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# Non-economic losses and other impacts of climate change affecting women in the tourism industry: a photovoice case study from Kenya's coast

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Coastal areas drive much of the world's tourism growth, yet they are highly vulnerable to the impacts of climate change. This vulnerability poses a significant risk to the tourism sector, as environmental degradation can diminish the appeal of destinations. The tourism sector's strong dependence on women's work exposes it to gendered impacts, as climate risks in coastal environments are not gender-neutral but affect women disproportionately. Despite the growing attention to climate change in tourism research, methodological limitations have often overlooked household and community scales, thereby underutilizing women's knowledge and lived experiences. This study addresses these gaps by using photovoice, a participatory method that enables participants to frame and articulate climate-related changes in their own terms, based on their lived experiences. The participants' photovoices revealed changes in natural resources and coastal infrastructure linked to the spaces where women's work takes place and upon which it depends. A feminist political ecology lens informs the interpretation of these results, suggesting that the growing uncertainty associated with climate change has blurred the boundaries of these spaces, which form the core of women's work in tourism, reshaping their roles in ways that reinforce subordination rather than promote equal participation in the ocean economy. Moreover, the photovoices reveal that economic and non-economic losses represent interconnected dimensions of the same processes of change. The interaction between climate change and tourism thus introduces multidimensional, gender-related vulnerabilities that extend beyond economic impacts to include implications for women's political agency and a sense of cultural pride. By focusing on women's experiences, this study enhances our understanding of gendered vulnerabilities in coastal tourism and provides insights for developing more inclusive practices that promote gender equity and diversity in marine environments.

## KEYWORDS

climate change, gender, ocean economy, photovoice, political agency

## Introduction

Coastal and ocean-based tourism plays a vital role in the ocean economy, standing alongside maritime transport, fisheries, and other ocean-based sectors. Globally, tourism dominates the ocean economy in both output and employment (OECD, 2025). It provides livelihood opportunities for coastal communities, supports conservation efforts,

and informs development. For instance, in Kenya, the tourism sector demonstrated a remarkable post-pandemic recovery, with a 163.5% increase in cruise tourism recorded in 2024 compared to the previous year (Kenya National Bureau of Statistics, 2024). This rebound highlights the sector's potential to drive economic growth (Kepher-Gona, 2024). However, realizing this potential requires a commitment to sustainability and equity (Kepher-Gona, 2024), particularly in the face of climate change. Climate change poses serious challenges to coastal tourism, making it one of the sectors most vulnerable to environmental stressors (Simpson et al., 2008). Compared to aquaculture, maritime transport, or infrastructure, tourism is more immediately affected by changes in ecological and socio-economic conditions (Nicholls et al., 2007; OECD, 2025). When future scenarios prioritize local solutions and environmental sustainability, tourism shows a sharper decline in growth potential, unlike the steadier adjustments observed in other sectors (Nicholls et al., 2007). This contrast highlights tourism's disproportionate influence on ecosystem outcomes amid abrupt, climate-induced transformations. Rising temperatures, changing precipitation patterns, sea level rise, and extreme weather events are already reshaping coastal landscapes (Moreno, 2010; Jarratt and Davies, 2020; Soontiens-Olsen et al., 2023). These changes present urgent challenges, threatening tourism infrastructure, ecosystem services, and the livelihoods of coastal communities (Simpson et al., 2008).

Tourism research on climate change has expanded considerably; however, with scant attention to the lived experiences of local communities (Hoogendoorn and Fitchett, 2018), it fails to capture how communities themselves understand climate change. This leaves the household scale underexplored, despite its centrality in community members' daily negotiations with climate risks. From a feminist political ecology (FPE) framework, such neglect sidesteps the knowledge and agency of groups whose contributions are essential for inclusive adaptation (Elmhirst, 2011; Walker et al., 2021), for example, the marginalization of women's knowledge. As shown in a recent review (Bagge-Petersen et al., 2025), photovoice is a well-suited methodology for capturing people's understanding of climate change and articulating their vulnerabilities.

The gap in tourism scholarship extends to questions of gender, which, despite gaining recognition in global climate change discourse, remains insufficiently addressed in tourism research (Eger et al., 2022; Pritchard, 2018), and significant gaps remain at the intersection of climate change and tourism (Equality in Tourism, 2024). In adaptation research, this gap is reflected in low coverage of gender as a social dimension of adaptation (Prakash et al., 2022). Often, such omissions reflect systemic barriers that sideline women's environmental knowledge. For instance, studies have shown a glaring absence of women in climate policy spaces (Spencer et al., 2022; Yiridomoh et al., 2022; Ndlovu and Mjimba, 2021), indicating that women are missing out on valuable knowledge contributions. Nchu et al. (2019) provide evidence that women's voices are downplayed by hierarchies that dictate which issues can be addressed through decision-making.

Women, especially younger ones, are often subject to decisions made by others (Rao et al., 2019; Wood et al., 2021), or married women are subject to decisions made by their spouses (Khoza et al., 2022; Nchu et al., 2019; Myeni and Wentink, 2021), as men

dominate ideas in patriarchal societies (Lawson et al., 2020); e.g., men dominate decisions over family assets, most of which are critical resources to support adaptation (Jeil et al., 2020; Ndlovu and Mjimba, 2021). Young women often lack the decision-making power to choose effective adaptation strategies (Wood et al., 2021). These systemic barriers reinforce masculinized knowledge systems, which Vercillo et al. (2021) note are presented as objective but are in reality partial. Attention to women in the aforementioned studies should not be interpreted as equating gender solely with women; the intention is instead to acknowledge that women's persistent marginalization offers an important lens for understanding how gendered inequalities shape adaptive processes. This perspective equally informs the focus of my research.

The gaps in integrating gender into tourism research, especially in relation to climate change, persist due to the limitations of conventional methods, which lack tools to access the depth of lived climate experiences (Eger et al., 2022; Figueroa-Domecq et al., 2015; Higgins-Desbiolles et al., 2019; Hoogendoorn and Fitchett, 2018; Pritchard, 2018). Hoogendoorn and Fitchett (2018) stress the importance of in-depth community-level inquiry, yet such approaches remain rare, leaving everyday understandings of climate risks largely invisible. This erasure is reinforced by the ways local communities are excluded from standard definitions of tourism (Higgins-Desbiolles et al., 2019), echoing the marginalization of feminist and qualitative methods that Pritchard (2018) and Eger et al. (2022) identify as a barrier to integrating gender into tourism research. Figueroa-Domecq et al. (2015) similarly demonstrate that feminist perspectives are largely absent from tourism scholarship, thereby narrowing the field's capacity to capture the complexity of lived experiences. Collectively, these studies highlight methodological constraints as a driving force behind gaps in gender research questions in tourism scholarship, underscoring the need for approaches that can fully capture the depth of lived experiences.

Indeed, a systematic review by Anderson et al. (2023) highlights that photovoice excels at engaging participants deeply to articulate their lived experiences through critical reflections. As Pierce (2020) shows in the context of aquaculture and fisheries, photovoice addresses these limitations by shifting interpretive authority to study participants, enabling women to narrate their visualized climate experiences in a way that embodies feminist research principles of inclusion and empowerment. Participants' framing of their climate experiences on a personal level echoes a feminist perspective (Harding, 1986) and reflects the methodological strength of photovoice (Masterson et al., 2018), allowing participants to actively share knowledge that is socially situated.

