Enhancing Disaster Risk Reduction Strategies for Sustainable Tourism Development in Cape Coast, Ghana

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Article

Enhancing Disaster Risk Reduction Strategies for Sustainable Tourism Development in Cape Coast, Ghana

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Abstract

Cape Coast is a prominent tourism destination in Ghana, distinguished by its historical landmarks, coastal ecosystems, and cultural heritage. Yet the city faces mounting threats from environmental hazards such as coastal erosion, flooding, extreme heat, and lagoon degradation, which directly compromise the sustainability of its tourism sector. Guided by the Sustainable Tourism Development Theory (STDT) and the Tourism Resilience and Adaptation Theory (TRAT), this study investigates the impacts of these hazards on tourism development, the effectiveness of current disaster risk reduction (DRR) strategies, and the roles of key stakeholders in building sectoral resilience. Using a qualitative research design, data were collected through in-depth interviews with eighteen stakeholders comprising four policymakers, six community leaders, five tourism business operators, and three representatives from non-governmental organisations, alongside documentary analysis of four institutional reports. The study contributes to the literature by demonstrating that fragmented, reactive DRR strategies and weak stakeholder coordination undermine Cape Coast's tourism resilience, and by showing how urban natural assets, a dimension largely neglected in existing tourism-DRR scholarship, are central to both hazard exposure and adaptive capacity. The findings call for integrated, ecosystem-based DRR frameworks that align governance mechanisms with sustainable tourism imperatives.

Keywords: sustainable tourism; resilience; disaster risk reduction; coastal erosion; flooding; climate change; urban natural assets; Cape Coast

1. Introduction

Tourism in coastal areas represents a key and environmentally sensitive component of the global tourism system [1]. It is a climate-sensitive sector that depends fundamentally on the stability and integrity of the natural environment [2,3]. Environmental degradation and climate-induced hazards increasingly threaten destination sustainability [4]. In coastal cities across the Global South, the intersection of rapid urbanisation, climate change, and weak institutional capacity is generating compounding environmental threats that undermine the very assets on which tourism depends. Scholarship on sustainable and nature-based tourism emphasises that environmental awareness, conservation financing, and stakeholder engagement are critical mechanisms for mitigating such risks and strengthening destination resilience [5,6].

Globally, coastal areas house approximately 2.4 billion people within 100 kilometres of the shore and generate an annual net value of roughly US$6 trillion through trade and industry [7]. Yet these zones are under profound stress. Reports indicate that nearly 20 percent of worldwide mangroves have been destroyed since 1980, and over 60 percent of coral reefs are now endangered [8]. In Africa,

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where urbanisation proceeds at 3.4 percent annually, the fastest rate in the world. The consequences for coastal ecosystems are severe [9,10]. Scholars have attributed the destruction of coastal wetlands and lagoons to unchecked urban expansion, reducing the natural regulatory and provisioning services that protect communities and tourism assets alike [11,12]. Cape Coast exemplifies these dynamics. Its population grew from 82,291 in 2000 to over 189,925 by 2021, placing intense pressure on natural systems [13].

Cape Coast, Ghana's foremost coastal tourism destination, suffers from the destruction of coastal wetlands and lagoons to unchecked urban expansion, reducing the natural regulatory and provisioning services that protect communities and tourism assets. Despite its World Heritage status, scenic coastline, and significant role in Ghana's tourism economy, the city is increasingly exposed to environmental hazards that its disaster risk reduction (DRR) systems are ill-equipped to address [14,15]. A vulnerability assessment conducted by the Cape Coast Metropolitan Assembly in partnership with ICLEI Africa [16] revealed that poor land management and inadequate regulatory enforcement have led to encroachment on wetlands, pollution of the Fosu Lagoon and Iture wetlands, and the degradation of beachfronts through sand winning and unregulated coastal development. These pressures have diminished the capacity of natural assets to buffer the city against flooding, erosion, and storm damage, with direct consequences for tourism infrastructure, visitor experience, and the conservation of heritage sites such as the Cape Coast and Elmina Castles. [17] and [18] indicate that the pollution and degradation of lagoons adversely affect biodiversity and ecotourism prospects. While prior studies have acknowledged these challenges, there remains limited integration of sustainability and resilience perspectives in examining how ecosystem degradation translates into tourism vulnerability.

The study thus seeks to examine the interconnections between coastal ecosystem degradation, governance failures, disaster risk vulnerability, and tourism sustainability in Cape Coast. Specifically, it delves into how coastal erosion, extreme heat, flooding, and lagoon degradation impact tourism development in Cape Coast; the adaptive measures that can address these environmental hazards; and understanding the role of stakeholders, including government agencies, tourism operators, NGOs and local communities, in building resilience in the tourism sector to achieve SDG 1 (no poverty), SDG 2 (no hunger), SDG 8 (decent work and economic growth), SDG 11 (sustainable cities and communities) and SDG 13 (climate action).

Drawing on qualitative data and four key institutional reports, the study asks the questions: How do coastal erosion, flooding, extreme heat, and lagoon degradation affect tourism development in Cape Coast? What roles do stakeholders play in building resilience within the tourism sector? And how effective are the DRR strategies currently in place? In doing so, the study makes an original contribution by integrating the role of urban natural assets (UNA) into the tourism-DRR nexus. This is a dimension systematically overlooked in the existing literature, and by applying both STDT and TRAT to a West African coastal context where these theories have rarely been tested empirically.

The paper is structured as follows: introduction, theoretical review and conceptual discussion of the key issues, methodology, presentation of findings, discussion in relation to the theoretical framework and existing literature, a conclusion with prioritised recommendations and theoretical and practical implications.

2. Literature Review

2.1. Theoretical Framework

This study is grounded in two complementary theoretical frameworks. The first, Sustainable Tourism Development Theory (STDT), conceptualises tourism development as a process that must balance economic benefits with environmental conservation, cultural preservation, and community well-being [19,20]. STDT emphasises that tourism viability depends on the integrity of the natural and cultural assets on which destinations are built. It further stresses the need for strong institutional frameworks, inclusive governance, and long-term policy commitment to sustain those assets. In the

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context of Cape Coast, STDT provides a lens for evaluating whether current tourism governance and DRR strategies are consistent with the conditions required for long-term sustainability.

