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Climate stress, fortress conservation and cultural rupture in rural communities of the Makana Local Municipality, Eastern Cape, South Africa

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Abstract

This article investigates the synergistic impact of accelerating climate stress and fortress conservation on the cultural well-being of historically marginalised communities in the Makana Local Municipality of the Eastern Cape, South Africa. This study develops and applies an author-derived analytical framework that integrates cultural ecology and critical political ecology to examine how climate stress and fortress conservation interact in shaping community experiences. This study utilises qualitative empirical data gathered via 58 household interviews, 3 focus group discussions, and 5 key informant interviews across three proximate communities (Alicedale, Kraabos, and Seven Fountains) that are situated on the margins of private game reserves. The data analysis employed a critical political ecology lens to examine how structural exclusion amplifies climatic vulnerability. Findings reveal a layered set of challenges: (1) climate stress destabilises livelihoods and erodes Traditional Ecological Knowledge; (2) fortress conservation imposes rigid spatial exclusion, restricting traditional adaptive pathways and denying access to critical resources; and (3) the convergence of these pressures culminates in cultural rupture and spiritual violence. The study concludes that this convergence produces a compounded vulnerability that structural models fail to capture. It highlights an institutional blind spot in which reserves externalise responsibility for community adaptation, advocating a shift towards restorative climate justice and shared ecological stewardship to mitigate this rupture.

***Keywords*:** Climate stress; Fortress conservation; Cultural rupture; Makana Local Municipality; Eastern Cape; Synergistic

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1. Introduction

The levels of global warming have been rising sharply over time mainly due to anthropogenic activities mainly linked to burning fossil fuels. According to the Intergovernmental Panel on Climate Change (IPCC) (2023), global surface temperatures during 2001–2020 were approximately 0.99°C higher than during 1850–1900, confirming a clear long-term warming trend. Recent synthesis work further shows that human-driven climate change has increased either the probability or intensity of most analysed extreme weather events (Clarke et al., 2022). The IPCC also notes heightened global exposure to heatwaves, droughts, floods, and cyclones, with more than 3 billion people living in highly climate-vulnerable contexts.

While these global trends are well documented, their impacts are neither evenly distributed nor uniformly experienced. The Global South is typified by compounding factors of structural inequalities, limited adaptive capacity, and historical patterns of marginalisation and, consequently, the populations there are disproportionately exposed to and affected by climate extremes (Gönenç, 2025; Ngcamu, 2023). South Africa is one of those countries that exemplify this uneven geography of vulnerability, experiencing recurrent droughts, shifting rainfall regimes, and intensifying heat stress that compound existing socio-economic challenges such as poverty, food insecurity, and inequality (Johnston et al., 2024; Matimolane and Mathivha, 2025).

Prolonged drought cycles, water scarcity, and land degradation intersect with apartheid-era legacies of dispossession, producing a highly climate-sensitive social landscape (Muyambo et al., 2017). This vulnerability is characteristic of the Eastern Cape, where regional climate models and historical data indicate an increasing frequency of extreme events (Hosu et al., 2016) that compound long-standing structural inequalities (Mani et al., 2021; Matimolane and Mathivha, 2025; Ngumbela et al., 2020). These patterns are consistent with broader findings across the Global South, where climate vulnerability is shaped not only by environmental stressors but also by historically embedded inequalities in land access, governance, and resource distribution (Adger, 2006; Ribot, 2014; Eriksen et al., 2021). It is in this context that the synergistic pressures of climate stress and conservation infrastructures gain sharper relevance, making Makana Local Municipality communities in the Eastern Cape an important lens through which to examine the localised manifestations of global climatic change.

Against this backdrop of deepening environmental stress and structural inequality, fortress conservation emerges as a critical yet under-examined dimension of vulnerability. The Eastern Cape contains numerous state and private reserves whose fenced, exclusionary conservation infrastructures often intensify resource conflict and restrict community access to land, water, and culturally significant sites (Kepe, 2004; Queiros, 2023). Recent work in the Eastern Cape further illustrates these dynamics in private reserve contexts (Effossou et al., 2025a; Maphosa et al., 2025).

The Eastern Cape province utilises the strategy of fortress conservation to protect biodiversity and manage high-value wildlife. This dominant conservation model defines the boundaries of numerous areas in the province, including state-managed National Parks (like Addo Elephant National Park and Tsitsikamma National Park), provincial reserves, and extensive private game reserves (*see* Le Fleur, 2021; Kepe, 2004; Queiros, 2023). This conservation strategy serves two primary purposes: to ensure biodiversity protection by safeguarding threatened species from poaching and habitat encroachment, and to enable intensive wildlife management, allowing managers to control animal populations, maintain ecosystem integrity, and prevent human-wildlife conflict (Angwenyi et al., 2021). This physically demarcated conservation approach often intensifies the resource conflict and marginalisation experienced by adjacent communities. This pattern of exclusion aligns with broader critiques of conservation governance in South Africa, which highlight how elite environmental and tourism-driven interests can override local agrarian needs (Ramutsindela, 2007; Maphosa et al., 2025).

Fortress conservation's impact goes beyond the demarcation of physical boundaries between vulnerable communities and natural resources. Its impact transcends into the non-material world where it causes cultural rupture (Brockington, 2002; Dowie, 2009). By this we mean the profound severing of the historical, spiritual, and material connections that indigenous and local communities maintain with their ancestral land and its natural resources. For the rural populations of the Eastern Cape, this rupture is rooted in apartheid-era land dispossession,

but it is constantly reinforced by the modern conservation model, making it difficult to sustain traditional practices, knowledge systems, and identities tied to the landscape (Koot et al., 2022; Mani et al., 2021).

Notwithstanding that the foregoing discussion has demonstrated that there is a considerable body of knowledge on the effects of climate variability, conservation enclosure, and rural marginalisation, these issues are frequently treated as separate analytical domains, despite growing recognition that vulnerability emerges through interacting social, ecological, and institutional processes (Eriksen et al., 2015; Eriksen et al., 2021). There is therefore a paucity of knowledge on how these forces interact in mutually reinforcing ways to reconfigure livelihoods, spatial practices, and cultural life in vulnerable communities. To contribute to plugging this gap, this article advances a synergistic argument. Its central argument is that climate stress, conservation fencing, and cultural rupture cannot be understood in isolation, as their combined effects amplify socio-ecological fragility in ways that exceed their individual impacts. Addressing this gap is vital, particularly in the Eastern Cape, where the combined forces of climatic shocks and fortress conservation profoundly reshape relationships between people and their ancestral landscapes. This study contributes to a growing body of work by offering an integrated reading of how climate stress and conservation enclosure interact in shaping cultural disruption. It offers a novel empirical illustration of how climate stress and fortress conservation intersect to shape cultural and livelihood disruptions in rural communities. In addressing this gap, the study is predicated on the following overarching research question: How do climate stress and fortress conservation advanced by private game reserves intersect to produce cultural rupture in rural communities of the Makana Local Municipality in the Eastern Cape? More specifically, it examines how: (1) climate stressors and conservation enclosures reshape local material and ecological relations that constitute the cultural core of rural communities in the Makana Local Municipality of the Eastern Cape; (2) conservation fences and restricted access to land, water, grazing, and sacred sites reconfigure power, space, and resource control in these communities; and (3) the interacting forces of climate variability and fortress conservation produce cultural rupture and shape community adaptations?

