ability to adapt (Udo and Naidu 2023a, 2023b, 2024).

Information constitutes a vital resource to enable a sustainable adaptation to adapt to climate disasters. However, the approach used in disseminating the information, for instance, information on an early warning system, also has implications for how different groups of people in local communities receive it. Stating how the mode of spreading early warning information in rural areas impacts vulnerability and adaptive capacity, particularly of local women, a participant in Kwamashu stated:

It is just a matter of us being strategic about things, sitting them down, telling them properly, we are going to do this, we are not going to do this, and stuff like that. I feel the best thing...communication is going to convey messages, especially in rural areas. In our community, that is how things were done. My community in the rural area is developing. It recently just got electricity. So, people do have television; they do have radios, but they still believe the old news traveling system of conveying messages through kids from school. Because I do not want to lie to you, you see, when you hear something from a kid, you know it is really serious. You take it seriously because you know it has been conveyed by the people that were there and gave them the information [FGD, K3(1)] [FGD, K3(1), a relatively young lady of 26, formally educated up to undergraduate level, from a relatively stable and financially well-to-do home].

The participant's narrative above highlights the importance of communication in addressing gender and climate adaptation, particularly in rural communities. The participants emphasised that traditional, community-based methods, such as relying on children as messengers, to convey necessary information regarding disasters early warning should be adopted in local communities to incorporate those who either do not have modern communication media or are not acquainted with using it. For her, this approach fits particular local contexts.

However, it raises critical questions about whether such an approach is sustainable in the long term or whether it may reinforce the gendered vulnerability of women, particularly if local women with lower access to modern information technology remain dependent on inconsistent and unsustainable informal channels for disseminating vital adaptation information (Bhanye and Maisiri 2023). In the face of evolving communication technologies and challenges related to climate adaptation, relying on such an approach may limit the accessibility and accuracy of vital information, thereby risking reinforcing gendered vulnerabilities if women, especially those with lower access to formal education or technology, remain dependent on inconsistent and informal channels for critical information. Nevertheless, this participant narrative is valuable for understanding local contexts, even though relying solely on such

methods may, arguably, not be sustainable for long-term, inclusive gender and climate adaptation.

5.3 | Gender, Agency, and Adaptation to Impacts of Floods

During both interviews and focus group discussions, many women in the study expressed that they were not merely victims; they demonstrated a strong agency in adapting to flood incidents. Some local women shared that they were responsible for their families' welfare, caring for children and elderly parents. While many felt that these responsibilities placed significant pressure on them, potentially compromising their ability to adapt to flood impacts, others viewed these same responsibilities as sources of strength that enhanced their adaptive capacity. Thus, although traditional gender roles created challenges, they fostered agency and resilience. During the study, one woman poignantly captured the challenges faced by women in the eThekweni region, stating:

In eThekweni region, we are often severely affected by devastating storms. We demand that infrastructure issues be attended to. Poor infrastructure contributes towards the more severe devastation this year. Our houses are destroyed, and we have to take matters into our hands to reconstruct our homes.

The quote reflects the urgent need for improved infrastructure and support to mitigate the impacts of severe weather conditions experienced by the community. Figure 5 shows women rebuilding their homes after they were destroyed by torrential rains and flash floods, and the destroyed houses at an informal settlement in Durban.

For some women, particularly single parents, the fear of impending floods affecting their children motivated them to seek proactive ways to adapt. Reflecting on her proactive response to the constant threat of flooding, one single mother from Ntuzuma shared:

Every time the rains start, my first thought is for my children's safety. The fear that our home could be washed away again compels me to be prepared. Last year, I organised our neighbours to collectively raise our land with soil and create better drainage around our homes. It's terrifying, but this fear pushes me to act, to find solutions not just for my family but for our whole community (N2, middle-aged single mother, living with a daughter and a one-year-old granddaughter).

This testimony highlights how fear, often seen as a negative emotion, can drive constructive action and bolster individual and communal resilience in the face of environmental threats. This also suggests that adaptation has a psychological dimension; managing fear positively can enhance one's agency and capacity



FIGURE 5 | Women re-building their homes after they were destroyed by torrential rains and flash floods that destroyed houses at an informal settlement in Durban. *Source:* Kahla (2019).

to adapt. This brings an interesting aspect of adaptation, recognising emotions as crucial factors influencing adaptation.

