Climate change impacts and adaptation strategies in tourism sector in Africa: a systematic literature review

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Abstract

Tourism sector is of great importance to the economies of many African countries. However, it faces significant challenges due to climate change impacts. This review paper evaluates various climate change impacts on African tourism and examines adaptation strategies implemented across the continent. 49 relevant papers were identified through a systematic review. An increase in extreme weather conditions, altered precipitation patterns and rising temperatures threaten the viability of key tourist attractions. These results highlight key issues such as the loss of biodiversity, the disruption of wildlife migrations, beach erosion and infrastructure damage. As a result, different adaptation strategies have been implemented. Resilient infrastructure development, diversification of tourism products, and community engagement and education programs are some examples. A variety of technologies, such as early warning systems and flexible itinerary options, are also mentioned in reviews. Concrete policy gaps such as limited access to climate finance for tourism specific adaptation in vulnerable destinations are also discussed. The paper concludes by discussing the implications of these findings for policy makers, the private sector and local communities. Finally, the paper discusses limitations of the study including reliance on English peer-reviewed literature and the omission of grey literature. The paper also suggests areas for further research including expanding coverage to underrepresented regions, using mixed methods approaches to assess sustainability and to include nature-based solutions.

Received
21 March 2025
Received in revised form
24 April 2025
05 June 2025
20 June 2025
Accepted
27 June 2025

Keywords:
Climate change
Impact
Adaptation
Tourism
Africa

1. Introduction

Tourism is one of the fastest growing industries in the world and plays a significant part in sustainable development by contributing in infrastructure, creating job opportunities and foreign exchange [The United Nations World Tourism Organization (UNWT), 2023]. According to Mihigo and Lukenangula (2023), the tourist industry in Africa is exceptionally diverse, offering a wide range of attractions such as stunning beaches, a wealth of wildlife, destinations with a profound cultural legacy and breath-taking landscapes like mountains and deserts. The industry contributes significantly to the economic development of many African countries by creating employment, generating income and advancing cross-cultural interactions (Mubita et al., 2023). On the other hand, climate change refers to long-term variations in sea levels, temperature, precipitation patterns and the frequency of extreme weather events [Intergovernmental Panel on Climate Change (IPCC), 2023]. Human-generated greenhouse gas emissions are primarily responsible for these changes, which already have an impact on both natural ecosystems and human civilisations. The relationship between tourism and climate change presents challenging issues that require effective adaptive solutions to ensure sustainability and resilience (Dube et al., 2022; Rogerson, 2016).

Climate change has complex implications on tourism; it influences both natural and man-made attractions, which threatens the industry's overall productivity. Changes in the factors that attract tourists have a significant impact on the tourism sector (IPCC, 2023; Kilungu & Munishi, 2024). Climate change factors that influence tourism include rising temperatures, shifting precipitation patterns and an increase in extreme weather events like floods and cyclones (Ngxongo, 2021; UNWTO, 2022). For example, Mount Kilimanjaro's appeal to climbers and adventurers is directly threatened by the melting of the mountain's famous snow (Minja, 2014; 2015). The abundant marine life that attracts scuba divers and snorkelers to the beaches of Kenya and Tanzania is additionally at risk due to coral bleaching events, which are fuelled by hotter water temperatures (Bushesha, 2018; Tervo-Kankare, 2023). High storms, rising temperatures and variations in rainfall are direct repercussions of these climate-related disruptions; indirect implications include health dangers from climate-sensitive illnesses, changes in tourist behaviour and financial losses

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https://doi.org/10.58548/2025abmj31.6880

(Hoogendoorn & Fitchett, 2016; Kessy, 2022). This difference encourages a more intensive examination of the ways in which climate change affects different viewpoints of the travel sector. For instance, shifting animal migration patterns and habitat changes are posing a danger to wildlife-based tourism in African national parks (Karani & Failler, 2020; Saarinen & Moswete, 2023).

In spite of being proposed and executed throughout Africa, adaptation strategies are still not equally covered. Either majority of recent assessments centre only on mitigating instead of adapting, or they use findings from various developing countries (Becken & Hay, 2007; Scott et al., 2016). There is a scarcity of research that completely evaluates adaptation strategies within the African setting, especially in underrepresented subsectors like community-based and eco-tourism. Besides, the need for tailored adaptation research is emphasised by Africa's natural diversity, sensitivity to climate change and dependence on nature-based tourism. It is crucial to assess how different coping strategies are addressing these challenges in light of these complex impacts. Adaptation strategies vary broadly over the continent extending from community-based activities like sustainable agriculture and eco-tourism integration to framework arrangements like ocean walls (Dube et al., 2020; Füssel, 2007). Insufficient funding, divided administration structures, and conflicting policy implementation continue to influence the tourism sector in spite of these initiatives (Kilungu & Munishi, 2024; Minja, 2015).

This review fills a major gap within the literature by carefully assessing the variety of adaptation strategies aimed at improving the resilience of African tourism. In contrast to past studies that generally centred on developing regions, this one centres on geographical areas with a scarcity of empirical information, such as East and West Africa, as well as underrepresented subsectors like eco-tourism and community-based tourism. The study does this by highlighting opportunities, best practices and gaps in resilience building at the local and national levels. To provide a comprehensive and repeatable evidence synthesis process, a systematic review methodology was employed. In order to give a comprehensive assessment of current adaptation approaches and their outcomes, the study looks at 49 peer-reviewed papers selected from an original collection of 320. National tourist boards, protected area authorities, tourism firms, non-governmental organisations and local community groups are among the key stakeholders who are intended to be guided by the knowledge gained. In order to enhance the sector's long-term climate change resilience, this review emphasises evidence-based, inclusive and sustainable adaption strategies.

The organisation of rest sections of this paper is as follows: Section 2 specifies the approach used for the systematic literature review together with the search approach, inclusion criteria and analytical framework. Section 3 summarises the main results emphasizing the significant impacts of climate change on tourism in Africa and the adaptation strategies identified in the literature. Section 4 offers a thorough discussion of these results linking them to current research and pointing areas of agreement and disagreement. Then, the paper summarises the main findings, examines their policy and practice consequences, and suggests future study directions. Finally, Section 6 outlines limitations and areas for further research.

2. Methodology

We used the systematic review technique recommended by Pickering and Byrne (2014) which offers a trustworthy, rational and repeatable framework for finding, choosing and evaluating academic research on tourism and climate change. Deciding the study theme, creating a search strategy, establishing inclusion and exclusion criteria, assessing the quality of studies and utilizing qualitative content analysis to synthesise findings are some of the stages that comprise this framework (Pickering et al., 2015). This method supports complex multidisciplinary subjects and makes it possible for researchers to recognize modern trends in a variety of case studies. However, three major electronic databases; Scopus, Web of Science and Science Direct were used to conduct a thorough search for relevant literature because of their broad coverage of peer-reviewed articles in environmental science, tourism and sustainability. Although other sites, including regional repositories and Google Scholar, were relevant, they were excluded because of issues with conflicting quality control, constrained filtering capabilities and duplicate results. Each database made use of wildcard characters (*), Boolean administrators (AND, OR), and phrase searches (""). ("tourism" OR "tourist destinations") AND ("global warming" OR "climate change") AND ("impact" OR "effect") AND ("adaptation" OR "resilience") AND "Africa" comprised the most search string.

