Tourism, climate change and biodiversity in Sub-Saharan Africa

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This book commemorates Prof. Bob Wishitemi. For many people engaged in the field of tourism studies in Africa, Bob has been a teacher, an engaged colleague, a friend and an inspiration. To memorialise his death in 2021, the present volume offers articles written by his former colleagues and other scholars who have interacted with him at various levels. The volume contains 12 articles and presents a variety of approaches to tourism, climate change and biodiversity in sub-Saharan Africa.

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About the authors

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the years he has done extensive research, publishing a many peer reviewed articles and book chapters. His work for the Amboseli Ecosystem has been significant, leading to the establishment of community sanctuaries and influencing management plans regarding the ecosystem for over ten years. He has supervised many undergraduate, masters' and doctorate students in different universities. Apart from that, he has given many keynote speeches at different conferences around the world, and has been an external examiner for many universities in Africa (in Kenya, Namibia, and Botswana). He continues to engage in management and research activities at Amboseli, Kenya.

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1

Introduction

D. Kieti, R.Okech and V.R. van der Duim

In 2021, we lost a great friend and colleague, Prof. Bob Wishitemi of Moi University, Eldoret, Kenya. To honour his great contribution to academia, we decided to publish this book to commemorate Bob and his scholarly work. Prof. Wishitemi was a wise, empathetic and kind colleague and friend. At the same time, he was very concerned, if not alarmed, about what is happening to our planet and our world. He was the first to say 'yes' when, in 2020, Roselyne Okech and Harry Wels asked him for a contribution to an edited volume they wanted to compile on the topic of tourism and climate change. He was also the first to hand in his contributions (see chapters 2 and 3 of this book). It is therefore more than fitting that, instead of finishing the edited volume as Roselyne Okech and Harry Wels initially intended, we have shifted the focus to his commemoration. In this first chapter we pay tribute to Prof. Bob Wishitemi and introduce the theme and the chapters in this book.

1.1 A Tribute to Prof. Wishitemi

Bobby Ernest Lisamula Wishitemi was born in the year 1958. He studied Zoology, Botany and Education at the University of Nairobi and graduated with a B.Ed. (First Class Honours) in 1981. He was awarded a MSc. scholarship in December of 1981. Between 1981 and 1983 he obtained his MSc. in Biology of Conservation at the University of Nairobi. In 1985, he was awarded a PhD scholarship under the auspices of ICIPE, and trained at Kenyatta University, where he obtained his PhD in Biology of Conservation in 1989.

Prof. Bob Wishitemi, or simply 'Bob' as he was commonly known, had been a Professor at the Department of Tourism Management of Moi University since 2004. Since 1983 he was involved in lecturing at the University and Tertiary Institutions, in administration, research and research supervision, as well as negotiating several grant proposals and agreements with donor agencies, project management and programme administration. He served as the Deputy Vice-Chancellor, Research & Extension, at Moi University between 2006 and 2016, where he spearheaded research, extension, outreach and international programmes. He chaired several university committees, including the committee of Deans, the Students' Disciplinary committee, the Examination Irregularities committee, the Graduate Studies, Research and Extension Committee, the Information and Learning Resources Committee, the Academic Affairs Committee, the Full Professors' Committee, and the Inter-School Executive Committee at the Institute of Gender Equity and Research and Directorate of Open and Distance Learning. Prof. Bob Wishitemi was a member of the following Moi University council committees: the Research, Training, Sealing and Statutes Committee, the Council Appointments Committee, the Council Staff Appeals Committee, and the Finance and General Purposes Committee.

Prof. Wishitemi distinguished himself with his contribution to the well-being of students and the faculty. He gave selflessly, topping it up with his availability. Besides giving his resources to those in need, he always had a listening ear, a big smile, and encouragement for those who were discouraged. He opened his beautiful soul to everyone – even at his lowest points in life. The doors to his office were always wide open for all to enter, regardless of age, race, tribe or status. As long as there was a need, Bob was ever ready and willing to give. One of his students, Moses Okello, now a professor at Moi University, recalls that he did not have funds to bind his senior project in the Wildlife Department in 1989, having come from a low-income family. Prof. Wishitemi paid for his senior project, later employing him and facilitating his studies in the US and Canada. Prof. Wishitemi was a living embodiment of humility and

love. He was a great man who had such a warm heart that he always welcomed whomever he met with a smile. He shook hands and took the time to exchange pleasantries with every person he met along the way. He created the circumstances that made those around him feel comfortable. He knew when to speak and when to keep silent, never domineering anyone. Indeed, he never consciously used the power of his office, but was powerful through his exhibition of humility.

Perhaps the most significant legacy of Prof. Wishitemi is his contribution to academia. He has been a driving force behind many established scholars, locally and further afield. Many have interacted with his work in their professional work lives. His works on biodiversity, conservation (protected) landscapes, culture, communities and tourism are used as reference materials in tertiary level teaching and research in Kenya, East Africa and beyond. Through seminars, sensitisation workshops, and conferences of international repute, he has made a tremendous contribution to research on conservation and protected area management, pro-poor and community-based tourism initiatives, and wildlife management in sub-Saharan Africa.

Prof. Wishitemi affectionately charted the course of academic life for many students. As observed by one of his students, George Ariya, now a faculty member at the University of Eldoret, "from him (Prof. Wishitemi) oozed the fountain of wisdom, a shining star that illuminated my voyage through the tunnel of knowledge discovery". Prof. Wishitemi believed in people's potential. Dr. Jethro Odanga, who was his colleague and who is currently based in Canada, remembers: "One day he (Bob) literally coerced me to write a concept to deliver to a high ranking office in the country. When I told him I feared doing so, he told me: if you cannot do it, then nobody else in this country can. That statement motivated me to throw myself in the pool to make a draft. Thanks to his words, I did what I could not have done."

Prof. Wishitemi valued collaboration. He was a strong advocate of teamwork, which is reflected in his many publications with colleagues and students, as well as in his numerous research projects. He increasingly emphasised the process of collaboration and teamwork and he was instrumental in establishing important linkages between stakeholders in the industry. Such linkages include those between Moi University and other universities worldwide: the University of Greenwich (UK), Wageningen University & Research (the Netherlands), the University of Lumière (France) and the Welsh School of Hospitality, Tourism and Leisure Management (UK), to name a few. These were monumental in cultivating collaborative research and supervision av-

enues, staff training and exchange, and postgraduate students' scholarships, among others. For instance, through a collaborative engagement with a team from the Netherlands that included Prof. Rene van der Duim, he steered the Joint Financing Programme in Higher Education (MHO) project that culminated in incredible infrastructural investments and capacity building for Moi University. He was also among the pioneers of ATLAS Africa and was at the centre of ATLAS activities in Africa. Indeed, he was the main initiator in the establishment of ATLAS Africa, which for many years had its headquarters at Moi University.

Prof. Wishitemi helped organise most of the initial ATLAS Conferences in Eastern Africa with the support of the ATLAS Secretariat in the Netherlands, and acted as keynote speaker on several occasions. Based on three ATLAS AFRICA conferences between 2000 and 2006, in 2007 he published the book *Culture and Community. Tourism studies in Eastern and Southern Africa*, together with Anna Spenceley and Harry Wels. Furthermore, while serving as a member of scientific teams, taskforces, and stakeholder workshops, he not only participated in steering, reviewing, and designing important fora, but also mobilised the resources necessary for the establishment and implementation of curricula and teaching models such as the student-centred Problem Based Learning (PBL). This dedication was critical to the establishment of Moi University's School of Tourism, Hospitality and Events Management, which at this moment has existed for over a decade.

Bob was not only a prolific academic but also a great human being who cared, listened, and most importantly, addressed the concerns of others. He was a perfectionist who would pay attention to every detail. His administration, albeit an epitome of professionalism, was characterised by warmth and friendliness – 'everyone was everyone's colleague'.

Prof. Bob Wishitemi was, and remains, many things to different people. It is a rare thing to have professors who shape peoples' intellect, interests, and life in general, but that was exactly what Prof. Wishitemi did. He was a mentor to many, and a friend to a lot more. He was popularly known among many as the 'gentle giant'. His warmth, humility, and availability were remarkable for a man of such stature and such an impeccable record of achievements. He was no stranger to anyone. His kindness, generosity, energy, enthusiasm and devotion to humanity – both on and off-campus - always put a smile on people's face. He was everyone's favourite.

Although Prof. Bob Wishitemi is gone, his legacy lives on.

1.2 Introduction to the theme of the book

The major challenges facing sustainable tourism in Africa are climate change and biodiversity loss. This is despite the unprecedented decrease in tourist movement and spending in 2020 and 2021 caused by the COVID-19 pandemic. The COVID-19 crisis not only showed that tourism has a close relationship with the economy; it also put tourism on the political map as an economic sector. The close relationship between tourism and our living environment, in the broadest sense of the word, requires a thorough reconsideration, as well as a political reflection of the role that it can and should play in society. The pandemic also magnified the role of tourism in areas related to climate change and biodiversity and made clear the need for a fundamental reorientation of its role in relation to health and safety, nature, and our production and consumption systems. Once the effects that COVID-19 has had on tourism will fade into the background, even greater challenges than COVID-19 – those related to climate change and biodiversity loss - will demand all of our attention.

This book focuses on these big challenges. Therefore, contributions to this book concentrate on the relation between tourism, climate change and biodiversity. To reach the Sustainable Development Goals on climate change (SDG 13) and ecosystems and biodiversity (SDG 15) and relatedly those on poverty alleviation, well-being, and responsible production and consumption, transformative changes are necessary. Here we follow calls from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC) for a better understanding of underlying – in this case particularly tourism related – causes of biodiversity loss and climate change and the obstacles, but also potentials, for alternative, more desirable, and innovative solutions.

In 2019 the IPBES in Paris concluded that current global efforts are insufficient to halt the loss of biodiversity and restore nature: far-reaching and fundamental societal changes are needed. They adopted a new work programme which included a thematic assessment of transformative change, whose objective would be to understand and identify factors in human society at both the individual and collective levels. These factors, including behavioral, social, cultural, economic, institutional, technical and technological dimensions, may be leveraged to bring about transformative change for the conservation, restoration and wise use of biodiversity, while taking into account broader social and economic goals in the context of sustainable development. Further degradation of nature will undermine progress towards achieving the global goals in the areas of poverty, hunger, health, water, cities, climate, oceans

and land use (approximately 80 per cent of the 44 researched targets under the Sustainable Development Goals or SDGs). This calls for transformative change, which means that our society and economy and, as a consequence, also tourism, must become sustainable.

Climate change is one of the drivers of change in nature, while tourism is one of the drivers of climate change. This book, therefore, also focuses on the relationship between tourism and climate change. The tourism industry could be considered as both a victim of, and a contributor to, climate change. Studies on tourism focus on mitigation (aiming to decrease tourism's contribution to climate change) as well as adaptation to climate change. While climate change affects all destinations, certain environments and communities – especially in sub-Saharan Africa – are more vulnerable to its impacts. Therefore, this book's contributions concentrate on the impacts of climate change on landscapes, national parks and their biodiversity, as well as on ways to cope with these changes.

1.3 Introduction to the chapters

The first two chapters in this book have been co-authored by Bob Wishitemi. In Chapter 2 George Manono, Simon Thiong'o and Bob Wishitemi seek to establish an overview of the perceived causes and manifestations of climate change amongst the community in, and adjacent to, the Maasai Mara National Reserve (MMNR) in Kenya, and to determine the perceived effects of climate changes on plant communities in the region. This study shows that practically every respondent drawn from the employees of MMNR and the local community has heard of climate change, demonstrating that awareness of climate change in the locale can be very pervasive. No significant differences have been found between the MMNR staff and members of the local community with respect to their awareness of climate change, suggesting the ubiquitousness of climate change knowledge throughout the two groups. However, the results also suggest that although most respondents know something about climate change, they can be quite ignorant of the technical details of the phenomenon. The perception of respondents about their knowledge of climate change also turns out to be influenced by gender, age and education level.

In Chapter 3 the same authors investigated changes in five climatic variables (temperature, relative humidity, precipitation, sunshine, and wind speed) over a 21-year period in Narok, Kenya and established the changes in tourism climatic suitability for the area using the Tourism Climate Index (TCI). The

study shows that both the minimum and mean temperatures in Narok have increased significantly, by about 0.07^0C and 0.04^0C, respectively, every year over the 21-year study period. However, the maximum temperature was found to have more or less stagnated. Mean daily relative humidity generally decreased over the years although the reduction was not significant. On the other hand, precipitation, daily sunshine hours, and wind speed all showed positive trends throughout the study period, although the rises were not significant. Based on these results the study recommends that the country should take action to minimise the deleterious effects of climate change, through deliberate approaches such as accelerated reforestation, sustainable land use practices, and conservation enactments, among others.

The next chapter takes us to Tanzania. Dev Jani and John Philemon extensively analyse the impacts of climate change on tourism in Tanzania, as well as, conversely, the impacts of tourism on climate change. Tanzania's tourism sector is affected by climate change mainly through coral bleaching, coastal flooding and erosion, the deletion of the Kilimanjaro Mountain snow cover, high temperatures, the spreading of diseases, the depletion of wildlife, and the destruction of tourist infrastructure. After also discussing the impacts of tourism on climate change, the chapter continues by outlining governmental strategies to counter these effects. The Government of Tanzania has especially been taking steps to mitigate the impacts of climate change on the coastal ecosystems. These strategies aim to reduce the impact of sea-level rise and changes in precipitation patterns caused by climate change and their direct and indirect effects, such as droughts, floods, infrastructure degradation, and environmental degradation. The outcomes of these efforts will ultimately help boost the tourism sector, which contributes massively to the country's economy.

In Chapter 5, Joseph Mbaiwa analyses the effects and implications of climate change on tourism sustainability in tourism destinations throughout Southern Africa. The analysis is based on secondary data, especially published and unpublished data on tourism development, climate change, and theoretical considerations around sustainability. The chapter also make suggestions for potential mitigation strategies that can be introduced in Southern Africa.

Temitope Onifade and Iyanuoluwa Akinbola discuss the implications of the international regulations around climate change on destination competitiveness in Africa in Chapter 6. Their analysis reveals that the central implication is that destination competitiveness is undermined. Guided by their theoretical and regulatory framework, they give us three reasons why destination

competitiveness is impaired. First, the Paris Agreement makes limited provisions for adaptation, loss, and damage. Poor adaptation and management of loss and damage make vulnerable African countries, especially those depending mostly on their natural capital, less competitive for tourism opportunities. The Glasgow Climate Pact does better on adaptation, loss and damage; however, considering we are already in a climate emergency, this progress is too little, too late. Second, the Paris Agreement relies on a voluntary, largely bottom-up, approach that does not guarantee adequate global climate mitigation. African countries will suffer more from the increasing hazards of the climate emergency and have limited access to ecosystem services to support their sustainable development. Therefore, they might be less competitive as a tourism destination. Third, the UNFCCC and the Paris Agreement fail to assign adequate finances that can help African countries deal with climate adaptation, loss, and damage, and enhance sustainable development. While the Glasgow Climate Pact seeks to address this problem, it suffers from the 'voluntariness' problem that does not facilitate financial transfer in an urgent manner. Ultimately, inadequate climate finances will render African countries unable to address climate impacts and develop sustainably, leading to their unattractiveness as tourism destinations.

Chapter 7 is an essay by Chris Boonzaaier and Harry Wels in which they tell about their own modest personal, professional and 'elemental journeys' in search of 'thinking wild', hopefully contributing to a world that is characterised by coexistence rather than anthropocentric plunder leading towards climate disaster. Coexistence is about dissolving the boundaries between Culture and Nature, but also between person and place, or between self and landscape. This sets the scene for the second part of the essay, which focuses on the relation between tourism and biodiversity.

Wilber Ahebwa and Amos Ochieng take over in Chapter 8, discussing the relation between tourism, climate change and biodiversity with a focus on Uganda, resulting in lessons for sustainable tourism and conservation. Based on their analysis of the situation in Uganda they argue for the need for a continuous, detailed and quantifiable assessment of the effects of climate change on the conservation values of biodiversity areas. They also express the urge to develop models to predict long-term impacts that can feed into a sustainable ecological monitoring and risk management plan to adapt the management of the protected areas to different climate change scenarios. The authors conclude that sustainable financing mechanisms are required to support the implementation of plans to mitigate impacts and to adapt the management of the biodiversity areas to the changing circumstances.

In the next three chapters the focus shifts from climate change to biodiversity conservation. In Chapter 9, Moses Okello examines the human-wildlife conflicts (HCWs) in the Tsavo-Amboseli landscapes of Kenya. Although many studies have been carried out on HWCs, describing their nature and effects, causal determinants and how they interact for the future of wildlife conservation as influenced by persecution of wildlife, perceptions, and benefits, have not been established. Such a study would be insightful in creating a further understanding of the mechanisms, influences, and relationships between multiple indicators of HWCs, persecution, wildlife benefits, perceptions of wildlife and how all of these factors determine the future of wildlife and conservation in different wildlife-rich landscapes. This study explores the relationships between factors and indicators using Structural Equation Modelling (SEM) with a view of defining the relationships between them, and how in particular they help determine the future of wildlife and conservation in the Tsavo-Amboseli landscapes. The findings are critical in examining detailed relationships in other landscapes, but can also help in formulating theories and predictions.

Damiannah Kieti and Rita Nthiga present an updated overview and synthesis of community-based conservation in Kenya in Chapter 10. They outline the policy framework, governance and benefit-sharing structure using the case of the Melako community conservancy, one of the most expansive community conservation areas operating under the NRT. To disentangle the complex dynamics of governance and benefit-sharing arrangements, they address the following issues: how the selected conservancy emerges; how the conservancy is governed, and how such governance relates to the traditional customs, leadership and beliefs. Finally, they investigate how benefits are accrued from the shared conservancies. Although the chapter does not question the current achievements or limitations of community conservancies, it aims at understanding the contexts in which they operate, their governance and benefit-sharing structures and the communities' development priorities.

In the second-to-last chapter, Geoffrey Riungu, David White, Unmesh Kanchan and Dandison Ukpabi used Flickr as a low-cost participatory data collection method to estimate potential tourism hotspots among five sub-Saharan countries. In this study, geotagged photos were extracted from Flickr. Then, spatial analytic tools were used to determine areas with a higher than average incidence of events — also called hotspot mapping. The study found that Flickr points were clustered around iconic/popular parks and reserves. If left unchecked, this frequenting of flagship protected areas may not only strain infrastructure and amenities but could also harm wildlife conservation and negatively influence visitor experiences. Therefore, the authors argue that

hotspot analysis may be incorporated into tourism spatial planning initiatives that are aimed at providing sustainable tourism opportunities at a specific destination, while minimising the environmental impact within and outside of protected areas.

In the final chapter we recur to our argument that transformative change, and research supporting this change, is needed to fully address the enormous challenges sub-Saharan Africa is facing related to climate change and biodiversity loss.

2

Perceived effects of climate change on plants and its potential impact on tourism – a perspective of the local residents of Maasai Mara National Reserve, Kenya

G. Manono, S.M. Thiong'o and B.E. Wishitemi

2.1 Introduction

The magnitude of the climate changes in the 21st century is comparable to the level of warming during the last deglaciation (Buizert et al., 2014; Corrick et al., 2020). For instance, according to the Intergovernmental Panel on Climate Change (IPCC, 2014), the global climate has warmed up by approximately 1.18^{0}C over the period from 1880 to 2020. This is also supported by other agencies such as the Goddard Institute of Space Sciences and the American Meteorological Society that postulate that global temperatures will continue to rise (Lindsey & Dahlman, 2021; Hawkins et al., 2017). Furthermore, extreme precipitation events will become more intense and frequent, while oceans will continue to warm, acidify and rise. A study by Thomas et al. (2004), which modelled the expected impact of gradual climate change on 1,103 species, predicted that 15-37% of these species would be committed to extinction by 2050. The Kenyan Government (GoK) contends that both minimum (nighttime) and maximum (daytime) temperatures have increased by 0.7^{0}C-2.0^{0}C and 0.2^{0}C-1.3^{0}C, respectively, since the early 1960s (GoK, 2010). Rainfall has become more irregular, unpredictable, and intense (Mwenda et al., 2020; Omonyo, Wakhungu & Oteng'i, 2015). Whereas precipitation has generally decreased in the main rainfall season between March and May, it has increased in the previously much shorter rain season between October and December. Moreover, severe floods are occurring (or are predicted to occur) along the coastal strip and the northern parts of the country in seasons which are normally dry such as that between September and February (Parry et al., 2012; Marigi, 2017; UNEP, 2021; GoK, 2010).