Against this background, photovoice applied to this paper addresses three interrelated research gaps: highlighting community-level perspectives that remain underdeveloped in tourism research; allowing gendered experiences to be documented on participants' own terms, a step that counters the systemic sidelining of women's knowledge; and expanding conventional notions of expertise by redistributing interpretive authority in a way that allows grassroots agency in knowledge production. As such, building on evidence from coastal aquaculture (Pierce,

2020), this study applies photovoice to research on women in coastal tourism, extending the method's feminist potential to a sector where disregard for topics of gender has implications for overlooking the voices of women who are a considerable workforce supporting the sector's development.

Kenya's coast is already facing multiple climate impacts that compound tourism's vulnerabilities. In the Western Indian Ocean region, which includes Kenya, sea levels are rising at a rate faster than the global mean (Kenya Meteorological Department, 2023). Sea level rise, a persistent risk to tourism infrastructure (Schliephack and Dickinson, 2017; Yong, 2021), also shrinks the size of beaches (López-Dóriga et al., 2019; Nidhinarangkoon et al., 2020; Toimil et al., 2018) and visibly erodes Kenya's coastline, with serious implications for tourism and agriculture (United Nations Environment Programme, 2021). Sea level rise is an escalating threat, as it encroaches on coastal settlements and infrastructure (IPCC, 2022), paving the way for multiple other cascading risks that directly affect coastal communities, including coastal livelihoods, food security—particularly in vulnerable regions—and heritage (IPCC, 2022). Coastal heritage sites, such as the Vasco da Gama monument in Kenya, are deteriorating due to increased salinity and shoreline erosion (National Environment Management Authority, 2020), resulting in structural weaknesses in the monument's supporting pillars, which in turn reduce visitor numbers. Coral bleaching poses a significant threat to Kenya's coast, diminishing the appeal of marine tourism (Obura et al., 2017). Coastal flooding (Wabnitz et al., 2021), which was previously seasonal, is becoming more frequent and unpredictable, damaging infrastructure and disrupting livelihoods (Kenya Meteorological Department, 2023). These impacts threaten the environmental and cultural capital that underpins coastal tourism.

Tourism is unique among ocean economy sectors because it faces both supply-side and demand-side risks from climate change. Impacts from a changing climate weaken tourism demand (Scott and Becken, 2010), which can be indicated by changes in tourist numbers at a destination (Baig et al., 2021; Falk and Lin, 2018; Veeken et al., 2016), sometimes driven by tourists choosing alternative destinations (Atzori et al., 2018). Similarly, the negative consequences of climate change on tourism supply at destinations include impacts on the development and delivery of tourism products, as well as a reduced attractiveness of destinations (Wolf et al., 2022; Dube and Nhamo, 2020).

Sea level rise is likely to lead to more frequent coastal flooding, as well as the modification of coastal ecosystems, including beaches, corals, and mangroves (Hoegh-Guldberg et al., 2014), whose natural, aesthetic, and utilitarian values, among others, are important in tourism product development. Scholars such as Horne et al. (2022) demonstrate that climate change impacts are evident in possible supply chain disruptions, as changes in the wellbeing of tourism-dependent communities are observed, threatening their livelihood opportunities. The cascading impacts of climate change, including water scarcity, food insecurity, and disease outbreaks, erode the social fabric upon which tourism relies. Recent analysis in Kilifi (Mostert et al., 2025), where this study is situated, highlights the causal links between climate shocks and mental wellbeing, noting the severe impact of drought shocks on the mental health of vulnerable women.

Because rapid tourism growth concentrates more people and infrastructure in coastal areas (Nicholls et al., 2007), the vulnerabilities of coastal ecosystems intensify, as both population and infrastructure are exposed to combined sensitivities to coastal hazards (Chandra and Gaganis, 2016; IPCC, 2022). To address such escalating risks, e.g., the effects of rising ocean waters, governments and private developers have prioritized infrastructure interventions, such as seawalls (Furman et al., 2021; IPCC, 2022; Owusu-Daaku, 2018). While these efforts aim to protect economic investments, they often neglect the socio-ecological realities of marine environments (Furman et al., 2021; Owusu-Daaku, 2018). They therefore result in unintended consequences, particularly when they fail to account for diverse community perspectives. Differences in how various stakeholders perceive and experience adaptation measures (Furman et al., 2021) point to diverse community perspectives, which are not just procedural hurdles for consensus in decision-making but also reflect political concerns about whose knowledge is actionable in decision spaces strongly structured by hierarchical asymmetries, such as in tourism or the ocean economy.

FPE offers insights into these asymmetries (Elmhirst, 2011) by interrogating how power and knowledge intersect with environmental governance. It emphasizes that ecological processes are socially mediated, taking into account the views of Djoudi et al. (2016) and Riverra-Ferre (2022), who argue that gender is a key axis through which environmental change is experienced and understood. Experiences of women in situations of climate risk stand out in showing where intersectionality, anchored in overlapping aspects of their gender identity, disadvantages their adaptive capacities or intensifies their vulnerabilities (Djoudi et al., 2016). This drawback reveals an additional layer of setbacks in sectors like tourism, which, to some extent, reflect the unequal, gendered structures of the societies upon which they are built (Calvet, 2022; Yang and Schänzel, 2023). Gender, defined in sociology as a construct that differentiates the behavioral aspects of biological sexes (West and Zimmerman, 1987), has dynamics in its relations that shape tourism development processes and related activities (Kinnaird and Hall, 1996), just as in other societal processes where gender relations have profound influences.

For the ocean economy, FPE highlights the invisibility of gendered labor, knowledge, and vulnerabilities in environmental planning. For instance, women in intertidal zones (Resurrección and Elmhirst, 2021) or informal tourism spaces are often excluded, even though their livelihoods are directly at stake. Exclusion reinforces inequalities (Harris, 2009; Mollett and Faria, 2013) and misses critical local insights (Nightangle, 2006), therefore undermining community resilience. This exclusion has implications for the production of actionable knowledge. Women possess valuable environmental knowledge gained through daily interactions with coastal ecosystems (Kitolelei et al., 2022), yet their contributions are often dismissed or undervalued (Fache and Breckwoldt, 2023).

Bridging this gap requires women's agency as a critical element for their inclusion in decision-making processes, allowing for a rethinking of whose knowledge is actionable in informing policy. Agency is the capacity of a person, group, or thing to independently act or influence change within contexts of power relations or

structural constraints (Littlejohn and Foss, 2009). Establishing agency for marginalized groups within such inclusive processes is essential for developing resilient and just adaptation pathways. As women gain greater representation in decision-making, it is important to ask whether their inclusion leads to genuine agency and influence. Representation alone does not imply that their perspectives shape outcomes in decision-making processes, nor does it guarantee that their participation translates to influence in decision-making.