The second framework, the Tourism Resilience and Adaptation Theory (TRAT), focuses on how tourism systems respond to and recover from environmental, economic, and social shocks. [21] define resilience as a destination's ability to withstand, adapt to, and recover from disturbances while maintaining its core functions. [22] similarly emphasises the capacity to anticipate and respond to disruptions. TRAT is particularly relevant in Cape Coast, where coastal erosion, flooding, extreme heat, and lagoon degradation are recurrent and intensifying. It highlights practical adaptation strategies, including coastal defence systems, lagoon restoration, and early warning systems. Stakeholder collaboration and institutional capacity needed to implement adaptation strategies are equally important.

Together, STDT and TRAT enable a comprehensive analysis of how Cape Coast's tourism sector can achieve both sustainable development and climate adaptation. They foreground the relationship between ecological integrity, governance quality, and adaptive capacity, and support the study's argument that DRR strategies must align with sustainability principles to safeguard the destination's long-term viability.

2.2. Conceptual Issues

2.2.1. Climate Change, Urbanization, and Sustainable Tourism Development

Sustainable tourism development aims at balancing the economic gains of tourism with environmental conservation, thereby ensuring the long-term viability and appeal of tourist destinations [19]. However, environmental challenges, defined as natural and anthropogenic changes to the environment that disrupt the ecological balance and long-term sustainability of ecosystems, undermine the objectives of sustainable development [23]. Climate change and rapid urbanization are two of the most pressing global challenges impacting tourism destinations, particularly in coastal cities. These interconnected phenomena contribute to the degradation of critical natural assets, heighten environmental vulnerability, and undermine the sustainability of tourism-dependent economies [4]. It is instructive to note that climate change poses both direct and indirect threats to tourism infrastructure, tourist experiences, and the viability of destinations. Coastal cities are especially vulnerable to coastal erosion, extreme heat, flooding, and lagoon degradation, which impede sustainable tourism development.

2.2.2. Coastal Erosion

Coastal erosion is a critical environmental issue affecting many shorelines worldwide. [24] define coastal erosion as the gradual loss of coastal land due to natural forces (such as wave action, rising sea levels) and human activities (like sand mining and deforestation). As regards natural forces, climate change has led to an increase in global temperatures, resulting in the melting of polar ice caps and glaciers. This has contributed to a rise in sea levels, intensifying wave action, and causing shorelines to retreat [25]. Higher sea levels also increase the frequency and intensity of storm surges, which accelerate coastal erosion. In relation to human activities, [26] indicates that sand mining is one of the major human-induced causes of coastal erosion. In many coastal regions, such as Cape Coast, sand is extracted for construction purposes, reducing the natural barriers that protect shorelines [27]. The removal of sand from beaches and riverbeds disrupts sediment replenishment, leading to rapid coastal degradation. Be it natural or human-induced, coastal erosion as a phenomenon poses significant threats to historical sites, beachfront resorts, and local fisheries, thereby affecting economic livelihoods and cultural heritage. It is important to note that mangrove forests play a crucial role in stabilizing coastlines by absorbing wave energy. However, widespread deforestation for urban expansion, aquaculture, and agriculture weakens coastal resilience, making shorelines more vulnerable to erosion and flooding [28], which impacts sustainable tourism development.

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2.2.3. Flooding

Flooding has emerged as a frequent and destructive phenomenon, particularly in urban and coastal areas of developing countries. It results from a combination of natural factors, such as intense rainfall and storm surges, and human-induced issues like inadequate drainage systems and poor urban planning. One of the main drivers of flooding is heavy rainfall, often intensified by climate change. According to [29], the frequency and intensity of extreme rainfall events have increased globally due to rising atmospheric temperatures, which enhance moisture content in the air. This trend has been particularly evident in coastal West African countries, where rainfall patterns have become more erratic and intense. Poor drainage infrastructure also exacerbates flooding, especially in urban areas. Many cities in sub-Saharan Africa suffer from aging or underdeveloped drainage systems that cannot handle high volumes of stormwater [30]. In rapidly urbanizing regions such as Accra, Ghana, construction often takes place without adequate provision for stormwater runoff, leading to waterlogging and flash floods during heavy rains [31]. Blocked drains caused by indiscriminate waste disposal further aggravate the problem [31].

Flooding causes extensive damage to roads and transportation networks, disrupting movement and economic activities, as well as impacting tourism assets and cultural heritage. In Ghana, for instance, floods in Accra in May 2023 led to the temporary closure of major roads, with damage to culverts and bridges estimated in millions of Ghana cedis [32]. These disruptions affect businesses and emergency response operations. The tourism sector is also vulnerable. Hotels and resorts, especially those near the coast or located in low-lying urban areas, are often inundated.

Flooding causes structural damage, affects customer safety, and results in revenue loss due to cancellations and repairs [33,34]. Moreover, the long-term reputation of tourist destinations can suffer if flooding becomes frequent. Of particular concern is the damage to historical landmarks, which are often irreplaceable. For example, the Cape Coast and Elmina Castles, which are UNESCO World Heritage Sites, are increasingly threatened by both flooding and coastal erosion. Intense rainfall combined with high tides weakens their foundations and promotes water infiltration, posing serious conservation challenges [34].

2.2.4. Extreme Heat as an Emerging Constraint to Sustainable Tourism Development

Extreme heat, driven by global climate change, has become a significant concern for the tourism industry. Rising temperatures negatively affect both tourist experiences and the well-being of tourism workers, leading to economic losses and health crises. Tourism is highly sensitive to climatic conditions. High temperatures reduce the appeal of outdoor activities such as sightseeing, hiking, and beach recreation. According to [2], tourist destinations experiencing extreme heat have reported declining visitor numbers, as prolonged exposure to high temperatures can lead to dehydration, heat stress, and overall discomfort. Destinations that rely on outdoor attractions, such as swimming and hiking, are particularly affected, as excessive heat discourages tourists from engaging in these activities. Luxury resorts and beachfront hotels are also at risk, as excessive heat may reduce beachgoers willingness to spend long hours outdoors [35]. This results in a decline in demand for outdoor entertainment, food services, and recreational tourism businesses [35].