Human activities have been found to be by far the major cause of climate change, through their continuous release of greenhouse gases and aerosols into the atmosphere, through changing land surfaces, and through depleting the stratospheric Ozone Layer (Abdollahbeigi, 2020; IPCC, 2014; Foukal et al., 2006; Krishnan et al., 2020; Schmale, Zieger & Ekman, 2021). No wonder an increasing band of researchers are suggesting that the current age be named the 'Anthropocene', a new division of geological time, in recognition of the tremendous impact that *Homo sapiens* has on the planet (Zalasiewicz et al., 2015). Like other developing economies in Africa and further afield that rely on tourism as a generator of foreign exchange, Kenya depends heavily on the outdoor recreational opportunities presented by its natural environment, which include pristine nature, spectacular landscapes and seascapes, rare species, and wildlife in their natural habitat (Akama, 1999; GoK, 2010; Maingi, 2020; Nampushi & Nankaya, 2020; World Bank Group, 2010). Apart from these, idyllic climatic conditions are an enabler of yet another major tourism pull factor – beach tourism (Smith, 1993; Hein et al., 2009; Papageorgiou, 2016).

Adverse impacts of climate change, however, threaten to scupper this source of livelihood, through their assault on biodiversity. Vegetation forms a substantial segment of the earth's biomass (Fleming, 2015; Thompson, 2018), and hence, the greatest impacts of climate change in the country result from its influence on plants. Moreover, plants are the autotrophs in an ecosystem, and hence, their depletion will affect other organisms, for instance, animals. Paleo-ecological evidence suggests that organisms respond to climate change usually by migrating, whereas evolutionary adaptation plays only a minor role (Huntley, 1991). Given the limited dispersal and/or migratory capacity of most plants, they are likely to be prone to climate change effects. Drought may cause some tree species to disappear and, as a consequence, affect both vegetation structure and species composition (February et al., 2007). Models of future biome distributions in tropical South America predict the substitution of Amazonian forest cover by savannah-like vegetation (Salazar et al., 2007; Lapola et al., 2009). Barlow and Peres (2008) expect forest dieback in West and Southern Africa as a result of climate change. Parmesan and Yohe (2003) reported that alpine herbs are shifting poleward, 6.1 km per decade on average. Further, studies of plant phenology have attributed longer growing seasons, earlier onset of flowering, and earlier harvesting times to climate warming (Parmesan, 2006).

Evidence has suggested that climate change is caused by both natural and man-made factors over a period of time (Earth Science Communications, 2021; Oreskes, 2004; USEPA, 2020; USGS, 2021). The natural processes im-

plicated in climate change include volcanic eruptions, variations in the sun's intensity, as well as very slow changes in ocean circulation or land surfaces which occur on time scales of decades, centuries or longer. The influence of diverse external factors on the climate can be broadly estimated using the concept of radiative forcing – a measure of the influence a factor has in altering the balance of incoming and outgoing energy in the Earth. A positive radiative forcing warms the surface (for instance, greenhouse gases), while a negative radiative forcing cools the surface (for example, some types of aerosols) (IPCC, 2001).

The most important greenhouse gases that have been found to cause positive radiative forcing include carbon (IV) oxide (CO_2), methane (CH_4), and nitrous oxide/nitrogen (I) oxide (N_2O) (Dupar, 2020; Shakoor et al., 2021). In addition, halocarbon gases that have been found to be both ozone-depleting, and greenhouse gases include trichlorofluoromethane ($CFCl_3$), dichlorodifluoromethane (CF_2Cl_2), chlorodifluoromethane (CHF_2Cl) and 1, 1, 1, 2-tetrafluoromethane (CF_3CH_2F) (IPCC, 2014; IPCC, 2001). The radiative forcing due to increases in the greenhouse gases from 1750 to 2000 is estimated to be 2.43 Wm^{-2}: 1.46 Wm^{-2} from CO_2 (60%); 0.48 Wm^{-2} from CH_4; 0.34 Wm^{-2} from the halocarbons; and 0.15 Wm^{-2} from N_2O (IPCC, 2001).

Amidst this inundation of information on climate change and how deleterious its impacts are or could be, it remains underexposed how people, especially those living in marginal areas and likely to be adversely affected by climate change, perceive climate change effects on plants. For instance, an assessment carried out by Mutimba et al. (2010) on climate change vulnerability and adaptation preparedness in Kenya, concluded that climate change awareness, especially in the countryside, was quite low. A Gallup poll carried out between 2007 and 2008 by Pelham (2009) reported that 56% of Kenyans had some knowledge of global warming, whereas 44% had no notion of climate change whatsoever. However, also those who had some knowledge of global warming, were often not well versed in various climate change issues, such as adaptation and mitigation arguments (Pelham, 2009). This is in agreement with related studies locally and further afield (see Sraku-Lartey et al., 2020; Nash et al., 2019; Takakura et al., 2021; Mutekwa, 2009; Van Aalst et al., 2008 and Scheffran et al., 2012). The studies concur that these locals, given their living in remote locations, strained economic capabilities and/or low literacy levels, profess their ignorance about climate change and its effects. According to a study by Froehlich and Al-Saidi (2018), a reason for this might be that some view climate change as a natural occurrence and its management as a government policy issue.

Therefore, this study seeks to establish the perceived causes and manifestations of climate change amongst the community[1] in, and adjacent to, the MMNR, and to determine the perceived effects of climate changes on plant communities in the region.

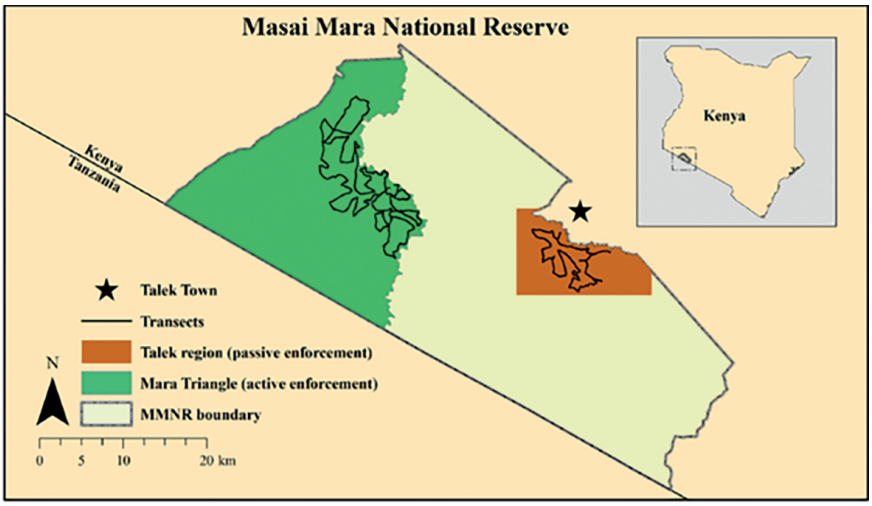

Figure 2.1
The Maasai Mara ecosystem (Source: Farr et al. 2019)

2.2 Materials and Methods

The study was carried out in the Maasai Mara National Reserve and its environs (the Mara ecosystem) (Figure 2.1). Located approximately 180 km west of Nairobi, the reserve adjoins the Serengeti National Park, forming an extensive wildlife dispersal area (Maasai Mara National Reserve, 2021; UNESCO, 2021). To the north, east and west of the reserve are large parcels of land demarcated as group ranches, owned and inhabited by the semi-nomadic pastoral Maasai people.

This study employed both a survey research design, which enabled it to obtain the requisite information from a large segment of the populace over a short period of time, and an exploratory research design, which allowed for

1 The term local/community residents in the context of this study refers to people living in and adjacent to the MMNR. It includes both the staff of MMNR (managers), community leaders, and the local rural folk.

deeper probing of respondents' attitudes, preferences and opinions (Oso & Onen, 2008). These designs used questionnaires and face to face interviews respectively.

The target population consisted of 1,500 residents of MMNR, including opinion leaders of the local community, local community members, and managers of the MMNR. This study collected data from 400 respondents, constituting 27% of the target population. This was close enough to the caveat suggested by Mugenda & Mugenda (2003) and Montgomery (1977), who stated that 30% of the accessible population would suffice for a descriptive study if the population units were more than 30. To ensure a proportionate representation, the sample consisted of 200 community members and staff members of the MMNR. The field study was conducted between the months of May and June of 2013[2]. A sampling frame of the respondents was obtained from either the reserve or the villages which served to select the participants for the study, using simple random sampling. The study employed two methods: questionnaires and interview schedules, to collect both qualitative and quantitative data. The data collection tools were administered by the researcher, two supervisors and six trained enumerators. Descriptive statistics, for instance, were used to describe, summarise, and organise the data. Chi-square (χ^2) cross-tabulations were used to test if there were any significant relationships between the study variables. Means from the study were compared using t-tests and Analysis of Variance (ANOVA). The t-tests were used to compare two independent groups. More than two means were compared using Analysis of Variance (ANOVA) and post-hoc analysis carried out by Tukey's Honestly Significant Difference (HSD) test.

Frequencies were used to analyze the perceived causes and manifestations of climate change amongst the Maasai community in and adjacent to the MMNR. Structural Equation Modelling-Path Analysis (SEMPATH), implemented using the Analysis of Moment Structures (AMOS), was used to examine the perceived effects of climate change on plant communities in MMNR. The model (Figure 2.2) hypothesised that climate change could influence changes in plant species distribution, species composition, changes in adaptation strategies, changes in species diversity, the emergence of alien plant species, changes in vegetation cover, and extinction of plant species. Climate change was specified as an exogenous measured variable, while the perceived effects were postulated as observed endogenous variables.

2 The data, though collected a little earlier, has not been presented elsewhere and is thus scientifically valid.

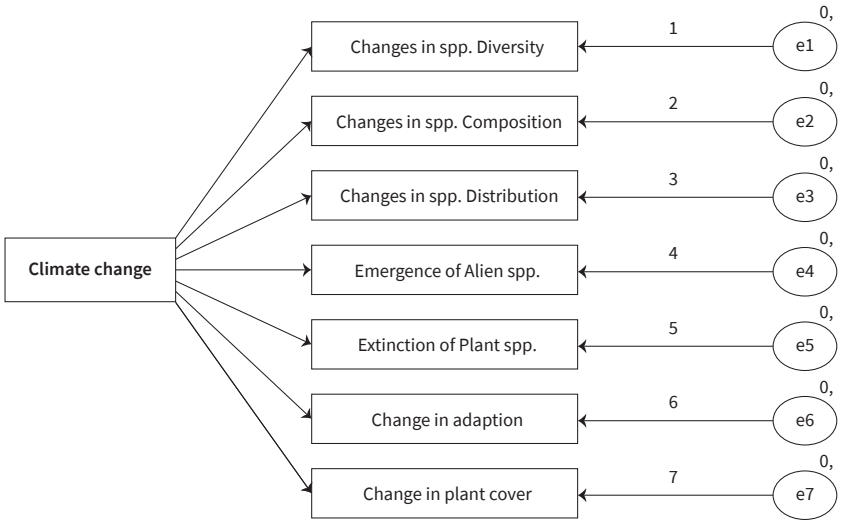

Figure 2.2
Path diagram of perceived effects of climate change on plants; spp. = species

All the above statistical tests were analysed with the Statistical Package for Social Sciences (SPSS) version 18, and STATA version 12. All statistical tests were two-tailed. Significant levels were measured at a 95% confidence level, with significant differences recorded at $p<0.05$.

2.3 Results

Response rate

From a target population of 1.500 local residents and a sample of 400 respondents, the study gathered 386 usable responses. This was a response rate of 96.5%, which was considered sufficient for analysis (Mugenda & Mugenda, 2003).

Sample characteristics

Gender distribution (Table 2.1) showed that the respondents were disproportionately male (staff: male=80%, female=20% and local community: male=94%, female=6%). The preponderance of male respondents in the study may be adduced to the traditional cultural roles among the Maasai people, the predominant community living around MMNR (Allegretti, 2018). Older men usually take the advisory role in their homestead, whereas women build houses and are responsible for childcare and all household chores, and young men are in charge

of security. On the other hand, young boys herd livestock (Bitange, 2005). Since women are tied down to tasks that occur mainly around the home, one is likely to interact with men rather than women when carrying out a study.

Most of the respondents were aged between 31 and 40 years (staff=70%, local community =84.5%), suggesting that the bulk of the respondents had lived long enough to be aware of changes in the climate. Fewer respondents belonged to the 21-30 years (staff=25.5%, local community=11.5%) and 41-50 years (staff=4.5%, local community=4%) age brackets. The results indicated that while the majority of staff had secondary education (n=110, 55%), the bulk of the local community possessed primary education (n=154, 77%). Interestingly, there were slightly more people with college or university education among the local community (15.5%) compared to the staff (12%), suggesting that pockets of the local community are reasonably well educated.

Table 2.1
Respondents' Characteristics

Biographic information	Respondent type	Categories	Per cent
Respondents' gender	Staff	Male	80.0
		Female	20.0
		Total	100.0
	Local community	Male	94.0
		Female	6.0
		Total	100.0
Respondent's age	Staff	21-30 years	25.5
		31-40 years	70.0
		41-50 years	4.5
		Total	100.0
	Local community	21-30 years	11.5
		31-40 years	84.5
		41-50 years	4.0
		Total	100.0
Highest education level	Staff	None	5.0
		Primary	28.0
		Secondary	55.0
		College	5.0
		University	7.0
		Total	100.0
	Local community	None	2.0
		Primary	77.0
		Secondary	5.5
		College	6.5
		University	9.0
		Total	100.0

Source: Survey data (2013)

Awareness of climate change in the community

Awareness of climate change among the respondents was estimated, as this knowledge could help shape the appropriate interventionist strategies. The study found that 96% (n=192) and 97% (n=194) of employees of the MMNR and the neighbouring Maasai community had heard of climate change, respectively. This suggested that the climate change message could be pervasive in the community. A χ^2 cross-tabulation to determine if awareness of climate change was influenced by membership of the local community or staff was found to be non-significant (χ^2 =0.29, df=1, p=0.586), indicating no significant differences between the staff and members of the local community with respect to awareness of climate change.

However, the majority of the respondents (n=308, 77%) considered themselves as 'somewhat knowledgeable' about climate change as compared to only 20% (n=78) and 2% (n=7), who felt that they were 'knowledgeable' or 'experts', respectively. The results suggested that although most respondents knew something about climate change, they might be ignorant of the technical details of the process.

Respondents' gender (χ^2 = 5.857, df=1, p=.016); age (χ^2 = 76.037, df=2, p<.001) and education (χ^2 = 63.09df=4, p<.001) were found to significantly influence their perception of their own knowledge about climate change. More females (Table 2.1.) perceived themselves to be knowledgeable about climate change (33.3%) compared to the males (18.3%), whereas more males were found to be somewhat knowledgeable (81.7%) compared to the females (66.7%). This could be related to the fact that the females in the study were older and better educated than the males. Furthermore, it could be deduced that the younger and less educated members of the local community were reluctant to participate in the study – an aspect that could be attributed to the cultural structure of the Maasai community, where the young are customarily supposed to serve their community through chores (Obeja, 2015; Kerubo, 2016). This conclusion was buttressed by the demographics that respondents aged between 41-50 years had the highest proportion of knowledgeable people with respect to climate change (76.9%) compared with those in the 31-40 years age bracket (11.2%). The results in Table 2.2 indicate that education was positively correlated with the level of knowledge about climate change, with respondents having college and university education rating themselves highest with regard to climate change knowledge (68.2% and 55.2%, respectively).

Table 2.2
The relationship between climate change knowledge and biographical variables

			Level of knowledge		
Respondents' category			**Somewhat knowledgeable**	**Knowledgeable**	**Total**
Gender	Male	Frequency	276	62	338
		Percentage	81.7	18.3	100.0
	Female	Frequency	32	16	48
		Percentage	66.7	33.3	100.0
	Total	**Frequency**	308	78	386
		Percentage	79.8	20.2	100.0
Age	21-30 years	Frequency	36	34	70
		Percentage	51.4	48.6	100.0
	31-40 years	Frequency	269	34	303
		Percentage	88.8	11.2	100.0
	41-50 years	Frequency	3	10	13
		Percentage	23.1	76.9	100.0
	Total	**Frequency**	308	78	386
		Percentage	79.8	20.2	100.0
Education	None	Frequency	6	2	8
		Percentage	75.0	25.0	100.0
	Primary	Frequency	184	25	209
		Percentage	88.0	12.0	100.0
	Secondary	Frequency	98	20	118
		Percentage	83.1	16.9	100.0
	College	Frequency	7	15	22
		Percentage	31.8	68.2	100.0
	University	Frequency	13	16	29
		Percentage	44.8	55.2	100.0
	Total	**Frequency**	308	78	386
		Percentage	79.8	20.2	100.0

Perceived causes and manifestations of climate change

The respondents perceived that climate change could be caused by deforestation, human settlement, agriculture, overutilisation of natural resources, greenhouse emissions, infrastructure and overharvesting of indigenous trees (Table 2.3). Most respondents (81%) considered deforestation to be the most important cause of climate change, followed by overharvesting of indigenous trees (72%) and human settlement (71%). The findings are corroborated by other studies carried out by Bennet (2017), Schlamadinger et al. (2005), and

Malhi et al. (2008), among others, who documented the deleterious effects of the loss of forest cover. The least important cause, according to the respondents, were greenhouse emissions (11%), followed by the construction of infrastructure (20%).

Most respondents (n=311, 78%) reported that erratic rainfall patterns were the most important manifestation of climate change, followed by droughts (n=286, 72 %), floods (n=213, 53%), and lastly, increased temperatures (n=184, 46%).

Table 2.3
Frequencies of response on causes of climate change

	Causes of climate change									
Name of variable	**Least important**		**Less important**		**Important**		**More important**		**Most important**	
	Fq	%	Fq	%	Fq	%	Fq	%	Fq	%
Deforestation	21	5.3	22	5.5	12	3.0	21	5.3	324	81.0
Human settlement	11	2.8	51	12.8	30	7.5	22	5.5	286	71.5
Agriculture	11	2.8	50	12.5	32	8.0	174	43.5	133	33.3
Overutilisation of natural resources	13	3.3	20	5.0	54	13.5	107	26.8	206	51.5
Greenhouse emissions	258	64.5	18	4.5	47	11.8	33	8.3	44	11.0
Construction of infrastructure	20	5.0	249	62.3	29	7.3	23	5.8	79	19.8
Overharvesting of indigenous trees	22	5.5	11	2.8	38	9.5	41	10.3	288	72.0

Key: Fq = Frequency

Perceived effects of climate change on plants

An overwhelming proportion (99%, n=198) of local community members felt that climate change affected plants, compared to 81% (n=162) of the staff of MMNR who held a similar opinion. Most respondents (Table 2.4) felt that climate change influenced changes in plant species composition, species distribution patterns, changes in plants' adaptation strategies, changes in plant species diversity, the emergence of alien plant species, and changes in vegetation cover (each accounting for 16% of the 2529 responses). However, very few respondents thought that climate change was causing the extinction of plant species (6% of the 2529 responses).

For this question, the number of responses (2529) was more than the number of respondents in the study (400), showing that most respondents felt that climate change had more than one influence on plants (the question was a multiple response type question). Additionally, the total percentage of cases was 632.3, indicating that, on average, each respondent felt that climate change had six (632.3/100) types of influence on plants.