Only peer-reviewed, English-language publications were included by applying filters, and only original research journal articles were considered as the document type. The literature examined covered a 16-year span from 2009 to 2024 and the search was carried out in January 2025. This period was chosen to record the history of climate adaptation techniques and to represent recent advancements in the field especially in the wake of significant international landmarks like the 2015 Paris Agreement and the IPCC Sixth Assessment Report of 2022. According to the inclusion

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criteria, studies had to: (1) be original journal article, peer-reviewed, English-language publications; (2) concentrate on African countries or region; (3) look at how climate change affects tourism and the adaptation strategies used; and (4) offer full-text access via the databases that were chosen. In order to assure methodological rigor and relevance, peer-reviewed empirical studies are given priority in environmental and tourism research which is where these criteria were influenced by established methods in systematic reviews (Pickering & Byrne, 2014). We acknowledge that this may introduce a language bias by excluding potentially relevant research in French, Portuguese or Arabic but the exclusion criteria excluded review articles, book chapters, conference papers, policy briefs and grey literature articles not published in English. Studies that did not specifically address the relationship between tourism and climate change in Africa as well as any duplicate records or papers without full texts available were also disregarded. Africa's increased vulnerability to climate change, reliance on nature-based tourism and the pressing need for efficient adaptation measures in a region characterised by abundant biodiversity, socio-ecological complexity and underrepresentation in international tourism climate change scholarship were the main factors in the decision to concentrate on the continent (IPCC, 2022; UNWTO, 2023).

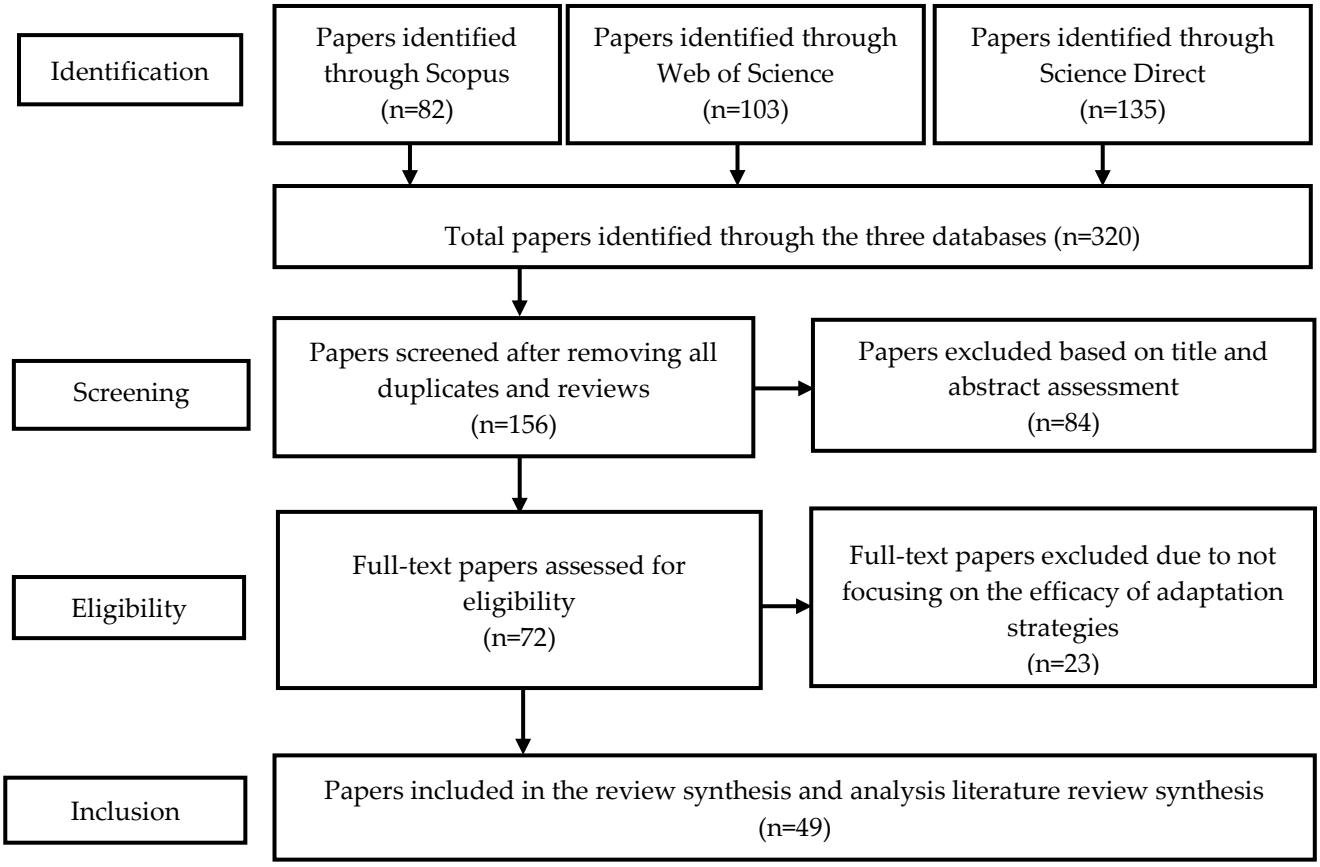

Figure 1. Steps taken for the literature search
Source: Adapted from Moher et al. (2009)

To monitor the selection process, we followed the preferred reporting items for systematic reviews and meta-analyses (PRISMA) criteria (Moher et al., 2009). 320 records were found in the first search. During the screening and assessment of eligibility criteria, as presented in Figure 1, a total of 271 publications were excluded because they were irrelevant to the current objective of the study. Some of them were duplicates and others did not adequately address climate change and tourism in the African context. In the end, 49 original research articles were selected for thorough examination and analysis after meeting all requirements. Every step of the review process is graphically depicted in the PRISMA flowchart (Figure 1). Key information like the study area, the type of tourism (such as wildlife, coastal, or heritage), the type of climate impact and the type of adaptation measures were all captured during the data extraction process using a standardised coding form. The quality of the chosen studies was assessed informally using the following criteria: empirical contribution, issue relevance and research design clarity. Peer-reviewed journals were used as a stand-in for quality assurance but no official risk of bias assessment method such as the critical appraisal skills programme (CASP).

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The extracted data were then analysed using qualitative content analysis, where similar findings were grouped into recurring themes. These topics were divided into two categories: adaptation techniques (such as policy reaction, eco-tourism innovation, community resilience and infrastructure redesign) and effect types (such as biodiversity loss, seasonal shifts and infrastructure damage). An in-depth grasp of how climate change is impacting many aspects of tourism in Africa and how adaption strategies are being put into practice or suggested was made possible by this theme synthesis. It also indicated future study goals by highlighting gaps in the literature, especially in underrepresented areas and developing tourism segments.