In terms of organisation, after this introduction, section 2 discusses the analytical framework. Subsequently, the methodology of the study is discussed in section 3. Section 4 presents the study's findings, which are subsequently discussed together with their theoretical and policy implications in section 5. The article terminates by offering concluding thoughts in section 6.

2. Analytical framework

This study advances the argument that climate stress, fortress conservation, and cultural rupture operate as mutually reinforcing processes, rather than as separate drivers of vulnerability. To model this, the framework first establishes the local-level relationship between people and the land/environment, which is in the theoretical realm of cultural ecology; then, through a critical political ecology lens, it factors in the historical and institutional power structures that disrupt this relationship. Finally, the framework makes a proposition for the Synergistic Approach to explain the profound outcomes. Bringing these lenses together enables the analysis to move beyond treating climate variability, conservation fencing, and cultural disruption as discrete phenomena, instead conceptualising them as mutually reinforcing forces that jointly shape the vulnerabilities and adaptive limits of rural communities.

2.1. Cultural ecology: Understanding human-environment relations under climate stress

To demonstrate the relationship that exists between societies and nature, we draw on the cultural ecology body of knowledge. This is a body of knowledge whose foundations are traced to the American anthropologist Steward in the 1950s (Lapka et al., 2012). In his work, Steward (1955) suggested that any society has what he termed a "cultural core" in reference to aspects of culture that are closely linked to its key strategies of survival (subsistence and economic activities). He also argued that human beings had the ability to change in response to changes in the biophysical environment. More specifically, for him, cultural change "...is induced by adaptation to environment" (Steward, 1955, p. 5). Steward's core methodological goal was to discover cross-cultural regularities among

unrelated societies. Through his approach, Multilinear Evolution, he theorised that when societies were exposed to similar environmental contexts and operated under analogous technological constraints, they would adapt by developing similar fundamental characteristics, or cultural cores.

The concept of the cultural core extends beyond mere economic activities to encompass the profound, integrated relationship between a society and its environment. This is partly reflected in both material and ontological connections. On the material side, this is in reference to subsistence and survival: the specific technologies, practices (e.g., grazing patterns, water management), and physical resources (land, grass, animals, trees, medicinal plants) that ensure a community's physical adaptation (Berkes, 2018). This is often recognised in the literature as Traditional Ecological Knowledge (TEK), sometimes known as indigenous knowledge, a cumulative body of knowledge vital for localised ecosystem management (Berkes et al., 2000; Berkes, 2024). However, these physical practices are inseparable from the ontological dimension, which refers to the fundamental way of being and knowing the world. This dimension includes the deep-seated spiritual beliefs, kinship ties to the land, knowledge of sacred sites, and traditional worldviews that define community identity, moral structure, and stewardship, which are often described as relational values (IPBES, 2022). Therefore, transposing this to the context of the Makana Local Municipality communities, their survival is sustained by this integrated reality: their physical survival is material, but their identity and worldview are ontological. The confrontation with fortress conservation and climate stress creates a crisis because it constitutes a cultural rupture, a violent severance of physical access that simultaneously undermines the community's systems of meaning and its sovereign right to practice its way of life on its ancestral land (Dowie, 2009; Knox, 2024). Given these theoretical attributes, cultural ecology allows us to decipher the nature of the connections being severed through fortress conservation in the form of private game reserves.

While classic cultural ecology is useful, its limitation is that it does not place primacy on macro-level political and economic forces that shape society-environment connections. This theoretical isolation is untenable in the Eastern Cape, where human-environment interactions are fundamentally mediated by the legacies of colonialism, apartheid-era land dispossession, and global conservation ideologies. Therefore, to analyse how external power structures, such as private fortress conservation and the uneven distribution of climate stress, produce cultural rupture, we must advance to the more robust lens of Critical Political Ecology (CPE). CPE shifts the focus from purely ecological adaptation to the political processes of access, control, and dispossession that determine who benefits from, and who bears the costs of, environmental change and conservation policy.

2.2. Critical political ecology: Power, inequality, and the production of socio-ecological vulnerability

The roots of CPE can be traced to the broader tradition of political ecology (Robbins, 2020). Robbins points out that political ecology arose out of the inadequacies of theorisation of environmental change that did not factor in broader system and structural factors, what he termed "apolitical ecologies." The political ecology school of thought, in its earlier forms as typified by the seminal work of Blaikie and Brookfield (1987), challenged the notion that environmental degradation or resource scarcity could be understood solely through biophysical or cultural variables. Political ecology advanced the argument that one needed to place political-economic processes, historical trajectories, and power relations at the centre of environmental analysis (Ribot, 2014; Robbins, 2020). CPE refined this methodology of understanding environment-society relations by going further than simply analysing the political economy of environmental change to also interrogating the production of environmental knowledge itself. For instance, Forsyth (2003) argues that the core ecological "laws" frequently cited in environmental politics, such as ecosystem equilibrium, are not value-neutral facts but must be analysed as elements of environmental politics themselves. Furthermore, he demonstrates that the use of orthodox, large-scale scientific models like the General Circulation Model for climate change is problematic because they often oversimplify complex realities. Forsyth goes further by arguing that even the resultant policy positions predicated on these generalised explanations for issues like declining soil fertility have proven not only ineffective but have actively restricted the livelihoods of local populations. This critique demonstrates the necessity of the "Critical" component in CPE, which questions the neutrality of scientific knowledge and its deployment by power structures. Consequently, Forsyth calls for a fundamental shift toward locally determined environmental management and greater public participation in the

formulation of environmental science, not just access to it. By challenging the knowledge-power nexus, CPE studies can become vital tools for achieving social justice in environmental policy. As Forsyth (2003) argues, environmental science, conservation policy, and ecological classifications are never neutral; they are shaped by institutional agendas, political interests, and particular narratives about nature and society.

Given the foregoing, CPE provides the necessary theoretical tools to understand the dynamics of climate variability, fortress conservation, and cultural rupture in the Makana Local Municipality. Firstly, it provides a robust framework for analysing human–environment relations in contexts shaped by enduring socio-historical inequalities, making it indispensable for this analysis of the Eastern Cape. CPE enables such an intellectual undertaking since it merges the analysis of political economy (e.g., capital accumulation, global governance, inequality) with ecology (e.g., environmental change, degradation) to understand environmental problems not as natural occurrences or outcomes of simple scarcity, but as outcomes of deep-seated political and economic processes. Historicity is essential in contexts like the Eastern Cape, where entrenched patterns of land dispossession and racialised governance have produced enduring forms of vulnerability; here, the impacts of climate stress, such as drought, are not experienced uniformly but are instead profoundly amplified by pre-existing structural inequalities inherited from the apartheid regime. This intersection of environmental stress and historical dispossession is well documented in South African land studies, where restricted resource access remains a primary driver of rural precarity (Walker et al., 2010), including mass land dispossession, poverty, and restricted access to infrastructure (Effossou et al., 2025b; Koot et al., 2022; Ngcamu, 2022). Furthermore, CPE opens analytical space for alternative epistemologies and ontologies. CPE does this by tapping even into epistemologies and ontologies rooted in local cultural, spiritual, and relational ties to the land, which provide a vital source for epistemic critique of dominant narratives (Agrawal, 1995; Berkes, 2018). This critique is especially relevant where scientific framings, such as orthodox environmental "laws," are used to justify restrictive conservation practices like fortress conservation, framing local communities as threats rather than custodians of biodiversity. Under the CPE lens, such enclosure policies are seen not merely as technical biodiversity strategies, but as a political project where the erection of fences by game reserves represents the physical manifestation of political power and capital accumulation, prioritising tourism revenue over local sustenance (Brockington, 2002; Dowie, 2009). Finally, CPE emphasises the relational and contested nature of power in environmental governance; power is not viewed as a static possession but as something enacted through institutions, spatial arrangements, regulatory mechanisms, and discursive framings (Kenney-Lazar et al., 2023; Svarstad et al., 2018). In landscapes where game reserves, state agencies, and private actors exert control over resources, CPE helps reveal precisely how this authority is produced, maintained, and resisted.