Table 2.4
Perceived impacts of climate change on plants

Plant impacts	Responses		Per cent of cases
	N	Per cent	
Changes in plant species diversity	394	15.6	98.5
Changes in plant species composition	396	15.7	99.0
Changes in plant species distribution patterns	397	15.7	99.3
Emergence of alien plant species	393	15.5	98.3
Extinction of plant species	162	6.4	40.5
Changes in plants' adaptation strategies	396	15.7	99.0
Changes in vegetation cover	391	15.5	97.8
Total	**2529**	**100.0**	**632.3**

Face-to-face interviews with older members of the community supported the above findings. One elder asserted:

> After flooding, new or alien plants grow on bare ground, hence colonising the whole area, thus affecting the original vegetation. This brings about changes in plant species and the distribution patterns of plants. The floods and drought have brought changes in this area, hence the vegetation cover change.

Another stated:

> The change in temperature, soils, and rainfall patterns has brought significant changes in the following: changes in plant species, changes in plant distribution patterns and introduction of alien species of plants. Some plants have been forced to adapt to the current state of the climate. You get some plant species growing where you least expect them.

To determine whether the perceived effects of climate change influenced plants in the MMNR, a SEMPATH analysis was conducted. The resultant path diagram is presented in Figure 2.3.

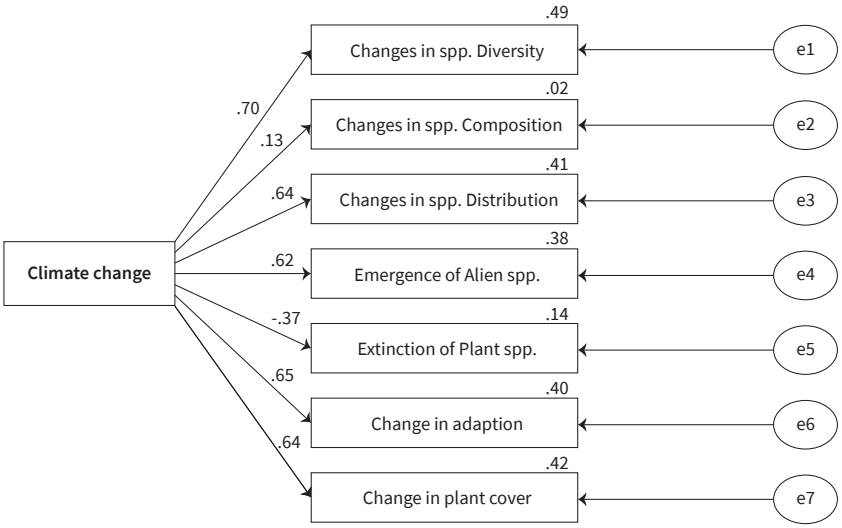

Figure 2.3
SEMPATH output of the perceived effects of climate change on plants

All the regression coefficients for the model were significantly different from zero beyond the 0.01 level. Except for the perceived effect on the extinction of plant species (coefficient = -0.37), all the path coefficients for the remaining six hypothesised relationships were positive. This indicated that when climate change increases, it causes changes in plant species diversity, plants' adaptation strategies, and species distribution. It also causes changes in the plants' vegetation cover, causes the emergence of alien species, and brings about changes in species composition. However, climate change was perceived to reduce the extinction of plant species. This implied that the respondents viewed climate change as having minimal effects on this variable.

2.4 Discussion

This study found a high awareness of climate change in the community (about 97%), which was unlike studies by Mutimba et al. (2010) and Pelham (2009), who reported that only 56% of Kenyans had some knowledge of global warming, whereas 44% knew nothing. The findings could suggest

that climate change mitigation initiatives, public sensitisation, and awareness programmes such as the National Climate Change Response Strategy 2010 as well as other reafforestation and carbon offset projects undertaken by the government, NGOs, and the media might have been effective. Other current projects include the Kenya Adaptation Action Plan (2015-2030), and the National Climate Change Action Plan (2018-2022). Although most respondents were found to know something about climate change, they were likely to be ignorant of the technical details of the process, as supported by Pelham (2009) who found out that many Kenyans who reported knowledge of climate change were not altogether well versed in various climate change issues such as adaptation and mitigation processes.

The perception of respondents about their own knowledge of climate change was found to be influenced by their gender, age and education level, with older age, better education and being female being associated with greater knowledge. Many studies report that in public, men demonstrate greater scientific knowledge and scientific literacy than do women (Miller, 2007; Hayes, 2001), largely due to differences in the way men and women experience science and mathematics education. In addition, many studies demonstrate that women are less confident in displaying their scientific knowledge and abilities than do men (for instance, McCright, 2010; Jacobs & Simpkins, 2006). From the findings, the percentage of female respondents was small but those who participated in the survey were more knowledgeable than their male counterparts. However, this is contrary to the documented expectations and might be related to the fact that the females in the study were older and better educated than the males. In this vein, older people have often been found to be more knowledgeable about climate change than their younger counterparts. For example, Ogunleye and Yekinni (2012) found a positive correlation between the age of crop farmers in Ilorin East, Nigeria and their knowledge of climate change.

Deforestation was perceived as the strongest cause of climate change, followed by overharvesting of indigenous trees, agriculture, and human settlement, while the least important causes were considered to be greenhouse emissions and the construction of infrastructure. Deforestation or logging has been a major concern amongst Kenyan conservationists. According to Cochrane and Laurence (2002), logging does not only lead to loss of habitat for animals in the forests but also to changes in the microclimatic environment, the erosion of soil and modification of fire regimes. The impact depends on the type of logging: commercial mechanised logging with heavy equip-

ment, or local exploitations of timber through, for example, pit-swaying and firewood collection.

Forests play a huge role in the carbon cycle on our planet by absorbing carbon (IV) oxide and releasing oxygen during the day. When forests are cut down, not only does their carbon absorption cease, but the carbon stored in the trees is released into the atmosphere as CO_2 if the wood is burned, or even if it is left to rot after the deforestation process (Karl & Trenberth, 2003). Hence, deforestation contributes to climate change by increasing the level of carbon (IV) oxide, the most dominant human-influenced greenhouse gas. It is estimated that more than 1.5 billion tons of carbon dioxide are released into the atmosphere due to deforestation, mainly the cutting and burning of forests, every year. In fact, whereas cars and trucks have been found to account for about 14 per cent of global carbon emissions, 15 per cent is usually adduced to deforestation (Stott et al., 2000). Overharvesting of indigenous trees, agriculture, and human settlement contribute to climate change for similar reasons as does deforestation, because all these activities involve the cutting down of some trees. In addition, agricultural activities produce gases such as methane (CH_4), nitrogen (I) oxide (N_2O), nitrogen (II) oxide (NO) and ammonia (NH_3), which are all implicated for their radiative or chemical effects in the atmosphere (IPCC, 2014; Li, 2000; Bollman & Conrad, 1998).

This study found that the climate change impacts on plants that were perceived as important were changes in plant species, plants' adaptation strategies, changes in the distribution of plants, changes in vegetation cover, the emergence of alien species and changes in plant composition, whereas the least important impact was considered to be the extinction of plant species. These findings are in line with research by Mackey and Currie (2001), which indicated that temperature and water availability account for more than 75% of the variability in plant species richness over broad spatial scales. Changes in climate will also alter interactions between species, including patterns of competition, symbiosis, mutualism, predation, and dominance. Climate change, in the form of altering rainfall patterns (for instance, increased droughts) and temperature, could explain the observable changes in plant species, their distribution and vegetation cover in this study.

Changes in plant distribution and an extended range of pests and pathogens caused by climate change can allow for an invasion by alien species (McCarty, 2001). For instance, *Prosopis juliflora* ('mathenge') has become dominant in important ecosystems of Baringo, Tana River, Garissa and other semi-arid areas of the country. In addition, an excessive growth of some tree species

has been observed, including that of *Acacia reficiens* (acacia) after the 1997 El-Nino in North-Eastern Province (NEP), suppressing the growth of various species that make up grasslands for wildlife and livestock (Mutimba et al., 2010). Increases in temperature could lead to a shift of vegetation to higher elevations, which are cooler, while some species could become extinct. Indeed, across the country, some tree species, including *Melia volkensii*, *Terminalia spinosa, Delonix elata*, and *Hyphenea corriaceae* in North Eastern Province, as well as *Psychotria* species in the Taita Hills, Coast Province, have either gone extinct, or else their numbers have dramatically reduced. In addition, the projected rise in temperatures and long periods of drought could lead to more frequent and more intense fires, with estimates showing that Kenya has lost more than 5,700 ha of forests per year to forest fires over the past 20 years (Mutimba et al., 2010).

The vulnerability of natural resources such as plants to climate change could have major implications for Kenya's tourism industry, because long-term environmental shifts could alter the destination attractiveness for vacationers (Papageorgiou, 2016; Martín, 2005; Forster et al., 2012). Unless carefully monitored, the impacts could lead to the downgrade and ultimately the collapse of the climate-sensitive coastal, marine and wildlife industry in Kenya.

2.5 Conclusion and recommendations

This study has shown that practically every respondent drawn from the employees of MMNR and the local community has heard of climate change, demonstrating that awareness of climate change in the locale can be very pervasive. No significant differences were found between the MMNR staff and members of the local community with respect to their awareness of climate change, suggesting the ubiquitousness of the climate change message among the two groups. However, the results suggested that although most respondents knew something about climate change, they could still be quite ignorant of the technical details of the phenomenon (Mutimba et al., 2010; Nanyingi et al., 2012). The perception of respondents about their knowledge of climate change was also found to be influenced by gender, age and education level.
Deforestation was perceived as the strongest cause of climate change, followed by overharvesting of indigenous trees, agriculture and human settlement, greenhouse emissions and construction of infrastructure. Erratic rainfall patterns were found to be the most important manifestation of climate change, followed by droughts, floods, and increased temperatures. Most respondents felt that climate change influenced changes in plant species com-

position, species distribution patterns, changes in plants' adaptation strategies, changes in plant species diversity, the emergence of alien plant species, and changes in vegetation cover.

The study recommends that the government and other environmental agencies should disseminate appropriate knowledge about climate change to the public and take immediate steps to discourage habitat destruction (for instance, deforestation, infrastructural and superstructural development in and adjacent to protected areas, overharvesting of trees, large-scale agriculture, indiscriminate harvesting of trees, and human settlement in forests) as this contributes to climate change. Most importantly, climate change's pernicious impacts on nature need to be controlled locally, regionally and internationally. For instance, marine and terrestrial spatial and seasonal quantifications of climate resources through Tourism Climatic Indices could inform sustainability planning for outdoor tourism in Kenya.

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3

An investigation of climate change and tourism climatic suitability in Narok county, Kenya

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3.1 Introduction

Weather, climate, and tourism are closely intertwined, with highly multifaceted and complex interactions between them (Gossling et al., 2012; UNWTO, 2009; Scott & Becken, 2011; Simpson et al., 2008). Tourism has been defined as the entirety of the relationships, phenomena, and experiences that arise from people's travel and overnight stay in locations or areas other than their usual residence (Matzarakis, 2006). Climate affects when, why and where tourists travel. Temperature, wind, humidity, drought, storms, snow conditions and the amount of sunshine extant in a particular area influence, to a great degree, tourists' decision to visit the area, their satisfaction, and the extent of their spending (Curtis et al., 2011). Climate determines the nature and location of many tourist attractions, with many sun, sand and sea travel decisions based mainly on perceptions of warm and sunny environments. It is a crucial element in the marketing of many destinations, and it shapes tourists' expectations, experiences and memories, influencing whether they return and where they will go next (Gossling & Hall, 2006a). Because of this sensitivity, it is logical that perturbations in a wide range of climatic variables occasioned by climate change would have significant implications on tourism activities.

The effects of climate change appear unavoidable (Bowles, Butler & Morisetti, 2015; Lu, 2018). The Intergovernmental Panel on Climate Change (IPCC, 2014), combining global average land and ocean surface temperatures, estimates that the world climate has warmed up and will continue to get warmer. Further, it estimates that since the 1950s, there has been a reduction in the frequency of extremely low temperatures with a concomitant but smaller increase in the frequency of extremely high temperatures. Annual precipitation

has increased in the northern hemisphere but decreased in the southern hemisphere, while oceans have warmed, acidified and risen. For instance, average precipitation has decreased by 2.4% per decade in African tropical rainforest regions, and by 4% per decade in West Africa (Bloschl & Montanari, 2010).

Numerous studies have documented the potential effects of climate change on tourism and outdoor recreation (for instance, Alizadeh et al., 2021; Askew & Bowker, 2018; Hamilton et al., 2005; Nicholls, 2006; Todd, 2003; Winter et al., 2020; Yañez et al., 2020). Mendelsohn and Markowski (1999) argued that climate change can affect outdoor recreation in three ways: (1) the availability of recreation opportunities through longer summer seasons and shorter winter seasons; (2) the overall comfort and enjoyment of recreation activities; and (3) the quality of the recreation experience. Such changes will have different effects in diverse parts of the world. For example, Hall (2008) predicts that higher temperatures could cause tourism to shift northwards, as cooler regions enjoy warmer summers, while warmer regions, such as Africa, suffer increased heatwave frequency and reduced water availability. In addition, Lise and Tol (2002), in an examination of the Organisation for Economic Cooperation and Development (OECD) group of countries, reported that visitors tend to prefer temperatures of around 21°C at their holiday destination of choice, and they suggested that global warming could therefore lead to a shift away from some destinations that either become too hot or too cold.

African countries such as Kenya that are heavily dependent on tourism, could suffer considerably if climate change negatively affects tourism. Tourism is a big revenue generator industry, second only after agriculture in foreign exchange earnings, and providing approximately 11% of the country's GDP (GoK, 2015; Nyika, 2021; Nechifor et al., 2021; Signé, 2018; Samoei & Kipchoge, 2021). In 2014, for instance, the tourism industry generated an export income of about Kshs. 160 billion (approx.. USD 1.4 billion) (18.3% of total exports), and employed about 9.2% of Kenyan workers (GoK, 2015; WTTC, 2008). Besides, it provides a livelihood to many other Kenyans, such as food suppliers to tourist hotels, transport providers to tourists, and manufacturers of curiosities sold to tourists. The impressive performance of the industry has caused it to be identified as one of the six pillars of economic growth in Kenya's Vision 2030, a development blueprint for the country (GoK, 2007).

The relationship between tourism and climate change can be analysed by looking at how the latter modifies the attractiveness of holiday destinations. This is usually accomplished by computing climate indices of travel destinations and analysing how climate change affects these indices. The formulation of such

climate indices has evolved from the more general development of climate indices in sectors such as health (for example, the Wind Chill and Humidex) and agriculture (e.g. various drought indices) (Galdies, 2015). A key plank in their construction is the selection of the right weather variables. Smith (1993) and Matzarakis and Moya (2002) suggested that the weather parameters affecting tourists' comfort and safety should include air temperature, humidity, radiation intensity, wind, cloud cover, sunshine duration and precipitation. On the other hand, De Freitas (2003) classified climate according to its thermal, physical and aesthetic aspects. The thermal aspect incorporates air temperature, humidity, wind and solar radiation; the physical aspect includes rain and wind; and the aesthetic aspect relates to sunshine or cloud conditions. One of the most comprehensive and widely used metrics in tourism climatology is the Tourism Climatic Index (TCI), developed by Mieczkowski (1985). The framework attempts to reflect the destination's climatic suitability for "average" tourists engaged in light physical outdoor activities such as sightseeing and shopping. It consists of five sub-indices, each calculated from one or two monthly climate variables. The five sub-indices (Table 3.1.) are daytime comfort index (maximum daily temperature [in °C] and minimum daily relative humidity [%]), daily comfort index (mean daily temperature [°C] and mean daily relative humidity [%]), precipitation (total precipitation, in mm), sunshine (total hours of sunshine), and wind (average wind speed, in km/h).

Table 3.1
Sub-indices within Mieczkowski's Tourism Climatic Index

Sub-index	Variable(s)	Climate influence on TCI
Daytime comfort index (CID)	Maximum daily temperature (0C) and minimum daily relative humidity (%)	Represents thermal comfort when maximum temperature occurs
Daily comfort index (CIA)	Mean daily temperature (0C) and mean daily relative humidity (%)	Represents thermal comfort over the full 24h period
Precipitation (P)	Total precipitation (mm)	Reflects the negative impact precipitation has on outdoor activities
Sunshine (S)	Daily duration of sunshine (in hours)	Long duration rated as positive for tourism but can be negative
Wind speed (W)	Average wind speed (in Km/h)	Variable effect depending on temperature

Source: Adapted from Mieczkowski (1985, pp. 228-9)

The index is weighted and computed as follows:

$$TCI = 8CID + 2CIA + 4R + 4S + 2W \quad \text{Equation 1}$$

CID = daytime comfort index, CIA = daily comfort index, R = precipitation, S = sunshine, and W = wind speed.

With an optimal rating for each variable of 5.0, the maximum value of the index is 100. Based on a location's index value, its suitability for tourism is then rated on a scale from –30 to 100. Mieczkowski (1985) divided this scale into 10 categories, ranging from ideal (90 to 100), excellent (80 to 89), and very good (70 to 79), to extremely unfavorable (10 to 19) and impossible (9 to –30) (Table 3.2.).

Table 3.2
Classification of TCI score

Numeric value of index	Description of comfort level for tourism activity
90 – 100	Ideal
80 – 89	Excellent
70 – 79	Very good
60 – 69	Good
50 – 59	Acceptable
40 – 49	Marginal
30 – 39	Unfavourable
20 – 29	Very unfavourable
10 – 19	Extremely unfavourable
-30 – 9	Impossible

Source: Adapted from Mieczkowski (1985, pp. 228-9)

The TCI has been widely used to explore the possible effects of climate change on the climatic suitability of various areas for tourism. Amelung and Viner (2006) predicted that TCI scores for the Mediterranean region would improve during the spring and autumn but deteriorate considerably in the summer. Scott et al. (2004) assessed the spatial and temporal distribution of climate resources for tourism in North America, while Farajzadeh and Ahmadabadi (2010), applying the concept of TCI in Iran, reported that in summer the whole country has unfavourable tourism climatic conditions whereas during winter months, excellent conditions subsist in the southern parts of the country. Nemeth (2013) used TCI to analyse tourism climate potential in the Lake

Balaton region of Hungary during the last half-century and reported summer months to have the best tourism climatic conditions. Amelung et al. (2007) measured the climatic suitability of the whole world, using TCI among other methods. Few studies have, however, explored how climate change could affect tourism resources in Kenya. This question formed the basis of our study, whose objectives were to determine changes in five climatic variables (temperature, relative humidity, precipitation, sunshine, and wind speed) in Narok County, Kenya, and to establish changes in tourism climatic suitability for Narok County over a 21-year period.

3.2 Materials and Methods

The study was conducted in Narok, a town situated in the Great Rift Valley of Kenya, 149 Km west of Nairobi. Located at an altitude of 1827 metres, its geographical coordinates are $1^0 5' 0''$ South and 35^0 52' 0" East. The main economic income in the region is derived from tourism and wheat farming (Zecchini, 2000). The choice of the study area was due to its proximity to major tourist destinations including Maasai Mara National Reserve and Hell's Gate National Park in Naivasha (Figure 3.1). For the purposes of this study, climatological data from Narok Meteorological Station (NMS) were also used.

Climatological data for the years 1986 and 1992 to 2011 was obtained as an Excel file from the NMS. The data consisted of daily recordings (for every year) of the following variables: maximum and minimum temperature, total precipitation, relative humidity (RH) at 06Z (Zulu or Universal Time Coordinated) and 12Z, which represented 9 am (maximum humidity) and 3 pm (minimum humidity) local times, total sunshine hours and wind speed (km/h). The mean daily temperature was obtained by summing up the maximum and minimum daily temperatures and then taking an average. The mean daily RH was similarly obtained by adding daily RH at 06Z and 12Z and then obtaining the average. The daily data were used to calculate monthly and yearly summaries of the variables by obtaining averages. The yearly averages were plotted on graphs to determine their annual changes over the study period.

