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LIVED EXPERIENCES OF CLIMATE CHANGE IMPACTS AND ADAPTATION STRATEGIES AMONG TOURISM-DEPENDENT RURAL COMMUNITIES IN CHIAWA, LOWER ZAMBEZI

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ABSTRACT

Context: Climate change escalating challenges within tourism-dependent rural peripheries in sub-Saharan Africa demands a critical examination of coupled socio-ecological systems. **Methods:** The study utilized a qualitative design based on 30 in-depth interviews and field observations to deconstruct the lived experiences of climate change among rural communities and tourism operators in Zambia's Chiawa Chiefdom, Lower Zambezi. **Results:** The empirical findings demonstrate that hydro-climatic variability, erratic rainfall, protracted droughts, thermal anomalies, and fluctuating river dynamics disrupt tourism architectures, attenuate wildlife visibility, and threaten local survival. While corporate operators leverage financial liquidity to mitigate operational risks, rural communities face structurally compounded vulnerabilities.

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For these local actors, diminished agricultural and fishing yields, exacerbated by climate-induced human-wildlife conflicts over contracting resource patches, directly undermine baseline livelihood security. This bifurcated adaptive capacity exposes a profound systemic disconnect between top-down national policies and localized, place-based realities, ultimately jeopardizing both conservation and human security.

Conclusion: To cultivate a climate-resilient and inclusive tourism economy, stakeholders must operationalize polycentric governance frameworks. National climate policies should be decentralized through participatory planning mechanisms that integrate traditional authorities and residents into adaptation design. Structural vulnerability should be reduced by investing in climate-smart agriculture and sustainable aquaculture to decouple local economies from climate-sensitive baselines. Proactive mitigation tools, including strategic solar fencing and transparent compensation mechanisms, should be institutionalized to address human-wildlife conflict. Finally, formalized community-operator partnerships, such as local procurement supply chains and community-managed eco-tourism, should rechannel private capital into local social safety nets, complemented by operator-led green eco-innovations and unified regional socio-ecological data sharing.

INTRODUCTION

Globally, tourism provides important livelihood opportunities for rural communities through employment, income generation, and infrastructure development. However, these benefits are often constrained by environmental change, economic fluctuations, and weak local institutions. Chen et al. (2019) found that tourism diversification in rural China improved household incomes but exposed communities to external economic shocks. Their study emphasized that both individual and collective agency are important for resilience building, although weak collective action limits long-term adaptation. Similarly, Styliadis et al. (2014) observed that residents tend to support tourism when they perceive clear economic, social, and environmental benefits. However, these findings largely reflect contexts with stronger institutions and infrastructure than those found in many developing countries.

The literature further shows contradictions in tourism development. While tourism can stimulate local economies, it may also increase inequality and weaken social cohesion. Kinyondo and Pelizzo (2020) reported that tourism expansion in East Africa

generated employment and improved infrastructure, but also widened socio-economic disparities. This indicates that tourism does not automatically lead to inclusive development and may produce uneven outcomes across communities.

In Sub-Saharan Africa, tourism's benefits and challenges are intensified by climate change and institutional constraints. Azwindini (2024) found that environmental degradation in South Africa threatens rural livelihoods and tourism sustainability. Likewise, Mwongoso et al. (2023) showed that tourism can enhance quality of life in Northern Tanzania through improved financial, social, and physical capital. However, conservation restrictions often limit access to natural resources, undermining livelihood strategies. Snyder and Sulle (2011) similarly observed that local communities are frequently excluded from high-value tourism markets despite living in tourism-rich areas. These studies suggest that weak governance and unequal benefit-sharing significantly reduce tourism's developmental impact.

The Zambian context reflects similar challenges. Chiwele (2023) found that limited education, weak institutional capacity, and lack of resource ownership restrict local participation in tourism, leaving most benefits to external investors. Although community-based tourism initiatives have improved outcomes in some areas, Kaitisha and Namangala (2025) report that unequal benefit distribution and weak stakeholder participation continue to undermine effectiveness. Manda and Mukanda (2023) also show that REDD+ initiatives can restrict access to natural resources, reducing community agency and livelihood options.

Despite these constraints, communities continue to rely on indigenous knowledge for climate adaptation. Milupi et al. (2024) found that seasonal migration, crop diversification, and traditional weather forecasting remain key strategies among the Lozi people of the Barotse Floodplain. However, these practices are rarely integrated into formal climate policies, creating a gap between national frameworks and local realities.