3. Findings

Climate change impacts on tourism alongside adaptation strategies are highlighted in this section (see Table 1). Biodiversity loss, which endangers ecosystems essential to wildlife tourism, has been reported by 100% of the countries under consideration. These include; Zimbabwe, Botswana, South Africa, Tanzania, Kenya and Namibia (Agrawala et al., 2004; Dube et al., 2022). For example, documented losses in species diversity and richness have been seen in more than 70% of Southern and Eastern African protected areas compromising the wildlife viewing experience that is essential to safari tourism. According to reports, 83% of the countries assessed (South Africa, Tanzania, Kenya, Botswana, Namibia and Zimbabwe) have disrupted animal migration patterns, which has a detrimental effect on both visitor pleasure and economic sustainability (Mkiramweni, 2014; Snoussi et al., 2008).

80% of the countries under consideration have reported an increase in the frequency and intensity of extreme weather events. These include draughts, heatwaves and floods which have resulted in direct damage to infrastructure, travel cancellations and safety hazards (Dube et al., 2022; Saarinen & Moswete, 2023). Inland nations like Lesotho and Egypt are facing water scarcity that endangers both tourists and local communities (Agrawala et al., 2004; Hoogendoorn et al., 2020), while coastal destinations in Botswana, South Africa and Morocco are facing rising sea levels that worsen shoreline erosion and harm heritage sites (Dube et al., 2020; Hambira et al., 2013). Furthermore, 50% of the nations under study describe changes in the seasonality of tourism with erratic weather patterns upsetting the customary peak and off-peak travel times (Kilungu et al., 2019; Mkiramweni, 2014).

Table 1. Climate change impacts in the tourism sector

Impact	Countries	References
Loss of biodiversity	Zimbabwe, Botswana, South Africa, Tanzania, Kenya, and Namibia	Agrawala et al. (2004), Dube et al. (2022), Gössling et al. (2006), Mkiramweni (2014), and Saarinen and Moswete (2023)
Disruption of wildlife migration	South Africa, Tanzania, Kenya, Botswana, Namibia, Zimbabwe	Agrawala et al. (2004), Gössling et al. (2006), Mkiramweni (2014), Saarinen and Moswete (2023), and Snoussi et al. (2008)
Increased frequency of extreme weather events	Zimbabwe, Botswana, South Africa, Tanzania Kenya, Namibia	Agrawala et al. (2004), Dube et al. (2022), Gössling et al. (2006), Mkiramweni (2014), and Saarinen and Moswete (2023)
Rising sea levels	Botswana, South Africa, and Morocco	Dube et al. (2020), and Hambira et al. (2013)
Water scarcity	Lesotho, South Africa, and Egypt	Agrawala et al. (2004), and Hoogendoorn et al. (2020)
Impact on cultural heritage sites	Botswana	Dube et al. (2022)
Shifts in tourism seasonality	Lesotho, South Africa, Egypt, and Tanzania	Kilungu et al. (2017), Kilungu et al. (2019), and Mkiramweni (2014)
Increased wildfire risk	Lesotho, South Africa, and Tanzania	Dube et al. (2023), and Kilungu (2024)
Loss of scenic beauty	Lesotho, South Africa, and Tanzania	Dube et al. (2022), and Kilungu (2024)

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https://doi.org/10.58548/2025abmj31.6880

About 45% of highland and forested tourist zones in Lesotho, South Africa and Tanzania have been found to have increased wildfire danger, which limits access and aesthetic appeal during fire seasons (Dube et al., 2023; Kilungu, 2024). According to reports, these same countries are seeing a decline in scenic attractiveness because of deforestation and landscape deterioration which has an effect on tourists' pleasure (Kilungu, 2024). More than 60% of Namibian and Botswana's cultural heritage monuments exhibit obvious degradation because of climate-induced weathering and floods (Dube et al., 2022).

Table 2. Adaptation strategies applied to lessen climate change impacts on tourism

Adaptation Strategy	Country	References	Tourism sector/subsector
Launch public awareness campaigns to educate tourists about the impacts of climate change	Egypt, Tanzania, Kenya, South Africa, Botswana, Namibia, and Zimbabwe	Agrawala et al. (2004), Gössling et al. (2006), Mkiramweni (2014), and Saarinen and Moswete (2023)	Coastal tourism Nature based Tour operators Cultural tourism
Diversify tourism products	Egypt, Zimbabwe, Botswana, and South Africa	Ahmed and Hefny (2007), Mushawemhuka (2021), and Saarinen and Moswete (2023)	Coastal tourism Nature based tourism
Engage local communities in tourism planning and management	Egypt, Kenya, South Africa, Namibia, Tanzania, Botswana, and Lesotho	Karani and Failler (2020), Saarinen and Moswete (2023), Shaaban and Ramzy (2010), and Tervo-Kankare et al. (2017)	Coastal tourism Nature based tourism Wildlife based tourism
Implement early warning systems for extreme weather events	South Africa, Lesotho, Morocco, Kenya, Egypt, and Botswana	Saarinen and Moswete (2023), and Tervo-Kankare et al. (2017)	Nature based tourism Coastal tourism
Habitat restoration projects to rehabilitate ecosystems.	Kenya	Karani and Failler (2020), and Marshall et al. (2011)	Nature based Wildlife based tourism
Develop and maintain tourism climate-resilient infrastructure	South Africa	Reddy (2012), and Köberl et al. (2016)	Nature based tourism Accommodation Trekking
Develop risk assessments and explore insurance options for tourism business	Tunisia, and Namibia	Grant (2015), Hoogendoorn and Fitchett (2018), Köberl et al. (2016), and Mahadew and Appadoo (2018)	Coastal tourism Tour operators Accommodation
Implement flexible tour itineraries	South Africa	Dube et al. (2022), Mushawemhuka et al. (2018), and Saarinen et al. (2022)	Tour operators

Source: Table by the authors

Table 2 shows variety of adaption strategies used by various countries and the tourism industry. In order to promote sustainable behaviour in coastal, nature-based and cultural tourism, public awareness campaigns have been launched in seven countries (Egypt, Tanzania, Kenya, South Africa, Botswana, Namibia and Zimbabwe) that target both tourists and local stakeholders (Agrawala et al., 2004; Saarinen & Moswete, 2023). At least four countries; South Africa, Botswana, Zimbabwe and Egypt have implemented tourist product diversification to lessen reliance on climate-sensitive attractions (Ahmed & Hefny, 2007).

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In more than 70% of the countries under review, community involvement in tourist planning is common. It promotes local ownership and integrates indigenous knowledge into management (Karani & Failler, 2020; Shaaban & Ramzy, 2010). Six countries; South Africa, Lesotho, Morocco, Kenya, Egypt and Botswana have set up early warning systems for extreme weather, improving readiness within the coastal and nature-based tourism businesses (Tervo-Kankare et al., 2017). Additional outstanding strategies include risk assessments with insurance choices (Tunisia and Namibia), climate-resilient infrastructure improvement (South Africa), flexible visit itineraries (South Africa) and habitat restoration projects (Kenya) (Marshall et al., 2011; Mushawemhuka et al., 2018; Reddy, 2012).