Furthermore, [29] states that prolonged exposure to extreme heat can have severe health implications. The elderly, children, and individuals with pre-existing conditions are especially vulnerable to heat-related illnesses such as heatstroke and dehydration. A study by [36] notes that vacationers in warm-weather resorts frequently experience high-risk sun exposure associated with skin cancer, emphasizing the importance of sun safety during such trips. Similarly, tourism workers, including hotel staff, tour guides, and outdoor vendors, are also at high risk. Studies indicate that workers in extreme heat conditions face productivity losses, increased fatigue, and long-term health issues, including cardiovascular problems [37]. Without adaptation measures such as shaded workspaces and hydration stations, the tourism workforce may suffer increased absenteeism and reduced efficiency.

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2.2.5. Lagoon Degradation

[38,39] explain that lagoon ecosystems play a critical role in coastal biodiversity, tourism, and local livelihoods. However, pollution, land encroachment, and declining water quality threaten their sustainability. Industrial waste, domestic sewage, and plastic pollution significantly degrade lagoon water quality. Unregulated waste disposal, particularly in urbanized coastal areas, leads to high levels of organic and chemical pollutants, causing eutrophication and harmful algal blooms[39]. Also, rapid urban expansion and illegal settlement developments near lagoons disrupt natural ecosystems. Wetland areas are often reclaimed for construction, reducing natural water filtration and leading to siltation [15]. The loss of wetland buffer zones also increases the risk of flooding and habitat destruction.

High levels of pollution combined with reduced freshwater inflows affect the ecological balance of lagoons. In some cases, heavy metal contamination from industrial discharge leads to bioaccumulation in fish, making them unsafe for consumption [34]. [40] note that degraded lagoon environments lead to the loss of key species such as fish, crabs, and migratory birds. The disruption of breeding grounds affects species that rely on lagoons for survival, leading to ecological imbalances [40]. It must be noted that coastal communities depend on lagoon-based fishing and canoe tourism. As fish populations decline due to pollution and habitat destruction, traditional fishing communities experience reduced incomes [41].

Additionally, canoe tourism, which attracts visitors to explore lagoon ecosystems, suffers as degraded water quality diminishes the aesthetic and ecological value of these destinations. Addressing lagoon degradation requires urgent interventions, including stricter environmental regulations, waste management improvements, and community-led conservation initiatives[41]. Without immediate action, continued degradation will result in the loss of biodiversity, cultural heritage, and economic opportunities for local communities. The conservation of urban natural assets is thus essential for building resilient and sustainable tourism.

2.2.6. Conceptualising Urban Natural Assets

Urban natural assets (UNA) include botanical gardens, beaches, mangroves, protected areas, parks, ponds, rivers, shrublands/grasslands, wetlands, and trees/forest/woodlands [16]. [42] argue that urban natural assets refer to natural resources or ecosystems that are intentionally managed to provide multiple benefits for the environment and human well-being. These assets can be applied at various scales, ranging from individual buildings to entire landscapes, and may take different forms [42]. UNA, as described by [16,42], includes air, water, soil, and both natural and restored ecosystems like wetlands, forests, lakes, rivers, mangroves, coastal dunes, living shorelines, meadows, and pastures. It also encompasses hybrid or enhanced elements that combine engineered and nature-based features, including urban forests, bioswales, stormwater ponds, parks and gardens, street trees, rain gardens, roadside verges, vegetable patches, bikeways and pedestrian trails, green roofs or walls, cemeteries, and community gardens [16,42].

According to the Municipal Natural Assets Initiative [43], governments continually seek innovative approaches to manage the vital resources that support essential services in the pursuit of delivering community services that are both economically viable and environmentally responsible. UNA have the potential to provide numerous advantages for communities. Natural assets showcase remarkable resilience, longevity, and often possess the ability to regenerate, positioning them as vital solutions for tackling the challenges posed by climate change [43]. Furthermore, the role of natural assets in urban environments enhances vital ecosystem services such as the provision of clean air, water, and food, while also improving pollination, reducing pollution, managing stormwater, sequestering carbon, mitigating noise, and conserving biodiversity [44]. Urban natural assets (UNA) also provide benefits to people. This includes improved physical and mental well-being, opportunities for recreation and economic growth, and cultural and aesthetic enhancements [45].

It is instructive to note that street trees, parks, and urban forests are vital components of our cities, serving as natural filters for particulate matter and absorbing harmful gases like nitrogen

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dioxide and ozone. In addition, urban natural assets contribute to cooling urban areas through shading and evapotranspiration, which not only reduces energy consumption for heating and cooling but also enhances respiratory health and boosts property values [46]. Moreover, these natural assets can shape urban environments by providing scale and ecological harmony, while enhancing resilience against severe climate events. It also contributes to enhancing carbon capture, reducing greenhouse gas emissions, improving water retention and infiltration, and lowering the risks associated with rising sea levels and flooding [43]. [43] add that coastal features like mangroves, dune systems, and artificial reefs play a vital role in safeguarding the environment. They control floods and erosion, store carbon, support marine biodiversity, and enhance tourism opportunities. Conservation of UNA, thus, contributes to disaster resilience and sustainable tourism development.