Given the foregoing, situating environmental issues within these broader structures of inequality, historical dispossession, and contested knowledge, CPE offers the conceptual tools needed to analyse how conservation fences and climate stress reshape rural lives in the Makana Local Municipality of the Eastern Cape, ensuring that environmental change is understood not as an isolated biophysical shift, but as a political process that reconfigures access, identity, and social justice.

2.3. Synergistic perspective: Intersections producing cultural rupture

The foregoing discussion using the CPE lens averred that the vulnerabilities faced by Makana Local Municipality communities are fundamentally rooted in historical dispossession, uneven power relations, and the politicised nature of conservation knowledge. CPE provides the necessary framework to see climate stress and fortress conservation as political processes. However, to fully capture the article's central argument, that climate stress, fortress conservation, and cultural rupture cannot be understood in isolation, it is necessary to adopt a synergistic perspective. This is because their combined effects amplify socio-ecological fragility in ways that exceed their individual impacts, reflecting broader findings on interacting and compounding risks in climate vulnerability research (Eriksen et al., 2015; Eriksen et al., 2021). The Synergistic Perspective, as shown in Figure 1, is thus proposed to analytically bridge the political context (CPE) with the observed profound outcome (cultural rupture), thereby addressing the analytical gap in how these forces interact in a mutually reinforcing way.

Figure 1 illustrates how the interaction between climate stress and conservation enclosure produces cultural rupture, which manifests through the erosion of the community's material, spiritual, and symbolic ties to land that sustain identity and continuity. The figure also shows that cultural rupture itself becomes a mechanism that compounds vulnerability. When communities lose access to ritual sites, ancestral graves, or culturally important resources, their capacity to interpret environmental change through established ontologies weakens. This erosion of meaning-making frameworks exacerbates uncertainty, undermines collective agency, and compromises intergenerational knowledge transfer. Thus, cultural rupture is simultaneously an outcome of intersecting pressures and a force that further destabilises systems of adaptation. The Synergistic Perspective therefore recognises three foundational insights:

- The pressures are mutually reinforcing—climate stress intensifies the consequences of enclosure, and enclosure deepens the harms of climate stress.
- The outcomes exceed the sum of individual effects—the combined pressures do not simply add to one another but generate new forms of socio-ecological fragility that are qualitatively distinct.
- Cultural rupture is produced through interaction—not by climate change alone, nor by conservation policy alone, but through their convergence within historically marginalised landscapes.

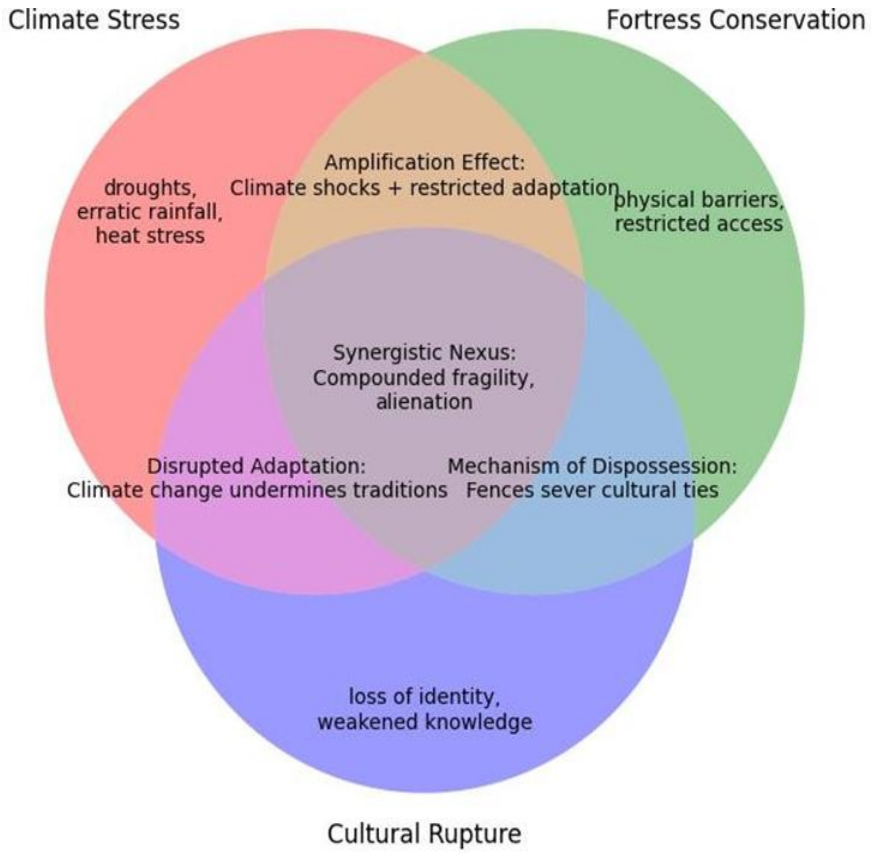


Figure 1. Synergistic framework: Climate stress, fortress conservation and cultural rupture. Source: Authors' creation

By adopting a synergistic lens, the study captures how intertwined socio-ecological processes produce new vulnerabilities and reshape rural life in the Makana Local Municipality in ways that neither Cultural Ecology nor CPE, in isolation, can adequately explain. This framework provides the analytical foundation for interpreting the

empirical findings presented later in the article, where the intersections of enclosure, climate variability, and cultural disruption emerge clearly in the lived experiences of rural communities.

3. Materials and methods

This section outlines the research methodology employed to investigate the synergistic pressures of climate stress and conservation fencing on cultural rupture in rural communities of the Makana Local Municipality, Eastern Cape, South Africa. The study utilised a qualitative, descriptive research design rooted in an interpretivist paradigm to gain in-depth insights into the lived experiences, perceptions, and complex negotiations of marginalised groups regarding socio-ecological change.

3.1. Profile of the study area

The study was strategically located in the Makana Local Municipality within the Sarah Baartman District Municipality of the Eastern Cape Province, South Africa. This region is uniquely suited for this synergistic analysis due to its distinct combination of factors, including the recurrent, severe climatic variability and drought that characterise the region (Botai et al., 2020; Tshona et al., 2025). The socio-economic context is typified by low incomes, high unemployment, and heavy reliance on state pensions and social grants (Eastern Cape Socioeconomic Consultative Council (ECSECC), 2024). Furthermore, the area is marked by a pervasive history of land dispossession and racialised governance that has resulted in enduring structural inequalities (Lahiff, 2003). The research was specifically conducted in the villages of Seven Fountains, Alicedale, and Kraabos, all situated near or sharing boundaries with major private conservation areas of Amakhala and Lalibela Game Reserves. Seven Fountains is an informal settlement located approximately 5 km from Lalibela Game Reserve and 3 km from the N2 highway. Alicedale is a semi-rural town situated about 35 km from the Lalibela Game Reserve and 30 km from the N2, whereas Kraabos is a small village located less than a kilometre from the precincts of Amakhala Game Reserve. In addition, both Kraabos and Seven Fountains lack proper service provision, with no roads, transport, water, or sanitation services, among other things. The communities live in shacks. However, Alicedale has a relatively better road network and decent houses, with intermittent water supplies from the local authority. The biophysical environment in these areas is largely characterised by grassland, Albany Thicket biome, and woodlands, where communities depend heavily on natural resources for precarious rural livelihoods.