In situations involving knowledge differences, FPE centers on the need to reconcile diverse perspectives, aiming for a positive change effect on the socio-ecological system. This reconciliation is evasive, for example, when interventions overlook peripheral workspaces where women are involved (Wabnitz et al., 2021) or ignore less visible scales, such as households (Elmhirst, 2011), where women have significant involvement in domestic duties. Maladaptive outcomes in a milieu of diverse knowledge points indicate a shallow understanding of vulnerability contexts and a lack of critical engagement with how adaptation success is defined (Eriksen et al., 2021), factors that suggest the exclusion of marginalized groups from adaptation planning. In tandem with FPE literature suggesting that exclusion reinforces or compounds inequalities (Harris, 2009; Mollett and Faria, 2013), the findings by Eriksen et al. (2021) show that exclusion intensifies vulnerabilities by failing to engage diverse perspectives, socially validated meanings, and local knowledge, shaping how different groups experience and define vulnerabilities. In general, this is a failure that results from overlooking differences in perceptions and reflects inequality in how the voices of unrepresented groups are treated.

Tourism has a high participation of women in its workforce, with most of them employed in hospitality and retail jobs that reflect socially constructed gender roles. Many of these typically female occupations, often associated with women's aptitudes, tend to be underpaid and undervalued in the tourism sector (Purcell, 1997), particularly in informal tourism work (International Labour Organization, 2023), such as in coastal tourism (Wabnitz et al., 2021). Much of the informal work in the tourism value chain is conducted through destination activities, such as those related to handicrafts, heritage, and nature-based excursions, which generate income for local communities. These activities are crucial entry points for local communities to benefit from tourism, for example, through opportunities for local small-scale entrepreneurship (Wabnitz et al., 2021), making them important subjects of focus for research on sustainable tourism. There is evidence of unpaid work performed by women in family tourism businesses (World Tourism Organization, 2019) or in tourism marketing promotion (Elledge and Faria, 2020). Elledge and Faria (2020) explain that their findings from Uganda, regarding the largely unremunerated work of beauty pageants in tourism promotion, can be generalized to countries in the global South. Beauty-based hiring practices (Calvet et al., 2021) limit women's opportunities for upward mobility in the tourism industry. Moreover, the underrepresentation of women in professional-level clerical and service jobs has been noted (World Tourism Organization, 2019), indicating that women face challenges in gaining recognition for their work within the tourism economy.

The described lower status of women in tourism has implications for the severity of their experiences with climate

change. This is because gender research on vulnerabilities to climate change (Enerson et al., 2006; Wabnitz et al., 2021) suggests that, when people are exposed to climate-induced risks, inequalities determine who will be chronically affected and who will not. Inequalities, such as those in land resource ownership or access (Awiti, 2022), hinder women's participation and contributions to planning and decision-making; therefore, their voices remain peripheral (Wabnitz et al., 2021) or ineffective (Hügel and Davies, 2020) in informing strategies and action plans. Furthermore, women's unequal status in the tourism sector marginalizes their involvement within it. This factor is compounded by broader gender norms that limit their decision-making agency within households and in public spaces.

In practice, adaptation planning tends to be top-down and detached from the lived realities of those most affected. These challenges are reflected in policy, where integrating grassroots agency remains a challenge, as illustrated by the top-down nature of climate change policy-making processes, for example, as observed in Kenya (Njoroge et al., 2018). National adaptation strategies often categorize women as a vulnerable group (Tanner et al., 2022), but research to complement these strategies—for example, across Africa—fails to disaggregate vulnerability or consider how intersecting gender identities, such as age and social status, influence women's experiences of risk and resilience (Vercillo et al., 2021). For ocean equity, Bennett (2022) emphasizes the importance of tracking social indicators in ocean policies, arguing for the inclusion of social data as a knowledge contribution for informed decision-making.

In other environmental literature, efforts undertaken by scholars such as Hanson (2016) and Pienaa et al. (2024) to identify and describe women's environmental knowledge reflect feminist counterstatements to the possible historical neglect of environmental knowledge sources based on gender. Findings from such studies can be interpreted to challenge tendencies for core understandings of climate discourses to overlook the diversity of knowledge sources, especially those of women. This is particularly relevant for marine environments, which are often considered a female sphere due to women's involvement in fisheries (Weeratunge et al., 2010) and also due to the high activity in tourism, a sector with high participation of women. A feminist approach to adaptation emphasizes the importance of lived experience as a basis for social knowledge of the environment. Considering masculinized environmental knowledge, feminist approaches can guide methodologies to center women's voices and foster critical reflection on environmental change. Participatory tools, such as photovoice, as applied in this study, reveal diverse ways in which women experience and respond to climate risks that affect the sustainability of their livelihoods. These methods reveal not only vulnerability but also grassroots agency.

Women's agency is already evident in their decision-making at the household level (Mekonnen, 2022; Wrigley-Asante et al., 2017). The scale of their effort here, often as proactive measures to mitigate the adversity of climate-induced risks at home, e.g., food insecurity (Tecklewold et al., 2020; Etale and Simatele, 2021; Mekonnen, 2022), is a pointer to their knowledge and understanding. Similarly, recent literature examples (Ranjitkar and Haukanes, 2022; Mubaya et al., 2017) foreground the active role of women in adaptation processes. However, their

agency should not obscure barriers that they face, as [Nightangle \(2006\)](#) flagged the possible risk that additional responsibility is shifted onto already burdened individuals or groups. Effective adaptation enables opportunities for grassroots agency, for example, through knowledge contribution, while simultaneously transforming structures that perpetuate vulnerabilities.

This study argues that women working in coastal tourism develop a strong identification with and an extensive understanding of the local environment, which they draw upon to support their work. They continue to cultivate this knowledge over time. Women's positions in the tourism industry, both on- and offshore, provide a context for examining diverse yet distinct observations of climate change effects, as well as local roots for understanding the concepts and interconnectedness of gender relations in tourism and climate change. At its core, this study responds to the call to socialize tourism by making it accountable to destination-hosting communities ([Higgins-Desbiolles et al., 2022](#)) through its society-driven approach to data collection, which foregrounds the voices of local women, thereby filling knowledge gaps and informing the alignment of development plans with local interests.

## Study site

This study was conducted in Watamu, a tourist hotspot in Kilifi County, coastal Kenya. Watamu is popular with international tourists for relaxation on its pristine beaches, marine excursions to experience the underwater world, and visits to several tourist islands located in front of Watamu's coast ([Figure 1](#)). Leisure ranks as the top motivation for traveling to Kenya, with about 50% of visitors in 2024 stating it as their primary motivation ([Tourism Research Institute, 2025](#)). The peak tourism season from October to March coincides with the drier season in the region.

## Materials and methods

Photovoicing collects data from participant-generated photographs and accompanying short narrations. It has applications in health research and is increasingly applied to diverse other fields, e.g., environmental research, among others. [Chen \(2023\)](#) describes the photovoicing method as combining documentary photography with feminist principles through its participant-led approach. A strength of this method lies in its ability to yield rich, high-quality data ([Kingsbury et al., 2020](#); [Masterson et al., 2018](#)), as participant-generated photographs convey their lived experiences in an authentic manner ([Pierce, 2020](#)), embodying situated knowledge ([Masterson et al., 2018](#)). [Kingsbury et al. \(2020\)](#), who examine residents' experiences and responses to tsunami impacts in a coastal tourism setting, state that photovoice remains largely absent in qualitative research. Most importantly for this study, photovoice data provide insights into the dynamics of power relations in adaptation ([Garcia et al., 2020](#)).