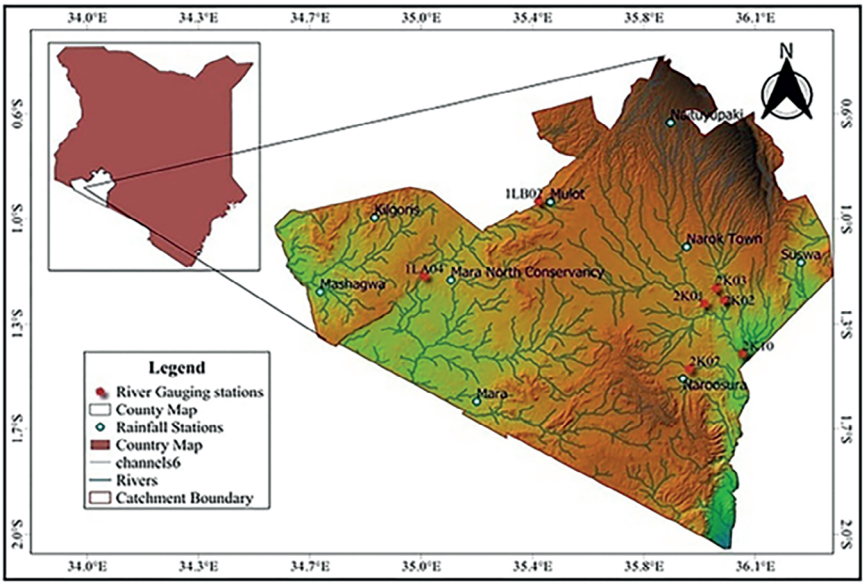

Figure 3.1
Location of the study area (Source: Opere et al., 2022)

Using the daily or monthly summaries of the above variables, the TCI sub-indices of daytime comfort index (CID), daily comfort index (CIA), precipitation, sunshine and wind speed were rated between 0-5, following the original classification by Mieczkowski (1985). The first two sub-indices, CID and CIA, combine temperature and humidity into effective temperature. At high temperatures, perceived temperature is higher than real temperature if humidity is high and lower than real temperature if humidity is low. The five sub-indices were then used to compute the TCI according to Equation 1, given above. The ensuing yearly TCI values were then plotted on a graph to establish their changes over the study period.

To determine trends in changes of the climatic variables and TCI over the study period, linear regression models were fitted to the data and the significance of the ensuing slopes (b coefficients) computed. The fit of the models was assessed by computing R square values. All statistical tests were analysed with the Statistical Package for Social Sciences (SPSS), version 18 and Excel, 2007. All statistical tests were two-tailed. Significant levels were measured at 95% confidence level with significant differences recorded at $p<0.05$.

In climate and tourism sustainability studies, several models are applied. One such model is Mieckowski's TCI framework which has been widely used to quantify/assess indicators of climatic suitability for tourism. Other mod-

els applied in tourism studies include the Holiday Climate Index (HCI), the Multivariate ENSO Index (MEI), the Temperature Humidity Index (THI), the Southern Oscilation Index (SOI), and the Relative Climate Index (RCI), among others. The paradigms make use of a set of selected indices to assess and describe climatic variability conditions and metrics favourable for tourism activities (tourism climate comfort) (Dubois et al., 2016; Hassan et al., 2015; Domínguez-Castro et al., 2020; Hasanah et al., 2020; Scott et al., 2016; Fitchett et al., 2019; Arya, 2014; Li et al., 2018).

3.3 Results

Changes in selected climatic variables

The maximum, minimum and mean temperatures all showed increasing trends over the study period as described by the equations in Figure 3.2 below. Both the coefficients for mean temperature ($b=0.38$, $\beta=0.73$, $t=4.64$, $p<0.0001$) and minimum temperature ($b=0.07$, $\beta=0.77$, $t=5.29$, $p<0.0001$) were significantly different from zero, which showed that a substantial increase in minimum and mean temperatures occurred over the study period.

The model predicts that every year the minimum and mean temperatures in Narok have increased by 0.07^0C and 0.04^0C, respectively, over the period under study. The variable 'Years' could explain a hefty 60% and 53% variance in minimum and mean temperatures, respectively. However, the coefficient for maximum temperature ($b=0.01$, $\beta=0.18$, $t=0.78$, $p=0.44$) was not significantly different from zero. The results show that a considerable increase in night temperatures has caused a significant elevation of the mean temperature in the study area.

Although the mean relative humidity decreased over the years, as described by the function in Figure 3.3, the relationship was not found to be significant ($b=-0.06$, $\beta=-0.13$, $t=-0.56$, $p=0.58$). The variable 'years' could explain only about 2% of the variation in relative humidity.

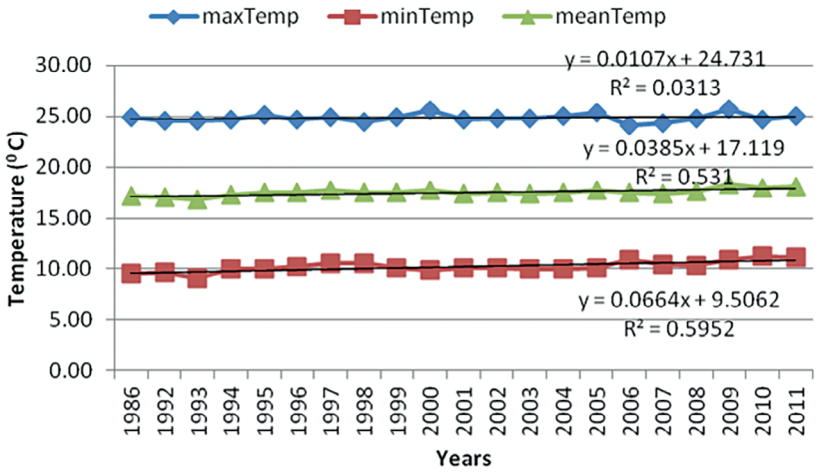

Figure 3.2

Changes in maximum (max), minimum (min) and mean temperatures (Temp)

Source: Authors' data (2016)

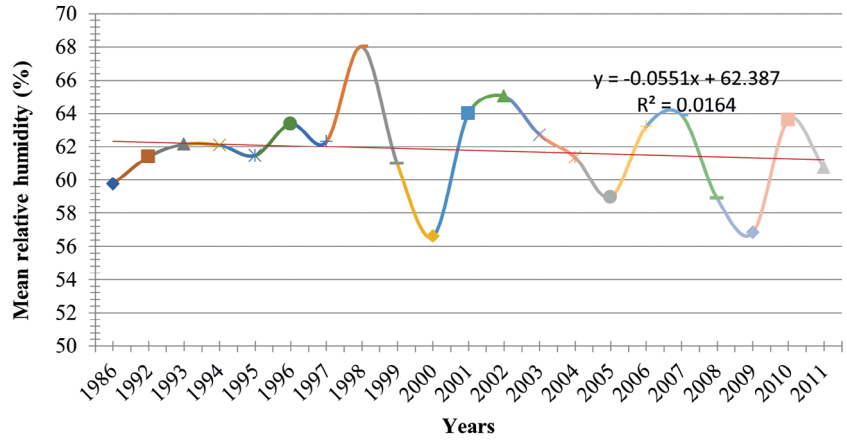

Figure 3.3

Predicted (red) and observed (blue) changes in relative humidity (1986 and 1992-2011)

Source: Authors' data (2016)

Monthly precipitation in the study area increased (Figure 3.4) over the study period, but the increase was not significant (b=0.54, β=0.21, t=0.93, p=0.37). The years could only explain roughly 4% of the variation in precipitation. In fact, when precipitation data was plotted from 1960 onwards (results not shown), a logarithmic regression model showed a significant decrease in monthly precipitation in Narok (b=-7.79, β=-0.36, t=-2.72, p=0.009, R^2=0.13).

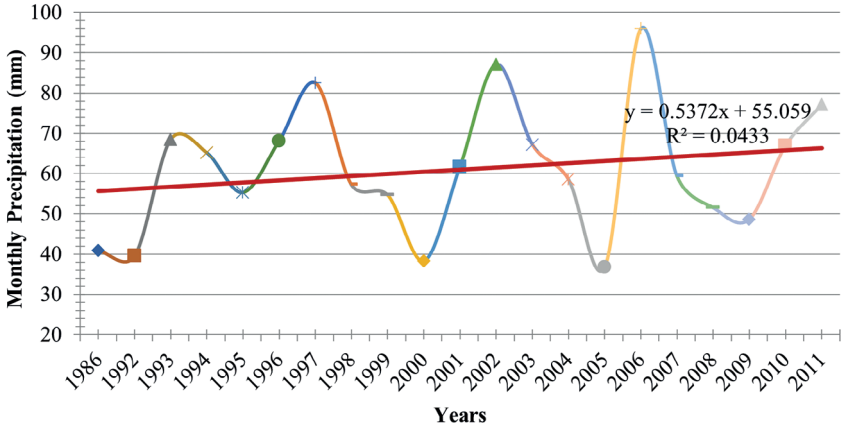

Figure 3.4
Predicted (red) and observed (blue) changes in monthly precipitation (1986 and 1992-2011) Source: Authors' data (2016)

The daily amount of sunshine hours was found to have slightly increased over the study period (Figure 3.5). However, the rise was found not to be significant (b=0.002, β=0.034, t=0.15, p=0.88).

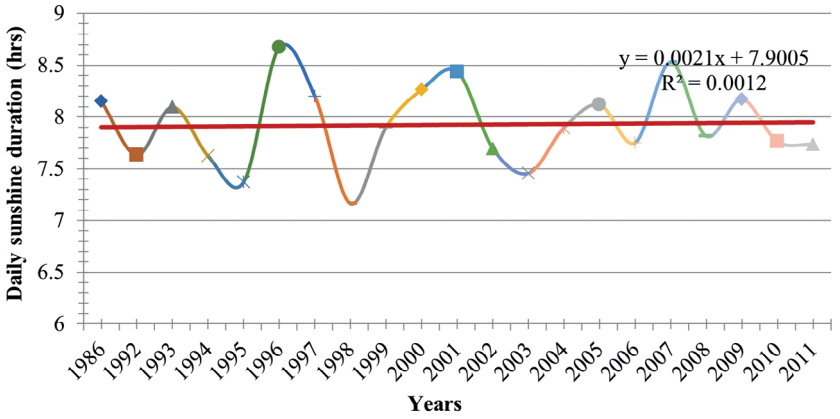

Figure 3.5
Predicted (red) and observed (blue) changes in the daily duration of sunshine (1986 and 1992-2011) Source: Authors' data (2016)

The study area was found to have become significantly more windy (Figure 3.6) over the study period (b=0.002, β=0.034, t=0.15, p=0.88). The passage of time was found to explain about 43% of the variance in wind speed.

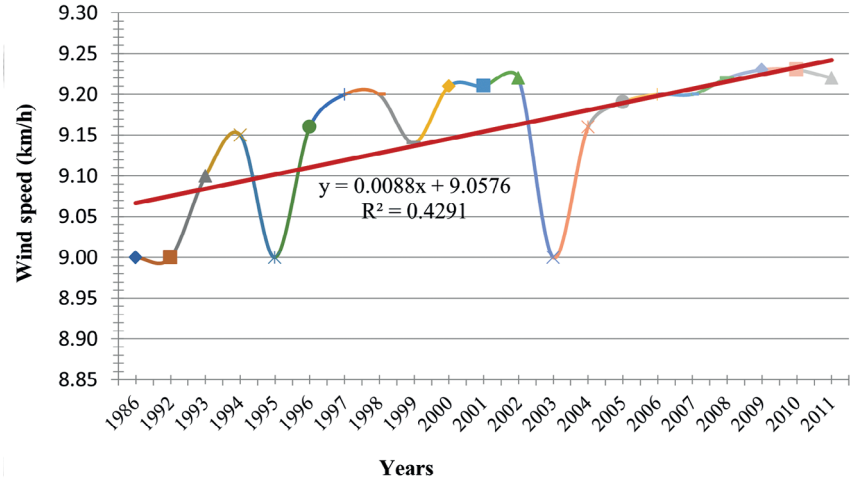

Figure 3.6
Predicted (red) and observed (blue) changes in wind speed (1986 and 1992--2011)
Source: Authors' data (2016)

Changes in TCI in Narok

The minimum and maximum TCI scores for Narok were 71 and 86 (Table 3.3), respectively, which showed that tourism conditions for the area ranged from very good to excellent. The mean TCI index was 80.48, indicating that conditions for tourism in the study area, according to Mieczkowski's (1985) index for outdoor activities, were generally excellent. The standard deviation for the TCI was three, showing that conditions varied from very good to excellent.

Table 3.3
Summary statistics for Narok's TCI

n=21	Min.	Max.	Mean	Std. Dev.	Skewness SE		Kurtosis SE	
TCI	71	86	80.48	3.29	-1.13	.501	2.24	.97

Key: N=number of respondents; Min. = minimum; Max. = maximum; Std. Dev. = standard deviation; SE = standard error

A linear regression model fitted over the data (Figure 3.7) showed that the TCI has decreased over the years in the study area, from an initial value of about 84 in 1986, to 76 in 2011. The study found that the decrease in TCI over

the 21-year study period was significant, (b= -0.34, β= -0.64, t= -3.61, p=0.002, R^2=41). From the regression equation in Figure 3.7, the study predicts that the TCI has decreased by 0.34 points every year over the 21 years. Thus, cumulatively, the TCI has shrunk by about seven points over the study period. Passage of time was found to explain a considerable 40% of the variance in TCI.

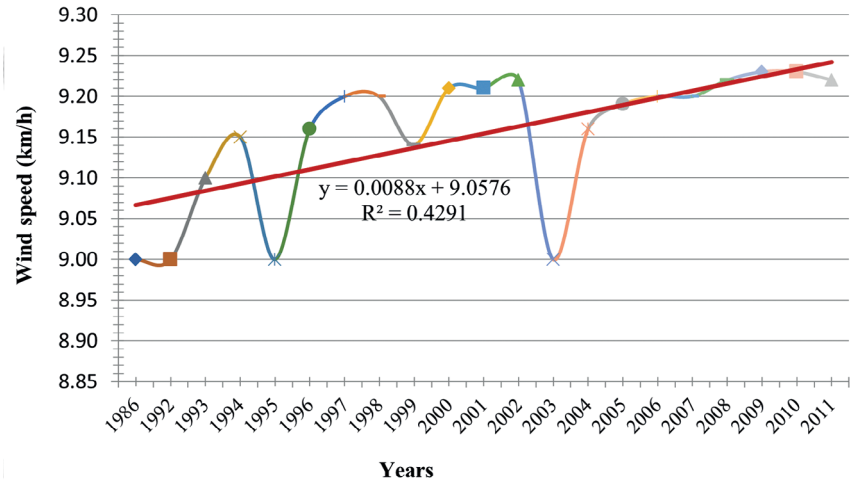

Figure 3.7

Predicted (red) and observed (blue) changes in TCI in Narok (1986 and 1992-2011)

Source: Authors' data (2016)

Several linear regression equations were used to analyse the effect of the contribution of each of the five TCI sub-indices (CID, CIA, precipitation, sunshine, and wind speed) on the possible deterioration of TCI over the years. The indices are summarised in Figure 3.8. Both comfort indices, CID and CIA, which combine temperature and humidity into effective temperature, were significantly influenced by time. Whereas CID was found to have significantly deteriorated over the years (b=-0.03, β=-0.50, t=-2.52, p=0.02, R^2=0.25), the CIA was found to have significantly increased over the years, (b=0.17, β=0.55, t=2.84, p=0.011, R^2=0.30), which can be seen from scores in Figure 3.8. However, precipitation, (b=-0.02, β=-0.26, t=-1.17, p=0.26, R^2=0.07), sunshine, (b=-0.01, β=-0.16, t=-0.70, p=0.491, R^2=0.03), and wind speed, (b=-0.01, β=-0.25, t=-1.11, p=0.28, R^2=0.06) scores were found not to be significant.

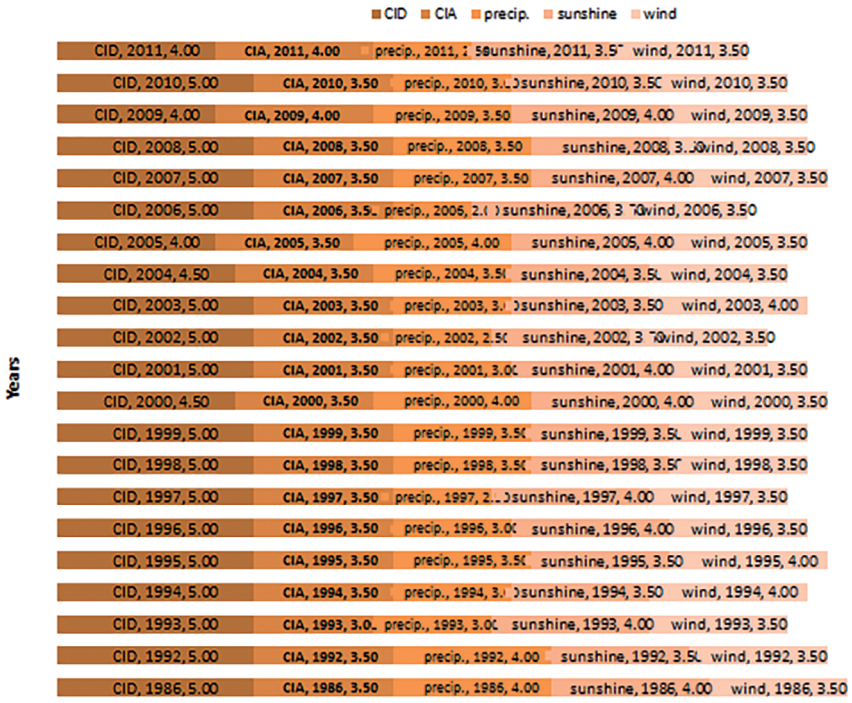

Figure 3.8
A summary of TCI sub index scores for Narok over the years
Source: Authors' data (2016)

3.4 Discussion

This study shows that both the minimum and mean temperatures in Narok have increased significantly, by about 0.07^{0}C and 0.04^{0}C, respectively, every year. However, the maximum temperature was found to have more or less stagnated. This finding is similar to the GoK (2010) results for Nairobi, which indicated that both the minimum and maximum temperatures for the city have increased over the last few decades. In contrast, the diurnal range of temperature has decreased.

Mean daily relative humidity generally and insignificantly decreased over the years. On the other hand, precipitation, daily sunshine hours, and wind speed all showed positive insignificant trends over the study period. The GoK (2010) report showed that most of the places investigated in Kenya did not show any significant trends with respect to rainfall. Annual rainfall showed either neutral or slightly decreasing trends, due to a general decline in the long rains

season that extends from March to May, whereas the short rains season between October and December, on the other hand, shows a positive trend in some locations.

With a mean TCI of 80, conditions for tourism in the study area were generally very good. This is in accordance with the Mieczkowski (1985) scores. However, the study shows that the TCI for the area has significantly shrunk and deteriorated over the years. The main explanation for the shrinkage of the TCI is the concordant and significant decrease in the CID, which accounts for the largest part of the index at 40% (Mieczkowski, 1985). The CID, just like the CIA, is a comfort index combining temperature and humidity into effective temperature – a measure of perceived temperature. At high temperatures, the perceived temperature is higher than the real temperature if humidity is high and lower than the real temperature if humidity is low (Amelung et al., 2007; Mieczkowski, 1985). The decrease in CID, especially in later years, was caused by the observed temperature being greater than 25^0C during those occasions, with high minimum relative humidity causing the effective temperature to be higher than the real temperature. Higher effective temperatures reduced the CID scores and hence TCI. GoK (2010) adduced the significant increase in temperature in Kenya to climate change. Thus, the worsening TCI in Narok could be directly linked to climate change. This could be the first empirical report that links climate change to the deterioration of tourism climatic conditions.