Amakhala and Lalibela game reserves are privately owned and operate a form of fortress conservation through the physical enclosure of land and resources, specialising in ecotourism and biodiversity conservation, as they both host, among other things, the “Big Five” (Elephant, Lion, Leopard, Buffalo, and Rhinoceros). Each of the reserves spans over 60 km^2 of land area. In addition, they are constituted by former white-owned commercial farms that were converted into private game reserves to capitalise on the lucrative wildlife tourism sector.

3.2. Research design

A qualitative research design was adopted, primarily employing a descriptive approach to capture the complex, contextual, and non-quantifiable nature of cultural rupture and its drivers. This design was chosen to facilitate an in-depth exploration of local worldviews, alternative epistemologies, and the relational ties to the land that are often excluded by quantitative methods. The interpretivist philosophy allowed the researchers to understand how community members subjectively interpret and negotiate climate-driven livelihood changes within their culturally structured knowledge systems.

Participant recruitment utilised a multi-stage, non-probability sampling design. This involved stratifying the selection process across the three study sites (Alicedale, Seven Fountains, and Kraabos) and then employing purposive sampling to target individuals based on their specific roles or experiences (such as household heads or conservation managers). This was complemented by snowball sampling, where initial participants referred the

researchers to other suitable informants who possessed rich data on the phenomenon under investigation. Key informants included game reserve officials, who totalled three in number (2 from Amakhala and 1 from Lalibela), and 2 community leaders knowledgeable about ancestral sites and cultural practices related to the land.

Table 1. Demographic profile of study participants

Participant/category	Total (n = 63)	Alicedale	Seven Fountains	Kraabos	Additional notes
Household interviewees	58	35	15	8	Aged 21–79; included household heads, farmers, unemployed adults, and pensioners
Focus group participants	3 FGDs	1 FGD (8 participants)	1 FGD (10 participants)	1 FGD (8 participants)	Mixed-gender groups; included elders and youth
Key informants	5	2 reserve officials (Amakhala)	–	1 reserve official (Lalibela), 2 community leaders	Selected for institutional and cultural knowledge
Gender distribution	57% men, 43% women	Mixed	Mixed	Mixed	Women were especially vocal about water, food security, and cultural access issues
Age range	21–79	21–79	25–75	30–70	Elders contributed most cultural/ancestral knowledge
Primary livelihood sources	—	Social grants, casual labour, and small livestock	Social grants and informal work	Social grants, livestock, and resource harvesting	High unemployment across all sites

Fifty-eight individual interviews were conducted with community members aged between 21 and 79. Thirty-five were drawn from Alicedale, 15 from Seven Fountains, and 8 from Kraabos. In addition, a total of 3 focus group discussions that combined both men and women were held in the three study sites. Some participants took part in both household interviews and focus group discussions. To ensure transparency in participant accounting, each individual was counted only once in the total sample (n = 63), with repeated contributions treated as part of a single narrative profile during analysis. The final sample size was determined by the principle of theoretical saturation, ensuring that data collection ceased when no new conceptual categories or themes emerged regarding the synergistic pressures and cultural rupture (Saunders et al., 2018). In fact, Guest et al. (2006, p. 60) consider saturation to be "the gold standard by which purposive sample sizes are determined in [qualitative] health science research." Crucially for this study, the final number of participants recruited from each communal area was relative to the size of the village. This means that although the total sample size was fixed by theoretical saturation, the distribution of participants across the three sites was proportional to the local population size, ensuring that the breadth of experiences in the largest community was adequately represented and explored in depth. Table 1 provides a summary of the composition of participants across the three study sites. The table highlights the distribution of household interviewees, focus group participants, and key informants, along with relevant demographic attributes such as gender, age range, and livelihood sources.

Primary data was collected through two main qualitative techniques: semi-structured interviews, which were the core data-generation method used to explore complex and sensitive topics related to access and identity, and focus group discussions (FGDs), which were conducted to encourage group interaction, validate individual accounts, and capture the collective experience and contested nature of power. The semi-structured interviews' key domains of inquiry centred on four areas. First, they probed the personal lived experiences of climate stress. Second, they focused on access restriction and conflict, documenting detailed accounts of being denied access to vital natural resources and, crucially, to culturally significant sites, such as ancestral graves, due to the presence of conservation fences. Third, the interviews explored individual perceptions of conservation governance, examining personal experiences of structural inequalities, the perceived fairness of benefit-sharing mechanisms, and how these

contemporary issues relate to the historical context of land dispossession. Finally, they focused on cultural identity and the meaning of land, exploring the participants' relational ties to the land and their subjective sense of cultural rupture, that is, the feeling of being disconnected or alienated from a place central to their identity.

FGDs focused on broader, community-level domains. The group setting allowed for collective problem identification and resilience, where participants shared concerns and articulated communal strategies for coping with resource scarcity and climate change. Furthermore, the FGDs facilitated a public and often contested articulation of conflict and power dynamics with the game reserves, covering grievances such as fence placement and inequalities in community support. This combined methodology provided a robust triangulation of data, ensuring both the deeply personal and the collectively contested aspects of socio-ecological change were thoroughly explored.

The ethical integrity of the study was confirmed by the University of Fort Hare Inter-Faculty Human Research Ethics Committee (IFHREC), which granted full ethical clearance (Approval number: EFF001-25), ensuring the research rigorously adhered to all necessary ethical protocols concerning human participants. In addition, we obtained gatekeeper consent from the respective community structures. These were followed by obtaining informed consent from all participants. To ensure anonymity and confidentiality during reporting, we use pseudonyms for individuals. All interviews and discussions were audio-recorded with consent, transcribed verbatim, and translated into English for subsequent analysis.

The qualitative data was analysed using Thematic Content Analysis (TCA). This technique was employed to systematically identify, categorise, and interpret recurrent themes related to the synergistic pressures and cultural rupture. The data analysis adopted a rigorous, iterative approach facilitated by NVivo 12, a computer-assisted qualitative data analysis software. The process involved initial coding that was simultaneously deductive (based on concepts and power dynamics derived from the Critical Political Ecology framework) and inductive (based on participant responses and emergent concepts) (Braun and Clarke, 2021; Svarstad et al., 2018). This initial coding was systematically followed by grouping these micro-level codes into higher-level, overarching themes that reflected the synergistic arguments of the study.

First, open coding was conducted to identify discrete concepts emerging from the data. This stage incorporated both deductive codes derived from the analytical framework (e.g., access, power, ecological change) and inductive codes grounded in participant narratives, allowing for flexibility and responsiveness to the data (Braun and Clarke, 2021).

Second, axial coding was used to establish relationships between codes, linking ecological disruptions (such as drought and declining grazing) with institutional constraints (such as restricted access and conservation fencing), thereby enabling the identification of patterned connections across the dataset (Svarstad et al., 2018).