Long-term integrated adaptation planning has substituted short-term sensitive measures as seen by the evolution of adaption strategies. Stronger institutional frameworks enable nations like South Africa, Kenya and Botswana to take the lead in implementing multi-stakeholder strategies that incorporate climate adaptation into their national development plans and tourist policies. An obvious trend is the adoption of inclusive participatory methods that prioritize local knowledge integration and community involvement. This development emphasises how climate change is acknowledged as a persistent issue that calls for coordinated, scalable and context-specific adaptation initiatives throughout Africa's tourism industry.

4. Discussion

Africa, a region known for its varied and particular attractions from flawless beaches to national parks with wildlife safaris is intensely affected by climate change. More frequent and serious climate events like heatwaves, surges and droughts are a direct result of climate change and have an impact on infrastructure and tourism attractions (Friedrich et al., 2020; Mushawemhuka et al., 2024). The survival of popular wildlife species for example in national parks is threatened by rising temperatures and changed precipitation patterns which reduces the appeal of safari tourism (Kessy, 2022). Coastal towns and beachside resorts are under risk due to the combined impacts of rising sea levels and stronger storms. In order to lessen the negative impacts of climate change on African tourism, adaptation strategies are essential. These strategies include building resilient infrastructure, such as flood barriers and sustainable water management systems (Hoogendoorn et al., 2021; Malik, 2010). Reliance on climate-sensitive attractions can too be decreased by expanding the range of tourism offerings to include cultural and heritage travel. The natural resources that are fundamental to tourism are moreover preserved by putting conservation initiatives into place to safeguard environments and biodiversity (Hoogendoorn et al., 2021; Malik, 2010).

4.1 Climate change impacts on the tourism sector

4.1.1 Loss of biodiversity

The results show that, in spite of the fact that the degree of these impacts vary by region, the loss of biodiversity brought on by climate change and the rise in extreme weather events are among the foremost predominant issues confronting African tourism destinations. The sustainability of coastal tourism infrastructure, beach quality and marine biodiversity are all at risk due to sea level rise, saltwater interruption and coral bleaching in coastal areas (Ratter et al., 2021; Satta et al., 2016). Increased desertification and protracted droughts in the Sahel are destroying rangelands, decreasing species diversity particularly for pastoral fauna, and migrating bird populations. This reduces the potential for tourism in semi-arid regions (Niang et al., 2014; Olsson et al., 2019). Breeding cycles and species movement are being disrupted in inland areas like savannahs and tropical forests due to changing rainfall patterns, habitat fragmentation and increased wildfire frequency (IPCC, 2022; Scheiter & Higgins, 2009). According to the reviews, biodiversity loss compromises the fundamental value of safaris and nature-based experiences, making these effects especially significant for wildlife tourism a significant economic pillar in many African nations (Gössling et al., 2006; Mkiramweni, 2014; Saarinen & Moswete, 2023). For instance, decrease in rainfall is affecting the grasslands that herbivores like zebras and wildebeests rely on, making the Serengeti–Masai Mara ecosystem which sustains the Great Migration more vulnerable. This has an impact on predator populations and visitor experiences (Karani & Failler, 2020). These results highlight the necessity of region-specific adaptation plans that put biodiversity preservation and ecosystem conservation first in order to support economies that rely heavily on tourism.

4.1.2 Habitat disruptions

Reviews further show that, South Africa's Kruger National Park is experiencing habitat disruption due to temperature and precipitation changes, endangering animals like elephants and rhinoceros (Dube et al., 2022). Local economic downturns are caused by the loss of these species that immediately affects employment prospects for rangers, tour guides and service providers. Safari experiences are a popular tourist destination and their appeal is greatly diminished by the loss of habitat for these keystone species (Saarinen et al., 2022). Since the keystone species' predictability is a major draw, the disturbance of animal habitats has a negative impact on tourism (Saarinen & Moswete, 2023). Changes

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in flood patterns, for instance, have an impact on both the wildlife and the activities that visitors partake in Botswana's Okavango Delta. These interruptions reduce the dependability and calibre of wildlife watching opportunities that are essential for maintaining tourism-related income.

4.1.3 Extreme weather events

Extreme weather events including floods, droughts and storms are becoming more often and severe in countries under consideration as recognised by tour operators, protected area managers and lodging management. For instance, a study conducted in South Africa's Western Cape shows that severe droughts, particularly the "Day Zero" water crisis, had a major impact on Cape Town's tourism industry by lowering the amount of water available to visitors and local businesses (Dube et al., 2022). This demonstrated the vulnerability of economies that depend on tourism by leading to the closure of several hospitality-related firms and the loss of jobs. Similar to this, catastrophic weather events in Zimbabwe have disrupted tourism operations and decreased visitor numbers by seriously damaging infrastructure in popular tourist destinations like Victoria falls. Egypt and Morocco's coastal tourist spots are at risk due to rising sea levels (Ahmed & Hefny, 2007). According to research, Morocco's Atlantic coast is also experiencing erosion and rising freshwater salinity that have an impact on the natural environment and tourism amenities. In Egypt, Red sea resorts are experiencing coastal erosion that threatens beaches and coral reefs, which are crucial for diving tourism (Shaaban & Ramzy, 2010; Snoussi et al., 2008). Local jobs are impacted and foreign exchange profits are decreased as a result of the drop-in tourists. The livelihoods of people that depend on coastal tourism as well as tourism money are directly impacted by the erosion of beaches and coral reefs.

4.1.4 Water shortages

The lack of water is a serious problem in desert areas like Namibia and Botswana. A Namibian study found that, decreased rainfall has caused water scarcity in Etosha national park, which has an impact on wildlife and visitor experiences (Saarinen & Moswete, 2023). According to Dube et al. (2022), Botswana's Okavango delta tourism is mostly dependent on seasonal floods that are growing more unpredictable and affecting water-based tourism. Because of operational difficulties, lodges and camps have experienced job insecurity among employees in the tourism and hospitality industries. In addition to affecting animal viewing, the lack of water supplies also affects basic hospitality services.

4.1.5 Impacts on cultural heritage

Cultural heritage sites in Africa are at serious risk from climate change. According to a 2007 study by Ahmed and Hefny, sites like Egypt's pyramids and sphinx are in danger due to rising salinity brought on by rising sea levels and shifting weather patterns. Increased rainfall and flooding have also been observed in Zimbabwe, causing erosion and structural damage to the Great Zimbabwe ruins, hence compromising their integrity and tourism appeal (Saarinen & Moswete, 2023). When cultural heritage is degraded, fewer tourists visit the area and local guides, artists, and cultural businesses make less money. Cultural tourism depends on these locations, and both historical preservation and tourism revenue are under risk from their deterioration.

4.1.6 Shifts in tourism seasonality

Other notable impacts identified throughout the review were changes in the seasonality of tourism and heightened danger of wildfires. The typical seasonality of tourism is changing due to changes in climatic trends. Lesotho's ski tourism season is being impacted by changes in snowfall patterns with shorter and less predictable snow periods affecting the viability of winter sports tourism. In Kenya, for instance, changing rainfall patterns influence the timing of peak tourist seasons for wildlife viewing in the Maasai Mara (Hoogendoorn et al., 2021; Karani & Failler, 2020). For seasonal labour and tourism operators, these disturbances make revenue less predictable that makes investment and company planning more difficult. Additionally, the reviews found that Namibia and South Africa now face a higher danger of wildfires (Dube & Nhamo, 2020). Wildfires in South Africa's Western Cape pose a threat to tourism infrastructure and wildlife affecting destinations such as Table mountain national park (Dube & Nhamo, 2020). The growing occurrence of wildfires in Namibia's savanna areas has an impact on wildlife habitats and the natural beauty that is essential to ecotourism. In addition to being a safety danger, wildfires can cause large financial losses for the travel and tourism industry.