Photovoice was employed in this study primarily for its ability to ensure the active participation of women in research, rather than their being objects of research ([Pierce, 2020](#)). Women's active participation in photovoice activities enabled listening to narratives that hold social meaning in the locally held knowledge of

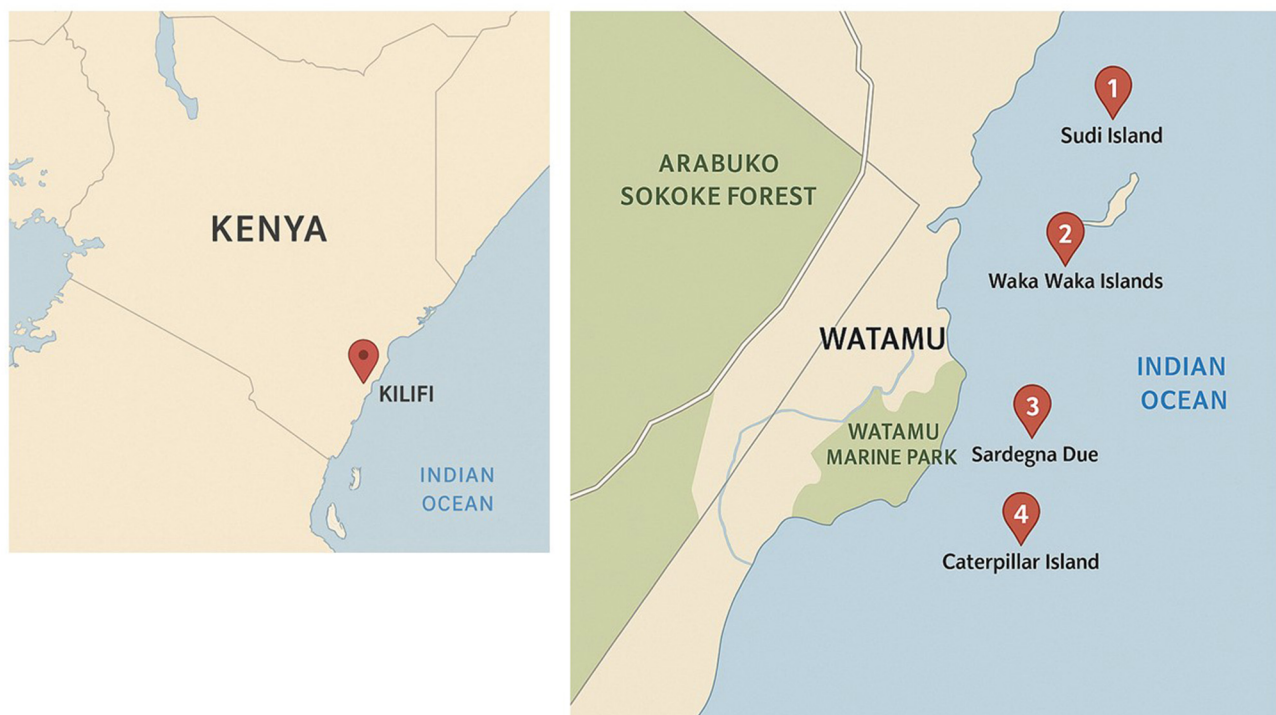
climate change. Photographs offer a valuable way to access public understandings of environmental questions, away from preframed, expert-led approaches ([Kohsaka and Flitner, 2004](#)).

The study's three photovoice workshops, which involved 10 female participants, all long-time residents of Watamu in Kilifi, drew upon previous research using photovoice (such as [Graziamo, 2004](#); [Mcintyre, 2003](#); [Side, 2005](#)), in which depth rather than breadth or prevalence was the focus. As confirmed in a systematic review by [Anderson et al. \(2023\)](#), photovoice thrives on a small number of engaged participants, allowing for in-depth exploration of lived experiences that enables critical reflection. Such studies could also take several weeks or even a longer duration. In Watamu, participants were approached through two local women's organizations. They had to be residents of the study area for at least 5 years and be involved in work where earnings were drawn directly or indirectly from tourism. Those interested were asked, using free, prior, informed consent, to confirm their availability to contribute to the photovoice approach in January and February 2023. The selection of participants aimed for diversity in age and representation of various tourism sub-sectors or various value chain activities.

The first workshop was for the introduction of the project, and the remaining two were for reporting on the photovoice tasks. Each workshop discussion session lasted approximately 2 h, after which participants were free to leave. Often, personal conversations followed after workshops, prompting further explanations of what was discussed. More time was spent with some of the women between the three workshop sessions, as the researcher visited sites shown in photos or places mentioned, such as public spaces where they work, for their own observations.

The initial workshop was designed as a session for group introductions and for the researcher to present the project idea, as well as to provide guidance on the ethics applied in photography. The researcher acted as a facilitator and was supported by one of the women participating in the workshops, a leader from one of the women's group organizations. The participants introduced themselves, mentioning their work in tourism and providing brief descriptions of the destination activities. The researcher explained that she wanted to learn about the concerns of the destination community regarding their experiences with climate change. In the first workshop, participants agreed that they had observed changes that they believed were driven by climate change. Suggestions for themes that they would like to cover, along with a plan of activities, were agreed upon in this session. The task for participants after the introductory workshop was to capture their observations through photographs of what mattered to them.

After the photograph production, two discussion workshops were scheduled. Participants had the option to identify what they felt was a typical observation on climate change affecting destination activities and to capture it through photographs taken with mobile phones, with which they are familiar. Photographs were shared via WhatsApp with the researcher. Since participants did not include captions with their submitted photographs, they held discussion sessions to express what their photographs represented. Captioning photographs may pose a challenge for participants with low literacy levels. All the photographs were printed by the researcher prior to the discussion workshops, and participants agreed to have them displayed on a table



**FIGURE 1**  
**(Left)** Kilifi on Kenya's Indian Ocean coast. **(Right)** A closer look at Watamu in Kilifi, highlighting its marine attractions and islands popular for tourist visits.

during the workshops. This physical setup worked well for participation by all, considering the technological challenges faced by participants using old phones during the sessions, as well as those who would benefit from larger print formats of photographs. The essence was interactive communication, shaping what is constructed as social knowledge from photograph data. The workshops served simultaneously as exhibition sessions, where the photographs shared were displayed for all participants to see, and no privacy concerns were raised. Participants were asked before the session which photographs they would like to speak about. The selected photographs were shared on a projector during the discussion session.

Each participant had multiple photographs, and during the workshops, they were allowed to select one and speak about it, allowing everyone enough time for their presentation. Participants were invited to respond to two questions when speaking about their photographs: What impact is portrayed in this photograph? Which jobs can be affected by this impact? These questions guided their reflections on climate change factors that came to mind from their photograph and subsequent discussion on which destination activities workshop participants felt would be affected by the described climate change effect. Photovoices are a valuable way to access public understandings of environmental questions, complementing rather than replacing conventional expertise, by making space for interpretations that emerge outside of pre-framed expert-led approaches (Kohsaka and Flitner, 2004). Participants spoke about their photographs one by one, and the researcher allowed others to comment on the photographs as well. Seven

photographs were discussed in the second workshop. Since some participants did not have ready photographs by the time of this workshop, a follow-up workshop was scheduled. During the final workshop, the presentations were open, and participants made their presentations in groups.