Carvajal-Escobar et al. (2008) report similar situations in Colombia, where local women utilised their situated knowledge to aid themselves and their communities in adapting to natural disasters. After a cyclone struck Ginebra municipality, women were critical in finding solutions for community survival. They helped secure alternative sources of drinking water after the cyclone damaged the community's water supply. Their familiarity with medicinal shrubs enabled them to manage these resources effectively, enhancing the community's adaptive capacity in future climate-related disasters. They also identified which native shrubs needed protection and which social capital should be promoted, demonstrating how their agency and experience provided valuable insights for adaptation measures (Carvajal-Escobar et al. 2008, 278).

Moreover, feminist theories on gender and climate change adaptation reveal that local women are not passive victims of natural disasters (Carvajal-Escobar et al. 2008). Instead, they possess agency and the potential to explore adaptive strategies that bolster their communities' resilience. Women often turn disasters into opportunities to generate new knowledge about local adaptation issues. In many societies, they engage in various activities to meet their families' needs and demonstrate adaptability in coping with climate-related challenges.

Local women's situated knowledge can complement municipal adaptation efforts. This knowledge, shaped by experiences of historical subordination, inspires agency and action. To harness the situated knowledge of Black women in the study context, initiatives such as training programs could be developed to teach simple flood management skills, like diverting water away from homes. Many participants expressed keen interest in acquiring

these skills, believing they would enable them to implement preventive measures and proactive approaches to flood management. Such training could be organised in small groups across different local wards.

5.4 | Psychological Adaptation and the Intersection of Agency, Victimhood, and Vulnerability in Women's Climate Resilience

Bradley and Reser (2017, 29), drawing from a survey of the study of adaptation to climate change in Australia, define psychological adaptation as "processes through which individuals orient towards, make sense of, and ultimately come to terms with the threat and reality of climate change." Psychological adaptation entails adopting a problem-solving mental attitude to climate impacts. The findings from this study reveal some aspects of psychological adaptation.

During the interviews and focus group discussions for this study, some participants (from similar socio-economic and locational conditions) described their adaptation experience quite differently: while some adapted from the position of agency, others described their adaptation experience from the standpoint of "victimhood." These contrasting experiences of adaptation seem to show further that adaptation is, to an extent, psychological and related to personal disposition or mindset. Personal disposition thus influences the women's agency, vulnerability and adaptive capacity (Grothmann and Patt 2005). What this implies is that apart from group vulnerability, or vulnerability arising from a group's common socio-economic and socio-political marginalisation, vulnerability is also individual in that people from the same vulnerable group could experience vulnerability differently (see Heckenberg and Johnston 2012; Codjoe and Owusu 2011).

Another aspect of psychological adaptation in the case of this study is what is described as “self-conditioning” as a coping mechanism. This mechanism was described in similar studies on this subject (see Udo and Naidu 2023a, 2023b). The self-conditioning, which also came up as “internalised oppression,” entails a situation where the women had developed mental resilience to stay in the flood-prone area amidst any actual or impending disaster. They had learnt to live with disaster or an imminent disaster because they seemed to get no positive intervention or response from the municipality whenever they called for intervention during flood events.

On the one hand, “self-conditioning” oneself to live with any impending disaster results from lack of financial capacity to relocate, revealed in expressions such as, “we have no option, we stay in our homes and endure,” on the other hand, “conditioning” also resulted from spatial or place attachment. For example, some relatively older women respondents indicated that they had gotten attached to the place as they had lived there most of their lives. They said they could not adapt to a new location, even if they had the financial capital to move from the disaster zone; they would rather endure the flooded areas. This implies that relocating would negatively impact their psychological well-being. It also shows how gender intersects with age and other related factors to shape vulnerability. More importantly, the findings shed light on how an individual’s psychological disposition, variations in social conditions and relational perspectives, and environmental, socio-economic and socio-cultural conditions are also significant factors to consider in any gender-equitable approach to climate change adaptation analysis and governance (Centeno n.d.).