Zambia has introduced several climate policies, including the National Adaptation Programme of Action (2007), National Climate Change Response Strategy (2010),

National Policy on Climate Change (2016), and National Adaptation Plan (2023). While these frameworks aim to enhance resilience, climate-related challenges continue to affect tourism and rural livelihoods in areas such as Chiawa Chiefdom.

Overall, the literature shows that tourism can improve livelihoods, but its benefits are limited by climate change, weak governance, unequal benefit-sharing, and low community participation. Although research exists on tourism and climate change, there is limited evidence on how government climate policies influence tourism-dependent communities in Zambia. This study addresses this gap by examining government interventions in mitigating climate impacts on tourism and rural livelihoods in Chiawa Chiefdom, Lower Zambezi.

Statement of the problem

Ideally, tourism destinations such as Chiawa Chiefdom should have strong adaptive capacities supported by local knowledge and community-led strategies that sustain livelihoods, promote human–wildlife coexistence, and enhance tourism resilience (UNWTO, 2022; IPCC, 2014). However, climate change has intensified temperatures, droughts, rainfall variability, and fluctuations in river levels across Zambia (MLNR, 2020; IPCC, 2022). In Chiawa, these changes have disrupted tourism activities, reduced agricultural and fishing productivity, and increased human–wildlife conflict, thereby undermining local livelihoods.

The central problem lies in the disconnect between national climate policies and local realities. As a result, many adaptation interventions are poorly targeted and fail to adequately reflect community needs, which undermines progress toward SDG 1 (No Poverty), SDG 13 (Climate Action), and SDG 15 (Life on Land). Understanding local experiences is therefore critical for designing more inclusive and effective adaptation strategies.

This study addresses three key research gaps. First, existing studies often examine climate impacts and livelihood challenges separately, overlooking how communities experience multiple and overlapping climate stresses. Second, most research focuses

either on local communities or tourism operators, with limited attention to their interlinked experiences within the same system. Third, current climate adaptation frameworks have rarely been assessed in rural African contexts characterized by customary land tenure systems, protected area restrictions, and limited local governance capacity. These gaps highlight the need for context-specific evidence to inform more integrated and responsive climate adaptation planning in Chiawa Chiefdom.

Significance of the study

Chiawa Chiefdom provides a valuable case study due to its exposure to multiple and interconnected climate-related challenges. Situated at the interface of the Zambezi River, the Lower Zambezi National Park, and expanding human settlements, the area experiences simultaneous climatic, ecological, and economic pressures. Communities face droughts, fluctuating river levels, increased human–wildlife conflict, and declining tourism opportunities, all of which threaten local livelihoods.

This study examines how climate change affects both local communities and tourism operators within the same socio-ecological system. It contributes to knowledge by applying climate vulnerability and livelihood frameworks in a rural African context characterized by customary land tenure systems, protected areas, and limited local governance capacity.

The study is grounded in Climate Vulnerability Theory, which conceptualizes vulnerability as a function of exposure, sensitivity, and adaptive capacity (Adger, 2006; IPCC, 2014). Exposure refers to climate hazards, sensitivity reflects dependence on climate-sensitive resources, and adaptive capacity captures the ability to respond and adjust. This framework is useful for understanding how climate risks translate into livelihood disruptions and adaptation needs in Chiawa Chiefdom.

Objectives of the study

The general objective of this study was to explore the lived experiences and perceptions of tourism-dependent rural communities and local tourism operators in Chiawa Chiefdom. Specific objectives included

- (i) To explore how local actors experience and perceive daily hydro-climatic shocks and water scarcity
- (ii) To deconstruct the lived experiences of residents regarding tourism job volatility and changing community benefits
- (iii) To understand how climate-induced human-wildlife conflict impacts the daily survival of tourism-adjacent communities
- (iv) To capture narratives of social stress alongside the role of indigenous knowledge and kinship networks in coping with climate shocks
- (v) To interpret localized preferences regarding decentralized governance and grass-roots eco-innovations for future climate resilience.

Theoretical frameworks

This study is guided by Climate Vulnerability Theory, Sustainable Livelihoods Theory, and Resilience Theory. These theories provide a comprehensive framework for understanding how climate change affects wildlife, tourism, and rural livelihoods in Chiawa Chiefdom. Climate Vulnerability Theory explains susceptibility to climate risks, Sustainable Livelihoods Theory examines impacts on livelihood assets, and Resilience Theory focuses on adaptation and recovery.

Climate Vulnerability Theory

Climate Vulnerability Theory emerged from the work of Burton (1993), Blaikie et al. (2006), and Adger (1999; 2006), and was later refined through IPCC assessment reports. The theory argues that vulnerability is determined by exposure, sensitivity, and adaptive capacity.