Additional photographs were submitted, bringing the total to 52 photographs collected from all workshop participants. Workshops were audio-recorded, notes were taken, and personal conversations were followed up on after all workshops with available participants. After these workshops, the researcher was able to visit some of the public places shared in participants' photographs, making her own observations of what was discussed. Audio recordings helped capture participants' verbatim voicing of their photographs, ensuring that their meanings were preserved with minimal influence from the researcher's own framing. Nonetheless, facilitating photovoice discussions shaped the co-produced nature of the knowledge generated.

The findings from the workshop were later used to guide the categorization of other photographs, converging on a list of climate change effects, such as those related to drought and sea-level rise. This study acknowledges that observations shared by women are complex, diverse, and follow an inductive approach in analysis. Qualitative analysis involved an initial step of code development from the photovoice workshop transcripts. The workshop discussion transcripts provided a basis for identifying themes based on the question of what kind of climate change effect was portrayed in the photographs. Workshop recordings were transcribed and coded on main ideas, with the codes categorized

into themes. Audio recordings, as each respondent spoke about their photographs, also guided the assignment of codes. The names of respondents and some locations were anonymized as a data protection measure. Codes developed from workshop transcripts were then applied to the entire set of 52 photographs collected during this study.

Analysis of photovoice additionally applied a set of codes for visual features (Kress and van Leeuwen, 2020) to uncover the salience of particular factors in the photographs. This allowed us to identify the degree to which certain factors were prominently represented in the photographs, ranging from strong salience—where an issue is almost entirely featured—to weaker forms of salience, where it is represented occasionally.

## Results

Women's photovoices draw attention to the fact that, contrary to the 'panicky' representation of climate change threats, observations can be presented in a space of conviviality, reckoning authentic livelihood experiences. Workshop discussions identified the effects of climate change depicted in photographs, and participants added comments on which destination activities they thought were affected by the stated effects. When coded, these photographs converged into three main categories of climate change effects: changes in ocean resource levels (Figure 2), changes to coastal infrastructure (Figure 3), and changes to farmland resource levels (Figure 4). Categorization of their photographs in groups presents a balanced view of the effects of climate change and related adaptation responses (Figures 2–4). Photovoice discussions show that these categorizations are important change contexts, with implications for various destination activities. For anonymity, participants quoted in the results discussion are referred to by numerical identifiers, ranging from WT1 to WT10.

*"My fishermen don't have deep-sea equipment; now I have no fish for sale": changes relating to ocean resource access.*

The quote in this subheading, voiced by a photograph of one of the workshop participants, encapsulates shifts in ocean resource levels, with climate change identified as a key driver of these changes. Photovoice discussions trace the flow of this shift from shallow ocean waters with vegetated ecosystems to the deep sea and outsourced seafood supplies from neighboring countries, linking them to women's roles in meeting demand for seafood as a restaurant menu item for tourist consumption. Reduced availability of fish in shallow waters drives fishers to venture further offshore. The decline of fish stock in shallow waters is due to multiple factors, including the effects of climate change and overfishing, such as "fishing down the food web" and "roving bandits." Although the subheading quote here highlights the importance of deep-sea equipment in enabling fishers to venture into deeper waters, skills and manpower also play a significant role in such ventures.

WT1, a seller of souvenir items at the beachfront, knows that the degraded mangrove area shown in her photograph (Figure 2a) is indicative of the effects of climate change. She attributes part of this to a rise in environmentally destructive behaviors, such as cutting down trees and mangroves for charcoal and wood, as these are the only resources readily available during times

of climate-induced scarcity. This is in reference to extended periods of dry spells and failed rains, which result in declining farm production. The monetary value obtained from mangroves helps some people meet their needs in the absence of farm yields. Food insecurity in communities with high poverty levels often leads to the overexploitation of environmental resources, such as forests (Food and Agriculture Organization (FAO), n.d.). Environmentally destructive behavior is attributable to multiple factors, including unsustainable behavior due to a lack of choice, unsustainable behavior despite having a choice, or a combination of these. WT1 notes that the degradation of mangrove areas poses an immediate disadvantage to tour guides, who miss out on income from tourism, as such a degraded environment is likely to reduce visitor numbers. WT2, an ecotourism guide, shared a photograph of a mangrove restoration site (Figure 2b), mentioning that mangroves are important breeding grounds for marine organisms. It is important to note that the framing of environmental degradation as linked to poverty reflects what political ecology identifies as the degradation and marginalization thesis (Robbins, 2004). At the same time, this case also connects to political ecology's other central questions: conservation and control (ibid.), as seen in the governance of marine protected areas, and environmental conflict (ibid.), where resource scarcity intensifies competition and exacerbates inequities. Thus, local narratives of blame may reflect broader dynamics of power and access, rather than subsistence pressures.

WT3 is in the seafood trade, delivering supplies to hotels for tourists' consumption. She and other workshop participants agree on the importance of mangroves for marine organisms, especially those whose habitats are in shallow waters.

When the mangroves are flourishing, we get crabs and prawns. Fishermen get their catch, and then we benefit too. At other times, they travel by boat, but here they walk on foot because the waters are shallow. Prawns and crabs like shallow areas, that's where they are found. -WT3.

WT4 discusses her photograph (Figure 2c) with the group, which shows a landing site with a tuna fish catch. She explains that she sources the bulk of her supplies from her husband, who is a small-scale fisherman, and he lacks the equipment to venture into deep-sea fishing. WT4, a fishmonger also engaged in supplying tourist hotels, knows that declining fish catches indicate rising ocean surface temperatures. It is also important to note, as mentioned earlier, that overfishing plays a significant role in the decline of fish stocks. WT4 learned from her husband about the rise in sea surface temperature and how this poses a challenge for his fish catch, as most fish migrate to cooler waters deep in the ocean, out of reach for many small-scale fishers like him. While it may be questioned whether this was the participant's knowledge or that of her husband, it is essential to note that knowledge is shaped by experiences and social contexts (Harding, 1986). The social aspect of knowledge acquisition is a concept in Bandura's social learning theory, which suggests that individuals are active gatherers of information that is internalized as knowledge (Littlejohn and Foss, 2009). Harding writes about this, referring to feminist standpoint theory: "women's social experience, structured by gender stratification, can provide the grounds for developing a distinctive and less partial and distorted



FIGURE 2

The participants' photographs presented at the workshop were categorized by the changes in resource levels at the ocean: **(a)** degraded mangrove area, **(b)** site for women's mangrove restoration project, **(c)** landing site where local traders source their fish supplies, and **(d)** seafood supplies outsourced from the neighboring county of Lamu.