5.5 | Standpoint Feminism and Local Women’s Vulnerability and Adaptation Experiences

Quite related to the psychological adaptation as described above is the notion of standpoint feminism. Bowell (2011) outlines three key claims of standpoint feminism that align with the aims of this study. The first claim asserts that knowledge is “socially situated.” The second states that “marginalized groups are socially situated in ways that make them more aware and questioning than non-marginalized groups.” The third suggests that “research, particularly concerning power relations, should start with the lives of the marginalized.” In her book *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*, Collins (2022) emphasises that feminist social sciences should be approached from the perspective of women, particularly those from marginalised groups, as they possess insights into aspects of the world that may elude men.

It became evident, in relation to the findings in this study, that while some local women adapted to the impacts of flooding by suppressing aspects of their needs and agency, by cultivating a resilient mindset to help them cope amidst the dire situation, reflected in expressions like, “we have no option; we stay in our homes and endure,” others were active in intentionally looking for ways to adapt. Some participants mentioned that they had been gradually saving money from their little earnings to help them relocate one day to better and safer locations. The fact that these women may have been negotiating their adaptation over

prolonged periods highlights why some viewed themselves as agents in the adaptation process while others saw themselves as victims. These contrasting experiences, even within similar contexts, suggest that women adapted from individual perspectives, which significantly shaped their resilience.

6 | Conclusion, Theoretical, and Policy Implications

Guided by the feminist political ecology and intersectional perspective, this paper emphasises how poverty, limited access to resources, and socio-cultural contexts significantly shape women’s experiences of vulnerability to climate impacts in the eThekweni area. The framework also sheds light on the intersections of race, gender, and class in determining women’s vulnerability. More importantly, the paper underscores the role that personal agency plays in women’s adaptation processes. It challenges the misconception that local Black women are merely victims of natural disasters, demonstrating instead that they adapt not only as a vulnerable population but also as individuals with agency and situated knowledge. The agency is expressed through constant expressions of hope, resilience, and personal disposition as response to climate disasters. These strategies contribute to their adaptive capacity and survival in challenging circumstances. When harnessed, these qualities can greatly enhance adaptation efforts, benefiting the women and their communities.

Further, understanding gendered vulnerabilities requires a comprehensive examination of the intersectional dynamics of their daily lives, including the constraints, threats, and challenges they face due to their socio-economic and socio-political marginalisation. Despite these challenges, the findings also demonstrated the women’s agency in adapting to flood impacts. This concept of agency aligns with contemporary views of vulnerability. For instance, Wisner et al. (2004) argue for a shift away from viewing vulnerability solely as victimhood or helplessness and recognising that those living with vulnerability can actively reflect on their circumstances and seek ways to improve their situation. In this context, it is crucial to empower individuals and address the conditions that limit their ability to anticipate, cope with, resist, or recover from natural disasters.

The findings show the critical importance of feminist theories in providing community—and individual-level perspectives on sustainability. Black women use various adaptive strategies to cope with flooding in their communities. While individual-level circumstances shape how they respond to these environmental shocks, community-level factors inform their behavior. Although these two-level approaches are nuanced due to structural circumstances that can shape a single or collective response to flooding, they are not essentially mutually exclusive. By interrogating these resilience strategies through a feminist political ecology and intersectionality lens, this analysis brings new light into achieving sustainability by considering the gendered experiences of communities with climate insecurities. Indeed, gendered resilience strategies can inform further discussions and actions in achieving sustainability. It offers new insights into making sense of sustainability using a feminist canon to highlight the influence of gender constructions and roles on the adaptive capacities of climate-vulnerable communities. As

shown in this analysis, sustainability themes arise in those discussions that intersect social, economic, and environmental aspects in distinctive gendered ways: information sharing and quality of life, social cohesion, and sense of place.