In Chiawa Chiefdom, exposure is reflected in droughts, rising temperatures, erratic rainfall, and fluctuating Zambezi River water levels. Sensitivity arises from the dependence of local communities and tourism operators on climate-sensitive resources, while adaptive capacity is influenced by access to resources, knowledge, and institutional support. The theory is relevant because it explains how and why climate change affects communities and tourism systems differently.

Sustainable Livelihoods Theory

Sustainable Livelihoods Theory was developed by Chambers and Conway (1992) and later operationalized by DFID (1999). The theory proposes that livelihoods depend on five forms of capital: natural, human, social, financial, and physical.

Climate change threatens these livelihood assets by affecting wildlife resources, water availability, tourism revenues, and employment opportunities. The theory is useful in understanding how climate-related changes influence household welfare, livelihood sustainability, and tourism-dependent communities in Chiawa Chiefdom.

Resilience Theory

Resilience Theory was pioneered by Holling (1973) and later expanded by Berkes (1998) and Folke (2006). The theory emphasizes the ability of communities and ecosystems to absorb shocks, adapt to change, and recover from disturbances.

In Chiawa Chiefdom, resilience is demonstrated through indigenous knowledge, livelihood diversification, social support networks, and community-based natural resource management practices. The theory helps explain how communities and tourism stakeholders respond to climate-related challenges and build long-term sustainability.

MATERIALS AND METHODS

Research design

This study adopted an empirical phenomenological research design. This qualitative approach focuses on exploring and understanding people's real, lived experiences and

how they make sense of them (Creswell, 2014; Moustakas, 1994). This design was chosen because it allowed for a close look at how rural communities and local tourism businesses in Chiawa Chiefdom experience and handle climate change in their daily lives and work.

Instead of looking only at big-picture statistics, this approach helped us capture the real-world stories, challenges, and adaptation choices of local people and tourism businesses. We gathered our data using two main methods: face-to-face interviews (N=30) and direct field observations. The study was able to double-check our findings or triangulate, ensuring that the interviews matched what could actually be seen on the ground.

Table 1: Population Group

Target Group	Number of Participants
Safari Lodge Owners/General Managers/Managers	5
Conservation Lower Zambezi (CLZ)	1
Community Resource Boards (CRBs)	2
Department of National Parks & Wildlife (DNPW)	2
Tour Guides (affiliated)	2
Biocarbon Partners (BCP)/Forestry	1
Zambia Wildlife Trust (ZWT)	1
Chiyaba Royal Establishment	1
Chisakila (Zone stakeholders)	3
Kambale Zone (Zone stakeholders)	3
Chitende Zone (Zone stakeholders)	3
Chiyaba Zone (Zone stakeholders)	3
Mugulameno Zone (Zone stakeholders)	3
Total	30

Source: Own generated (2025)

Study area

The research was conducted in **Chiawa Chiefdom, Lower Zambezi, Zambia**, a region highly dependent on tourism and exposed to climate variability, including rising temperatures, fluctuating river levels, and extreme weather events. The study area was located in Chiawa Chiefdom (Kafue District, Zambia), approximately 160 km from Lusaka, encompassing the Chiawa Game Management Area and the Lower Zambezi

National Park (Figure 1). Situated on the low-lying Lower Zambezi Valley floor at an altitude of 380 m (15.89S, 29.04E), the chiefdom is characterized by a tropical savanna climate. The region receives low annual rainfall (400–700 mm) and experiences extreme seasonal temperatures, ranging from 11°C in winter to 43°C in October.



Figure 1: Map of Zambia showing is a map of Chiawa in Kafue district of Lower Zambezi.

Target population

The target population comprised local tourism workers, conservation personnel, government officers, and village residents from Chisakila, Kambale, Chitende, Chiyaba, and Mugulameno in Chiawa Chiefdom. These participants were selected due to their direct involvement in tourism, natural resource management, and local livelihood activities.

To ensure relevant and informed responses, participants were required to have livelihoods or responsibilities linked to tourism or natural resources and to have lived or worked in the Lower Zambezi Valley for at least ten consecutive years. This criterion ensured that respondents had sufficient experience to provide insights into long-term climate change impacts on tourism, conservation, and rural livelihoods.