Finally, selective coding was undertaken to consolidate these relationships into overarching themes that reflect the study's central argument regarding the interaction of climate stress and fortress conservation in producing cultural rupture (Braun and Clarke, 2021).

The coding process was conducted by a single researcher. To ensure analytical consistency and transparency, detailed reflexive memos were maintained throughout, alongside a clear audit trail documenting coding decisions and theme development, in line with best practices for reflexive thematic analysis (Braun and Clarke, 2021).

To ensure consistency and traceability in reporting, participant quotations are identified using a standardised coding system. Household interview participants are labelled as HHI, key informants as KI, and focus group discussions as FGD, followed by a unique numerical identifier and site location (e.g., HHI-12, Alicedale). This system is applied consistently throughout the manuscript.

Despite the rigorous methodology, this study acknowledges inherent limitations associated with qualitative research in complex socio-ecological settings. Due to the purposive, non-probability sampling strategy, the findings are highly context-specific to the communities of Alicedale, Seven Fountains, and Kraabos and therefore may not be generalisable to the broader population of the Eastern Cape. The reliance on subjective lived experiences introduces the potential for researcher bias during thematic analysis. Furthermore, discussing sensitive issues such as access restriction and land claims in the presence of dominant conservation institutions may have influenced the candour of some participants, potentially leading to social desirability bias in responses. Finally, the study design, being

strictly qualitative and descriptive, does not permit the quantification of the precise magnitude or intensity of the synergistic effects, focusing instead on the mechanisms and nature of the cultural rupture.

However, several measures were implemented to mitigate these issues, including the use of a reflexive thematic analysis approach, with detailed analytical memos kept ensuring an audit trail and accounting for researcher positionality (Braun and Clarke, 2021). To foster candour on sensitive topics and reduce social desirability bias, significant emphasis was placed on establishing deep community rapport and trust, ensuring all interviews were conducted individually and in strictly confidential settings. The limitations on generalisability were addressed by providing thick descriptions of the context to enable readers to assess the transferability of the findings.

3.3. Operationalisation of the analytical framework

To ensure coherence between the study's theoretical foundations and its empirical procedures, the three analytical lenses of cultural ecology, Critical Political Ecology (CPE), and the synergistic perspective were explicitly operationalised across the stages of data collection, coding, and interpretation.

The cultural ecology lens informed the design of the data collection instruments, particularly the semi-structured interview guide. Questions were structured to elicit participants' understandings of human–environment relations, with specific attention to traditional ecological knowledge (TEK), seasonal indicators, livelihood practices, and the material and symbolic significance of land. This enabled the study to capture how climate variability disrupts both subsistence systems and the cultural meanings embedded in ecological interactions.

The CPE lens guided the interrogation of power relations, institutional arrangements, and patterns of access and exclusion. Interview and focus group prompts were designed to explore participants' experiences with conservation governance, including restrictions on land use, access to natural resources, perceptions of fairness, and the historical context of dispossession. During analysis, this lens informed the identification of codes related to authority, control, inequality, and the distribution of environmental costs and benefits.

The synergistic perspective was operationalised primarily at the interpretive stage of analysis. While initial coding combined deductive categories derived from cultural ecology and CPE with inductively generated codes emerging from the data, the synergistic lens guided the integration of these codes into higher-order themes. This involved examining how climate stress and conservation enclosure interacted within participant narratives to produce compounded and qualitatively distinct outcomes, particularly in relation to cultural rupture.

4. Results

This section presents the empirical findings derived from household interviews (HHIs), focus group discussions (FGDs), and key informants (KIs) conducted across the three study sites (Alicedale, Kraabos, and Seven Fountains). The data are structured around the central analytical premise that cultural rupture emerges from the synergistic interaction of climate stress and exclusionary conservation practices. The findings are organised into five major, interconnected themes. Section 4.1 establishes the foundational threat of climate stress and its impact on material fragility. Section 4.2 details the political and spatial constraints imposed by fortress conservation and the resultant structural exclusion. Section 4.3 synthesises these two layers to demonstrate the cultural rupture occurring at their intersection. Finally, Section 4.4 presents evidence of exclusionary economics and the institutional barriers that perpetuate this compounded vulnerability, leading to the overall synthesis in Section 4.5.

4.1. Climate stress as a driver of material fragility

This section establishes the first layer of vulnerability, showing how the ecological foundations of cultural practice and material livelihoods appear to be increasingly destabilised by exogenous climate stress.

Participants consistently reported significant changes in weather patterns, specifically identifying rising temperatures, prolonged droughts, and unpredictable rainfall cycles. Seasonal markers that once guided

agricultural and grazing decisions were described as no longer reliable. One participant confirmed this drastic change, stating, "Yes, it is changing a lot" (HHI-3, Alicedale), while some noted the difficulty in adapting: "It's hard. If there's too much rain, it ruins crops; if there's a drought, it's the same problem. Small farmers have no way to manage these extreme changes" (HHI-5, Seven Fountains). Another participant in Seven Fountains added that "climate change has made things harder. We experience droughts more often, and even when we have rain, it's unpredictable. This has made it difficult for people to plan and grow anything" (HHI-2, Seven Fountains). Such shifts suggest a decline in the reliability of ecological cues, with implications for local traditional knowledge.

Across all sites, participants described a consistent pattern of ecological instability characterised by declining water availability, unpredictable rainfall, and deteriorating grazing conditions. These pressures were not experienced in isolation but interacted to undermine agricultural production and livestock maintenance, thereby intensifying livelihood insecurity. As one participant explained, "we all need water … but it's not enough" (HHI-31, Alicedale), capturing the broader perception of systemic resource scarcity.

The instability of the climate appears to be affecting confidence in Traditional Ecological Knowledge (TEK). This perceived disruption of traditional predictive capacity is associated with uncertainty and cultural destabilisation that extends beyond material constraints. Participants repeatedly noted the stark divergence between present conditions and ancestral teachings: "It's different from the past, it's not the same" (HHI-6, Alicedale). "We used to watch the flowering of the *umthombothi* (*Spirostachys Africana*) and other trees to know when to start planting. Now they flower at the wrong time, or sometimes not at all, so we can't trust those signs anymore" (HHI-11, Seven Fountains). The predictability that TEK once afforded for subsistence activities appears to have diminished, as reflected in participant accounts such as one who noted that the unpredictable rain "has made it difficult for people to plan and grow anything. In the past, [it was different]" (HHI-7, Seven Fountains). "Even the birds don't follow the seasons like before. When the Ilunga legwaba [Jacobin Cuckoo bird] called in certain ways, we knew rain was near, but now it cries and nothing happens. The old ways of reading the sky are confusing us" (FGD-1, Alicedale). Taken together, these accounts suggest that the community's historical knowledge base, which previously supported anticipation and adaptation to environmental rhythms, is being undermined, contributing to perceptions that "the world no longer behaves as taught by elders" (HHI-3, Kraabos). This reduced ability to predict and plan reliably using ancestral knowledge can be understood as a significant disruption to what has historically functioned as a key adaptive mechanism within the community.

4.2. Fortress conservation as spatial and institutional restriction

Following the analysis of climate stress, the second set of findings examines how the physical and regulatory boundaries of the private conservation areas may contribute a second, structural layer of vulnerability. The goals and methodologies of the private game reserves provide important contextual background, as summarised in the boxed insert below.