The study further shows that CIA has significantly increased over the years. This, however, has not improved the TCI, probably because in the computation of the weighted TCI, CIA only contributes 10% as opposed to CID, which accounts for 40% (Amelung et al., 2007). The improvement in CIA was caused by the increase in mean daily temperatures. However, a continued increase in mean daily temperatures above 25^0C, coupled with high mean daily relative humidity, will result in a decrease of the CIA scores. This study suggests that climate change, unless mitigated, could worsen tourism climatic conditions by both increasing maximum daily temperatures (which would have the greatest impact) and minimum daily temperatures.

Precipitation, sunshine, and wind speed sub index scores were found not to be significantly influenced by the passage of time. The results therefore suggest that for Narok, these components of TCI did not contribute to degrade the index over the study period. Both sunshine and precipitation contribute 20% each to the TCI whereas wind contributes 10% (Amelung et al., 2007; Mieczkowski, 1985). Climate change is likely to impact greatly on precipita-

tion, more so than on the other two elements (IPCC, 2014) and hence, it is the former that is likely to affect TCI. However, as the GoK (2010) reports, rainfall trends in the country show mixed signals, with some locations indicating trends towards wetter conditions in recent years, whereas the majority of locations are not showing any significant trends. Wetter conditions would degrade the TCI (Scott et al., 2004) but a clearer trend for this element is required to delineate its possible contribution to TCI in the study area.

3.5 Conclusion and recommendations

This study investigated changes in five climatic variables (temperature, relative humidity, precipitation, sunshine, and wind speed) over the study period in Narok, Kenya, and established the changes in tourism climatic suitability for the area using TCI. The study showed that both the minimum and mean temperatures in Narok have increased significantly, by about 0.07^0C and 0.04^0C, respectively, every year, over the study period. However, the maximum temperature was found to have more or less stagnated. Mean daily relative humidity generally decreased over the years although the reduction was not significant. On the other hand, precipitation, daily sunshine hours, and wind speed all showed positive trends over the study period, although the rises were not significant.

The mean TCI index for Narok was 80, indicating that conditions for tourism in the study area according to Mieczkowski (1985) were generally excellent, ranging from very good to excellent. However, the study showed that the TCI for the area has significantly deteriorated over the years, having shrunk by about seven points. This was principally caused by the concordant significant decrease in the CID, resulting from a significant increase in temperature owing to climate change. This study could be the first empirical report that links climate change to deterioration in tourism climatic conditions in Narok, Kenya. The study recommends that the country should take action to minimise the deleterious effects of climate change through deliberate approaches such as accelerated reforestation, sustainable land use practices, and conservation enactments, among others.

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4

Climate change – tourism nexus and mitigation strategies in Tanzania

D. Jani and J.R. Philemon

4.1 Introduction

Climate change is a global concern that affects everyone in all socio-geographic spheres. It has attracted collective global attention by being included as one of the action areas under the 17 Sustainable Development Goals (Goal 13-Climate Action). Climate change pertains to the global warming arising from anthropogenic sources reflecting the increase in carbon emission (Schafer & Schlichting, 2014) that leads to rising temperatures and adversely affects other climatic conditions. Moreover, given the fact that climate change touches all aspects of people's lives, it is related to most of the other SDGs (1-poverty, 2-hunger, 3-good health and wellbeing, 5-gender equality, 6-clean water and sanitation, 10-reduce inequality). Therefore, actions and strategies to mitigate and adapt to the phenomenon are also imperative to attaining the other SDGs. As climate change emerges from anthropogenic causes, inclusive adaptations are called upon as they affect global and local players from all sectors of any country's economy.

Tourism is noted to be a cause of climate change (OECD, 2011) as well as being affected by climate change (Schott, Reisinger & Milfont, 2010) and dependent on climate (Gossling & Hall, 2006). The tourism and climate change nexus necessitates behavioral change and positive actions from all tourism stakeholders, including local communities, tourists, governmental and non-governmental agencies, and private sector organisations at a particular tourism destination. The local community is among the tourism stakeholders being affected and has a subtle power to mitigate and adapt squarely to climate change. Local communities in sub-Saharan Africa who are poor and dependent on natural resources for their livelihood, are greatly susceptible to

the vagaries of climate change (Kajan & Saarinen, 2013), thus appropriately engaging them in mitigating and adapting to the effects of climate change through education, geared towards changing their attitude and behaviour, is crucial.

Despite the pressing need to involve the community in mitigating the effects of climate change within the tourism sector, there are limited studies to inform these processes (Kajan & Saarinen, 2013). Many studies have taken an approach of describing the extent of the effect of climate change on the livelihood of the community or of providing normative solutions (e.g. Mahadew & Appadoo, 2019; Wiseman et al., 2010) instead of coming up with locally-based adaptive strategies to provide lessons and experiences not only to a particular locality but to other similar localities. It is a thesis of this chapter that climate change mitigation and adaptation strategies within the tourism sector have to be brought to the fore, and that there is a need for contextual knowledge that can not only reduce the effects of climate change but help realise the potential of diverse tourism products, improve people's livelihood and ultimately place tourism on a sustainable path.

Despite its impressive growth, the tourism industry has been affected greatly by climatic changes (Higgins-Desbiolles, 2020; Jamal & Camargo, 2014). The impacts of climatic changes on tourism have typically affected the Triple Bottom Line (TBL) of sustainable tourism, including economic, environmental, and social-cultural aspects. Additionally, climate changes impact ecosystems, water resources, weather events, health issues, desertification, sea-level rise (IPCC, 2001), and political and social stability and conflicts (Christian Aid, 2006). For instance, in the much-researched dimension of economic inequalities, studies indicate tourism to increase income gaps (e.g. Manyara & Jones, 2007; Mbaiwa, 2017), while those focusing on the environment (e.g. Lee & Jamal, 2008), particularly in developing countries, consider tourism to decrease locals' access to environmental resources. With respect to social-culture aspects, studies show the absence of local context within the tourism industry. With such a gap between ideals and what is experienced on the ground, writers, researchers, and advocacy groups have tried to debate, promote, and research the climate-tourism linkages. Climate change in the context of tourism is now a new and burgeoning concept calling for further studies.

Sustainable Tourism

Sustainable tourism has been a growing concern to researchers and academicians ever since the Brundtland report (WCED, 1987), whose contents have

been adopted by international and national bodies. Despite the wide adoption of the concept, explicitly, one single definition is lacking (Zolfani, Sedaghat, Maknoon, & Zavadskas, 2015). Nevertheless, there is an agreement of the dimensions of sustainable tourism, including economic, environmental, and socio-cultural aspects. Addressing the negative effects brought about by climate change will go a long way to sustaining the tourism industry, upon which millions of people's lives and country's economies depend.

Tourism in Tanzania

Tanzania is the largest country in East Africa, lying close to the equator on the East Coast of Africa. Because of its position close to the equator, the climate variations in temperature are not very extreme. Pemba, Zanzibar, Mafia, and a narrow coastal line strip are parts of Tanzania. Lake Nyasa and River Ruvuma can be found in the south, whilst Lake Victoria is in the north. Tanzania borders Uganda to the north, Rwanda and Burundi on the north-western side, Malawi and Zambia to the south-west, and Mozambique to the south. On the north-eastern side, the country borders Kenya, while the Indian Ocean is on the eastern side (URT, 2007). Tanzania is one of the best safari destinations in East Africa and the sub-Saharan African countries. The country is the home of the highest mountain in Africa, Mount Kilimanjaro, and has 21 national parks. Tanzania is divided into four geographies of the national parks known as tourism circuits: the northern circuit, the western circuit, the southern circuit, and the coastal circuit. The coastal circuit is famed for its beautiful sandy beaches, clear ocean waters, abundant marine life, and world heritage sites.

According to Philemon (2021), Tanzania is also exceptionally endowed with cultural heritage resources that offer a true cultural mosaic and diversity that appeal to many tourists. Likewise, Mabulla (1996) highlighted archaeological, palaeontological, and historical resources found in Tanzania. These resources are further divided into (1) Archaeological/ Paleontological resources, (2) Historical sites, (3) Historical towns, (4) Traditional Settlements, (5) Historic Buildings, (6) Sites with special memories, and (7) Natural Features and Structures (Kamamba, 2014). Such abundant natural resources have led the World Economic Forum to place the country at the 8th position worldwide concerning tourism natural resources (WEF, 2018). According to WEF (2019), in terms of natural resources, Tanzania's ranks dropped 4 levels from the 8th to the 12th position globally, due to its World Heritage natural sites in which it ranks 18th, the impressive wildlife ranks (12$^{th)}$, and habitat protection (10th). Tanzania is endowed with six World Heritage Sites: the Ngorongoro Crater, Serengeti National Park, Mount Kilimanjaro, the ruins of Kilwa Kisiwani, the

Selous Game Reserve, and Zanzibar's Stone Town. In 2018, Tanzania received about 1.5 million tourists, with the industry contributing 9.4% of GDP as well as creating about 8.2% of total employment (WTTC, 2018).

The climate change – tourism nexus

Of importance in this chapter is the universal claim that tourism, a weather-dependent industry, is a source of greenhouse gas (GHG) emissions as well as a significant victim of climate change. The effect of tourism on climate change and the fact that the sector is equally affected by climate change pose a significant challenge on the key issues to be addressed first and foremost. The chapter is thus intended to report the extent of climate change in Tanzania, tourism sustainability issues, the impact of climate change on tourism, the impact of tourism on climatic changes, and best practices to address the effects of climate change and tourism.

Many studies indicate that developing countries are greatly affected by climate change due to their lack of resources to cope with its effects (IPCC, 2001, 2007), their over-dependence on rain-fed agriculture, recurrent droughts, and inadequate land distribution and policies, combined with widespread poverty (ibid.). Poor people are particularly vulnerable because poverty is associated with a high reliance on natural resources that are already impacted by climate change. In turn, poverty constrains the community's adaptive options. Tanzania is not exempted from the vagaries caused by climate change and the impacts of tourism on climate change.

According to the United Nations World Tourism Organisation (UNWTO, 2011), climate change is one of the single most daunting challenges facing the world in the twenty-first century. Few other economic activities are as dependent on the climate as tourism (UNWTO, 2011). While climate change has had a profound impact on tourism, the sector itself contributes to greenhouse gas emissions (GHGs), especially through the transportation of tourists and other activities. Thus, tourism is both a victim of and contributor to climate change. Mwandosya (2007) highlights some of the impacts of climate change on tourism in Tanzania as follows: (1) the deaths of wildebeests and other animal species due to hunger and thirst; (2) a serious drop in water levels causing severe droughts; and (3) the recession of the Mount Kilimanjaro glacier (UNWTO, 2007). Other impacts are: (4) the destruction of coral reefs; (5) the erosion of beaches owing to rising sea levels; (6) the destruction of infrastructures such as roads and airfields in national parks by heavy storms and

floods; and (7) threats of tropical cyclones which affect the flow of tourists to the beaches.

While the climate change – tourism relationship has been highlighted as a research interest in recent years, this was not the case just a couple of decades ago. While several studies today have been conducted in the area, the world is still a long way from addressing the negative effects that both sides have on each other, subsequently destroying the very base upon which many people earn their livelihood. Becken, in his 2007 study, already found that tourists were skeptical about the tourism and climate change nexus. The perception regarding the linkage is still the same today, as tourists do not pay adequate attention to how best to mitigate the effect that their activities may have on climate change. Sharon, Pang, McKercher and Prideaux (2013) note that this indifferent perception is attributed to ignorance and denial. The authors also state that the ambivalence is attributed to tourists' beliefs that their actions are not enough to have a profound impact on causing climate change or that they can even help alleviate the catastrophe. Tourism and climate change have a 'two-way relationship' (WTO, 2003b: 8) in that they have an impact on each other. In the same vein, Sharon et al. (2013) argue that the tourism sector is a double-edged sword. They elaborate by highlighting that it is both a victim, and a supplier, of GHG emissions whose impacts are immeasurable. These emissions result from transport, accommodation, and other tourism activities (Ceron, 2003; Gössling, 2000, Peeters, 2003). The GHG emissions are inadvertently causing an increase in the average global temperature, accelerating the frequency, duration, and intensity of extreme weather and climate events.

4.2 Impacts of climate change on tourism in Tanzania

Tanzania's tourism sector is affected by climate change mainly through coral bleaching, coastal flooding and erosion, the deletion of Mount Kilimanjaro's snow cover, high temperatures, the spreading of diseases, the depletion of wildlife, and the destruction of tourist infrastructure. The destruction accelerates the degradation of ecosystems that form the basis of the Tanzanian tourism economy. Therefore, climate change impacts on tourism must be identified and addressed to abate the loss of biodiversity, which is central to the tourism sector.

Coral Bleaching

Coral bleaching is the paling of corals, stemming from the loss of symbiotic zooxantheallae (Chauka et al., 2016). Coral reefs, 'the rain forests of the ocean' (Reaka-Kudla, 1995), constitute some of the most vulnerable ecosystems and are heavily affected by the vagaries of climate change (Chauka et al., 2016). Coral reefs create habitats for fish and marine life and are the basis of coastal and marine tourism in Tanzania. The Tanzanian coastal zone is home to some of the most ecologically fragile areas, such as mangroves, wetlands, and reefs, which are vulnerable to climate change. Tourism operations in Tanzania's coastal zones consist mostly of diving and snorkeling, with Tanzania being famous for being one of the world's best scuba diving locations. However, coral bleaching caused by climate change has caused damage to the oceans and the reefs. According to Chauka (2017), the 1997-1998 global coral bleaching event instigated coral reefs' mortalities of up to 80% along Tanzania's coast. The bleaching was caused by El Nino, which increased sea surface temperature by 2°C. Over 90% of these mortalities happened in Pemba and Mafia Islands. Coral bleaching occurs when corals lose their vibrant colours and turn white, resulting in the death of live coral and a high amount of dissolved carbon dioxide that destroys the corals, mollusks, and shells. Without these organisms and creatures underwater, scuba diving and, subsequently tourism, suffers. Tourists who are into diving may opt to stay in their places of origin or pursue other alternatives if there are not enough corals in the world left that are worth their time (Viner & Agnew, 1999). Reef-dependent tourism is thus greatly affected by the coral bleaching. It is estimated, for instance, that Zanzibar incurred a loss of between 3-4.6 millions of USD following mass coral bleaching of 1997-1998 (Schuttenberg & Obura, 2001). According to the authors, the losses are manifested through (i) declining visitation, hence loss of revenues; (ii) tourists not pursuing coral reef-related tourism activities; and (iii) reduced tourist satisfaction due to degraded coral reefs.

Coastal flooding and erosion

The Tanzania (Mainland and Zanzibar) coastline is about 1424 kms long, extending from the Tanga region in the north (4° TS) to the Lindi Region in the south (10° 5'S). The country is endowed with marine resources thanks to its 223,000 km^2 of offshore waters (MNRT, 1997). The tourism industry, which partly depends on coastal resources and ecosystems, is already a major source of foreign exchange. A large proportion of total tourism infrastructures are located along the coast, in areas close to major urban development that are vulnerable to coastal erosion and flooding. A pressing concern with respect

to climate change along the coastline is the rising sea level. Global warming is noted to cause a rise in sea levels due to (i) the melting of glaciers and ice-sheets; (ii) warming ocean waters; and (iii) a decline in the amount of liquid water on land (Lindsey, 2020). Two of the highly noted incidences in Tanzania which help demonstrate that sea levels are in fact rising, are the disappearance of Maziwi Island in Tanga in the late 1970s, and the submerging of the Africana Hotel (Fay, 1992). The hotel was located along the infamous Kunduchi beach in Dar es Salaam, Tanzania. According to Cusick (2018), it is estimated that by 2050, the sea level in Tanzania will rise with between 0.5 and 1.4 feet. While the problem has not manifested itself greatly in Tanzania, it is still estimated that it will severely impact the tourism industry because tourism in Tanzania, especially in Zanzibar, depends on the relatively serene beauty of the coastal areas. Tourist resorts, hotels, human settlements, and other assets are all vulnerable to these coastal floodings and erosion. A study by Kebede and Nicholls (2012) estimated that over 210,000 people could be exposed to a potential coastal flood event by 2070, up from 30,000 people in 2005. According to the researchers mentioned above, the damages resulting from such an event are estimated to rise from US35 million (2005) to US10 billion (2070).

Reduction of Mount Kilimanjaro's snow cover

With its snow-capped Kibo peak standing at 5,895 meters' altitude, Mount Kilimanjaro is one of the largest volcanoes in the world. Trekking, the key tourism activity on Mount Kilimanjaro, entails the physical challenge of reaching the top as well as sightseeing. Both activities are dependent on the mountain's physical conditions and aesthetic features. Sightseeing has been affected by a decrease in wildlife, waterfalls, and a receding snow cover, among other factors. In 1912, the snow-covered area on Mount Kilimanjaro was around 11.40 km^2. According to Pepin et al. (2014), the glaciers have receded by 85% between 1912 and 2007. The declining glaciers are attributed mainly to global climate change, including deforestation (ibid.). In 2011, the size of the snow cover decreased to approximately 1.76 $km^{2.}$. The disappearing snow cover may ultimately reduce the number of tourists.

High temperatures

Climate change is also causing tourists to shift destinations when temperatures rise to levels that are no longer comfortable. While tourists enjoy sunbathing for several hours, temperatures above 40c are considered unbearable, or at least uncomfortable, which may lead to heat stress, and may even cause fatalities due to stroke. Therefore, tourists are not likely to visit such places, to

avoid the soaring temperatures. They could instead opt to go to areas that are slightly warmer than their own regions. Alternatively, the holidaymakers may postpone their vacations to a later time of the year or take them earlier when the heat is not as intense (Viner & Agnew, 1999).

Spread of diseases

Climate change affects the geographical distribution and population densities of wildlife, thus altering disease dynamics (Jones et al., 2011). Higher temperatures, floods, and prolonged droughts, resulting in scarce water resources due to climate change, make Tanzania vulnerable to outbreaks of diseases among both the human population and wildlife. It is documented that in 1994, the canine distemper virus (CDV) killed slightly more than one-third of the lion population in the Serengeti. Seven years later, the same depletion of lions took place in Ngorongoro Crater. Warmer climates are found to be conducive to the spread of many diseases. The movement of people or goods from one place to another can also be a factor in spreading infections. Tourism being about people's movement, is therefore a culprit for the spread of diseases. The current Covid-19 pandemic, which is causing havoc, is spreading due to the movement of people. The travel restrictions imposed on people are damaging a once flourishing tourism sector.

Depletion of wildlife

Sintayehu (2018) argues that climate change is posing the most important loss and threats to Africa's biodiversity, and the trend is bound to accelerate in the coming years. Over 58 per cent of species in the Masai Mara ecosystem has declined over the last 30 years due to droughts (Ottichilo et al., 2000). It is further argued that climate change, fragmentation, degradation and increased eco-system deterioration are exacerbating the depletion of endangered species in the country to almost three-fold compared to the records of 2000. Climate change is one of the major drivers of fauna and flora extinction in Tanzania. It affects vegetation and ecological zones, and ultimately the distribution of wildlife. The present network of parks and reserves is based on animal distribution and climate conditions, and adjacent land areas face increasing pressure due to human use. Therefore, any redistribution in wildlife could threaten the population, which, in turn, reduces the attraction for tourists. Tourism activities vary widely in terms of their climatic and environmental requirements, and they respond to environmental change in very different ways. A case in point is that of Serengeti National Park, which is

prominent for its wildlife and wildlife migration and therefore vulnerable to climate change.