FIGURE 3

Participants' photographs presented at workshop, categorized under changes to coastal infrastructure. **(a)** Makeshift beach stalls used by traders, **(b)** built coastal wall in response to rising ocean waters.

understanding of nature and social life" (p. 26). This does not suggest that women's knowledge is free from partiality, but that they represent a grounded standpoint among others. With these

considerations, the understanding of WT4 is valid, regardless of how it is acquired. Moreover, the workshop questions focused on what participants knew, as shown in their photographs,



FIGURE 4

Participants' photographs presented at the workshop, categorized as food security risks. (a) Preparation of a local dish using coconut as the main ingredient. (b) Kitchen garden. (c) Using piped water for farm irrigation.

and they were unable to question in detail how they acquired this knowledge.

WT3, a seasoned seafood supplier serving island excursions, knows that outsourcing seafood supplies (Figure 2d) indicates climate-induced damage to mangrove ecosystems (Figure 2a), which are important breeding and nursery grounds for crabs, prawns, and lobsters. Figure 2d is among the photographs she shared at the workshop, where she mentioned that she was collecting lobster and other seafood supplies delivered from the neighboring county of Lamu. It is essential to consider here why seafood supplies appear to be more abundant in Lamu County compared to Kilifi County. However, this question can only be adequately addressed in a separate study examining the compounding factors that affect species abundance in these areas. Reframing the question of why supplies appear to be more scarce in Kilifi, one possible reason that can explain the scarcity is Kilifi County's significantly higher tourist numbers compared to Lamu County, resulting in increased demand for seafood driven by tourists in Kilifi. According to the [Tourism Research Institute \(2025\)](#), Kilifi is among the leading counties in terms of tourist numbers and tourism infrastructure development, whereas Lamu does not appear in the top list. Tourism leads to higher fishing intensity to meet demands for seafood consumption by tourists ([Miller, 2022](#)).

If mangroves are flourishing, we get plenty of prawns. But now that all this has been cut, those prawns run away, and they are not found. Crabs are also found here in the mangroves—WT3.

WT3, who has been in the seafood supply business for over 40 years, explains that its role extends beyond supplying tourist hotels and is a critical support for itineraries for visits to nearby creeks and islands. During the peak tourist season, many touristic boats

depart daily to the creeks or islands, including the popular Sudi Islands, Waka Waka Islands, or Sardegna Due (pronounced Italian-style “Sardegna 2”), among others (see Figure 1). She explains that for many of these trips, she supplies a combination of octopus, lobster, prawns, and fish. These are a must-have package for tourists to experience seafood delicacies while on the islands; otherwise, the tourist trips often fail to materialize due to a lack of such packages. She, however, notes the difficulties in locally sourcing some of these species, primarily due to the destruction of their habitats, e.g., the cutting down of mangroves. According to WT2, their efforts for mangrove restoration face a challenge during periods of excessive dry weather, when the seedling growth pace is slow.

Similar to WT4, who has observed a scarcity of seafood supplies, WT3 points out that this scarcity has pushed her to outsource her supplies from the neighboring county of Lamu in order to meet the demand for seafood consumption by tourists in Kilifi. Besides the degraded mangrove habitats, WT3's other concern is raging ocean waters, for which she sees climate change as a driver. Both WT3 and WT2 link it to the safety of water transport, and thus, they present a challenge for fishers, as they suppress their catch. Other workshop participants contribute to this discussion by suggesting that, for ocean excursionists, these changes limit their views of diverse species in glass-bottom boats. In general, boat trips for fishers and tourists are affected during wavy conditions and raging oceans.

At times, there are unusually strong winds. The wind blows so much that it is not safe for those going fishing—WT2.

The shortage of lobsters is because the ocean is sometimes rough, and now it is deep sea. Lobsters are found in the deep sea, about sixty feet deep. That is, from top to bottom, it is sixty feet—WT3.

In explaining the shortage of seafood supplies, WT3 reverts to the point on dependency on small-scale fishers who lack adequate gear for fishing in deep waters. She gives the example of dependence on small-scale fishing methods, such as spear gun fishers, who catch octopus and fish, as problematic to their businesses. The spear marks darken the produce in a short time, making it difficult to sell to hotels that prefer fresh-looking products.

*“What is important to me is that I found some space right there”: Rising ocean waters and changes to coastal infrastructure.*

The sentiment expressed in this quote by one of the participants, “What is important to me is that I have found some space right there,” was echoed in diverse ways as other participants spoke about changes they observed from their position alongside the coastline.

WT5 shares [Figure 3a](#), which shows the beach stalls where she has worked for over 30 years. She speaks of the shade depicted in the photograph of the beach stalls, which provides shelter from the scorching sun. As a result, many beach traders, mostly women whose activities are outdoors, gather under the shade of the beach stalls. WT5 goes on to list various activities, mostly undertaken by women, that converge at the beach stalls. A statement from WT6 during the workshop shows that these stalls are strategically located in a convenient area near beachfront hotels, allowing tourists on their way to the ocean to easily view the items for sale and make purchases. WT6 is a henna artist who operates from the beach stalls, a space shared with other women whose primary source of income depends on the tourist dollar.

Those beach stalls provide shade. If you go to their backside, you will find a woman making beads, you will find those who apply henna, that's where they do their work, because there is shade. It's not just pareos that we sell in these stalls. We even sell souvenirs. Animal souvenirs sculptured from soapstone and wood. If you get a client who wants to be massaged, there is space to spread a mat for massage—WT5.

What is important to me is that I found some space right there, I don't walk, I know that visitors must go to the ocean. They get to see what we sell, if it interests them, if it's a pareo, they will take the printed design of the pareo they want—WT6.

There are children who want to be taught the Swahili language. When I am at the stalls and the children hear us speaking, they ask their mother, who in turn asks us to explain and teach them a bit of Swahili. All this while we are right there at the backside of the beach stalls, mother and child—WT7.

These women organize to operate collectively from beach stalls. Their use of beach stalls creates, in turn, a space that defines their everyday activities for informal tourism work. Often, it is a woman's only space, not shared by others, and it is a convergence point for women's work in tourism. Pareos and other items sold from the beach stalls are displayed on the side facing the ocean. This way, the majority of beach stalls at the study site face east, where the sun rises, and will have shade on their backside in the morning hours. In this area, many tourists visit the ocean during the morning hours for boat excursions or relaxation at the beach when the sun is not scorching hot.

The beach stalls are not permanent; their fragility is evident as tourism seasons shift from peak to off-peak, and strong tides erode them. WT5 further points out that, to salvage their belongings from possible damage, they temporarily relocate their beach stalls from this prime trading location during the low tourism season.

During the low season, our stalls are carried away by the water. So when the low season comes, we carry our stalls, we tear them down, we take them away, our work is just to build and tear them down—WT5

Further insights into local experiences with the diverse effects of climate change at the shoreline are provided by WT1, a trader at the beachfront, who notes that the shrinking space for beach activities indicates land loss to the sea caused by sea level rise, which overlaps with coastal erosion. This poses a threat to their beach stalls, which must be relocated away from the rising waters. Although WT5 had earlier linked the threat to seasonal tides, the photographs shared by some of the women open up discussions of sea level rise as an immediate risk to built infrastructure along the coastline. WT8, a masseuse who operates from a beach stall, highlights the severity of this problem with her photograph ([Figure 3b](#)), as she described how she has seen coastal protection walls rebuilt repeatedly after every damage caused by rising waters. These walls have been built by tourist hotels to shield their premises from rising ocean waters.