2.2.7. Sustainable Tourism Development and the Role of Stakeholders in Building Resilience

The concept of sustainable tourism development has been a focal point in academic and policy discussions since the 1980s. While the economic advantages of tourism are widely recognized, there is an increasing awareness of its potential adverse effects. This awareness has prompted governments at various levels to mandate comprehensive tourism planning and development strategies. These strategies encompass several critical areas, including sustainable tourism development, governmental interventions, the role of local authorities, and the challenges faced by local governments in tourism development[19,20]. Understanding the principles and objectives of sustainable development within the tourism sector necessitates a clear definition of "sustainable development." Despite its widespread usage, the term lacks a universally accepted definition. According to [20], sustainable development comprises three pillars: economic development, environmental protection, and sociocultural development. This framework emphasizes the importance of thoughtfully designed relationships among these pillars to ensure economic, ecological, and social balance both within and across generations [19]

Sustainable tourism development necessitates the informed participation of all pertinent stakeholders, as well as strong political leadership to ensure broad participation and consensus-building [47]. Achieving sustainable tourism is an ongoing process that requires continuous monitoring of impacts and the introduction of necessary preventive and/or corrective actions where appropriate. Sustainable tourism also needs to maintain a high level of tourist satisfaction, provide meaningful tourist experiences, and raise tourist awareness, promoting sustainability issues and sustainable tourism practices [19,20]. Several principles guide the development and management of destinations committed to sustainable tourism. These principles include stakeholder consultation and partnerships, integration of tourism into national and/or local plans, local community participation regardless of gender, race, age, sexual orientation, disability, or poverty, respect for diversity, responsible marketing, reduction of overconsumption and waste, research and development, skill development and training, support for local economies, and sustainable resource use [47].

Similarly, governance plays a critical role in shaping sustainable tourism outcomes, particularly in environmentally vulnerable regions **[48,49]**. **[48]** states that effective governance in tourism and environmental management involves coordinated action among multiple stakeholders, including government institutions, private sector actors, civil society organizations, and local communities. **[50]** indicate that governance refers to the institutional structures, policy mechanisms, and enforcement capacities that guide tourism development and environmental stewardship. Weak coordination between tourism, environmental, and urban planning agencies often leads to fragmented interventions and overlapping mandates **[48,49]**. Furthermore, **[51]** argue that limited financial resources, bureaucratic delays, and inconsistent policy enforcement undermine efforts to protect natural assets such as beaches, lagoons, wetlands, and mangroves, many of which are central to the city's tourism economy. It is noteworthy that the success of sustainable tourism development and climate adaptation efforts hinges on inclusive stakeholder engagement. Each of the stakeholder

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groups contributes uniquely to promoting sustainability, building climate resilience, and preserving urban natural assets vital to tourism.

Furthermore, [52] note that tourism sustainability requires innovation in terms of products, processes, logistics, and institutions on the part of target actors. [52] indicate that sustainable tourism supports the presence of tourists, the tourism industry, and host communities without endangering or destroying the resources upon which future tourism depends. [47] underscores the critical role tourism can play in achieving the Sustainable Development Goals (SDGs). Therefore, to achieve sustainable tourism development in tourist destinations, disaster risk reduction strategies must be prioritised.

2.2.8. Disaster Risk Reduction Strategies for Sustainable Tourism

The Sendai Framework for Disaster Risk Reduction (2015–2030) highlights the importance of risk-sensitive development planning for the tourism sector [53]. [54] indicate that tourism systems must embrace adaptive governance to respond effectively to disaster risks. Similarly, [55] argue that DRR is increasingly viewed as not only a risk management tool but also a pillar of sustainable tourism development. It is worthy to note that tourism destinations, especially coastal and mountainous areas, are often located in hazard-prone regions [56]. [56] state that disasters disrupt tourism demand, damage infrastructure, and tarnish destination image. It must be noted that tourists' perceptions of safety significantly influence travel behaviour. As such, DRR measures must be visible and effective to maintain destination appeal, especially in coastal regions.

Coastal erosion is a major threat to tourism infrastructure, necessitating protective measures such as beach nourishment and seawall construction. Beach nourishment involves adding sand to eroding shorelines to restore beach width, thereby preserving recreational spaces for tourists and protecting coastal properties [57]. Studies have shown that nourished beaches enhance coastal resilience while maintaining the aesthetic appeal necessary for tourism. Seawalls, on the other hand, provide structural protection against wave action and storm surges. While effective in reducing erosion and property damage, they can sometimes disrupt natural sediment transport, leading to increased erosion in adjacent areas [29]. To mitigate such effects, hybrid approaches combining seawalls with natural solutions like dune restoration and mangrove replanting have been recommended [29].

Sustainable land-use planning, which integrates environmental considerations into development policies, is essential for minimizing risks that emanate from uncontrolled coastal development, such as erosion and flooding. Coastal buffer zones, setback regulations, and strict building codes can help prevent further encroachment into fragile coastal areas [15]. Countries like the Netherlands and Singapore have successfully implemented integrated coastal zone management (ICZM) strategies, balancing tourism development with long-term sustainability [30]. Moreover, increasing urban temperatures necessitate green infrastructure, such as urban forests, green roofs, and shaded walkways, to mitigate heat stress. Research shows that tree canopies can reduce ambient temperatures by up to 5 °C, making urban spaces more comfortable for tourists and workers [3]. In cities like Singapore and Barcelona, extensive tree-planting initiatives and vertical gardens have significantly improved thermal comfort in tourism hotspots [30].

Tourist accommodations and recreational facilities need climate-resilient designs to cope with rising temperatures. This includes natural ventilation, energy-efficient air conditioning, and heat-reflective building materials [2]. Another strategy is the investment in proper drainage systems and early warning systems. Flooding in coastal and urban areas is exacerbated by poor drainage infrastructure. Governments must upgrade drainage networks, incorporating permeable pavements, flood retention ponds, and underground reservoirs to improve stormwater management [53]. Cities like Tokyo and Rotterdam have adopted floodable public spaces, which temporarily store excess water during heavy rains [58].

[59] indicate that early warning systems (EWS) play a critical role in disaster preparedness. Advances in climate modelling and real-time satellite data allow for more precise flood forecasting,

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giving communities and tourism operators time to evacuate or implement protective measures. In addition, community participation is key to effective flood risk management. Local flood committees, participatory mapping, and early warning dissemination empower residents to respond effectively to flood threats [60]. In Ghana, the Adaptation Fund Project has supported local communities in developing flood-resistant livelihoods and eco-friendly infrastructure [61].