Sampling procedure and sample size

This study adopted a non-probability purposive sampling strategy to choose our participants. This means we chose people on purpose because of their specific roles and experiences, helping us get a balanced mix of views from business owners, government officers, and village residents. The total sample size was set at 30 participants (Table 1). While general qualitative rules suggest that 20 to 30 people are enough for this kind of study (Creswell, 2014), the study actively checked for data saturation during our fieldwork using a method by Guest et al (2006). Data saturation was assessed throughout the interview process. The first 18 interviews generated the main themes, including water shortages, livelihood challenges, and human-wildlife conflict. Interviews 19 to 25 added depth to existing themes but produced few new insights. By interviews 26 to 30, responses had become repetitive and no new themes emerged, indicating that data saturation had been reached and further interviews were unlikely to yield additional information.

Data collection instruments and procedure

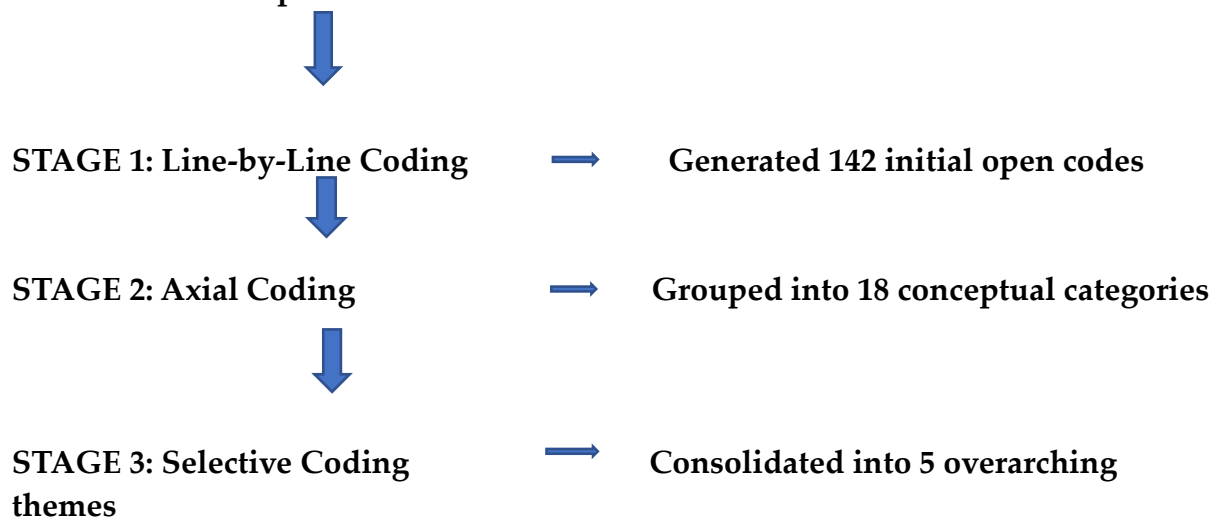
Data were collected using semi-structured interviews and field observations. Semi-structured interviews served as the primary data collection method and were guided by themes on climate variability, tourism livelihoods, human-wildlife conflict, coping strategies, and local adaptation measures. Interviews lasted approximately 30–45 minutes and were conducted in English, Soli, or Nyanja, depending on participant preference. With consent, interviews were audio-recorded, transcribed verbatim, and anonymized using participant codes.

To complement interview data, field observations were conducted using a structured observation guide. Observations focused on environmental conditions, water sources, evidence of human-wildlife conflict, and community livelihood activities. Field notes were recorded in a daily journal and used to validate and enrich findings from the interviews.

Data analysis

The study analyzed interview notes and field journals using a step-by-step approach called Qualitative Content Analysis, following the thematic analysis framework established by Braun and Clarke (2006). The study used a specialized NVivo software.

Verbatim Transcripts & Field Notes



The analysis followed three main steps:

Data analysis followed a three-stage thematic coding process in NVivo. Open coding generated 142 initial codes from line-by-line transcript analysis using participants' own words. Axial coding then grouped these into 18 categories based on similarity of meaning, such as "Hydro-climatic Water Scarcity" and "Labour Volatility." Finally, selective coding integrated these categories into five key themes aligned to the study objectives, covering climate exposure, livelihood impacts, human-wildlife conflict, coping strategies, and governance responses.

Reliability and Validity

To ensure credibility and trustworthiness, three validation methods were used. First, an inter-coder reliability check was conducted on 20% of transcripts, comparing an independent coder's results with the primary researcher's NVivo coding, yielding a Cohen's Kappa of 0.84, indicating strong agreement.

Second, triangulation was used by comparing interview data with field notes and official records, with themes included only when supported by multiple sources. Finally, member checking was done with selected village leaders and a lodge manager, who confirmed that the findings accurately reflected their experiences.