*“Coconut is used for everything”: Changes to farmland resource levels.*

In home settings, the effects of climate change are evident in farmlands, where failed rains and drought seasons negatively impact crop harvests. Repeated mentions of coconuts in photovoice discussions as representatives of farm produce highlight their importance both at home for food preparation and in work settings, such as restaurants specializing in local cuisine.

WT9 runs a coastal dishes restaurant and knows that a fading taste in coconut-flavored coastal delicacies indicates the impact of drought on farm produce. She uses her photograph ([Figure 4a](#)) to discuss the impacts of drought on coconut, cashew nut, and baobab seed harvests. WT9, who prepares a variety of coastal dishes and snacks, reveals that she has a considerable number of tourists visiting from upcountry, taking specially made snacks with them as souvenirs of their trip to the coast. She notes that special, locally sourced ingredients such as coconuts are crucial for their aroma, taste, and nutritional value in food preparation. Workshop participants add their voices to her photograph, noting the increased commodity prices resulting from this scarcity. WT9 mentions that her clients are very sensitive to price changes, yet her production costs are increasing due to the scarcity of farm produce. Prices in hotels and restaurants also increase, disappointing customers who prefer lower rates.

Participants also note that the coconuts harvested are smaller in size, as the harvesters are impatient to wait for them to mature. Drought slows down the maturity of crops, as observed by [Kim and Byung-Moo \(2023\)](#), an effect brought forth by participants in photovoice discussions. In the workshops, the women mentioned that prolonged drought prompts early harvesting of immature coconuts. Harvesting is carried out by men, who may also act as

middlemen in selling coconuts. As a result, such early harvested coconuts do not have the same taste as expected in previous dishes. During the workshop, a brief discussion was held about the fact that early-harvested coconuts are not suitable for making coconut oil. WT10's photograph (Figure 4c) of farm irrigation and WT5's photograph (Figure 4b) of her kitchen garden, discussed at the workshop, equally highlight this plight of declining crop harvest as a result of failed rains and drought. Workshop participants add that climate threats to the gastro destination identity of the region pose a risk to their livelihoods in tour guiding and hospitality.

*Matobosha*, a local food, is prepared using coconut. Coconut is used for everything; it is a good thing, used in cooking, such as *matobosha*, beans, coconut fish, coconut rice, and *kashata*. We use coconut for many things. We also make coconut oil—WT9

Coconut is a major crop along many coasts (Ulysse et al., 2021; Nenci et al., 2023), with its diverse uses highlighted in photovoice workshops, as also reflected in the aforementioned research. Most important for women is that coconuts, in various forms, are an ingredient in several coastal dishes, such as coconut rice, coconut beans, and coconut fish, as evident from the study site, providing additional nutritious benefits to homemade meals. Coconut trees have a wide range of uses within the local community. Coconut wine is brewed locally by men, while women make coconut oil. The palm reeds are woven by women to make mats. Palm reeds are also used as a roofing material, providing a cooling effect to indoor spaces in tropical coastal areas with warm temperatures. Some tourist-style accommodation facilities in the area utilize palm reeds for roofing, reflecting the local roof-style design that is well-suited to the area's warm temperatures. There are reservations, however, regarding the safety and durability of reed roofing during fire incidents, as it can provide fuel for fires to build up. Coconut trees provide wood for building materials.

## Discussion

Existing methodological gaps in tourism and climate change research often lead to the neglect of lived experiences. This study's use of photovoice as a participatory visual method addresses these gaps and centers women's lived experiences of climate change. The study demonstrates the value of photovoice in redistributing interpretive authority and enabling women to define what aspects of their lives and environments matter most in the context of coastal change. By prioritizing women's agency in generating and interpreting images, the research foregrounds their situated knowledge and reveals how grassroots perspectives enrich the understanding of climate impacts on tourism and the blue economy. These findings align with Anderson et al. (2023), who argue that photovoice effectively captures rich experiential knowledge. The results further show that women's contributions extend beyond economic roles to include the symbolic, cultural, and political dimensions of coastal life, all of which are threatened by climate change. For instance, climate experiences detailed in photovoice data reveal that the local community is doubly disadvantaged by the combined risks of tourism affected by beach

loss (López-Dóriga et al., 2019; Toimil et al., 2018), which they depend on, and cascading risks at the household level (IPCC, 2022).

In particular, the combination of women's photographs and their personal voices in this study highlights a shared concern about changes to land- and ocean-based resources, which serve as forms of economic capital that support their work in tourism, as well as a heritage they are proud of. Economic capital is crucial for women's position in the social hierarchy of coastal tourism, which is structured under the blue economy. Climate-induced changes to resource levels have significant implications for the status of women in the tourism industry. Reduced resource levels are associated with lower earnings, a measure of the status difference between women and others in the coastal tourism sector. Additionally, photovoice data highlight the symbolic recognition of women's place in this hierarchy through their use and access to various spaces that organize their work, which solidifies their position in tourism as part of the blue economy. Most importantly, women's locally held knowledge—which encompasses in-depth social dynamics—helps identify non-economic losses that directly affect women. These losses have eventual costs for tourism, yet they risk being overlooked in the sector, which is largely positioned within an economic context.

## Resource scarcity and women's dependence on tourism livelihoods

Women's photovoices highlighted concerns about declining fish stocks and unstable seafood supplies. Their work in tourism relies on artisanal fishers, whose ability to operate is constrained by rising ocean temperatures, hazardous conditions, limited technology, and competition from industrial fleets. These pressures diminish local catches and undermine women's opportunities to supply seafood to tourist hotels. Besides climate-driven scarcities, Ochiemo et al. (2020) note that small-scale fishers in Kilifi target demersal fish, which are at risk of overfishing. Women's dependency is further complicated by the impact of illegal, unreported, and unregulated fishing by larger industrial operators, which reduces available stocks. Sumaila and Tai (2020) highlight that the majority of global fishing subsidies disproportionately benefit large-scale operations, while foreign subsidies in African waters are nearly twice those of African countries. These dynamics spill over into women's livelihoods, leaving their seafood businesses vulnerable.

Attempts to source seafood from neighboring regions, such as Lamu County, incur additional transportation costs that are not accessible to all traders, thereby weakening community linkages to the tourism value chain. This illustrates how capital-intensive responses can exclude small-scale actors. Similar exclusionary patterns have been observed in other contexts. For instance, Dube and Nhamo (2020) demonstrate how rising electricity costs during drought years disproportionately burden small food-service businesses in the tourism sector that cannot afford alternative energy sources. Awiti (2022) also recommends that resource-based climate interventions in Africa be gender-responsive, highlighting the challenges women face in accessing capital to mitigate climate risks.

## Insecure spaces for women's work

Women's informal enterprises are primarily located along the shoreline, where they face direct exposure to sea level rise, beach erosion, and coastal land loss. These risks threaten makeshift structures that house small-scale retail activities, contrasting with the permanence of hotels protected by seawalls. Photovoice data revealed that seawalls constructed to protect tourist infrastructure simultaneously displace women's stalls and reduce community access to beaches. Such outcomes demonstrate how adaptation measures can inadvertently reinforce inequalities. Similar counterintuitive consequences have been documented elsewhere in Africa. For example, tree planting projects promoted as restoration strategies have been critiqued for displacing grassland ecosystems (Parr et al., 2024). In Ghana, Owusu-Daaku (2018) illustrates how the construction of sea defense systems has incentivized large-scale tourism development, thereby displacing local communities.