4.1.7 Seasonal shifts and tourism benefits

It is interesting to note that reviews from Egypt indicate conflicting effects on foreign tourism earnings, with carbon dioxide emissions having a detrimental effect on the industry. Elsayed (2023) asserts that temperatures and rainfall have a positive correlation over both the short and long term. He added that by prolonging the warm season, especially for

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visitors from Europe, high temperatures might help the travel and tourism sector. Given that, prolonged warm seasons draw more tourists and prolong the employment of tourism workers, this points to possible economic benefits for some nations. Elsayed's (2023) results, however, go counter to Dube et al.'s (2022) assertion that high temperatures can negatively affect tourism. A review of these conflicting results shows that whereas some areas might see short-term benefits from warmer temperatures, others might experience negative effects, particularly with regard to visitor comfort and the sustainability of natural attractions. The reason for this discrepancy is that the majority of research on how temperature and precipitation affect winter travel, especially in Europe (Harrison et al., 1999), indicates that warming temperatures will be detrimental to ice and, thus, to the travel industry. Rising temperatures will help some nations, especially those in the Mediterranean region like Egypt.

Depending on sensitivity, exposure, and adaptability, the effects of climate change on tourism vary from one African country to the next. However, because wildlife tourism is a significant economic engine and is directly threatened by the unpredictable migration patterns brought on by climate change, biodiversity loss has the most significant influence on the African tourism industry. An additional serious issue is the rise in the frequency of extreme weather events. These incidents cause immediate and significant financial losses as well as long-term harm to the tourism sector by destroying infrastructure, interfering with travel plans and directly endangering visitor safety.

4.2 Climate change adaptation strategies

The adaptation strategies described in the countries under consideration have shown a distinct change over time, from unplanned, reactive efforts to more planned, proactive and multi-level interventions. Initially, tourism stakeholders concentrated on implementing temporary closures or back up plans to deal with climate shocks. Nonetheless, adaptation strategies have changed to incorporate long term planning and diversification to tourism markets and products. This change also shows how governments, communities and tourism businesses are moving away from discrete interventions and towards integrated responses. A reflection of this wider trend is the greater focus on climate proof infrastructure, flexible itinerary design and awareness campaigns. Another significant trend is the move towards participatory adaptation. There has been an increase in investment in indigenous knowledge systems and community engagement as a basis for sustainable tourism planning in countries like Botswana and South Africa. Nevertheless, the emergence of technology such climate risk mapping and early warning systems suggest a parallel trend of digital integration in adaptation. As a result, methods that have been observed show both a development in complexity and recognition that tourism adaptation needs to be inclusive, customised and future focused.

4.2.1 Raising awareness and educating stakeholders

According to reviews, in many of the countries under consideration, increasing awareness and educating the public and visitors are common adaptation measures (Table 2). These strategies aim to educate travellers on how their decisions and actions affect the environment (Agrawala et al., 2004; Dube et al., 2022; Hoogendoorn et al., 2020). This involves promoting eco-friendly travel practices like cutting back on trash, conserving water and honouring regional ecosystems (Dube et al., 2022). Notably, visitors are more likely to engage in sustainable practices when they are conscious of the effects of their actions. In South Africa, for example, government-led activities like the "Responsible Tourism Handbook" have incredibly increased public awareness and brought about quantifiable flow in visitor water and littering [South Africa Department of Tourism (SADT, 2021)]. Besides, there is a growing demand for sustainable tourism products and services due to tourists' growing awareness (Hambira et al., 2013). In order to fulfil this need, tour operators, lodging providers and other tourism-related enterprises are then empowered to execute eco-friendly strategies. This might result in the creation of eco-friendly travel options and nature-based activities, which would help to reduce the overall impacts on the environment.

4.2.2 Tourism product diversification

Expanding tourism products is a strategy for adaptation in most of the countries under review, especially for tour operators (Ahmed & Hefny, 2007; Mushawemhuka, 2021; Saarinen & Moswete, 2023). This entails broadening a destination's selection of experiences and offerings. Tour operators in Botswana have switched their primary business from nature-based tourism to cultural tourism due to the potential for climate change to create unpredictability in weather patterns, which could affect the dependability of tourist. By differentiating their tourism offerings, tourism businesses can reduce their dependence on a single activity. To provide alternatives in the event of bad weather, a seaside location can expand into adventure tourism, cultural tourism or nature-based experiences. This strategy allows destinations to draw tourists all year round by providing activities that are interesting at different times of the year.

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4.2.3 Developing flexible itineraries

Studies from South Africa, Zimbabwe and Botswana show that, creating a flexible travel schedule for visitors is a successful adaptation strategy (Chikodzi et al., 2022; Dube et al., 2022; Hambira et al., 2013; Saarinen & Moswete, 2023). Since climate change might result in more unpredictable weather patterns, such as sudden changes in temperature, precipitation or the occurrence of extreme weather events, itinerary flexibility is fundamental to the tourism industry's adaptation to climate change. Tour operators and travel organisations can immediately adjust planned activities and keep an eye on weather conditions (Dube et al., 2022; Chikodzi et al., 2022). In order to reschedule game drives or switch to indoor cultural experiences in the event that rains disrupt scheduled safaris, Zimbabwean safari operators, for instance, have executed dynamic planning devices that consolidate real-time meteorological information (Zimbabwe Parks and Wildlife Management Authority, 2024). This protects visitors by maintaining a strategic distance from regions affected by bad weather and offering substitute activities that suit the circumstances at hand. This adaptability promotes repeat business and favourable word-of-mouth referrals by enhancing overall visitor fulfilment and enjoyable travel experiences.

4.2.4 Early warning systems

Reviews show that, early warning systems is recognised and implemented as an adaptation strategy in different African countries. Early warning systems enable tour operators safeguard infrastructure and lessen tourist's exposure to danger by forecasting and communicating threats related to tropical storms and tidal floods in coastal regions (Ratter et al., 2021). This adaptation strategy also helps with water resource planning, agro tourism connections and visitor safety in the Sahel where heatwaves and draughts are common (Niang et al., 2014; Olsson et al., 2019). They achieve this by anticipating dry spells and facilitating proactive mitigation measures. However, early warning systems enable tourism business operators to monitor precipitation patterns, flooding, wildfires and seasonal variability (IPCC, 2022). The installation of early warning systems in Kenya's Masai Mara, has provided timely alerts during the 2023 flash floods. Meanwhile, in South Africa, for instance, drought early warnings aid in water conservation for both local and tourism purposes (Dube et al., 2022). Early warning systems are important in itinerary modification as well as advising tourists on safety precautions and enable lodge managers to withstand different weather events in the face of climate change (Kilungu & Munishi, 2024; Saarinen & Moswete, 2023).