2.8 Ethical Considerations

This study followed international and local ethical standards for research involving human participants (Gummesson, 2000; Leedy & Ormrod, 2005). Ethical approval was granted by the University of Zambia Research Ethics Committee (REF NO. HSSREC-2025-JUN-003), with additional permits from the Department of National Parks and Wildlife (REF- NPW 72/2/5).

Informed consent was obtained from all participants after explaining the study in their preferred language, with consent given through signatures or thumbprints. Participation was voluntary, and respondents could withdraw at any time without penalty. Anonymity was ensured by removing personal identifiers and using coded IDs. All data were securely stored in encrypted, password-protected systems, with physical records kept under lock and retained for five years before deletion.

RESULTS

Demographic Data and Cross-Tabulation Analysis

The demographic profile of the 30 participants provides a mature, multi-layered foundation for this study (Table 1). The sample was predominantly composed of an economically active population, with 36.7% ($n = 11$) aged 30–39 years, 30.0% ($n = 9$) aged 40–49 years, and 23.3% ($n = 7$) aged 50 years and above. Collectively, more than 90% of the participants are aged 30 years or older, providing the extensive historical knowledge required to assess long-term environmental degradation and changing rainfall patterns. In contrast, the younger age group of 20–29 years constitutes 10.0% ($n = 3$) of the sample, offering valuable insights into contemporary tourism employment dynamics and job volatility.

Regarding gender distribution, 60.0% (n = 18) of the participants are male, while 40.0% (n = 12) are female, capturing gender-related variations in climate vulnerability and adaptation strategies. In terms of nationality, 90.0% (n = 27) of the respondents are Zambian, while 10.0% (n = 3) are non-Zambian, thereby incorporating both indigenous community perspectives and the views of corporate safari lodge operators.

Educationally, the sample reflects a diverse range of qualifications: 40.0% (n = 12) completed secondary education, 26.7% (n = 8) hold diplomas or certificates, 16.7% (n = 5) attained primary education, and 16.7% (n = 5) possess university degrees or higher qualifications. Professionally, the majority of respondents (63.3%, n = 19) are Community Resource Board members and local residents representing various Village Action Groups within Chiawa. Private tourism stakeholders account for 16.7% (n = 5), institutional stakeholders constitute 16.7% (n = 5), and government representatives make up 3.3% (n = 1). Crucially, 80.0% (n = 24) of the participants have lived or operated in Chiawa for more than six years, ensuring their perspectives are grounded in extensive firsthand observation of environmental shifts.

Table 1: Baseline Demographic Profiles of the Study Sample (N=30)

Demographic Characteristic	Category Cohort	Frequency (n)	Percentage (%)
Age Distribution	20–29 Years	3	10.0
	30–39 Years	11	36.7
	40–49 Years	9	30.0
	50 Years and Above	7	23.3
Gender Dimension	Male	18	60.0
	Female	12	40.0
Nationality Profile	Zambian National	27	90.0
	Non-Zambian	3	10.0
	National		
Educational Attainment	Primary Education	5	16.6
	Only		
	Secondary Education	12	40.0

Professional Typology	Vocational Diploma / Certificate	8	26.7
	University Degree or Higher	5	16.6
	Private Tourism Sector (GMs / Guides)	5	16.6
	Government Administrative Bodies	1	3.3
	Institutional	5	16.6
	Conservation NGOs		
	CRB Executives / Village Action Zone Residents	19	63.3
Tenure of Residency	1–5 Years	6	20.0
	6 Years and Above	24	80.0

Source: Field Data (2025)

Table 2 presents a multi-dimensional cross-tabulation matrix. This matrix reveals how specific climate vulnerabilities and structural adaptation perspectives intersect across key demographic variables (Age and Gender) and professional positions within the NVivo environment.

Table 2: Advanced Multi-Dimensional Demographic Cross-Tabulation Matrix

Core Emergent Theme (Parent Node)	Male (n=18)	Female (n=12)	Youth (20–39) (n=14)	Elder (≥40) (n=16)	Tourism Operators (n=5)	Local Residents (n=19)	Conservation/Gov (n=6)
Theme 1: Hydro-Climatic Shocks	n=16	n=12	n=11	n=17	n=5	n=19	n=4
(Farming / Fishing / Water Stress)							