In reviewing literature on the impact of environmental hazards on tourism, the role of stakeholders in building resilience and DRR strategies for sustainable tourism, several key themes emerged. While existing studies have explored the impacts of environmental hazards on tourism, there remains a notable gap in understanding the role of stakeholders in building resilience for tourism and DRR strategies put in place to achieve sustainable tourism. This study aims to address this gap by providing a comprehensive analysis of the impacts of environmental hazards on tourism, the role of stakeholders in building resilience and DRR strategies for sustainable tourism development in Cape Coast. Also, what sets this research apart from previous studies is its focus on the integration of both urban environmental degradation and tourism sustainability within a climate vulnerability lens. In addition, the application of both the Sustainable Tourism Development (STD) theory and the Tourism Resilience and Adaptation Theory (TRAT) to explore the impact of environmental degradation and how tourism systems can adapt, recover, and evolve is novel and provides a more comprehensive theoretical framework for analysing long-term sustainability and resilience in tourism under environmental stress.

Furthermore, even though there are several studies on environmental hazards on tourism, this study focuses on urban natural assets such as lagoons, beaches, mangroves, wetlands, and green spaces, and their role in sustainable tourism development and reducing climate impacts**.** It is instructive to note that this urban ecological dimension is often overlooked in tourism and DRR studies, which tend to focus narrowly on infrastructure or economic performance. By drawing on local qualitative data and institutional reports (CCMA MTDP, EPA's CVA, ICLEI's UNA Resilience Report, DRR4Africa Baseline Report), this study provides a data-rich, grounded assessment that reflects real-time policy challenges, governance gaps, and community-level responses. This is something that is not widely represented in scholarly research. Finally, the study makes an original contribution by offering practical insights for other climate-vulnerable coastal cities in Africa and beyond. This study proposes ecosystem-based solutions, integrated policy approaches, and community engagement strategies that offer valuable insights for broader regional and national tourism resilience planning.

3. Methodology

To obtain a profound understanding of the issues at hand, the qualitative research approach was adopted. Qualitative approaches address non-numeric data and underline the fact that reality is socially constructed [62,63]. The study relied on both primary and secondary data sources. First, secondary data was collected through a documentary review of four (4) key planning and policy documents, namely: the CCMA Medium Term Development Plan (2022–2025)**,** Climate Vulnerability Assessment (CVA) developed by the Environmental Protection Authority for Cape Coast [14], the ICLEI UNA Resilience Cape Coast Report [16] and the [64]**.** These documents provided insights into climate risk assessments, disaster mitigation strategies, and sustainable tourism initiatives relevant to Cape Coast. Documentary review is a non-reactive and unobstructive data collection method that is appropriate for engaging with pre-existing materials without influencing the content [65]. It was selected for this study because, although the documents were not originally compiled to address the specific research questions of this study, they contain relevant information that can be extracted, organized, and interpreted to address the issues at hand.

The primary data was collected through in-depth interviews. Using interview guides, eighteen (18) stakeholders in Cape Coast's tourism industry were interviewed. Data collection ceased upon reaching saturation, ensuring that the sample size was adequate for the study's objectives [66]. Participants comprised policymakers (4), local community leaders (6), private-sector tourism

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businesses (5), and non-governmental organizations (NGOs-3). A purposive sampling strategy was adopted to select participants based on their knowledge of the subject and relevance to the research objective. Data collection was conducted over two weeks from March 10 to March 24. The interviews were designed to capture experiences, expert insights, and stakeholder perspectives on local DRR strategies, environmental challenges, and sustainable tourism practices in Cape Coast. The interview data were manually transcribed and analysed to validate and complement insights obtained from the secondary data sources.

The deductive thematic analysis technique was employed to analyse both primary and secondary data. In other words, coding was guided by the theoretical framework underpinning the study. Using direct quotations and narrative reports, the results were presented and discussed using a narrative approach. Integrating both documentary analysis and in-depth interviews in the study enabled a holistic assessment of the objectives. Triangulation was employed to cross-validate findings across the different sources to ensure the credibility and reliability of the analysis.

Ethical protocols were observed throughout the research process. For the secondary data, permission was sought from the original data owners prior to its use. Also, care was taken to maintain the authenticity and integrity of information by minimising alterations and ensuring contextual accuracy. To avoid misrepresentation and misuse of data, the research team individually agreed on a common interpretation of secondary data. Regarding the collection of primary data, informed consent was sought from all participants before commencing the interviews. Also, participants were informed of the voluntary nature of their involvement in the data collection as well as their right to withdraw from the interview at any time without any consequence. To preserve their anonymity, all responses were coded and securely stored without any identifying information disclosed.

Table 1. Profile of Study Participants.

Stakeholder Category	Number of Participants	Institutional Role
Policymakers/CCMA officials	4	CCMA and public environmental/planning agencies
Community Leaders	6	Representatives of communities proximate to tourism assets and natural features
Tourism Business Operators	5	Accommodation, guiding, and cultural tourism enterprises
NGO Representatives	3	Environmental governance and resilience programming organisations
Total	18	

4. Results

4.1. Environmental Hazards and Their Impact on Tourism Development

Findings from both documentary sources and stakeholder interviews confirm that coastal erosion, flooding, lagoon degradation, and heat risk pose significant and compounding threats to tourism development in Cape Coast.

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4.2. Coastal Erosion

The UNA Resilience Cape Coast Report and the DRR4Africa Baseline Assessment document confirmed that the shoreline has retreated significantly over the past decade, attributing this to uncontrolled sand winning and rising sea levels. Beachfront resorts, coastal access roads, and heritage structures have been directly affected. Interview participants corroborated these findings, noting in particular the physical impact on the Cape Coast Castle. One respondent observed:

> *"In the past, the sea was far from the Castle and the beaches. Today, you cannot trace the old Elmina road, which used to pass through the Bakano stretch. Coastal erosion as a result of rising sea levels and sand winning are causing devastation to our beaches, and the Castle is now at risk. For me, this is alarming, and we have to take steps quickly."*

The vulnerability of the Cape Coast Castle to water infiltration and structural weakening was consistently raised across policymaker and community leader interviews, reflecting the intersection of natural hazard exposure and cultural heritage risk that is distinctive of Cape Coast as a tourism destination.