4.2.5 Engaging local communities

Reviews show that integrating local residents is one of the adaptation strategies given top importance in countries under consideration. Local community engagement has gained popularity as it is used in decision making about tourism, sustainable land use and wildlife conservation, which ensures sustainable practices and build resilience (Dube et al., 2022; Friedrich & Stahl, 2019; Karani & Failler, 2020). As part of engagement, community is given access to financial and employment benefits that come with tourism (Shaaban & Ramzy, 2010; Tervo-Kankare et al., 2017). In Kilimanjaro region for example, community owned lodges have increased local employment by 20% and empowered local community by offering platforms for promoting sustainable tourism (Minja, 2015; URT, 2024). Meanwhile in South Africa, local communities adjust to climate change by incorporating climate resilient activities into the tourism services they offer (Dube et al., 2022). In Tanzania, some of the local communities adjust to changing climate conditions by actively engaging in tourism planning and management. They do this by diversifying tourism offerings, putting sustainable practices into place and working with conservation organisations to safeguard their natural and cultural resources (Kilungu et al., 2019; Mkiramweni, 2014; Qwatekana & Tshikovhi, 2024).

Generally, reviews indicate that, provision of education on climate change and local community engagement are prioritised in the majority of the countries under consideration due to their emphasis on sustainability. These strategies can lead to better results and long-term success in adapting to climate change impacts. Evidence from different parts of Africa indicate that, if local residents are put into consideration, adaptation strategies are likely to be accepted and will persist overtime. This will in turn reinforce both economic and environmental resilience (Friedrich & Stahl, 2019; Karani & Failler, 2020). It is therefore, worth noting that, successful adaptation strategies often involve a combination of approaches. However, those that prioritize community engagement tend to be more successful in achieving resilience and sustainability in the face of climate change challenges.

5. Conclusions and implications

5.1 Conclusion

Climate change poses direct and a growing challenge to tourism in Africa. Loss of biodiversity, extreme weather events and cultural heritage disruptions are facing major impacts. However, protected areas such as Serengeti national park in Tanzania, Kruger national park in South Africa and the Okavango Delta in Botswana face particular risks. Tourism

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https://doi.org/10.58548/2025abmj31.6880

industry is weakened since important tourism attractions such as wildlife viewing are in jeopardy. Countries with stronger institutions such as South Africa and Kenya are progressing well regardless of adaptation strategies being fragmented. These strategies involve policy reforms, community engagement and the use of indigenous knowledge. The future sustainability of African tourism hangs on the implementation of locally grounded, inclusive and forward-looking adaptation measures. These include; investments in climate resilient infrastructure, ecosystem restoration and education. Urgent coordinated action is needed to build adaptive capacity and protect Africa's natural and cultural assets for future generations.

5.2 Implications for policymakers

Policymakers must take the lead in building climate-resilient tourism. They should invest in infrastructure that can withstand dry seasons, floods and other extraordinary climate events. Solid water management frameworks are also key. Governments can further help by inserting conservation efforts into national plans. This bolsters the protection of biodiversity and cultural heritage sites. However, the viability of these efforts may encounter challenges including limited funding and governance institutions. These gaps might be filled in part by utilizing international climate funding institutions and public private partnerships. There is a need to develop a unified response to climate threats. Therefore, policy makers must integrate climate change adaptation into tourism policies encouraging intersectoral collaboration across urban development, agriculture and wildlife protection.

5.3 Implications for the private sector

Tourism industry has to adopt the use of sustainable methods such as trash reduction and energy efficient technologies in order to lessen the impacts of climate change in tourism. Companies should expand their focus to include cultural tourism in order to diversify their tourism offers and lessen their dependency on climate sensitive attractions. Private sector can further be involved in providing financial incentives including tax refunds for green investments and low interest credits for environmentally beneficial projects. Lessons from places like South East Asia, where community-based tourism and incentives for sustainable resort development have worked well and can be copied in other parts of Africa. Investments in technologies will also improve operational resilience and enable quick responses to weather related interruptions.

5.4 Implications for local communities and regional cooperation

Local communities are important for climate change adaptation when involved in terms of tourism management and planning. They can preserve biodiversity and get direct benefits of sustainable tourism by taking part in conservation programs and capacity building projects. In order to stimulate active engagement, real financial incentives should be offered through microfinancing local tourism businesses and community-based tourism revenue sharing models. Nonetheless, tackling the common problems posed by climate change needs both regional and global collaboration. African countries should work together on knowledge sharing platforms and harmonize their tourism and climate policies in order to increase resilience across borders. In light of this, the African Union (AU) and other regional organisations can operate as facilitators by giving forums for coordinated action and debate about policies. Additionally, partnerships with foreign organisations can also offer crucial capital and knowledge to support tourism related adaptation initiatives.

6. Limitations and future research

This study, while comprehensive, is not without limitations. First, the exclusive reliance on peer-reviewed English-language literature may have introduced a language bias, excluding valuable insights published in French, Portuguese, Arabic, or local African languages, especially given the linguistic diversity across the continent. Second, the exclusion of grey literature, policy briefs, and reports from non-governmental organisations (NGOs) or development agencies might have limited the exploration of practical, on-the-ground adaptation initiatives not yet captured in academic publications. Third, while the systematic review covered diverse African regions, significant geographic disparities remain, with a predominance of studies from Southern and Eastern Africa, and limited representation from Central and parts of West Africa. Additionally, the review primarily focused on adaptation strategies without sufficiently examining their implementation challenges, effectiveness, or long-term sustainability in different contexts. The absence of quantitative meta-analysis further limits the ability to generalize or compare the effectiveness of adaptation measures across case studies. Future research should aim to address these gaps by incorporating multilingual and grey literature sources, expanding empirical coverage to underrepresented regions, and employing mixed-method approaches that include longitudinal studies and stakeholder-driven evaluations. Moreover, future studies should explore the integration of nature-based solutions, gender-responsive strategies, and cross-sectoral collaboration to provide a more holistic understanding of how tourism can adapt to climate change in Africa.

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https://doi.org/10.58548/2025abmj31.6880

References

Adger, W. N., Huq, S., Brown, K., Conway, D., & Hulme, M. (2003). Adaptation to climate change in the developing world. *Progress in Development Studies, 3*(3), 179-195. https://doi.org/10.1191/1464993403ps060oa

Agrawala, S., Bosello, F., Carraro, C., De Cian, E., &Lanzi, E. (2011). Adapting to climate change: costs, benefits, and modelling approaches. *International Review of Environmental and Resource Economics, 5*(3), 245-284. https://doi.org/10.1561/101.00000041

Agrawala, S., Crick, F., Jette-Nantel, S., & Tepes, A. (2004). Development and climate change in Uganda: Focus on Mount Elgon. *OECD Environment Working Papers*, No. 5. https://doi.org/10.1787/19970900

Ahmed, M. T., & Hefny, M. (2007). *Climate Change and Tourism: an Egyptian Perspective*. Ismailia, Egypt: Suez Canal University.