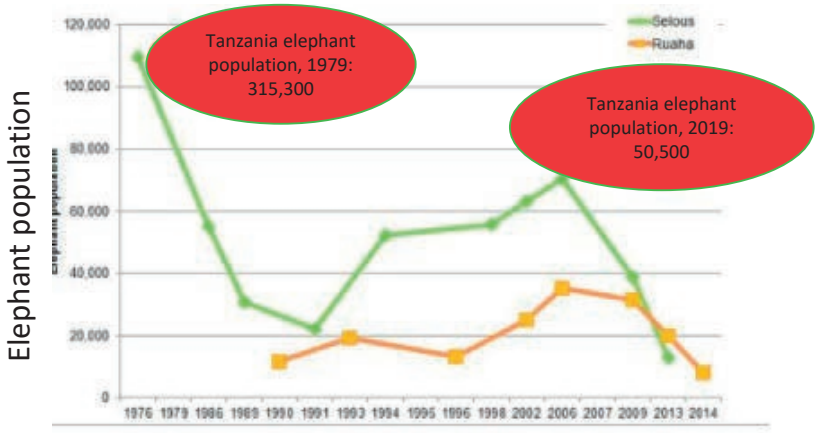

Figure 4.1

Tanzania elephant population: Selous and Ruaha subsets 1976-2014

Source: Leaked statistics confirm scale of Tanzania's elephant crisis – EIA (eia-international.org)

It has been scientifically proven that African forest elephants are affecting climate change by contributing to natural carbon capture. As these elephants forage the forests, they leave behind late-succession trees which sequester more carbon from the air by tilting the biological balance (Battersby, 2021). It is thus stated that these elephants are potentially more valuable than they have been estimated to be before.

Destruction of tourist infrastructure

Sunlu (2003) states that tourism destroys the environmental resources on which it depends. Infrastructure that is crucial for tourism is greatly affected by climate change. For example, at Lake Manyara National Park, whose diverse bird and animal populations form one of its chief attractions, heavy rainstorms can cause a temporary closure of tracks and make the lakeshore inaccessible. Roads within Lake Manyara National Park and Masai Mara Game Reserve as well as roads leading to the park and reserve deteriorate during heavy rains. Some roads and bridges may be temporarily closed due to flooding. Road maintenance becomes particularly difficult and expensive during prolonged heavy rains. Incidents of extremely heavy rains leave park roads impassable for long periods and result in reduced tourist visits and loss of revenue.

4.3 Impacts of tourism on climate change

The relation between climate change and tourism is bidirectional. Climate change impacts on tourism and tourism influences climate change. It is worth noting that the impact of tourism on climate change is not evenly distributed among different types of tourism. Some of the key determinants that will explain the magnitude of the impacts are the distance between the host and destination, the mode of transportation, and the tourists' length of stay. Tourism makes a significant contribution to GHG emissions, due to its use of accommodations (heating, cooling, washing, cooking), the transport between the tourists' homes and the destination areas (by car, coach, train, ferry, aircraft), and tourist activities (energy use for transportation of tourists from their accommodations to the sites of activities, for operating restaurants, bars, disco's, cinemas, cable-cars, scenic tours).

GHG emissions from transport

While tourism and aviation are perceived to be closely related (Bieger & Wittmer, 2006; WTO, 2006), aviation accounts for just 17% of all tourism-related transport (UNWTO, UNEP, WMO, 2008). Nevertheless, it is argued that the aviation industry is considered one of the high emitters of GHGs whose impact on ozone is immensurable (Schumann, 2004). Of all the emissions from the tourism sector, aviation takes the lion's share with 40% of total emissions compared to surface-based emissions (Gossling et al., 2007). The scholars further contend that aviation emissions are, on the higher side, 5.1 times more harmful.

GHG emissions from accommodation

The contribution of tourist hotels/accommodations towards climate change is now unquestionable. However, the extent of these emissions in developing countries such as Tanzania remains a less explored domain. It is universally acknowledged that different modes of accommodation have different carbon footprints. Full-service hotels have the largest footprints, followed by self-catering vacation homes and guesthouses, campsites, and pensions/bed and breakfasts (UNWTO-UNEP-WMO, 2008). Chan and Lam (2002) indicated that the predicted amount of carbon emissions due to energy use in the hotel industry is significant, whereas Lai et al. (2012) indicated that due to the unavailability of a proper method to determine the carbon emissions from hotels,

the facilities managers and other professionals have been unable to identify their contribution to GHG emissions. Accordingly, global accommodation providers have initiated the process of recording their carbon emissions in different formats. Ever since 2003, when the World Tourism Organisation organised a conference on climate change and tourism in Tunisia, awareness and government efforts towards climate change adaptation practices have increased. The results have been mixed, with some nations taking halfhearted measures.

Notwithstanding the negative impacts of tourism on climate change, there are also some positive contributions that the sector is making towards environmental protection, conservation and restoration of biological diversity. A more sustainable use of natural resources contributes to environmental protection, conservation and restoration of biological diversity (Sunlu, 2003; 269). According to Sunlu (2003), all these positive changes can be attained through (i) direct and indirect financial revenues generated from tourism-related activities, which are then spent towards conservation and the protection of pristine sites; (ii) enhanced environmental management and planning, which will ensure that tourism facilities are more compatible with the surrounding natural environment. These may include such approaches as the adoption of efficient waste management technologies, energy-efficient systems, and an increased use of affordable energy sources; (iii) raising environmental awareness. The profound contribution that tourism makes to communities and national economies helps the public to appreciate and observe suitable consumption practices; (iv) the enactment of robust regulatory measures. As will be noted later in this chapter, countries, and Tanzania in particular, are enacting laws, policies and regulatory frameworks intended to ensure the sustainability of the natural resources upon which tourism is dependent. However, for these regulatory measures to have a profound impact they need to be enacted after a careful and in-depth analysis.

4.4 Climate change adaptation strategies

The Government of Tanzania has been taking steps to mitigate the impacts of climate change on the coastal ecosystems. These strategies aim to reduce the impacts of sea-level rise and changes in precipitation patterns caused by climate change and their direct and indirect effects, such as droughts, floods, infrastructure and environmental degradation. The outcomes of these efforts will ultimately help boost the tourism sector, which contributes massively to the country's economy. In trying to implement these strategies, the country

will eventually help the tourism sector thrive. Areas around which these strategies revolve include forests, grassland and wildlife, water resources, coastal resources, and the energy sector.

Forests, grassland, and wildlife

Tanzania *is not* notably recognised as a destination for forest-based nature tourism. However, to address the issues related to forestry, grassland, and wildlife, the Government of Tanzania has developed several strategies and plans. Some of these are the establishment of collaborative forest management in various districts and the undertaking of concerted efforts to conserve forest biodiversity, water catchment, and soil fertility. Coupled with those strategies are the ongoing national-wide tree planting campaigns and inclusive and participatory forest management programs throughout the country. All these will help guide the country's venture into nature-based tourism and open up more unexplored investment opportunities, which will also scale up conservation activities.

Coastal resources

The coast of Tanzania has a diversity of resources (coral reefs, mangroves, sea grass beds, and beaches), and the people living along the coast utilise a variety of its natural resources. The complexity of issues and multiplicity of management responses related to resources found in the coastal areas call for an integrated approach to address the challenges of interrelated issues. Accordingly, the government of Tanzania has embarked on establishing numerous marine and coastal environment management policies, programs, and projects. Some of these policies, programmes and projects include:

(i) National Fisheries Sector Policy and Strategy Statement, 1997;
(ii) National Forest Action Plan 1990/91–2007/08;
(iii) Management Plan for the Mangrove Ecosystem in Tanzania, 1991;
(iv) Fisheries Act, 1970;
(v) Marine Parks and Reserves Act, 1994;
(vi) Deep-Sea Fishing Authority Act, 1997;
(vii) Territorial Sea and Exclusive Economic Zone Act, 1989.

In addition to these plans, policies, and legislation, it is widely acclaimed that traditional knowledge is extensively found within coastal communities. However, with the inclination to impose solutions from the top, scholars and policymakers have taken too long to realise the value of this knowledge and

utilise it to sustain the coastal resources. For example, Berkes et al. (1995) identified three levels of traditional knowledge: (i) local traditional knowledge of resources and environment; (ii) traditional management systems based on existing knowledge and imposed restrictions on resource utilisation; and (iii) social organisations for co-ordination, rule-making, and enforcement. Three examples of indigenous knowledge to help highlight traditional management systems are illustrated below:

(i) The use of fence traps (Tobisson et al. 1998): Fence traps are fishing gear used in many areas, including Chwaka Bay, to trap fish when the tide moves out. Traps are owned by individuals or families who have exclusive rights to harvest fish from them.

(ii) Lunar/tidal effects on fishing activities: (Tobisson et al. 1998) Indigenous communities have a wealth of knowledge on lunar/tidal effects and their relationships to the availability of fish. The fisherfolk apply this knowledge to make optimal use of the resources.

(iii) Crab Management System (Tobisson et al. 1998): The number of crabs found in the mangroves has decreased significantly due to increased demand and technological changes. Crab fishing used to be confined to low water during spring tides, when it was possible to collect the crabs in the mangroves; however, with the increased availability of diving masks and snorkels, the picking of crabs can be done at any time.

Energy sector

Tanzania anticipates diversifying from electric power fuel sources to natural gas, coal, hydro, geothermal, and renewable solar and wind energies. Furthermore, as the Tanzanian tourism sector rises, this trend will further increase energy consumption. Therefore, a tourism-friendly energy policy is essential to facilitate the booming sector. For instance, in addition to conventional power plants, the Government of Tanzania promotes (1) the improvement and intensification of clean thermal power generation projects; (2) the protection of hydropower water catchments; (3) the increasing availability of biomass resources; and (4) improving biomass to improve energy conversion efficiency (URT, 2013).

Freshwater resources

Tanzania has plentiful freshwater resources whose conservation is of paramount importance for the country's survival and, specifically, the tourism

sector's prosperity. Like in the case of coastal resources, Tanzania has enacted various policies and legislations to safeguard freshwater sources. These include the National Water Policy (2002) and Water Management Act (2009). The major challenges that pose significant threats to water security for river ecosystems and humans in Tanzania are:

(i) a rapidly growing population;

(ii) deforestation for agricultural expansion;

(iii) industrialisation;

(iv) climate change.

These challenges have led to concerted efforts to (1) adopting integrated water resource management; (2) constructing new dam sites and reservoirs (3) promoting conjunctive water use and inter-basin transfers; (4) protecting water catchments and groundwater, as well as diversifying the use of groundwater in drought-prone areas; (5) rainwater harvesting and water conservation. The ever increasing Tanzania population, at the rate of 2.9% (NBS, 2002), is putting pressure on tourism resources by increasing human activities which are known to emit Green House Gas (GHG) into the atmosphere. Simpson et al. (2008) contend that climate change has over 90% probability of accelerating GHG emissions, with surface temperatures rising to 4.0°C from 1.8°C. To enhance the efficacy of all these adaptation strategies, it is imperative that they are instituted to sustain tourism as much as possible. In accordance with the Carbon Neutrality Concept, there are four main iterative steps to be taken: (i) to ELIMINATE the emission of greenhouse gases by keeping away from certain activities that can be avoided without considerable changes to the tourism product or service quality; (ii) to REDUCE the emission of greenhouse gases by focusing on energy-efficient practices for specific activities; (iii) to SUBSTITUTE practices that are responsible for a large amount of greenhouse gas emissions with practices that have a lower carbon footprint; (iv) to OFFSET remaining emissions to achieve full carbon neutrality (Simpson et al, 2008: 68).

4.5 Conclusion

The climate change-tourism nexus and the profound effects they have upon one another calls for organised efforts by all countries. Isolated and fragmented efforts will do little to mitigate the immense and gigantic challenge of climate change and tourism. Tanzania needs to forge regional collaborative strategies to address the challenges in a way that conforms to the international frameworks in order for these strategies to have profound and long-lasting effects. Likewise, cross-cutting practices must be adopted since tourism is a sector that cuts across many sectors of the economy. As noted earlier, the sector involves transport, construction, retail, and other sectors producing leisure and business travel-related services. While it may not be possible to ameliorate all the challenges of tourism and climate change, ignoring this problem may pose a disaster for the future. It is necessary to always bear in mind the now well-rehearsed concept of sustainability which, in its essence, constitutes of avoiding the depletion of natural resources in order to maintain an ecological balance.

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5

Climate change and tourism in Southern Africa

J.E. Mbaiwa

5.1 Introduction

The tourism industry is highly vulnerable to climate change due to the strong causal relationship between weather patterns and tourist travel (Dogru et al., 2019). Tourism and climate change are two sides of the same coin. Climate can make travel and tourism conducive but can also make travel and tourism unconducive and impossible. Climate change can alter the suitability of weather for tourism and the aesthetic quality of natural settings (Hall 2018; Scott et al., 2015). Outdoor tourism directly relies on climatic conditions, with weather often being affected by climate change, especially changes in temperature (Georgopoulou et al., 2019; Rutty & Scott, 2014; Scott and Lemieux, 2010). Conversely, if the climatic conditions and temperatures are suitable, travelling and leisure become possible. Tourism has been a long-standing major economic activity for many African countries, including Southern Africa.

Southern Africa is known for its unique natural assets which include iconic wildlife, snow-capped mountains like South Africa's Drakensberg Mountains, waterfalls, rapids, majestic forests, unique bird populations, pristine beaches, and coral reefs, which have come to be a dominant tourism attraction in the continent (Lovei, 2017). Southern Africa's rich biodiversity and natural environment thus include Mount Kilimanjaro, Mount Kenya, the Victoria Falls, Zanzibar's Stone Town and its beautiful beaches, and the wildebeest migration between the Masai Mara and Serengeti, which are some of the world's best-known tourist attractions (Lovei, 2017). The rich natural environment makes tourism primarily nature-based in East and Southern Africa (Lovei, 2017). As such, nature-based tourism significantly contributes to Gross Domestic Product (GDP), jobs, and livelihoods in East and Southern Africa. The total contribution of travel and tourism was 7.8 percent of GDP and 6.0% of

total employment, including its wider effects with respect to investment, supply chain, and income, in 2016 (World Travel and Tourism Council, 2017).

Southern Africa, like the rest of the world, is experiencing natural climate variability (Kuivanen et al., 2015). This climate variability affects tourism development in Southern Africa countries. Southern Africa is defined as the total geographical area occupied by the 15 member states of the Southern African Development Community (SADC). These countries are: Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, eSwatini, Tanzania, Zambia, and Zimbabwe (Fig. 5.1).

Figure 5.1
Map of Africa showing Southern Africa (Source: Kuivanen et al., 2015)

The climatic conditions of Southern Africa follow a broad gradient, with more arid conditions in the west and increasingly humid conditions towards the east (Kuivanen et al, 2015). Kuivanen et al. note that closer to the equator, the

climate is largely humid. Precipitation patterns reveal lower annual rainfall in the south versus higher annual rainfall in the north (Kandji et al., 2006). Thus, the climate ranges from the winter rainfall Mediterranean conditions around South Africa, through the semi-arid summer rainfall savannah regions of the Kalahari in Namibia and Botswana, to the sub-humid rainfall regimes typical of Malawi (Stringer et al., 2009). The climate of the region is controlled by global patterns of atmospheric circulation (Kuivanen et al., 2015). Natural rainfall variability is linked to shifts in the tropical temperate trough over the region (Usman & Reason, 2004; McGregor & Nieuwolt, 1998) and regional sea surface temperature effects are explained by a phenomenon known as the El Niño Southern Oscillation (Todd & Washington, 1998; Stringer et al., 2009). The different climatic conditions thus determine tourism development in Southern African countries.

While climate change affects tourism in Southern Africa, its effects on tourism have not been extensively quantified (Dogru et al., 2019). In addition, the extent to which tourism is vulnerable or resilient to climate change compared to other sectors of the economy is not known (Dogru et al., 2019). The objective of this chapter, therefore, is to analyze the effects and implications of climate change on tourism sustainability in tourism destinations of Southern Africa. The chapter also make suggestions for potential mitigation strategies that can be introduced in Southern Africa. This is undertaken to demonstrate the extent to which vulnerability and resilience to climate change affect tourism and the overall economy of any country with reference to Southern Africa. The analysis is based on secondary data, especially published and unpublished data on tourism development, climate change, and theoretical considerations around sustainability.

5.2 Conceptual and theoretical considerations

Tourism and climate change are considered as 'a two-way street', suggesting that climate influences tourism, and tourism influences climate (Patterson et al, 2006). Tourism influences climate when considering the effects such as energy consumption and greenhouse emissions. Therefore, tourism policy interventions are concerned with mitigation to reduce radiative forcing due to tourism (Peterson et al., 2006). Conversely, climate also has an influence on tourism. Interventions thus identified are of an adaptive nature (Peterson et al., 2006). Tourism is therefore both a victim of, and a contributor to, climate change (Budeanu, 2005). This scenario suggests that both natural and human factors contribute to environmental changes in the natural landscape

upon which tourism relies. To understand this relationship, the Drivers-Pressure-State-Impact-Response (DPSIR) conceptual framework is suitable to be used in this chapter.

To guide and organise this chapter, as well as to identify and describe the stresses and key environmental threats that climate change poses to tourism in Southern Africa, the Drivers-Pressure-State-Impact-Response (DPSIR) conceptual framework was used (MacLean et al., 2013; UNEP, 2007). According to this DPSIR framework, socio-economic and natural factors (driving forces) exert pressure on the environment as a consequence of which the environment changes. This affects the health of the ecosystem and its dependent human population. This, in turn, may elicit a societal or governmental response that feeds back on all the other elements (UNEP, 2007). The DPSIR framework is thus a useful tool for elucidating the relationship between climate change and environment (in this case, outdoor tourism) and for tracing the origins and consequences of environmental problems in a particular ecosystem. According to UNEP (2007) the framework contributes to society's enhanced understanding of the links between environment and development, human well-being, and vulnerability to environmental change.