Theme 2: Economic							
Downscaling	n=14	n=9	n=13	n=10	n=5	n=15	n=3
(Labor Cuts / Benefit Losses)							
Theme 3: Human-Wildlife Conflict							
	n=17	n=10	n=12	n=15	n=4	n=19	n=4
(Crop Raiding / Habitat Loss)							
Theme 4: Socio-Psychological Stress							
	n=11	n=12	n=9	n=14	n=2	n=18	n=3
(Anxiety / Kinship Safety Nets)							
Theme 5: Localized Adaptation							
	n=13	n=11	n=12	n=12	n=4	n=16	n=4
(Green Jobs / Local Governance)							

Source: Field Data (2025)

3.2 Thematic Analysis of Study Results

The qualitative coding pipeline generated five major themes and ten distinct child nodes from the verbatim transcripts and field journals. Table 3 breaks down the precise structural architecture of the codebook, outlining the exact coding frequencies (\$f\$), the number of unique participants associated with each theme (\$n\$), and the corresponding NVivo coding keywords.

Table 3: Qualitative Codebook Architecture and Hierarchical Document Matrix

Parent Node (Core Theme)	Child Node (Sub-theme)	Participant Count (n=30)	Total Coding Frequency (f)	Primary NVivo Keywords & Reference Triggers
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Theme 1: Hydro-Climatic Shocks & Livelihood Disruptions	1.1 Agrarian & Fishery Failure	n=28	f=114	Rains changed, crops dry, heat, fishing fails, shallow wells dry, long distances, walking.
	1.2 Water Scarcity & Hydro-stress	n=26	f=98	
Theme 2: Economic Downscaling & Benefit Asymmetry	2.1 Labor Market Insecurity	n=23	f=86	Layoffs, shifts cut, unstable, school fees, tourist booking decline, support collapse, no money.
	2.2 Institutional Benefit Decay	n=19	f=64	
Theme 3: Climate- Induced Human- Wildlife Conflict	3.1 Habitat Desiccation & Encroachment	n=27	f=132	Water finished in bush, river banks, elephants, crop-raiding, fence broken, fear at night, safety.
	3.2 Agrarian Depredation & Insecurity	n=25	f=105	
Theme 4: Socio- Psychological Vulnerability & Capital	4.1 Chronic Social Stress	n=23	f=74	Life stressful, uncertainty, depression, support each other, food sharing, chiefs guide, traditions.
	4.2 Kinship Networks & Indigenous Knowledge	n=26	f=91	
Theme 5: Localized Adaptation and Strategic Action	5.1 Decentralized Resource Governance	n=24	f=79	Community involved, local voice, revenue share, water harvesting, conservation forestry, trees.
	5.2 Eco- Innovation & Diversification	n=22	f=71	

Source: Field Data (2025)

Theme 1: Hydro-Climatic Shocks and Livelihood Disruptions (n=28, f=212)

NVivo analysis shows widespread ecological instability across Chiawa Chiefdom. The sub-theme “Agrarian & Fishery Failure” (n=28, f=114) reflects disrupted seasonal patterns leading to repeated crop failures and reduced fish availability. “Water Scarcity & Hydro-stress” (n=26, f=98) highlights severe groundwater depletion, forcing long-distance water collection, particularly affecting women and youth and increasing exposure to risk.

Field observations confirmed this pattern, with most communal wells in Mugulameno and Chisakila found dry and households walking long distances to unsafe river collection points. Participants described complete livelihood breakdown during drought periods, where farming, fishing, and income sources collapse simultaneously.

Theme 2: Economic Downscaling and Benefit Asymmetry (n=23, f=150)

Findings show that environmental degradation directly reduces tourism activity and local employment. “Labour Market Insecurity” (n=23, f=86) reflects unstable tourism jobs, while “Institutional Benefit Decay” (n=19, f=64) captures the collapse of community benefit systems such as conservation funds.

Field observations confirmed reduced tourism activity and workforce downsizing in lodges during low-water seasons. Participants reported reduced shifts, income instability, and loss of community revenue used for education and household support.

Theme 3: Climate-Induced Human–Wildlife Conflict (n=27, f=237)

Human–wildlife conflict emerged as the most dominant theme. “Habitat Desiccation & Encroachment” (n=27, f=132) shows that wildlife moves into settlements due to drying water sources in the park, while “Agrarian Depredation & Insecurity” (n=25, f=105) reflects crop destruction and household vulnerability.

Field observations recorded extensive crop damage, broken fencing, and damaged water infrastructure caused by wildlife movement. Participants described severe food insecurity and safety threats linked to recurring elephant invasions.

Theme 4: Socio-Psychological Vulnerability and Social Capital (n=26, f=165)

This theme highlights rising social stress alongside coping mechanisms. “Chronic Social Stress” (n=23, f=74) reflects anxiety over livelihood insecurity, while “Kinship Networks & Indigenous Knowledge” (n=26, f=91) shows reliance on traditional knowledge and family support systems.