Becken, S., & Hay, J. E. (2007). *Tourism and climate change: Risks and opportunities* (Vol. 1, Climate Change, Economies and Society – Leadership and Innovation series). Channel View Publications. https://doi.org/10.21832/9781845410681

Botswana Tourism Organisation. (2023). *Tourism sector performance report 2023*. https://www.botswanatourism.co.bw/reports/2023

Bushesha, M. (2018). Climate change and tourism in Tanzania: Identifying the gaps. *The African Review: A Journal of African Politics, Development and International Affairs, 45*(1), 134–167.

Chikodzi, D., Nhamo, G., Dube, K., & Chapungu, L. (2022). Climate change risk assessment of heritage tourism sites within South African national parks. *International Journal of Geoheritage and Parks, 10*(3), 417-434. https://doi.org/10.1016/j.ijgeop.2022.09.001

Dube, K., Nhamo, G., & Chikodzi, D. (2020). Climate change-induced droughts and tourism: Impacts and responses of Western Cape tourism businesses. *Jàmbá: Journal of Disaster Risk Studies, 12*(1), 1–9. https://doi.org/10.4102/jamba.v12i1.755

Dube, K., Nhamo, G., & Chikodzi, D. (2022). Climate change-induced droughts and tourism: Impacts and responses of Western Cape province, South Africa. *Journal of Outdoor Recreation and Tourism, 39*, 100319. https://doi.org/10.1016/j.jort.2022.100319

Dube, K., Nhamo, G., Kilungu, H., Hambira, W. L., El-Masry, E. A., Chikodzi, D., Chapungu, L. & Molua, E. L. (2023). Tourism and climate change in Africa: informing sector responses. *Journal of Sustainable Tourism, 32*(9), 1811–1831. https://doi.org/10.1080/09669582.2023.2193355

Elsayed, A. H. (2023). Climate change and tourism in Egypt: An econometric analysis. *Tourism Economics, 29*(2), 345–362.

Friedrich, J., & Stahl, J. (2019*). Beach tourism and climate along South Africa's coastline*. (Unpublished Master's thesis). University of Göttingen, Germany.

Friedrich, J., Stahl, G., & Mbatha, N. (2020). Climate change impacts on tourism infrastructure in Southern Africa. *Climate Risk Management, 28*, 100215. https://doi.org/10.1016/j.crm.2020.100215

Füssel, H. M. (2007). Adaptation planning for climate change: concepts, assessment approaches, and key lessons. *Sustainability Science, 2*, 265-275. https://doi.org/10.1007/s11625-007-0032-y

Gössling, S., & Hall, C. M. (2006). Uncertainties in predicting tourist flows under scenarios of climate change. *Climatic Change, 79*(3), 163-173. https://doi.org/10.1007/s10584-006-9081-y

Hambira, W. L., Saarinen, J., Manwa, H., & Atlhopheng, J. R. (2013). Climate change adaptation practices in nature-based tourism in Maun in the Okavango Delta area, Botswana: How prepared are the tourism businesses? *Tourism Review International, 17*(1), 19-29. https://doi.org/10.3727/154427213X13649094288042

Harrison, S. J., Winterbottom, S. J., & Sheppard, C. (1999). The potential effects of climate change on the Scottish tourist industry. *Tourism Management, 20*(2), 203–211. https://doi.org/10.1016/S0261-5177(98)00073-2

Hoogendoorn, G., & Rogerson, C. M. (2016). New perspectives on Southern African tourism research. *Tourism: An International Interdisciplinary Journal, 64*(4), 355-357.

Hoogendoorn, G., Fitchett, J. M., & Grant, B. (2020). Climate change and South African tourism: Impacts and responses. *South African Geographical Journal, 102*(2), 123–137. https://doi.org/10.1080/03736245.2019.1705910

Hoogendoorn, G., Fitchett, J. M., & Grant, B. (2021). Climate change and tourism in South Africa: A review of impacts and adaptation strategies. *Tourism Geographies, 23*(4), 567–584. https://doi.org/10.1080/14616688.2020.1808431

Intergovernmental Panel on Climate Change (IPCC). (2023). *Climate change 2023: Impacts, adaptation, and vulnerability*. Contribution of Working Group II to the Sixth Assessment Report.

Karani, P., & Failler, P. (2020). Comparative coastal and marine tourism, climate change, and the blue economy in African Large Marine Ecosystems. *Environmental Development, 36,* 100572. https://doi.org/10.1016/j.envdev.2020.100572

Kessy, D. (2022). Community Engagement in Tourism: Implication on Sustainable Heritage Management in Urban Spaces. *Eastern African Journal of Hospitality, Leisure & Tourism, 9*(1), 74–86

Kessy, J. F. (2022). Climate change and wildlife tourism in Tanzania: Challenges and adaptation strategies. *African Journal of Ecology, 60*(1), 45–54. https://doi.org/10.1111/aje.12912

Kihila, J. M. (2018). Indigenous coping and adaptation strategies to climate change of local communities in Tanzania: a review. *Climate and Development, 10*(5), 406-416. https://doi.org/10.1080/17565529.2017.1318739

Kilungu, H. (2023). A Decade of Climate Change and Tourism Research in Tanzania: Where are we? *Tanzania Journal of Forestry and Nature Conservation, 92*(1), 185-201. https://doi.org/10.1234/tjfnc.2023.0001

Kilungu, H., & Munishi, P. K. (2024). Eco-parcel: An approach to identify and describe attractions to support adapting nature-based tourism destinations to climate-change impacts. *African Journal of Ecology, 62*(1), e13211. https://doi.org/10.1111/aje.13211

Kilungu, H., Leemans, R., Munishi, P. K., Nicholls, S., & Amelung, B. (2020). *Forty years of climate and land-cover change and its effects on tourism resources in Kilimanjaro National Park*. In Sustainable Tourism Policy and Planning in Africa (pp. 127-145). Routledge. https://doi.org/10.4324/9780367813881-11

Kilungu, H., Munishi, P., &Mbonile, M. (2019). Community perceptions of climate change impacts on tourism in Tanzania. International Journal of Climate Change Strategies and Management, 11(3), 345–360.

Köberl, J., Prettenthaler, F., & Bird, D. N. (2016). Modelling climate change impacts on tourism demand: A comparative study from Sardinia (Italy) and Cap Bon (Tunisia). *Science of the Total Environment, 543,* 1039-1053. https://doi.org/10.1016/j.scitotenv.2015.03.099

Mahadew, R., & Appadoo, K. A. (2019). Tourism and climate change in Mauritius: assessing the adaptation and mitigation plans and prospects. *Tourism Review, 74*(2), 204-215. https://doi.org/10.1108/TR-02-2018-0025

Malik, A., Qin, X., & Smith, S. C. (2010). Autonomous adaptation to climate change: A literature review. *Institute for International Economic Policy Working Paper Series,* 202, 1-25.