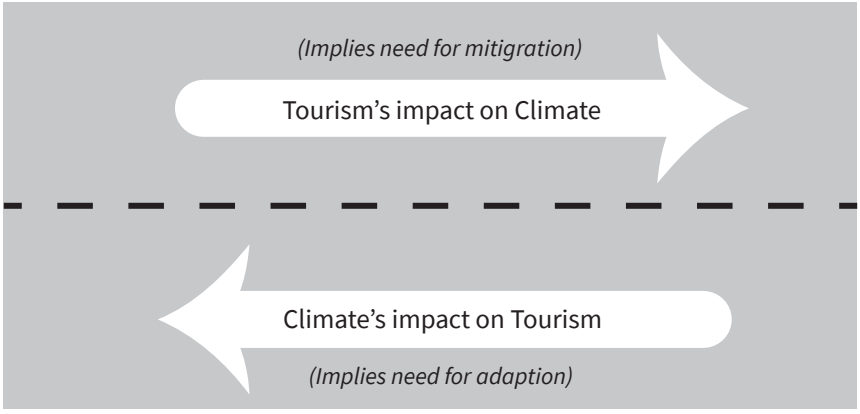

Figure 5.2
The Tourism-climate change system illustrated as a two-way street
Source: Peterson et al, (2006)

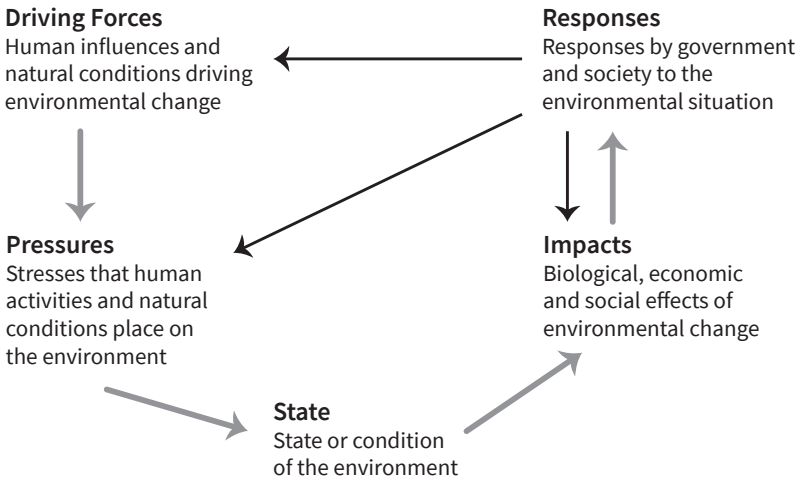

Figure 5.3
Drivers-Pressure-State-Impact-Response (DPSIR) framework
Source: (UNDP, 2007)

Driving forces are natural and human factors driving environmental change. They have also been referred to as indirect or underlying drivers (UNEP, 2007). These are the fundamental processes in society which drive activities that have a direct impact on the environment (Nachtergaele et al., 2003). In the case of climate change and tourism in Southern Africa, it would be interesting to identify both natural and man-made factors that influence climate change, hence causing environmental changes that might be detrimental to tourism development. *Pressures* involve the stresses that human activities and natural conditions place on the environment. As Peterson et al. (2006) indicate, tourism activities such as those involving energy consumption and greenhouse gas emissions, contribute to climate change and environmental stress. Conversely, climate change factors such as droughts and floods result in environmental stress which affects tourism development. *State* refers to the condition of the environment resulting from the effects of the pressure exerted by physical and human activities on the environment. *State* also includes trends, which often refer to environmental change (UNEP, 2007). *Impacts*, either on human well-being, or on the social and economic sectors, or environmental services, are highly dependent on the characteristics of the drivers and are therefore generally location specific. For example, floods and droughts in Southern Africa have been associated with climate change. Southern Africa has experienced tropical cyclones such as *Ana* (January 2022) and *Dineo* (2017), which caused storms and floods that did not only kill people and livestock and caused crop damage in Malawi, Mozambique,

South Africa and partly Botswana, but also destroyed infrastructure, used for tourism purposes. These tropical cyclones are associated with climate change. *Response* addresses issues of vulnerability of both people and the environment and provides opportunities for reducing human vulnerability and enhancing human well-being. Southern African countries have adopted policy measures to mitigate climate change, including enforcements to ensure that tourism adapts to these changes. In this regard, *Responses* can also be viewed as land use policies created by the government and environmental activities by people, representing human interventions in response to ecological and societal impacts (UNEP, 2007).

As can be gleaned from the Drivers-Pressure-State-Impact-Response (DPSIR) conceptual framework, key drivers of pressures and environmental stresses emanate from two major sources, which are natural factors and human activities (mainly climate change and tourism development). Both physical factors, such as climatic variability and climate change, and tourism development are rapidly transforming the ecosystem. These changes in turn lead to natural resource depletion, biodiversity loss and other forms of land degradation. Water is the principal driver of tourism and wildlife conservation in tourism destinations such as the Okavango Delta, Victoria Falls, as well as costal and beach areas of South Africa, Namibia, and Mozambique. For Botswana, the seasonal rainfall in the Angolan highlands governs the extent of the annual floods in the Okavango Delta. As a result of climatic variability, the Delta is subject to seasonal pulsing, that is, expansion and shrinking. Long-term climatic variations in flood pulse from the Okavango River create episodic wetting and drying of parts of the delta (SAIEA, 2012).

In addition to DPSIR framework discussed above, climate change impacts should be understood to be having both direct and indirect consequences on the tourism sector (El-Masry, 2021). As shown in Figure 5.4., climate change impacts has both direct (biophysical resources-related) and indirect (socioeconomic status-related) consequences that have a significant impact on the global tourism industry (see: UNWTO-UNEP-WMO, 2008; Grimm et al., 2018; IPCC, 2019). Climate is a principal resource for tourism, as it co-determines the suitability of locations for a wide range of tourist activities and is a principal driver of the seasonality of demand (El-Masry, 2022). Adequate climatic conditions are key for all types of tourism activities, ranging from conventional beach tourism to special interest segments, such as eco-, adventure-, and sport tourism (El-Masry, 2021). As a result, changes in the length and quality of climate-dependent tourism seasons (i.e., sun-and-sea or ski holidays) could have considerable implications for competitive relation-

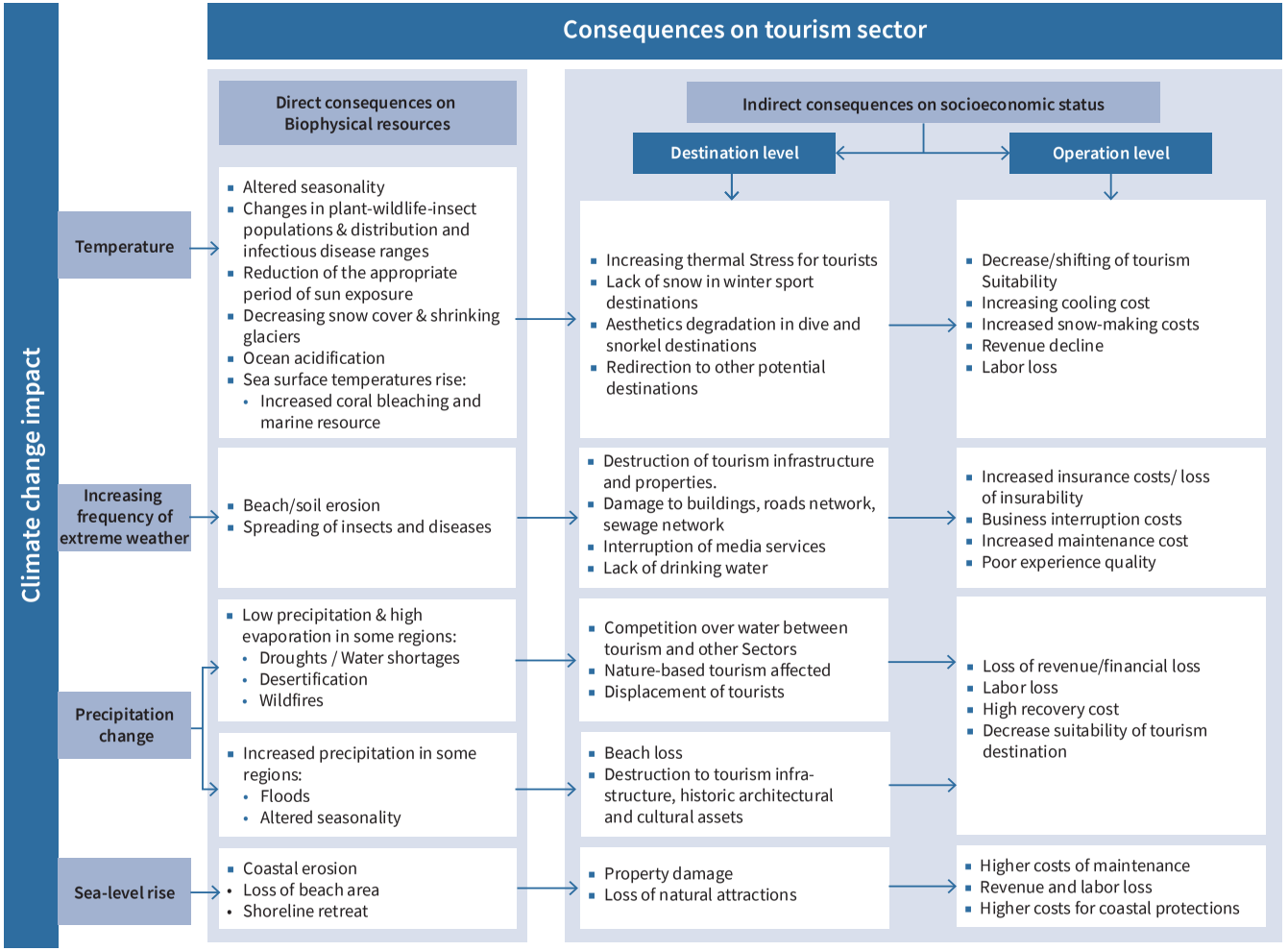
Climate change impact
Consequences on tourism sector
Direct consequences on Biophysical resources
Indirect consequences on socioeconomic status
Destination level
Operation level
Temperature
Altered seasonality
Changes in plant-wildlife-insect populations & distribution and infectious disease ranges
Reduction of the appropriate period of sun exposure
Decreasing snow cover & shrinking glaciers
Ocean acidification
Sea surface temperatures rise:
Increased coral bleaching and marine resource
Increasing thermal Stress for tourists
Lack of snow in winter sport destinations
Aesthetics degradation in dive and snorkel destinations
Redirection to other potential destinations
Decrease/shifting of tourism Suitability
Increasing cooling cost
Increased snow-making costs
Revenue decline
Labor loss
Increasing frequency of extreme weather
Beach/soil erosion
Spreading of insects and diseases
Destruction of tourism infrastructure and properties.
Damage to buildings, roads network, sewage network
Interruption of media services
Lack of drinking water
Increased insurance costs/ loss of insurability
Business interruption costs
Increased maintenance cost
Poor experience quality
Precipitation change
Low precipitation & high evaporation in some regions:
Droughts / Water shortages
Desertification
Wildfires
Competition over water between tourism and other Sectors
Nature-based tourism affected
Displacement of tourists
Loss of revenue/financial loss
Labor loss
High recovery cost
Decrease suitability of tourism destination
Increased precipitation in some regions:
Floods
Altered seasonality
Beach loss
Destruction to tourism infra-structure, historic architectural and cultural assets
Sea-level rise
Coastal erosion
Loss of beach area
Shoreline retreat
Property damage
Loss of natural attractions
Higher costs of maintenance
Revenue and labor loss
Higher costs for coastal protections

Figure 5.4

ships between destinations and therefore the profitability of tourism enterprise (UNWTO-UNEP-WMO, 2008).

5.3 Results and discussions

Climate change and tourism in Southern Africa

The tourism industry is central to the development of Southern African states. Tourism in southern Africa relies on the array of spectacular and varied landforms and landscapes and the diverse flora and fauna. As such, much of Southern Africa's tourist industry relies on national parks, game reserves and other protected areas, containing world-renowned wildlife, biological diversity, and natural attractions (Poonyth et al., 2002). Southern Africa boasts iconic landscapes such as Table Mountain in South Africa, the Victoria Falls in both Zambia and Zimbabwe, and the Okavango Delta in Botswana (Dube et al., 2018). Botswana is favoured by international nature-based tourists for its pleasant climate and abundant wildlife populations (Winterbach et al., 2015). Nature-based tourism in Southern Africa also involves excursions to national parks and wilderness areas where a large portion of the world's biodiversity is concentrated (Olson et al., 2001: 936; WWF, 2001; Christ et al., 2003: 5).

While nature-based tourism is a dominate activity in Southern Africa, recent trends in the literature indicate that the industry is beginning to experience the impact of climate change and weather extremes such as droughts, heatwaves, wildfires, extreme frost, and flooding (Dube & Nhamo, 2020). This makes Southern Africa vulnerable to the long-term impacts of climate change (Pandy, 2017). The observed temperature changes for Southern Africa are higher than increases indicated for other world regions, with projections of 3.4 degrees Celsius increase in annual temperature when comparing the period of 1980-1999 to that of 2080-2099 (Pandy, 2017). The mean annual temperatures of Southern Africa have escalated by at least 1.5 times global average, and extreme rainfall events have increased in frequency over the last 50 years (Ziervogel et al., 2014).

To illustrate the effects of climate change on tourism and biodiversity in Southern Africa, specific countries were selected:

Zimbabwe – is known for its Victoria Falls and Lake Victoria which are visited annually by a significant number of international tourists. However, nature-based tourism at Lake Kariba in Zimbabwe is under threat from in-

creased and intense droughts resulting from climate change (Dube & Nhamo, 2020). Zimbabwe is vulnerable to climate change principally through shifting rainfall patterns and extreme events (Dube et al., 2018). Extreme temperatures and droughts are critical threats to biodiversity and water levels at Lake Kariba. These climatic conditions undermine both tourist activities and destination attractiveness. Increased incidents of drought have led to a reduced hotel occupancy over the last two decades, threatening tourism business viability (Dube & Nhamo, 2020).

Climate variability and change also have an impact on the global tourist resort of Victoria Falls in Zimbabwe. The Victoria Falls are shared by Zimbabwe and Zambia because of their location on the Western border tip of Zimbabwe and the Southern border of Zambia. This landscape which is rich in biodiversity, is experiencing climate variability and extreme rainfall patterns with a stronger leaning towards drought years, a shift in seasons, and winter warming resulting in shorter peak discharge periods. All these factors are affecting the Victoria Falls and their rich biodiversity as a tourist destination (Dube & Nhamo, 2020). The Victoria Falls depend on water resources from the Zambezi River for its tourism attractions. However, climate change is reported to be affecting the hydrological patterns within the Zambezi River Basin, especially the drought episodes. Dube and Nhamo postulate that temperatures at the Victoria Falls have increased by 1.4°C between 1976 and 2016. This is noted to negatively affect flora and fauna. Increased temperatures affect tourists' comfort at Victoria Falls which has increased the demand for cooling systems, which, in turn, are contributing to carbon emissions leading to more global warming (Dube et al., 2018). Droughts at the Victoria Falls have led to an increase in fire frequency which disturb the ecology of the area. There has been a warming of winter months with the month of June witnessing a 1°C temperature increase between 1976 and 2016 at Victoria Falls (Dube & Nhamo, 2018). Tourist activities like helicopter operations at Victoria Falls are affected by this, since high temperatures mean that the aircrafts take longer to fly into regulatory levels, hence consuming more fuel (Dube & Nhamo, 2020). Helicopter companies operating at Victoria Falls complain that the ever-increasing temperatures during the summer months disrupt tourist activities, because they are hindering the helicopter view of the Mosi-oa-Tunya that the tourists come to see (Dube & Nhamo, 2020). According to Dube and Nhamo, helicopter engineers and helicopter pilots indicate that they experience difficulties in operating the helicopter efficiently when temperatures rise above 35 °C. They state that due to rising temperatures, it takes longer for helicopters to fly into the regulatory level, which results in the consumption of more fuel per trip and can also render the trip impossible.

Zambia – is also experiencing the effects of climate variability and change on tourism in the Zambian tourist town of Livingstone (Dube & Nhamo, 2020), where the high temperatures are causing challenges for tourism activities. These include an increased air conditioning energy demand in summer, with energy costs going down in winter; increased insurance premiums due to extreme weather events like droughts, extreme rainfall, and fires; and changes in seasons and water flow at the waterfalls, all of which might affect the tourism peak and off seasons (Dube & Nhamo, 2020).

Botswana – tourism plays a pivotal role in Botswana as the second largest economic sector after mining (especially diamonds) (Mmopelwa & Blignaut, 2006; Dube et al., 2018). The tourism sector contributed 11.6% towards Botswana's economy and employed 8% of the country's population in 2015 (WTTC, 2016; Dube et al., 2018). As such, tourism is central to foreign currency generation for Botswana. Botswana, like other Southern African countries, is vulnerable to the impact of climate change (Rogerson, 2016). The Okavango Delta, which is the central focus of most of Botswana's tourists, is vulnerable to climate change; hence, climate change is expected to have severe impacts on Botswana's tourism industry (Andersson et al., 2006; Hambira, 2011; Mearns, 2016). For example, climate change is said to be the reason for the shrinking of the Okavango delta and for its shifting from north to south (Kgathi et al., 2005). As a result of this shrinking process, some parts of the Okavango Delta have become dry, rendering these areas unsuitable for wildlife to survive and therefore also for tourism. The result has been that these dry areas are now infiltrated by livestock production (Mbaiwa et al., 2008). It is for these reasons that climate change will be detrimental to tourism in Southern Africa, and Botswana in particular (Hambira, 2011; Mearns, 2016). This indicates that tourism is one of the most climate-sensitive industries globally (Hernandez & Ryan, 2011).

The tourism operators in northern Botswana are reported to be aware of the general impacts of climate change (Saarinen et al., 2013; Hambira et al., 2013). These operators observed changes in the physical environment, livelihoods and weather patterns and linked these changes to climate change (Saarinen et al., 2013; Hambira et al., 2013; Hambira & Mbaiwa, 2020). In this regard, these tourism operators rendered nature-based outdoor activities vulnerable to climate change, as it could lead to a loss of quality of attractions and consequently to a decline in tourist numbers (Hambira & Mbaiwa, 2020). Mitigation efforts by these operators were limited to energy and water saving mechanisms (Hambira & Mbaiwa, 2020). International tourists visiting northern Botswana are also reported to be aware of the general causes of climate change and the

implications of their actions on climate change (Dube et al., 2018). Tourists are noted for being aware that the water flow as well as the flora and fauna of the Okavango Delta have been altered by climate change (Hambira & Mbaiwa, 2020). In southwestern Botswana, tourism operators are also reported to be aware of climate change and its effects on their physical environment (Saarinen et al., 2012). However, these operators argue that climate change has not influenced their businesses and the nature-based tourism activities they offer (Saarinen et al., 2012). In addition, policy makers in Botswana state that they are aware of climate change and its possible impacts on the tourism industry (Hambira and Saarinen, 2015). Hambira and Saarinen argue that policy makers note that while there are aware of climate change, there are several factors which are likely to impede effective policy development. These include uncertainties surrounding climate change, information gaps, inadequate data and poor public awareness, challenges posed by poor coordination and indeed data capturing and harmonisation by concerned institutions. This indicates that Botswana is not well prepared when it comes to the development of mitigation measures to address the effects of climate changes in the tourism industry.

South Africa – the tourism industry has also proved to be a key economic sector and growth enabler of the South African economy (Amusan & Olutola, 2017). In this regard, South Africa ranks high both as a contributor to, and as one of the nation's hardest hit by the impacts of climate change (Amusan & Olutola, 2017). South Africa is vulnerable to climate change (Hoogendoorn et al, 2016; Rogerson, 2016; Pandy, 2017). The country has a record of relatively huge emissions of GHGs and ranks among the world' top 15 GHG emitters (Chevallier, 2011; Amusan & Olutola, 2017). Conversely, South Africa ranks as the first tourist destination in sub-Saharan Africa (WEF-TTCR, 2015). This is mainly because South Africa attracts tourists from different parts of the world because of its rich cultural heritage and exquisite natural beauty (Amusan & Olutola, 2017). South Africa has a well-established network of nature reserves, beaches and lush winelands, and other adventure activities like skydiving and water sports.

Table 5.1
Top African countries for travel and tourism

Ranking	Country	Global Rank	Score (scale 1-5)
1	Mauritius	54	4.0
2	South Africa	61	4.0
3	Seychelles	62	3.9
4	Morocco	66	3.9
5	Namibia	81	3.7
6	Kenya	82	3.6
7	Tunisia	85	3.6
8	Cape Verde	88	3.6
9	Botswana	92	3.5
10	Tanzania	95	3.4

Source: IATA (2014); Jumia Hospitality (2019)

Climate change is observed to be affecting South Africa's tourism economy (Preston-Whyte & Watson, 2005; Steyn & Spencer, 2012). In 2017, Cape Town, which is South Africa's iconic destination for long-haul international travelers especially from Europe and North America, experienced its worst drought in 100 years and this resulted in water restrictions for the accommodation sector in the city (Wright & Jacobs, 2016; Pandy, 2017). This affected tourism development in the area, even though no adequate research has been carried out to determine the effects of these changes in climatic conditions on tourism, especially the amount of revenue lost due to this extreme drought.

The Drakensberg is the highest mountain range in South Africa. It is also a primary tourist destination (Linde & Grab, 2008). The Drakensberg Mountains are reported to be experiencing climate change which manifests itself in the form of a decrease in snow cover, a shrinking of glaciers, melting permafrost and an increased frequency of extreme events such as landslides, which ultimately affects economic activities such as tourism (Bürki et al., 2003; Uchegbu & Kanu, 2011). Winter sport activities at the Drakensburg Mountain have also been affected by the decrease in snow cover and the shrinking of glaciers, which have resulted in altered winter sport seasons and landscape aesthetics (Uchegbu & Kanu, 2011). Climatic change has also been experienced at Tiffendell Mountain, which is the highest mountain peak in the Cape Province and a ski resort in South Africa (Lew et al., 2008). These results indicate that climate change is affecting tourism activities in South Africa's Mountain ranges.