4.3. Flooding

Secondary data from both the UNA Resilience and DRR4Africa reports document a rising trend in flood incidents linked to outdated drainage infrastructure, encroachment on wetlands, and inadequate waste management. Interview participants described regular waterlogging during rainy seasons that rendered key tourism infrastructure—access roads, heritage sites, accommodation—inaccessible or damaged. One tour operator stated:

> *"Unlike Accra and other parts of Ghana, flooding was not common in Cape Coast until recently. I believe building in waterways and climate change are responsible for recent floods in the city. Some roads leading to key attraction sites always get flooded during heavy downpour. We need to do something about it because it affects the appeal of Cape Coast as a desired destination for tourists."*

Participants expressed concern that persistent flooding incidents were damaging Cape Coast's reputation as a tourism destination and deterring repeat visitation.

4.4. Lagoon Degradation

Both primary and secondary data indicate a marked decline in the ecological condition of Cape Coast's lagoon ecosystems, particularly the Fosu Lagoon. Documentary sources identify pollution from domestic and industrial waste and increasing land encroachment as the primary drivers. Interview participants noted that this degradation had reduced the aesthetic and recreational value of the lagoon and foreclosed its potential as an eco-tourism asset. Participants identified indiscriminate solid waste disposal as the most visible contributors to the decline.

4.5. Extreme Heat

The 2024 Climate Vulnerability Assessment projects a substantial rise in average temperatures over the coming decade in Cape Coast. Participants interviewed for this study reported that they are already observing increased ambient temperatures and attributed declining engagement in outdoor recreational activities to growing visitor discomfort. Concerns were raised about heat-related health risks for both tourists and tourism workers, particularly those engaged in outdoor guiding and vending.

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Table 2. Summary of Environmental Hazards, Drivers, and Tourism Impacts in Cape Coast.

Hazard	Primary Drivers	Impact on tourism
Coastal Erosion	Sand winning, rising sea levels, and deforestation	Loss of beachfronts; damage to heritage structures; reduced destination appeal
Flooding	Poor drainage, wetland encroachment, and inadequate waste management	Infrastructure damage, access disruption, heritage site deterioration
Lagoon Degradation	Pollution, land encroachment, and domestic and industrial waste	Loss of eco-tourism potential; reduced aesthetic value; biodiversity decline
Extreme Heat	Climate change, urban heat island effect, and limited green cover	Reduced visitor comfort, health risks, and deterrence of outdoor activity

Roles of Stakeholders in Building Resilience

The study identified four stakeholder groups with roles in resilience-building: NGOs, government institutions, private-sector tourism businesses, and local communities. Their contributions and limitations are summarised below.

4.6. Non-Governmental Organisations

NGOs emerged from both documentary analysis and interviews as the most proactive stakeholders in Cape Coast's tourism resilience landscape. Organisations including ICLEI Africa, Green Growth Africa, and Youth in Natural Resources and Environmental Governance were identified as leading capacity building workshops, environmental awareness campaigns, and pilot resilience projects. The UNA Resilience Workshops and the DRR4Africa Initiative were frequently cited as examples of effective NGO-led stakeholder coordination. One policymaker observed:

> *"ICLEI and other NGOs such as Green Growth Africa and the Youth in Natural Resources and Environmental Governance are doing well in addressing the environmental issues in Cape Coast. Over the past three years or so, the city has received support in the area of capacity building from ICLEI Africa. They have supported us with data on all urban natural assets in the city. Today, we are aware of all the assets and their vulnerabilities. Again, Green Growth Africa with donor support from UNDP and MEST, has initiated the 'Beyond Waste' programme to train waste pickers on waste collection, segregation, and recycling to promote environmental sustainability."*

Participants noted, however, that NGO programmes were frequently donor-driven and lacked integration into the CCMA's development planning cycle, limiting their long-term institutional impact.

4.7. Government Institutions

Government institutions were identified as central to resilience planning but widely perceived as constrained by institutional weaknesses. Both the UNA Resilience and DRR4Africa reports warn of bureaucratic silos, political interference, and limited financial resources that undermine policy enforcement and cross-sector coordination. Respondents for this study corroborated these findings, describing a tendency among policymakers to prioritise short-term economic interests over long-term

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environmental sustainability, and characterising government actors as reactive rather than proactive in DRR implementation.

4.8. Private-Sector Tourism Businesses

Tourism operators were characterised by both documentary sources and interview participants as critical but underperforming stakeholders. The UNA Resilience and DRR4Africa reports highlight the private sector's limited engagement in resilience-building and its reluctance to invest in sustainable infrastructure or nature-based solutions. Participants described tourism businesses as oriented towards short-term profitability, with minimal investment in waste management, green infrastructure, or early warning systems. This orientation was seen as undermining the sector's capacity to absorb and recover from environmental shocks.

4.9. Local Communities

The involvement of local communities in resilience efforts was found to be largely tokenistic. Both the UNA Resilience Cape Coast Report and the DRR4Africa Baseline Assessment describe communities as passive beneficiaries of resilience programmes rather than active co-designers. Participants interviewed for the study reinforced this finding, noting that while community members possess valuable local knowledge of environmental conditions and hazard patterns, they are rarely invited to participate meaningfully in planning or implementation. One community leader stated:

> *"Local communities play an important role in resilience efforts. We can mobilise community support for DRR efforts, but we are not actively involved in planning. For instance, I have been taking part in workshops organised by the city, but I can say that key decisions are taken by the city without the involvement of community members."*

Table 3. Stakeholder Groups, Roles, and Limitations in Tourism Resilience Building.