At the study site, the displacement of women's trading spaces diminishes their visibility in the blue economy and weakens their symbolic recognition in coastal governance. The shift to inland market centers for seafood collection disconnects women from ocean spaces, exacerbating their marginalization. This finding is consistent with research indicating that women's contributions to tourism are often poorly recognized at the professional level (World Tourism Organization, 2019) and that men disproportionately access state aid (Rao et al., 2019) and seed system channels (Otieno et al., 2021). Women may be excluded from assistance because their work is viewed as secondary or unproductive (Myeni and Wentink, 2021, cited in Dibakoane et al., 2022).

## Economic and non-economic losses

The photovoices also illuminated forms of loss that extend beyond direct income. Drought-induced scarcities of coconuts and other produce disrupt culinary traditions central to women's identities and food businesses. Participants expressed pride in culinary heritage, yet the scarcity of ingredients erodes traditions passed down through everyday cooking and food service roles. This resonates with the debate on non-economic loss and damage (NELD) under the United Nations Framework Convention on Climate Change (UNFCCC, 2013). While NELD categories include cultural heritage, local knowledge, and biodiversity, institutional attention tends to prioritize losses that can be economically quantified (Hirsch et al., 2017).

At the study site, non-economic losses are closely linked to economic outcomes. Coconut, a key farm product, supports women's businesses by reducing operating costs in food services. Scarcity of coconuts and other crops, therefore, undermines women's ability to sustain both livelihoods and cultural identity. This intersects with broader debates on gastro-tourism, where food heritage plays a central role in tourism markets. Bowlby et al. (1997) note that household resources such as crops shape gendered hierarchies within families. Their scarcity diminishes women's capacity to challenge economic domination and reinforces inequalities. It is essential to recognize that, while economic and non-economic losses are often presented as distinct categories,

they can also be viewed as different perspectives on the same processes of loss. Economic losses capture the quantifiable, financial aspects, whereas non-economic losses reflect the more intangible, experiential dimensions. Rather than being mutually exclusive, these perspectives may be complementary in the context of coastal tourism. Recognizing both economic and non-economic losses is, therefore, critical for designing climate and tourism responses that are equitable, culturally grounded, and inclusive of women's knowledge and contributions.

Through women's photovoice, which illustrates how economic and non-economic, climate-induced losses are intertwined, the study advances debates in tourism-climate research by reframing adaptation as more than a matter of economic resilience. For example, the loss of cultural continuity and recognition is shown to be constitutive of women's vulnerabilities and not secondary to economic impacts. Photovoice's feminist orientation, as Pierce (2020) demonstrates, is well-suited to capturing such overlooked dimensions, as it privileges lived experiences and elevates participants from subjects of inquiry to active participants in the research process.

## Policy implications

Findings from this study highlight the need for policy approaches that address both the material and symbolic dimensions of climate impacts on women in coastal tourism. First, recognition of non-economic losses, such as the erosion of culinary traditions and displacement from coastal workspaces, should be integrated into adaptation frameworks alongside economic considerations (UNFCCC, 2013; Hirsch et al., 2017).

Second, adaptation measures such as seawall construction require gender-sensitive assessments to prevent further exclusion of women's informal enterprises from coastal spaces. Planning processes should strike a balance between protecting large-scale tourist infrastructure and safeguarding community access and livelihoods (Owusu-Daaku, 2018). Current evidence of interventions with maladaptive outcomes (Parr et al., 2024) highlights the need for rigorous scrutiny of interventions prior to implementation.

Third, strengthening local seafood supply chains is critical for women's participation in the tourism economy. This includes supporting artisanal fishers through fair regulation, protection against industrial competition, and the provision of appropriate technologies that enhance their resilience (Ochiewo et al., 2020; Sumaila and Tai, 2020).

Finally, governance structures in the blue economy must establish channels for women's direct participation in decision-making. Policies that prioritize women's knowledge and acknowledge their economic and non-economic contributions will foster more inclusive and equitable adaptation strategies (World Tourism Organization, 2019; Rao et al., 2019; Otieno et al., 2021).

## Conclusion

By applying photovoice as a participatory method, this study was able to reveal less recognized details about how women in coastal tourism experience the impacts of climate change. The

use of photovoice in this study allowed the collection of socio-ecological information relevant to the ocean economy, whose results contribute to conceiving non-economic losses from climate change and exchanges between these losses as experienced by women, which are relevant to coastal tourism, where concrete actions are needed as part of efforts to advance gender equity in the ocean economy. Non-economic losses are significant pressure points at the grassroots level, while economic losses are commonly associated with macro indicators, such as GDP, which, for tourism, has not been a panacea for host community development. Studies can employ participatory methods, e.g., photovoice, to illustrate what non-economic loss and damage mean for climate-sensitive sectors in the coastal and ocean economy.

Geographic space is central to gender inequality in coastal economies because access to specific locations along the shoreline determines both livelihood opportunities and political recognition. Women's economic activities, such as small-scale trade and services, often depend on proximity to the coastline; however, climate change and tourism development are displacing them from these spaces. When women lose access to these spaces, they miss out on income opportunities and risk being excluded from local governance structures such as Beach Management Units (BMUs), which draw legitimacy from direct connections to ocean spaces. It is thus important to safeguard women's physical and institutional access to the shoreline, as environmental stressors coupled with tourism development reshape it. This can involve formal recognition of women's roles within community-based coastal management bodies, as well as mechanisms that equally safeguard their participation in climate adaptation planning.

The ocean, coastal shore, and farm fields are depicted as important contexts that link women's activities to the tourism value chain. The situation regarding climate change at the study site indicates that women's access to economic capital, as well as the symbolic recognition of the spaces organizing their work, is crucial in shaping their influence within tourism in marine environments. At the study site, there is growing uncertainty that climate change will destabilize the boundaries for spaces organizing women's work, thereby relegating their involvement in the ocean economy to the periphery. Emerging themes in this study's photovoice analysis draw from both social and environmental dimensions, providing examples that illustrate how gender inequalities in coastal tourism may contribute to the subordination of women's knowledge on climate change. Loss of political agency is evident in women's detachment from male-dominated ocean governance structures, resulting from the displacement of their trading activities further from the coastline due to rising ocean waters or climate impacts on marine biodiversity. By displacing women from coastal spaces, climate impacts erode their economic livelihoods and political agency, as exclusion from ocean-based institutions like BMUs severs the spatial and social ties through which recognition and influence in the coastal economy are conferred.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving humans were approved by ZMT Bremen Ethics Committee and Pwani University Kenya Ethics Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their Written informed consent was obtained from the individual(s) for the publication of any identifiable images or data in the article. The images were not reproduced from an existing publication.

## Author contributions

LA: Writing – review & editing, Writing – original draft, Formal analysis, Methodology, Data curation, Investigation, Project administration, Conceptualization.

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