The preceding summary in Box 1 details the ecological and financial rationale underpinning the private conservation model, focusing on habitat, species protection, and the funding necessary for high-end tourism. However, community experiences suggest that the implementation of these conservation efforts may be shaped by a spatial order that appears to restrict the historical rights and freedoms of access of neighbouring communities.

Fortress conservation materialises as a rigid spatial regime defined by physical barriers such as electric fences, patrols, and surveillance cameras. However, this enclosure is not merely physical; it is reinforced by a system of bureaucratic surveillance that makes former ancestral rights contingent on reserve goodwill. Participants describe a reality in which movement is heavily monitored and requires pre-clearance. As one resident from Alicedale explains: "I was free to visit my family there... But now I can't. My uncle has to report first and get pre-clearance and then there would be a detective accompanying you..." (HHI-1, Alicedale). This administrative oversight functions as a tool of structural exclusion, effectively criminalising traditional social patterns and movement.

The physical enclosure of these lands is directly associated with restricted access to essential livelihood resources, including firewood, medicinal plants, grazing areas, and water sources. These restrictions are described as absolute, with participants noting, "we can't go into the conservation area to gather things we might need, like

firewood or medicinal plants" (HHI-5, Seven Fountains). This lack of access is exacerbated by exclusion from consultation during the initial land-conversion process. One participant from Seven Fountains recalled: "As far as I know, we were not consulted directly [about conversion of farms to reserves] ... I don't think we had much say in the process" (HHI-3, Seven Fountains). In a stark illustration of this disparity, while local communities face chronic food insecurity and are barred from grazing lands, participants observed that private game reserves used beef or game meat to feed the reserve's lions and cheetahs.

Box 1. The multifaceted conservation model and funding rationale

The conservation efforts undertaken by the reserve official are described as multifaceted. Their work begins with preserving specific regional habitats, specifically the Albany thickets, which are a type of vegetation found exclusively in the Eastern Cape. They note that several of these unique thickets exist within the boundaries of their reserve. Beyond this specific vegetation, the reserve also focuses on conserving the broader landscape itself, which spans five different biomes. By preserving these biomes, each having its own unique ecological function, the reserve aims to ensure the integrity of the entire ecosystem within the Eastern Cape. A crucial element of their active conservation strategy involves the eradication of invasive plant species such as black wattle, blue gum, pine, and hakea. These alien species were introduced to the landscape centuries ago. Black wattle, for example, was used in the tanning of animal hides. Since these alien species have now overtaken the landscape, the reserve is actively removing them to restore a habitat that can support indigenous wildlife. In terms of wildlife conservation, the official states they focus on protecting several high-profile animal species, including some that are endangered or vulnerable. Their objective here is two-fold: not only to protect the individual species but also to preserve their genetic diversity. To further enhance this goal, the reserve is actively working to expand selectively by purchasing land to increase their ecological footprint. This expansion strategy allows them to create larger, contiguous areas where wildlife can thrive, which, in turn, helps enhance genetic diversity within the animal populations. Finally, tourism plays an integral role in sustaining their overall conservation model. By safeguarding the landscape and wildlife, they establish a sustainable tourism model that draws national and international visitors. The revenue generated from tourism is essential, as it helps to fund their conservation efforts. Source: KI-1

Beyond material needs, these restrictions deeply affect cultural practices and customs. The process of obtaining permission to visit ancestral sites is often described as difficult and demeaning. A resident in Alicedale noted the friction caused by these policies: "We also want to get herbs or sometimes you have your relative who is buried there, and you want to see them... it becomes a process, it raises a lot of talk… it really disturbs our customs" (HHI-27, Alicedale).

Furthermore, access remains "heavily restricted" even for spiritual purposes, requiring "special permissions to visit graveyards or perform cultural rituals within the conservation zones" (HHI-2, Seven Fountains). Consequently, proximity to these reserves often brings more challenges than benefits, such as instances in which there is "no reliable water supply for nearby farmers" despite their being adjacent to the reserve (HHI-17, Alicedale).

Even where reserves occasionally permit access, the requirement for permission appears to transform what were once understood as rights into forms of access that can be interpreted as reinforcing the community's structural precarity.

Adding to the restriction is the negative externality of Human-Wildlife Conflict (HWC), which is often described as arising from enclosure practices. High-profile wildlife, particularly kudu, bushbuck, and elephants, are reported sometimes to cross or breach boundary lines, resulting in crop destruction, property damage, and direct danger to residents and livestock. Responsibility for managing this conflict is widely perceived to fall largely on the community, as detailed in Table 2.

Table 2. Burden of human-wildlife conflict (HWC)

Risk to safety and property	"It's risky, especially with kids around; you always have to stay alert..." (HHI-19, Alicedale)
Presence of dangerous wildlife	"We do see animals like elephants around from time to time, and that can be worrying." (HHI-13, Alicedale)
Institutional failure to manage conflict	"Sometimes the reserve staff come by and say they'll handle issues if animals come too close, but we're often left on our own." (HHI-3, Alicedale)

4.3. Cultural rupture at the intersection of climate stress and fortress conservation

The ultimate consequence of the convergence of climate stress and exclusionary conservation is reflected in what participants describe as cultural rupture. This section examines how material and spiritual dimensions of vulnerability intersect in participant accounts. One of the most significant forms of rupture is associated with restricted access to ancestral graves and sacred sites located inside conservation areas. This physical exclusion is described by participants as a form of spiritual violation, as it is understood to disrupt the intergenerational bond between the living and the ancestors. Participants from Kraabos described the psychological trauma of this denial, stating, "When the gates are closed to the graves, our traditional life cannot be maintained. This place has become a 'death-world' for us, where even the dead are guarded by the private owner" (FGD-3, Kraabos). Access, where permitted, is heavily restricted, requiring special permissions to visit graveyards or perform cultural rituals (HHI-2, Seven Fountains). This need for permission from reserve staff to perform essential rites is experienced as emotional distress, with residents stating that the bureaucratic process "really disturbs our customs" (HHI-27, Alicedale). Furthermore, the lack of continuous access is associated with increased vulnerability of these sites to environmental damage. Participants reported that graves previously maintained by families have been destroyed or rendered unidentifiable, noting that "elephants have destroyed them" because the community is blocked from tending to them (HHI-6, Kraabos). Taken together, these accounts can be understood as pointing to a perceived loss of control over ancestral lands, which participants frame as a deeply distressing experience.

Essential rituals such as communing with ancestors, gathering herbs, and performing rites of passage are described as being significantly disrupted. Climate stress appears to reduce the availability of ritual materials, while fences limit access to sacred lands. For the community, this represents more than just a loss of resources; participants describe this experience as "losing our way of life" (HHI-21, Alicedale) and "being cut from who we are" (HHI-1, Kraabos).

4.4. Exclusionary economics and institutional barriers

This section details the economic implications of the conservation model and the institutional dynamics that shape patterns of inequality by highlighting divergent views on responsibility.

The findings suggest that the economic model of the private reserves may be experienced as exclusionary, with benefits perceived to be concentrated among a select few employees while access remains restricted to the majority. The "support" provided by the reserves was frequently described by participants as limited in scope and impact. This was illustrated by one resident who remarked that "they come with small food parcels and take pictures like they are helping us, but nothing changes for the community" (HHI-33, Alicedale), rather than providing structural support or shared resource benefits. Such accounts suggest that these interventions may be perceived as symbolic or procedural, rather than as forms of sustained or structural support, contributing to a sense that engagement does not translate into meaningful community benefit.