Field data confirmed strong informal support systems, including food sharing and reliance on traditional leadership during crises. However, participants also noted that prolonged drought conditions are weakening these coping mechanisms.

Theme 5: Localized Adaptation and Strategic Responses (n=24, f=150)

The final theme captures community-driven adaptation strategies. “Decentralized Resource Governance” (n=24, f=79) shows strong demand for local control of resources and tourism benefits, while “Eco-Innovation & Diversification” (n=22, f=71) reflects emerging practices such as rainwater harvesting and conservation forestry.

Field observations identified small-scale adaptation initiatives, including rooftop water harvesting and community woodlots. Participants emphasized the need for participatory governance and youth-focused green employment through community-based tourism.

DISCUSSION

This study sought to understand how climate change is experienced by tourism-dependent communities and tourism operators in Chiawa Chiefdom. The findings suggest that climate change is no longer perceived as a distant environmental concern but as a daily reality affecting livelihoods, tourism operations, social wellbeing, and community resilience. Participants consistently linked changing weather conditions to declining agricultural productivity, reduced tourism opportunities, increased human-wildlife conflict, and growing household insecurity. These experiences reveal that climate vulnerability in Chiawa extends beyond environmental exposure and increasingly reflects broader socio-economic and institutional challenges.

Hydro-Climatic Shocks and Water Scarcity

The findings demonstrate that changing rainfall patterns, prolonged droughts, and declining river levels have significantly altered livelihood systems within Chiawa Chiefdom. Participants frequently compared current climatic conditions with those experienced in previous decades, describing a noticeable decline in seasonal predictability. Such observations support the argument by Adger (2006) that vulnerability is shaped not only by exposure to climatic hazards but also by the capacity of individuals and communities to anticipate and respond to environmental change.

A notable finding is that climate-related water scarcity rarely occurs in isolation. Instead, reduced rainfall simultaneously affects crop production, fishing activities, livestock management, and household water access. This suggests that climate impacts operate as interconnected livelihood stressors rather than discrete environmental events. Similar observations have been reported elsewhere in Sub-Saharan Africa where climate shocks often trigger cascading effects across multiple livelihood sectors.

The study further highlights the unequal distribution of climate burdens within households. Women and young people were frequently identified as bearing the greatest responsibility for securing water during drought periods. This finding suggests that climate vulnerability is also shaped by social roles and responsibilities, reinforcing evidence that environmental change often exacerbates existing inequalities within rural communities.

Tourism Employment and Community Benefits

Although tourism remains a critical source of income in Chiawa Chiefdom, the findings indicate that its contribution to local livelihoods is becoming increasingly unstable. Participants reported that extreme temperatures, changing river conditions, and reduced wildlife visibility have affected tourism activity and employment opportunities. Lodge operators similarly noted growing uncertainty in visitor patterns, particularly during periods of environmental stress.

These findings support previous research which identifies nature-based tourism as highly sensitive to climate variability (Scott et al., 2012). However, the Chiawa case demonstrates that the consequences extend beyond tourism enterprises themselves. Reduced tourism activity affects household income, community development projects, and benefit-sharing arrangements that many residents depend upon. In this regard, climate change appears to weaken not only individual livelihoods but also local institutions that rely on tourism-generated revenues.

An important insight emerging from this study is that tourism-dependent communities may face a double vulnerability. On one hand, they are exposed to direct climate impacts such as drought and water scarcity. On the other hand, they experience indirect impacts through declining tourism performance. This dual exposure increases the overall vulnerability of households that depend heavily on tourism-related employment.

Climate-Induced Human-Wildlife Conflict

Human-wildlife conflict emerged as one of the most pressing concerns among study participants. Residents consistently associated increasing wildlife incursions with prolonged drought conditions and declining water availability within protected areas. Elephants were frequently identified as the primary source of crop damage and threats to household safety.

While previous studies have linked environmental stress to changing wildlife behaviour (Milupi et al., 2024), the findings from Chiawa suggest that climate change acts as a catalyst that intensifies existing tensions between conservation objectives and local livelihood needs. Participants often described wildlife conflict not simply as an environmental issue but as a threat to food security, household income, and personal safety.

The findings also raise broader questions regarding environmental justice in conservation landscapes. Communities living adjacent to protected areas appear to bear a disproportionate share of the costs associated with wildlife conservation,

particularly during periods of climatic stress. This suggests that future adaptation strategies should incorporate both conservation goals and livelihood protection measures if they are to achieve long-term sustainability.