Marshall, N. A., Marshall, P. A., Abdulla, A., Rouphael, T., & Ali, A. (2011). Preparing for climate change: recognising its early impacts through the perceptions of dive tourists and dive operators in the Egyptian Red Sea. *Current Issues in Tourism, 14*(6), 507-518. https://doi.org/10.1080/13683500.2011.555523

Mihigo, D., & Lukenangula, J. M. (2023). Smart tourism for managing climate change effects on tourism industry and tourism development in African countries. *Green Building & Construction Economics, 4*(1), 183–198. https://doi.org/10.1007/978-3-030-78303-5_18

Minja, G. (2014). Vulnerability of tourism in Kilimanjaro national park and the livelihoods of adjacent communities to the impacts of climate change and variability. *European Scientific Journal, 10*(29), 185-201

Minja, G. S. (2015). Ecological and socio-economic implication of climate change and variability on tourism in Kilimanjaro Mountain National Park, Tanzania. *European Scientific Journal, 11*(35), 409–423. https://www.eujournal.org/index.php/esj/article/view/6806

Mkiramweni, N. (2014). *Sustainable wildlife tourism in the context of climate change: The case study of Ngorongoro conservation area, Tanzania* (Doctoral dissertation, Victoria University).

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group, T. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine, 151*(4), 264-269. https://doi.org/10.7326/0003-4819-151-4-200908180-00135

Mubita, K., Milupi, I., Kalimaposo, K., Monde, P. N., Muyangana, A., Simooya, S. M., & Phiri, C. (2023). Responding to challenges in tourism in the era of climate change in Zambia. *International Journal of Education and Social Science Research, 6*(2), 129–139. https://doi.org/10.37500/IJESSR.2023.6212

Mullikin, T. S. (2024). *Challenges and opportunities facing ecotourism in sub-Saharan Africa from climate change desertification*. In 7th International Conference on Tourism Research: ICTR 2024. Academic Conferences and publishing limited.

Mushawemhuka, W. J. (2021). *A comprehensive assessment of climate change threats and adaptation of nature based tourism in Zimbabwe* (Doctoral dissertation, University of Johannesburg, South Africa). University of Johannesburg. https://hdl.handle.net/10539/41699

Ngxongo, N. A. (2021). *Environmental vulnerability and the economic implications of climate change for tourism development in the Central Drakensberg Region (CDR) of KwaZulu Natal* (Doctoral dissertation, Durban University of Technology, South Africa). Durban University of Technology. https://doi.org/10.51415/10321/3912

Niang, I., Ruppel, O. C., Abdrabo, M. A., Essel, A., Lennard, C., Padgham, J., & Urquhart, P. (2014). Africa. In V. R. Barros et al. (Eds.), *Climate change 2014: Impacts, adaptation, and vulnerability. Part B: Regional aspects* (pp. 1199–1265). Cambridge University Press. https://www.ipcc.ch/report/ar5/wg2/

Olsson, L., Opondo, M., Tschakert, P., Agrawal, A., Eriksen, S. H., Ma, S., Perch, L. N., Prakash, A., Revi, A., Rivera-Ferre, M. G., Roe, S., Schultz, S., Scoville-Simonds, M., Stringer, L. C., Vermeulen, S., & Zakieldeen, S. A. (2019). *Livelihoods and poverty*. In P. R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, & J. Malley (Eds.), Climate change and land: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems (pp. 435–534). Intergovernmental Panel on Climate Change. https://www.ipcc.ch/srccl/

Pickering, A. J., Djebbari, H., Lopez, C., Coulibaly, M., & Alzua, M. L. (2015). Effect of a community-led sanitation intervention on child diarrhoea and child growth in rural Mali: a cluster-randomised controlled trial. *The Lancet Global Health, 3*(11), e701-e711. https://doi.org/10.1016/S2214-109X(15)00144-8

Pickering, C., & Byrne, J. (2014). The benefits of publishing systematic quantitative literature reviews for PhD candidates and other early-career researchers. *Higher Education Research & Development, 33*(3), 534-548. https://doi.org/10.1080/07294360.2013.841651

Qwatekana, Z., & Tshikovhi, N. (2024). Tourism Under Siege: Impact of Climate Change on the Global South Tourism Sector. In C. Tanrisever, H. Pamukçu, & A. Sharma (Eds.), *Future Tourism Trends Volume 1* (pp. 19–31). Emerald Publishing Limited. https://doi.org/10.1108/978-1-83753-244-520241002

Ratter, B. M. W., Kruse, K., & von Storch, H. (2021). Risk of loss of tourism attractiveness in the Western Mediterranean under climate change. *Frontiers in Climate, 3*, 727747. https://doi.org/10.3389/fclim.2021.727747

Reddy, M. (2012). *Tourism and climate change risks: Opportunities and constraints in South Africa* (Master's thesis, University of KwaZulu Natal, South Africa). University of KwaZulu Natal. http://hdl.handle.net/10539/11392

Rogerson, C. M. (2016). Climate change, tourism and local economic development in South Africa. *Local Economy, 31*(1-2), 322-331. https://doi.org/10.1177/0269094215624354

Saarinen, J., & Moswete, N. (2023). *Climate Change, Cultural Heritage, and Tourism in Africa: Critical Issues and Changes*. In Cultural Heritage and Tourism in Africa (pp. 284-303). Routledge.

Saarinen, J., Fitchett, J., & Hoogendoorn, G. (2022). *Climate change and tourism in southern Africa*. Routledge.

Satta, A., Puddu, M., Venturini, S., & Giupponi, C. (2016). Assessment of coastal risks to the tourism sector: A Mediterranean case study. *Regional Environmental Change, 16*(3), 593–604. https://doi.org/10.1007/s10113-015-0760-3

Scheiter, S., & Higgins, S. I. (2009). Impacts of climate change on the vegetation of Africa: An adaptive dynamic vegetation modelling approach. *Global Change Biology, 15*(9), 2224–2246. https://doi.org/10.1111/j.1365-2486.2008.01838.x

Scott, D., Gössling, S., & Hall, C. M. (2016). *Tourism and climate change: Impacts, adaptation and mitigation*. Channel View Publications.

Shaaban, I., & Ramzy, Y. (2010). The impact of climate change on tourism in Egypt as perceived by both policymakers and tourism managers. *WIT Transactions on Ecology and the Environment, 139*, 241-251. https://doi.org/10.2495/ST100211

Snoussi, M., Ouchani, T., & Niazi, S. (2008). Vulnerability assessment of the impact of sea-level rise and flooding on the Moroccan coast: The case of the Mediterranean eastern zone. *Estuarine, Coastal and Shelf Science, 77*(2), 206-213. https://doi.org/10.1016/j.ecss.2007.09.024

South Africa Department of Tourism (SADT). (2021). National tourism recovery strategy 2021–2023. https://www.tourism.gov.za/strategies/recovery2021.pdf

Tervo-Kankare, K. (2023). *Tourism and climate change adaptation in protected areas*. In Handbook on Tourism and Conservation (pp. 73-85). Edward Elgar Publishing.

World Tourism Organization (UNWTO). (2022). *Baseline report on climate action in tourism*. https://doi.org/10.18111/9789284423965

World Tourism Organization (UNWTO). (2023). *Tourism at COP28 – Delivering on the climate action commitments of the Glasgow Declaration.* https://www.unwto.org/news/tourism-at-cop28-delivering-on-the-climate-action-commitments-of-the-glasgow-declaration

Zimbabwe Parks and Wildlife Management Authority. (2024). *Wildlife conservation and tourism report 2024*. https://www.zimparks.org.zw/reports/2024