Stakeholder Group	Observed Contribution to Resilience	Key Limitations
Government Institutions	Formal resilience planning mandate, policy, and regulatory authority	Weak enforcement; bureaucratic delays; political interference; insufficient investment
NGOs	Capacity building, awareness campaigns, pilot projects, and data generation on UNA	Donor-dependency; limited integration into city planning
Tourism Businesses	Potential for investment in sustainable infrastructure	Short-term profit orientation; minimal engagement in DRR or environmental stewardship
Local Communities	Local environmental knowledge; community mobilisation capacity	Excluded from meaningful co-design; tokenistic participation

4.10. Effectiveness of Current DRR Strategies

Cape Coast currently implements five broad DRR strategies: coastal protection through seawall construction, drainage infrastructure improvements, early warning systems, heat adaptation

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measures, and conservation and sensitisation programmes. Across all five, findings reveal significant implementation gaps.

4.11. Coastal Protection

Secondary data from the DRR4Africa Baseline Assessment, the CVA, and the UNA Resilience Report confirm that seawall construction has been undertaken along sections of the coastline. However, all three sources agree that these hard-engineering measures are limited in geographic scope and provide insufficient protection against the scale of erosion observed, particularly around the Cape Coast Castle. The documentary sources and participants interviewed called for nature-based solutions, including dune restoration and mangrove rehabilitation, to complement existing seawall infrastructure.

4.12. Drainage Infrastructure

Documentary sources indicate that Cape Coast's drainage networks remain dated and under-capacity, with planned upgrades characterised as largely reactive. Interview participants described drainage channels as chronically choked and poorly maintained. One participant noted:

> *"The absence of routine cleaning and waste collection schedules, poor waste disposal, coupled with weak enforcement of spatial planning regulations, leaves the city's tourism infrastructure vulnerable to flooding and damage to property."*

4.13. Early Warning Systems

The secondary data reveal the absence of an integrated early warning framework that incorporates tourism sector needs. While proposals for meteorological alert protocols exist in policy documents, none have been mainstreamed within tourism development plans. Participants interviewed for the study confirmed that current early warning systems make negligible provision for tourism operators. One respondent stated that "current early warning systems for flooding largely fail to involve tourism-specific contingency planning" and that no actionable information is provided to tourism businesses to enable adequate preparation.

4.14. Heat Adaptation

The CVA and UNA Resilience reports found minimal investment in green infrastructure or shading in key tourist areas. Beyond limited tree planting initiatives, no systematic programme of urban greening has been implemented in tourism precincts. This leaves the city without the infrastructure needed to maintain visitor comfort as temperatures rise.

4.15. Conservation and Sensitisation Programmes

Multiple NGO-led conservation and sensitisation programmes, including the UNA Resilience project, the DRR4Africa initiative, the 'Beyond Waste' project, and campaigns by youth organisations, have been launched. However, secondary data and interview accounts agree that enforcement mechanisms remain weak, allowing continued pollution and ecosystem degradation. A recurring theme across interviews was the fragmented, donor-driven character of these initiatives and their failure to achieve institutional continuity. One participant described the situation as follows:

> *"Although capacity building and conservation programmes and community sensitisation initiatives such as the UNA Resilience project, DRR4Africa, the 'Beyond Waste' project, and campaigns by other non-governmental organisations are underway, these efforts remain isolated and donor-driven. Once donor funding ends, there is no continuity from the city. Policies and initiatives by the NGOs are not integrated into city development plans."*

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5. Discussion

The findings of this study extend the existing literature on coastal tourism resilience in important respects, and in doing so, illuminate both the particular challenges of Cape Coast and broader patterns common to tourism destinations in the Global South.

5.1. Environmental Hazards, Urban Natural Assets, and Tourism Sustainability

The evidence from Cape Coast confirms and deepens the existing literature on coastal tourism vulnerability. [15,34] document the structural threats to heritage sites from coastal erosion and flooding, and this study corroborates those findings while adding the perspective of tourism operators and community members who experience these impacts in their daily work. The degradation of the Fosu Lagoon, as documented by [18] and [17], is shown here to directly suppress eco-tourism potential, a linkage that the existing literature addresses in general terms but that is rarely traced empirically to specific changes in visitor patterns and operator decision-making.

The study's most distinctive contribution, however, lies in its demonstration that urban natural assets are not merely a contextual backdrop to tourism but active determinants of both hazard exposure and adaptive capacity. Where mangroves, wetlands, and lagoons are degraded, the city loses both the buffers that moderate flooding and erosion and the ecological assets that attract nature-based visitors. This dual function of UNA as both protective infrastructure and tourism product is underemphasised in the DRR literature, which tends to focus on engineered solutions, and in the tourism sustainability literature, which rarely engages with the institutional and governance conditions required to maintain urban ecological systems. The present study argues that this gap represents a significant blind spot in both bodies of scholarship.

From the perspective of STDT, the degradation of Cape Coast's natural assets, such as beaches, lagoons, mangroves, and wetlands, represents a direct failure of the conditions that theory identifies as prerequisites for sustainable tourism. The city's tourism is built on both cultural heritage and coastal ecology; the deterioration of either undermines the long-term viability of the sector. TRAT further reveals that this deterioration is not merely a physical problem but a governance one: the absence of integrated, ecosystem-based planning has left the city without the adaptive capacity to absorb and respond to environmental shocks.

5.2. Stakeholder Coordination and Governance Quality

The study's findings on stakeholder roles closely parallel patterns identified in the broader literature on tourism governance in the Global South, but with some distinctive features. The dominance of NGOs in resilience programming, filling gaps left by under-resourced and institutionally constrained public agencies, is consistent with findings from other sub-Saharan African contexts [59]. However, the degree to which NGO initiatives remain disconnected from city planning cycles and dependent on short-term donor funding represents an especially acute vulnerability in Cape Coast. When donor programmes conclude, there is no institutional mechanism to sustain the practices or knowledge generated, and the city reverts to its pre-programme baseline. This fragmentation directly contradicts both STDT's emphasis on integrated, institutionally embedded sustainability planning and TRAT's requirement for systemic and coordinated adaptive governance.

The marginalisation of local communities from meaningful participation in DRR and resilience planning is a finding with particular theoretical and practical significance. Research from other tourism destinations shows that community-based knowledge and monitoring significantly improve both the accuracy of hazard assessment and the uptake of protective measures. In Cape Coast, the tokenistic nature of community consultation means that this knowledge is systematically excluded from official planning, weakening the quality of decisions and reducing local ownership of DRR initiatives. This is a governance failure with direct consequences for tourism resilience.