Social Stress, Indigenous Knowledge and Resilience

Beyond material losses, participants described significant emotional and psychological stress associated with climate uncertainty. Concerns regarding food availability, declining incomes, and future livelihood prospects were common across interviews. These experiences support emerging evidence that climate change has important psychosocial dimensions, particularly in resource-dependent rural communities (Cunsolo & Ellis, 2018).

Despite these challenges, the findings reveal considerable adaptive capacity within local communities. Indigenous knowledge, social networks, and traditional leadership structures continue to play an important role in supporting household survival during periods of environmental stress. Traditional weather forecasting, communal food sharing, and reliance on local ecological knowledge were repeatedly identified as important coping mechanisms.

However, the findings also suggest that these informal systems are increasingly under pressure. Participants noted that repeated droughts and declining livelihood opportunities are reducing the ability of households to support one another. Consequently, while indigenous knowledge and social capital remain valuable adaptation resources, their effectiveness may diminish if climatic conditions continue to worsen.

Community Perspectives on Adaptation and Governance

Participants strongly emphasized the need for greater community involvement in climate adaptation planning. Many respondents expressed frustration with externally designed interventions that fail to consider local realities and priorities. Instead, they advocated for decentralized approaches that recognize community knowledge and strengthen local decision-making structures.

Interestingly, adaptation preferences differed across age groups. Younger participants tended to prioritize employment creation, entrepreneurship, and tourism-related skills development, whereas older participants focused more on natural resource governance and community control over local development initiatives. These findings challenge the common assumption that rural communities hold uniform views regarding adaptation priorities.

The findings therefore support calls for community-based adaptation approaches that integrate local knowledge with formal policy interventions. Such approaches are likely to enhance both the legitimacy and effectiveness of adaptation programmes in tourism-dependent regions.

Implications for Theory and Policy

The findings reinforce the relevance of Climate Vulnerability Theory, Sustainable Livelihoods Theory, and Resilience Theory in explaining the complex interactions between climate change, tourism, and rural livelihoods. However, the study also demonstrates that vulnerability within tourism-dependent communities cannot be understood solely through environmental indicators. Economic dependence on tourism, governance arrangements, social relationships, and access to local resources are equally important determinants of resilience.

From a policy perspective, the findings suggest that climate adaptation in Chiawa should move beyond sector-specific interventions. Strengthening resilience will require integrated strategies that address water security, livelihood diversification, tourism sustainability, human-wildlife conflict management, and community participation simultaneously. Such an approach would contribute to sustainable development while enhancing the adaptive capacity of both tourism operators and local communities.

CONCLUSION AND RECOMMENDATIONS

The findings indicate that climate change is increasingly affecting livelihoods, tourism activities, and community wellbeing through prolonged droughts, erratic rainfall, rising temperatures, and declining water availability. These changes have disrupted farming, fishing, and tourism-related employment, thereby increasing household vulnerability and economic insecurity. The study further reveals that climate change is reducing the benefits derived from tourism by affecting visitor flows, employment opportunities, and community revenue streams. As a result, local communities experience a dual vulnerability arising from both direct climatic impacts and indirect losses associated with tourism decline. Climate-induced human–wildlife conflict has also intensified, leading to crop destruction, safety concerns, and additional livelihood losses.

Despite these challenges, communities continue to rely on indigenous knowledge, traditional leadership, and social support networks as important coping mechanisms. However, the effectiveness of these strategies is increasingly strained by recurrent climate shocks. Participants emphasized the need for greater community involvement in adaptation planning, stronger local governance, and livelihood diversification through community-based tourism initiatives.

The findings reinforce Climate Vulnerability, Sustainable Livelihoods, and Resilience theories by demonstrating that vulnerability is shaped not only by environmental exposure but also by economic dependence, institutional capacity, and social relations. Consequently, climate adaptation efforts should move beyond sector-specific interventions and adopt integrated approaches that address water security, livelihood diversification, tourism sustainability, and human–wildlife conflict simultaneously.

The study recommends strengthening participatory adaptation planning, investing in climate-resilient infrastructure such as all-weather road network from Muluwe Village upto Amanzi Camp in the Lower Zambezi National Park, promoting community-based tourism such as cultural tourism in central places such as Mugulameno and Kabwadu , and integrating indigenous knowledge into climate policies. Further

research should assess the long-term effectiveness of community-led adaptation strategies in tourism-dependent communities across Zambia.

Declaration of interest

The author declares that he has no known financial interests or personal relationships that could have inappropriately influenced, or may be perceived to influence, the work reported in this study.

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