Conservation management expressed a divergent view regarding institutional responsibility for community well-being and climate education, which points to a potential gap in how responsibilities are allocated and understood. The official noted that communities are typically in "survival mode," grappling with basic necessities like electricity, water, and education. This focus makes complex climate change discussions challenging: "Measuring the impact of climate change on the community is more challenging because they don't have tools or frameworks in place to assess these changes" (KI-1). The institution is highly attuned to ecological decline within its boundaries; another official noted that:

> *With rivers drying up, we're losing waterbirds, and even if some species that might thrive in exotic waters remain, the native wildlife is clearly in decline... these are observations rather than scientific data, but it's concerning… (KI-2).*

However, this internal ecological awareness does not appear to extend consistently to questions of external responsibility, as the official articulated the institutional dilemma concerning their role: "Ultimately, the question is whether it's our responsibility as a game reserve to raise climate change awareness or if this should be driven by government or educational institutions" (KI-1). Taken together, these perspectives can be interpreted as pointing to what may be understood as an institutional blind spot, particularly in relation to how the reserve's governance practices may shape or contribute to the vulnerabilities experienced by neighbouring communities.

4.5. Synthesis: The synergistic production of cultural rupture

Drawing together the empirical evidence presented in Sections 4.1 through 4.4, the findings suggest that climate stress and fortress conservation may operate as mutually reinforcing pressures. Their interaction appears to produce a qualitatively different form of vulnerability, one that is simultaneously ecological, material, and ontological. The combined pressures are associated with the destabilisation of ecological knowledge, restricted access to adaptive resources, the disruption of ancestral relationships with the land, and challenges to cultural identity. These patterns point to interconnected processes through which environmental and institutional dynamics shape lived experiences of vulnerability. The findings provide evidence supporting the argument that cultural rupture may emerge not from climate change alone, nor from conservation alone, but through their interaction within a landscape historically shaped by dispossession.

5. Discussion

The empirical findings presented in Section 4 provide evidence for the paper's central argument: that the cultural rupture experienced by proximate communities in the Makana Local Municipality of the Eastern Cape is a synergistic product of climate stress and the political ecology of fortress conservation. This section interprets these findings through relevant theoretical lenses and existing literature, demonstrating how the compounded nature of these pressures creates a unique and devastating form of vulnerability that transcends mere material loss.

5.1. The nexus of compounded vulnerability and synergistic rupture

The core contribution of this study lies in its demonstration that neither climate change nor conservation exclusion operates in isolation. Our synergistic analytical framework is affirmed by the data: while climate stress initiates material fragility through drought and unpredictable weather, the conservation model immediately restricts traditional avenues for adaptation. The loss of Traditional Ecological Knowledge (TEK) is not simply a cognitive phenomenon; it is materially enforced by the conservation fence, which denies access to the very resources (grazing, water, medicinal herbs) that TEK would direct the community toward.

This nexus creates a state of compounded vulnerability (Adger, 2006; Ngumbela et al., 2020) where the structural barriers of exclusion amplify the exogenous shock of climate change. By privatising and militarising the most ecologically viable land, the reserve effectively forces the community to absorb the full cost of climate change on their small, degraded communal properties, guaranteeing the failure of traditional coping mechanisms and leading directly to cultural rupture.

5.2. Necropolitics, hierarchy of lives, and spiritual violence

While the preceding analysis has shown how conservation governance and climate stress interact to shape material precarity, these dynamics also raise broader questions about how certain populations are differentially exposed to risk, abandonment, and constrained life opportunities. The empirical evidence suggests that for proximate communities, these experiences extend beyond material deprivation into cultural, ontological, and spiritual domains.

A central feature emerging from the data is what can be understood as a hierarchy of lives. Participants describe a landscape in which the well-being of charismatic megafauna appears to be prioritised over the livelihoods and food security of neighbouring rural communities. This is reflected in accounts that game meat is allocated to wildlife or that cattle are purchased to feed predators, while local households face increasing food insecurity linked to climate variability. These observations resonate with broader findings on conservation related exclusion in South Africa, where fortress conservation models continue to marginalise agrarian livelihoods in favour of elite conservation interests (Ngumbela et al., 2020; Hertzog et al., 2022).

These patterns can be cautiously interpreted through the lens of Achille Mbembe's (2003) notion of necropolitical power, which draws attention to how authority operates through the uneven exposure of populations to conditions of vulnerability, abandonment, and constrained life making. In this case, conservation practices and climate stress appear to interact in ways that shape whose livelihoods are more protected and whose are rendered more precarious, without necessarily constituting direct forms of coercion or elimination.

The relevance of this interpretive lens is illustrated by two empirical observations. First, restrictions placed on access to ancestral graves, including requirements for prior clearance and supervised visits, point to a shift in authority over cultural and spiritual practices. In this context, the reserve extends its control beyond land and wildlife management into the domain of community relationships with ancestors. This reflects patterns identified in the literature on conventional conservation, where governance practices can adopt securitised and restrictive forms that reconfigure local claims to land and heritage (Layden et al., 2025).

Second, participants reported that ancestral graves are subject to damage by wildlife, particularly elephants, while families are restricted from conducting maintenance or protective rituals. This produces a form of slow and cumulative harm in which sacred sites are transformed into sources of distress and dislocation. In this hierarchy, the ecological mobility of wildlife is prioritised over the ability of communities to sustain cultural and spiritual practices linked to place. Such dynamics reinforce forms of marginalisation and precarious belonging that have been documented in conservation contexts across South Africa (Hertzog et al., 2022).

However, this interpretation is offered with caution. The findings do not demonstrate necropolitics in a strict or totalising sense. Rather, they point to dynamics that resonate with aspects of necropolitical power, particularly in how exclusionary conservation practices and climate stress combine to constrain the material, cultural, and spiritual conditions of life for affected communities. In this sense, the concept is used as an analytical lens to illuminate patterns of marginalisation and differentiated vulnerability, rather than as a definitive characterisation of the governance system.

These dynamics also intersect with questions of ontological security, understood as the sense of continuity and stability derived from connections to place, identity, and ancestry (Schlosberg and Collins, 2014). The restriction of access to ancestral sites, combined with the erosion of cultural practices, undermines this sense of stability and continuity. As such, the most profound consequence of the hierarchy of lives identified in this study lies not only in material deprivation, but also in the disruption of cultural reproduction and the weakening of community relationships to land and heritage in the Makana Local Municipality of the Eastern Cape.

5.3. Institutional blind spots and the failure of climate justice

The findings also reveal a critical institutional blind spot that constitutes a failure of procedural and recognitional climate justice (Schlosberg and Collins, 2014). The official's perspective, which observes community members as being in "survival mode" and questions whether climate change awareness is the reserve's responsibility, serves to externalise the problem of vulnerability. The reserve is highly attuned to its own ecological decline (KI-2), yet it fails to connect the community's lack of adaptive capacity to the structural violence of its own exclusionary practices (Robbins, 2020).

This perspective is an act of responsibility shifting (Maniates, 2001). By framing the issue as one of the community's "lack of tools or frameworks" or a failure of government or educational institutions, the reserve ignores its direct contribution to the problem: the denial of land, water, and resources necessary for local adaptation. A genuinely just model of conservation would acknowledge this historical and ongoing exclusion and accept responsibility for sharing resources and knowledge to build community resilience against climate change (Schlosberg and Collins, 2014; Queiros, 2023). Instead, the current model reinforces historical marginalisation by reducing community support to "tokenistic" handouts rather than engaging in meaningful co-management or restorative justice.