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The private sector's limited engagement with environmental stewardship is consistent with patterns documented by [51] and echoes findings from studies of tourism operator behaviour in climate-vulnerable destinations elsewhere in Africa. The short-term profit orientation documented here is structurally reinforced by the absence of regulatory incentives or penalties that would make environmental investment economically rational for individual operators. Addressing this requires not only awareness raising but changes to the regulatory and fiscal environment in which tourism businesses operate.

5.3. DRR Strategy Effectiveness and the Case for Integration

The finding that Cape Coast's DRR strategies are fragmented, reactive, and insufficiently tailored to tourism sector needs is consistent with the broader literature on disaster governance in rapidly urbanising coastal cities of the Global South. [3] and [30] identify green infrastructure as essential for heat adaptation in tourism precincts, and this study confirms the absence of systematic investment in this area in Cape Coast. The contrast between the documented best practices in integrated coastal and drainage management and the reactive, under-resourced approach observed in Cape Coast is striking. It underscores the importance of institutional capacity in translating DRR policy commitments into implemented measures.

More fundamentally, the study shows that the separation between coastal protection, drainage, heat adaptation, and conservation programming, each managed through different institutional channels with limited coordination, prevents the emergence of an integrated resilience framework. TRAT calls for systemic approaches that align adaptation strategies across hazard types and stakeholder groups. The evidence from Cape Coast suggests that the absence of such alignment is not an incidental implementation failure but a structural characteristic of the city's governance architecture, requiring deliberate institutional reform.

6. Conclusion and recommendations

This study set out to investigate the impacts of environmental hazards on tourism in Cape Coast, the roles of stakeholders in building resilience, and the effectiveness of existing DRR strategies. The findings converge on three principal conclusions. First, coastal erosion, flooding, lagoon degradation, and extreme heat are significantly undermining the sustainability of Cape Coast's tourism sector, threatening both its natural and cultural assets. Second, while NGOs have emerged as the most proactive actors in resilience programming, the overall stakeholder landscape is characterised by weak government enforcement, limited private-sector engagement, and tokenistic community participation, an imbalance that prevents the coordinated action required for systemic resilience. Third, current DRR strategies are fragmented, reactive, and insufficiently integrated with tourism planning, leaving the sector without the adaptive capacity to address mounting environmental pressures.

Applying STDT and TRAT, the study concludes that Cape Coast requires a fundamental reorientation of its approach to tourism governance and DRR: from reactive infrastructure management to integrated, ecosystem-based, participatory resilience planning that recognises urban natural assets as both protective infrastructure and productive tourism assets.

The following recommendations are made and summarised in Table 4.

- ✓ The CCMA should collaborate with the Ghana Hydrological Authority to establish a routine maintenance programme for drainage infrastructure, including scheduled cleaning schedules and enforcement of waste disposal regulations. DRR.
- ✓ The CCMA should commission and implement a programme of nature-based solutions for coastal protection, including mangrove restoration, dune rehabilitation, and beach nourishment, as complements to existing seawall infrastructure.
- ✓ Spatial planning regulations governing development in wetland and lagoon buffer zones should be updated and enforced, with priority given to areas that provide flood regulation services to tourism precincts. d.

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- ✓ The city should develop and adopt an integrated tourism resilience framework that aligns DRR, environmental management, and tourism planning under a common governance structure, with clear accountability mechanisms and performance monitoring.

Table 4. Prioritised Recommendations by Implementation Horizon.

Timeframe	Priority Actions	Lead Actor(s)
Short-Term (0-2 years)	Drainage maintenance programme; tourism-specific early warning system; integration of NGO conservation initiatives into MTDP; structured community consultation	CCMA; Ghana Hydrological Authority; NGOs
Medium-Term (2-5 years)	Mangrove and dune restoration; spatial planning enforcement around wetlands; urban greening in tourism precincts; regulatory incentives for private sector	CCMA; EPA; Tourism operators; National planning agencies
Long-Term (5+ years)	Integrated tourism resilience governance framework; sustainable financing mechanisms; regional knowledge partnerships	CCMA; National government; Regional bodies; Tourism industry

7. Theoretical and Practical Implications

This study advances the theoretical foundations of both STDT and TRAT in two respects. First, it expands the empirical application of these frameworks to a West African coastal context in which urbanisation, institutional weakness, and climate vulnerability intersect in ways that have received limited scholarly attention. The case of Cape Coast demonstrates that STDT's conditions for sustainable tourism, ecological integrity, inclusive governance, and long-term policy commitment are simultaneously endangered by environmental hazards and by the governance failures that prevent effective response to them, creating a compounding vulnerability that the theoretical literature has not fully addressed. Second, by foregrounding urban natural assets as both tourism products and adaptive infrastructure, the study integrates an ecological dimension into TRAT that is often treated as a contextual given rather than a variable requiring active governance.

In practical terms, the study provides actionable guidance for policymakers, tourism planners, and NGO practitioners in Cape Coast and in comparable coastal tourism destinations across the Global South. The recommendation to treat urban natural assets as managed infrastructure—subject to the same planning attention and investment as roads or drainage systems—represents a reframing of conventional DRR thinking that has practical implications for both budget allocation and institutional design. The study also offers a transferable model for integrating community knowledge into hazard assessment and resilience planning, addressing a governance gap that is common across rapidly urbanising coastal cities.

Abbreviations

CCMA Cape Coast Metropolitan Assembly

CVA Climate Vulnerability Assessment

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DRR	Disaster Risk Reduction
EPA	Environmental Protection Authority
EWS	Early Warning Systems (EWS)
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
MNAI	Municipal Natural Assets Initiative
NGO	Non-Governmental Organisation
SDGs	Sustainable Development Goals
STDT	Sustainable Tourism Development Theory
TRAT	Tourism Resilience and Adaptation Theory
UN	United Nations
UNA	Urban Natural Assets
UNEP	United Nations Environment Programme
UNWTO	United Nations World Tourism Organization

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