Information sharing influences how Black women build awareness about existing schemes and financial opportunities provided by the government to assist impacted families. This is also highlighted in their level of access to education. In the case of the sites studied, this remains an issue because most women are not properly informed or educated about the processes to benefit from these programs. This hampers their ability to improve their quality of life during flood events. Studies note how security and access to essential services contribute to the quality of life of individuals and communities and are essential in harmonising nature, society, and structural relationships with improving living conditions of the present and future generations (Hellberg 2017; Neamtu 2012; Rashidfarokhi et al. 2018). This study further elucidates that providing services or information or just their availability does not guarantee their use, given gaps in knowing how such schemes work. This is due to language, cultural and gender constructions and role barriers, which particularly affect women, in this case, at both individual and community levels. This points to the need to adopt inclusive, participatory methods in education and information, 2024 sharing methods sensitive to gender, language and culture.

Social cohesion, resulting from the women's resilience and protective instincts, appears to be a recurring topic in the conversations. Black women engage in agentic actions to protect their families (siblings and kids) by providing basic economic necessities to endure the impacts of floods. Social cohesion is seen in the literature as the safeguarding of social values, relationships and customs, which is achieved through self-organisation (Vallance, Perkins, and Dixon 2011; Corsini and Moultrie 2019). Indeed, Sajjad and Shahbaz (2020) argue that it is rooted in social capital. The authors understood the latter as "the development and reengineering of social resources (e.g., social trust, reciprocity, organisational commitment)" (Sajjad and Shahbaz 2020, 7). Further, Palich and Edmonds (2013) highlight that through the consolidation of physical, cultural and social places, social cohesion enables a sense of community. As shown in the experiences of Black women in this study, agency drives their efforts to contribute to the wider community. While agency is expressed individually, its impact is communal. The absence of agency, in this case, leads to a lack of social cohesion essential to communities coping strategies in the face of climate insecurity. It is crucial to empower Black women to be agents of change and resilience in their communities.

A strong sense of place also characterises Black women's adaptive strategies to floods. This is built through an emotional attachment to their place of residence and commitment to endure these environmental challenges instead of moving to safer areas, which is indicated as "self-conditioning." As such, women link the land they inhabit to their mental and social well-being. As seen in the literature, such factors are associated with human needs. It is seen as human satisfaction, human well-being and happiness (Stender and Walter 2019; Segerstedt and Abrahamsson 2019). Thus, Black women's sense of place

is also associated with their agency and predisposition to build resilience.

This suggests, in this context, that social, economic, and environmental factors intersect to build sustainability for Black women and communities affected by floods. This case shows the implications of resilience strategies at the individual and community levels. Most importantly, how Black women's agency contributes to the sustainability of their communities. While achieving social sustainability will yield economic and environmental sustainability in this case, focusing exclusively on the latter two may hinder sustainability. It is worth noting, as shown in other studies, that climate-affected populations can be categorised into two groups: Change agents and those affected by change. Each group can consider some aspects of social sustainability more relevant than others, that is, the social elements to be sustained can vary depending on the needs or interests of the stakeholders involved (Weingaertner and Moberg 2014). In this case, further differentiation among Black women based on socio-economic status can determine how social sustainability is achieved, particularly, in adaptation and adaptation governance.

Future research could explore the longitudinal impacts of climate adaptation strategies to assess their sustainability and long-term effectiveness, particularly for local Black African women. Comparative studies across different regions within the Global South could highlight unique adaptation strategies and contextual influences. Additionally, examining the role of technology and innovation in enhancing community resilience and the psychological and social impacts of adaptation efforts would provide deeper insights. Investigating barriers to effective adaptation, including institutional and socio-economic challenges, and further delving into the intersectionality of gender with other identities would enrich our understanding of vulnerability and resilience in climate change contexts. Lastly, documenting traditional knowledge and evaluating participatory governance models could offer valuable insights into integrating women's voices in climate resilience planning.

Author Contributions

Fidelis Udo: conceptualisation, developing methodology, data collection, formal analysis, writing – original draft, review and editing. **Johannes Bhanye:** formal analysis, writing – reviewing and editing. **Balkissa Daouda Diallo:** formal analysis, writing – reviewing and editing. **Maheshvari Naidu:** supervision.

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Conflicts of Interest

The authors declare no conflicts of interest.

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