5.4. Global parallels: Fortress conservation and synergistic vulnerability beyond South Africa

The synergistic dynamics identified in the Makana Local Municipality communities closely mirror patterns observed across other global conservation frontiers. In East Africa, for instance, research from Kenya's Maasai Mara and Tanzania's Ngorongoro Conservation Area highlights how fortress-style conservation restricts mobility at precisely the moment when climate change intensifies pastoral dependence on flexible grazing systems. During prolonged droughts, pastoralists require wide grazing corridors and seasonal mobility for livestock survival, yet conservation enclosures and tourism-heavy protected areas have increasingly closed these routes (Homewood et al., 2019; Greiner et al., 2021). The result parallels the Eastern Cape where climate variability intensifies need for adaptive landscapes, while conservation governance simultaneously restricts access, producing compounded vulnerability.

A similar dynamic is documented in India, where the creation of inviolate Protected Areas for charismatic carnivores like the Asiatic Lion and the African Cheetah has adversely affected the Sahariya Adivasi and other forest-dependent communities. This approach, described as the "slow violence of fortress conservation," systematically restricts their access to vital forest-based livelihood resources and land. This prolonged exclusion and reduction of livelihoods often creates conditions of vulnerability and economic distress that then shape their response to and facilitate socially unjust 'voluntary' relocation from areas around national parks and tiger reserves (Mahalwal and Kabra, 2023). While biodiversity protection is the stated rationale, the lived outcome is the curtailment of access to sacred forests, cultural sites, and subsistence resources. Thus, parallels can be drawn to the cultural rupture experienced by communities neighbouring Amakhala and Lalibela. Here too, climate change exacerbates the precarity of those already displaced or marginalised by conservation interventions.

In Namibia, the effectiveness of the Community-Based Natural Resource Management (CBNRM) approach is fundamentally challenged by the legacy of apartheid, which established a structural and ongoing inequality in access to land. This historical context has left communal land residents highly vulnerable. Recent studies reveal that during periods of climate-induced droughts, the ability of pastoralists to implement essential coping strategies such as livestock mobility and the reserving of emergency pastures is severely constrained. These persistent, non-climate barriers, which include an overall lack of available grazing lands and the failure to rest rangelands due to fencing and poor grazing management, ultimately undermine the adaptive capacity of communal area residents (Ntombela, et al., 2024). These global examples demonstrate that the synergistic pressures documented in this study are not unique to South Africa but reflect a broader pattern in which fortress conservation and resource distribution injustices deepen climate vulnerability, both materially and ontologically.

By connecting the Makana Local Municipality in the Eastern Cape case to global parallels, the study reinforces the argument that conservation-enforced exclusion not only mirrors historical dispossession but also interacts with accelerating climate hazards to produce new and intensified forms of socio-ecological fragility.

5.5. Synergistic vulnerability and implications for global climate adaptation debates

The findings also contribute to broader debates about the political nature of climate adaptation. Contemporary adaptation scholarship emphasises that resilience depends on mobility, diversified access to resources, and the maintenance of cultural-ecological knowledge systems (Marty et al., 2023; Johnson et al., 2021). However, the communities in the three study sites face a dual restriction, that is, climate stress undermines traditional ecological knowledge, while fortress conservation prevents access to the landscapes and resources necessary for adaptive response.

This reveals a critical insight: adaptation failure is rarely caused by climate hazards alone but rather emerges from the interaction between environmental stressors and institutional constraints (Ribot, 2014; Eriksen et al., 2021). The synergistic relationship uncovered in this study aligns with international evidence showing that enclosure, land privatisation, and militarised conservation significantly limit communities' ability to adapt to climate change.

Moreover, a synergistic perspective challenges dominant technocratic approaches to adaptation which often prioritise infrastructure, financial instruments, or individual behavioural change. It does this by demonstrating that adaptation will remain structurally constrained where landscapes are securitised, access is criminalised, and cultural relationships to land are severed. Cultural rupture, as shown in this study, is not a peripheral impact but a central mechanism inhibiting adaptation itself, because it undermines the ontological security and relational systems through which communities interpret environmental change and mobilise collective responses.

By situating the Makana Local Municipality of the Eastern Cape within these global debates, the study underscores that effective climate adaptation must move beyond technical fixes and engage with questions of justice, land access, historic dispossession, and culturally grounded ecological stewardship. Without addressing these underlying structural factors, adaptation efforts risk reinforcing the very vulnerabilities they purport to solve.

5.6. Implications and future research

The findings of this study have significant theoretical and practical implications.

5.6.1. Theoretical implications

This research argues for the necessity of a synergistic analytical framework in climate vulnerability studies. While existing political ecology literature (Robbins, 2020) provides the basis for critiquing fortress conservation, our data demonstrates that in the contemporary context of accelerating climate change, these two forces interact to produce cultural rupture as the endpoint of compounded vulnerability. Future research should apply this synergistic model to other high-vulnerability landscapes globally, particularly those characterised by conservation-induced displacement or exclusion.

5.6.2. Policy and practical implications

The current fortress conservation model, driven by exclusionary economic models, is ecologically and socially unsustainable. Policy must shift towards models of restorative climate justice that prioritise social-ecological resilience over pure exclusion. This implies moving beyond tokenistic benefits to implementing:

- **Shared Resource Access:** Negotiated and formalised access to water, grazing, and cultural sites within the reserves, acknowledging the community's historical rights.
- **Co-management Structures:** Empowering local communities to participate in decision-making processes, especially concerning Human-Wildlife Conflict (HWC) mitigation and climate adaptation strategies.

- **Climate-Resilient Land Reform:** Prioritising the allocation of viable communal land to address the pressure caused by climate stress on the marginalised areas adjacent to the reserves.

6. Conclusion

This study set out to investigate the synergistic relationship between climate stress and fortress conservation practices and their combined impact on the cultural fabric of proximate communities in the Makana Local Municipality of the Eastern Cape. Drawing upon rich empirical data, the article suggests that this relationship is associated with patterns of cultural rupture as experienced by participants. The findings reveal a layered set of challenges. First, climate variability is described as contributing to pressures on the material and ecological foundations of livelihood, with implications for Traditional Ecological Knowledge (TEK). Second, fortress conservation practices are experienced as creating forms of spatial and institutional exclusion that may limit established pathways for adaptation and recovery. Third, the interaction of these dynamics is described by participants as contributing to forms of spiritual and ontological disruption, particularly in relation to restricted access to ancestral graves and sacred sites.

The study further suggests that differences in how institutional actors and communities understand vulnerability may shape responses to climate stress. In particular, the framing of community conditions as "survival mode" may overlook the ways in which conservation governance practices intersect with and potentially intensify local vulnerabilities. Rather than proposing a generalisable model, this research offers a context-specific account of how climate stress and conservation practices interact within a historically shaped landscape. While the findings are grounded in the Makana case, they may offer insights into similar dynamics in other settings characterised by overlapping environmental and institutional pressures.

Addressing these challenges may require greater attention to the relationships between conservation governance, local livelihoods, and cultural practices. This includes considering approaches that move beyond exclusive models of control towards more inclusive and context-sensitive forms of ecological stewardship.

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