The impacts of climate change on tourism in South Africa can be witnessed in extreme weather conditions, prolonged droughts and a rise in temperatures and sea levels leading to a redistribution of tourism resources geographically and seasonally (Steyn & Spencer, 2012). Business operators in St Francis Bay and Cape St Francis, which are South Africa's coastal tourist areas, are of the perception that climate change will have impact on destinations and business operations. Shaaban and Ramzay (2010) argue that industry managers and policy makers are convinced that climate change will cause damage to coastal tourism facilities due to a rise in sea level. In addition, tourists and tourist accommodation establishment managers at St Francis Bay and Cape St Francis in South Africa are concerned about the risk of flooding, sea level rise and degeneration of beaches (Shaaban & Ramzay, 2010). These managers are also concerned with day-to-day changes in weather, and subsequently, the comfort level of their guests (Hoogendoorn et al., 2016). In the Eastern Cape province of South Africa, climate change is a cause for concern, as managers of establishments located close to the coast believe that it will negatively affect the towns due to extreme weather events which can damage infrastructure and compromise access to some tourism establishments (Fitchett et al., 2016). The government is perceived to be responsible for providing adaptative measures and should invest in infrastructural changes that address flooding induced by sea level rise (Fitchett et al., 2016).

Finally, climate change and variability pose a threat to wildlife resources in the semi-arid savannahs of Southern Africa (Kupika et al., 2018). The SADC countries of Botswana, Zambia, Zimbabwe, and Namibia have formed what is known as the Kavango Zambezi Transfrontier Conservation Area (KAZA-TFCA) to protect the abundance of wildlife resources in the region. Wildlife species promote the lives and livelihoods of local communities, particularly those living adjacent to protected areas (Ntuli & Muchapondwa, 2015; Kupika et al., 2018) in Southern Africa. Such communities generate revenue from activities such as eco-tourism, safaris, and consumptive hunting and bush meat trading. However, climate change is causing economic losses through floods, droughts, and savannah wildfires (Kupika et al., 2018). In Botswana, in addition to other factors like poaching, climate change, especially in the form of droughts, is noted to be one of the factors that contributes to wildlife decline in the country (Chase, 2011). In this regard, trophy hunting was banned in Botswana in 2014. While the banning of trophy hunting has been one of the critical shifts in Southern African states, especially those in the KAZA-TFCA, the trophy hunting industry remains a controversial phenomenon (Batavia et al., 2018; Mkono, 2018; Mbaiwa & Hambira, 2021). That is, trophy hunting is a topical issue in international tourism affairs (Zhou, 2020).

Trophy hunting in Southern Africa has received world-wide criticism (Mbaiwa, 2018; Mbaiwa & Hambira, 2021). Opponents of hunting, especially western media, and animal rights groups, argue that the killing of animals is immoral and abhorrent, unsustainable, and unethical. These opponents argue that trophy hunting results in the extinction of animal species and wreaks havoc amongst populations of big cats, elephants, and endangered species such as the black rhino (Baker, 1997; Gunn, 2001; Knezevic, 2009; Vitali, 1990). Conversely, proponents of hunting, especially the Southern African states of Botswana, Namibia, Zimbabwe, and Zambia, argue that hunting is controlled, has more financial benefits than photo-tourism, is selective, and promotes biodiversity conservation (Lindsey et al., 2017; Muposhi et al., 2016; Sorensen, 2015) and rural livelihoods (Mbaiwa, 2018; McNamara et al., 2020). Countries of Zimbabwe, Namibia and Zambia argue that trophy hunting, if well-regulated, plays an important role in wildlife conservation and guarantees immediate and long-term economic benefits for communities and nation-states (Lindsey et al., 2017). As a result, these states support trophy hunting, which has resulted in disagreements with opponents of hunting especially in developed countries. The global consensus on trophy hunting and the debate between the global South and North seem to be defining the new course of tourism growth in the wildlife-rich states of Southern Africa.

International organisations such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), control the use of wildlife within the tenets of sustainable tourism. CITES regulates the trade in wildlife products, especially trophy hunting, which arguably used to generate funds for the conservation and management of wildlife resources, especially in emerging markets like Africa and Asia-Pacific (Zhou, 2020). CITES has however been criticised by the Southern African states of KAZA-TFCA, who argue that the organisation is unrealistic and is influenced by animal rights groups, to the detriment of their economies (Mbaiwa & Hambira, 2021). That wildlife resources are in decline and trophy hunting should be ended, as argued by opponents of the industry, indicates that there are changes in wildlife and biodiversity, not only in Southern Africa but also in the world. Wildlife decline is partly a result of drought factors, which are due to climatic changes. Drought, among other factors, has been noted to be causing wildlife decline in Botswana (Chase, 2012).

Adaptation and mitigation measures of climate change in Southern Africa

Southern African countries have proposed adaption and mitigation measures to address the effects of climate change on tourism and biodiversity loss in the SADC region. These measures include government economic policies aimed at raising the price of greenhouse gas emissions or subsidising the price of carbon-free energy sources, e.g. a carbon tax or a cap and trade system, the inclusion of air transport in emission trade systems; increasing the use of clean energy or reducing the emissions of GHGs, for example fuel economy standards, designing aircrafts that have low fuel consumption levels, alternative fuels; modification of operational procedures for landing and take-off; technological policies aimed at lowering the cost and improving the performance of low-carbon sources, e.g. LED lighting, solar panels, room keys to operate lights, light sensors; and promoting energy consciousness and energy saving behaviour on the part of the tourist and tourism industry employees (Becken, 2005; Chapman, 2007; Hernandez & Ryan, 2011; Mendes & Santos, 2008; Romm, 2018; Scheelhaase & Grimme, 2007; Hambira & Mbaiwa, 2020).

In South Africa for example, the tourism industry has adopted measures and climate actions which include the greening of accommodation establishments to mitigate climate change (Hoogendoorn et al., 2016; Rogerson & Sims, 2012). The greening of accommodation establishments includes the implementation of measures to reduce energy and water consumption, and to minimise the hotel's environmental footprint (Hoogendoorn et al., 2016; Rogerson & Sims, 2012). As part of these greening measures, operators are expected to change from high-energy demand electric appliances such as stoves, to gas-powered appliances, to install heat pumps to reduce the energy costs of boilers, to use renewable energy and smart technologies for all energy inputs, outputs and consumption; and with respect to water conservation, to install water saving shower heads and use grey water where possible (Hoogendoorn et al., 2016; Rogerson & Sims, 2012).

In Southern Africa, adaptations geared towards increased temperatures include the alteration of activity times (Hambira et al., 2013) and the adoption of climate-friendly facilities (Dube & Nhamo, 2020). In response to increased drought occurrences, tourism operators in Botswana provide water holes for animals (Mbaiwa & Mmopelwa, 2009; Saarinen et al., 2012). Since Southern Africa has become prone to flooding, tourism operators in the Okavango delta in Botswana move guests to alternative rooms or locations far from flooding areas (Mbaiwa & Mmopelwa, 2009). This explains why tourism facilities

in the Okavango Delta are constructed using environmentally friendly material and are temporary in nature. In South Africa, tourists are encouraged to engage in alternative activities that are not weather-dependent while beach tourism operators in coastal towns provide board games and satellite televisions for their guests (Hoogendoorn et al., 2016).

Mitigating climate change in the tourism industry in the Okavango Delta, the Botswana Government is promoting the use of renewable energy sources instead of the use of fossil fuels. This is hoped to promote an environmentally friendly tourism industry. The use of renewable energy or 'going green' has become a marketing strategy in tourism which companies use to sell their tourism products. Mbaiwa et al. (2018) note that a tourism company such as Okavango Wilderness Safaris (OWS), which owns and operates 22 lodges/hotels in the Okavango Delta, has adopted a shift in its policy to move away from the use of fossil fuels to solar energy in all its lodges and camps. OWS has adopted the use of a 100% solar energy to meet their energy demands in a total of 10 lodges. Wilderness Holdings (a parent company owning the Okavango Wilderness Safaris)(2015, p.14) notes:

> "In 2015, our solar power investment grew to the point where we can generate 517 kW from plants in 16 camps, of which nine are 100% solar powered and four have hybrid systems which use a combination of solar power and generators. A further 12 camps operate off smaller solar systems that power each guest unit independently, leaving the generator to power only the main area…. 22 camps make use of inverter-battery systems that enable them to reduce generator running times from 24 hours to an average of just nine hours daily. The result is that we consumed 214 239 GJ of energy, a 12% decrease from the 244 614 GJ consumed in 2012. Over the same period, our carbon emissions have reduced by 13% from 17 412 tonnes CO2e to 15 135 tonnes CO2e."

The use of solar energy in the Okavango Delta has proved to decrease some carbon emissions for companies that use this technology. For example, Wilderness Holdings (2015) notes that between 2012 and 2015, it managed to reduce carbon emissions by 16% from 0.097 to 0.081 tonnes CO2e per bed per night (Mbaiwa et al., 2018). The Botswana Tourism Organisation (BTO), a government parastatal established to market and brand Botswana's tourism industry, also promotes the use of renewable energy to mitigate climate change in the tourism industry. In addition, the BTO adopted the Botswana Ecotourism Certification Standards in 2010 to alleviate the challenges of climate challenge (Mbaiwa et al., 2018). These Standards promote the use of renewable energy in lodges and camps in the Okavango Delta. The BTO en-

courages ecotourism operators to use energy efficiently in their camps and lodges. A BTO environmental officer noted:

> "The Botswana Tourism Organisation encourages the use of renewable energy in tourism lodges and camps in the Okavango Delta as a component of the Botswana Ecotourism Certification Standards for Accommodations and Ecotours. It has also become a requirement for lease renewal for concession areas to illustrate the commitment towards the introduction and implementing of the use of renewable energy to promote environmental best management practices and to eliminate pollution and soil contamination from fuel/oil or fossil fuel at large and the emission of carbon through the carbon offset or carbon sequestration on the sensitive ecosystem of the Okavango Delta as a Ramsar Site and World Heritage Site." (Richard Malesu, 2018 Interview)

The challenge is that if standards which prescribe how renewable energy is to be adopted in the tourism industry are voluntary, some of the companies might opt to continue to use fossil fuels, which are not environmentally friendly but harmful to fragile ecosystems like the Okavango Delta (Mbaiwa et al., 2018). At a consultation workshop for the tourism industry in Botswana, held during the precertification stage with tourism stakeholders in July 2021, company managers and representatives of companies operating lodges in environmentally sensitive areas argued that standards should be made compulsory instead of voluntary as is the case at present.

Chobe Game Lodge, located in Northwestern Botswana, is an up-market tourism facility and safari lodge that has invested millions of dollars in environmentally friendly practices that mitigate climate change and achieve a greening tourism practice. The lodge is located in Chobe National Park, which is an essential safari destination in Botswana. Informal interviews conducted with Mr Johan Bruwer, the General Manager at Chobe Game Lodge and the Environmental Officer, revealed that the Lodge has adopted several practices meant at alleviating climate change and environmental change. These practices include the following: the use of renewable energy sources from hydroelectric power, the use of solar energy for heating water for guests at the lodge, and the production of biogas from waste which is used for cooking. Chobe Game Lodge has made an investment in making use of excess power generated by the hydroelectric scheme around Victoria Falls to provide lighting in the lodge. In this regard, Chobe Game Lodge uses clean power generated from a renewable energy source and thus significantly reducing the amount of carbon emissions they emit. In addition to using renewable energy from hydroelectric power, Chobe Game Lodge is heating all the water used by

guests using solar energy. The hot water system at Chobe Game Lodge is supplemented by three sets of solar panels that heat over 6,000 litres. Combined with the low voltage lighting recently installed in the lodge, this has reduced power consumption by more than a third. In this regard, Chobe Game Lodge has almost zero use of fossil fuels. For heating water, Chobe Game Lodge has solar panels mounted on top of the building. Chobe Game Lodge also has a recycling project where all the waste from the kitchen is used to produce biogas. This is the first biogas plants in Botswana's tourism industry. Mr. Johan Bruwer notes that "*We are constantly evaluating new technologies and developing new environmentally friendly business practices and we do acknowledge the reality that there is lots of room for improvement in our day-to-day operations*". Chobe Game Lodge has therefore demonstrated a commitment to promote renewable energy use and sustainable tourism in its business. In 2015, Chobe Game Lodge announced their first CO_2-emission and noise-free 4WD vehicle and boat, with the goal of creating an all-electrical game-viewing fleet. This initiative is important for limiting the usage of fossil fuels and noise, which is disruptive to wildlife.

At the Southern Africa, sub-regional level, the Southern African Development Community (SADC) has established adaptation and mitigation programmes and actions aimed at addressing the impact of climate change. Some of the sectors that SADC states have focused on to mitigate climate change include: coastal zones; tourism; biodiversity and ecosystems; forests; fisheries; and wildlife. As a result, some examples of existing and/or planned adaptation actions in some of the sectors are elaborated on below:

Biodiversity and ecosystems: SADC acknowledges that biodiversity in the region is declining, and that this is caused by climate change. As a result, SADC has established a biodiversity programme at its Secretariat Office in Gaborone (Botswana) to coordinate and promote the conservation of biodiversity and fragile ecosystems in the region. According to SADC, conservation is an important adaptation and mitigation action because biodiversity and ecosystems are directly impacted by temperature rises and changes in precipitation, which in turn is increasing the extinction rates and the reduction of species diversity in the region (SADC, 2010). Habitat destruction, fragmentation, land use changes and poor land management are thus affecting the region. It is estimated that about 22.5 million ha of the region's indigenous forests were lost during the ten-year period between 1990 and 2000 (SADC et al 2005; SADC 2010). The associated disruption of ecosystem integrity and reduction in population of some species have compromised the conditions necessary for the survival of others. Similar changes have occurred in the aquatic ecosystems (SADC, 2010).

The SADC biodiversity programme thus aims at mitigating climate change through the implementation of national biodiversity strategies and action plans (SADC, 2010). The programme addresses the challenge of inadequate biodiversity inventory and monitoring systems in member states. It also addresses the lack of knowledge on, and ability to handle biodiversity information, by promoting strategies to develop and implement a comprehensive and simple biodiversity inventory and monitoring of projects covering key species of flora and fauna, as well as skills to handle and package the information, leading to improved knowledge. Finally, the programme aims to improve the weak institutional and legal framework for carrying out biodiversity initiatives (SADC, 2010).

Coastal zones: SADC also acknowledges that its coastal areas are being negatively impacted by climate change. As a result, the region is faced with coastal degradation including pollution from oil spills and erosion (SADC, 2010). The coral reefs off the coasts of Mozambique, Tanzania and South Africa are under threat of bleaching due to a rise in sea temperature resulting from El Niño events and global climate change (SADC, 2010). The coastal zone is experiencing degradation and marine resources are declining due to an increased demand for resources, improved transport networks, and migration of people and industries to the coastal zones (SADC, 2010). SADC also notes that its coastal areas are prone to sea level rises that may cause destruction of infrastructure and loss of productive lands. In addition, the increasing tourism is also a cause of climate change, and resources and revenue from tourism will not be sustainable in the medium to long-term to address the effects of climate change (SADC, 2010). As a mitigation measure, the SADC biodiversity programme requires member states to forge agreements on technology transfer, capacity building and information sharing, to strengthen policy, institutional and regulatory frameworks, and to implement international rules and regulations to address the effects of climate change on coastal areas and tourism development (SADC, 2010).

Forests: SADC recently adopted the SADC Forestry Strategy for the period of 2010-2020 to address issues of forest degradation. The Strategy is meant to

> '... provide a framework for both regional cooperation and international engagement on forest issues that transcend national boundaries and to encourage concerted action by SADC Member States in the management, conservation and sustainable use of their forests' (SADC, 2010).

The Strategy focuses on climate change mitigation and adaptation in the SADC region (SADC, 2010).

Mitigation and adaptation measures by Southern Africa, countries to counter the effects of climate change indicate that countries in the sub-region are focused on promoting a green economy. A green economy is perceived as a solution to climate change and the negative environmental impacts of the tourism sector (UNEP and WTO, 2012; Sifolo & Henama, 2017). A green economy is driven by investments which focus on the development of sustainable strategic areas concerned with the reduction of carbon footprint, with the host government paying attention to policies and priorities regarding climate change mitigation and energy, as well as observing the climate change impact on tourism sites (UNEP and WTO, 2012; Sifolo & Henama, 2017). The implications include increased substitution of fuels toward electricity, in particular an increased investment in passive solar collectors and PV, alternative fuels for vehicles, an increased number of project developers orienting business strategies toward a lower carbon footprint (Sifolo & Henama, 2017).

At a continental level, Southern African states adhere to the African Union (AU)'s Agenda 2063 on mitigation of climate change, which presents a variety of mitigation options. The entire African continent is expected by the AU to participate in global efforts for climate change mitigation that support and broaden the policy space for sustainable development on the continent (African Union, 2014). The UNEP and WTO (2012) identified key challenges for the tourism industry and its sustainability, which include: a) energy and greenhouse gas (GHG) emissions; b) water consumption; c) waste management; d) loss of biological diversity; e) effective management of built and cultural heritage; and f) planning and governance (Sifolo & Henama, 2017). As such, the AU Agenda 2063 notes that as a mitigation measure, Africa should address the global challenge of climate change by prioritising adaptation in its actions, drawing upon skills of diverse disciplines combined with adequate support (affordable technology development and transfer, capacity building, financial and technical resources) to ensure the implementation of actions for the survival of the most vulnerable populations, including island states, and for sustainable development and shared prosperity (2014; Sifolo & Henama, 2017). It is from this background that Southern Africa states have adopted adaptation and mitigation measures against climate change, not only in the tourism industry but also in other sectors such as agriculture and food security.

5.4 Conclusion

The tourism industry's vulnerability to climate change in Southern Africa emanates from the fact that it is largely nature-based. Climate change af-

fects biodiversity and thus the tourism business in the region. With soaring temperatures, erratic precipitation and rising sea levels, most natural capital which forms the basis for nature-based tourism will be highly affected, resulting in changes in market demand, tourist flows and revenue streams. Climate change also results in an increased frequency of extreme weather events such as droughts, heat waves, floods, cyclones and wildfires, the consequences of which have revealed the level of vulnerability and exposure of some ecosystems and human systems (IPCC, 2014). Global warming has caused heat waves to be longer, stronger, and more frequent, as well as leading to more intense droughts more by drying out and heating up land that is suffering from reduced precipitation. This puts more water vapour in the atmosphere, which makes the wet areas of the world even wetter and results in more intense and more frequent deluges, with the resulting rise in sea levels making devastating storm surges more likely (Romm, 2018). The consequences include extreme summertime temperatures; the loss of biodiversity and natural attractions; the disruption of food production and water supply; and damage to the existing infrastructure (IPCC, 2014).

The main emitters of carbon emissions (CO2) in Southern Africa are fossil fuel burning, deforestation and land degradation, which includes loss of carbon from the soil. As a result, the tourism industry in Southern Africa has adopted adaptation and mitigation measures against climate change. These include a greening of the tourism industry, especially of accommodation establishments where renewable energy sources are used instead of fossil fuels. This is particularly applied in Botswana, South Africa, and Zimbabwe. Adaptation and mitigation measures developed in Southern Africa involve strategies such as government economic policies aimed at raising the price of greenhouse gas emissions or subsidising the price of carbon-free energy sources, e.g. a carbon tax or a cap and trade system, the inclusion of air transport in emission trade systems; increasing the use of clean energy or reducing the emissions of GHGs, for example fuel economy standards, designing aircrafts that have low fuel consumption levels, alternative fuels; modification of operational procedures for landing and take-off; technological policies aimed at lowering the cost and improving the performance of low-carbon sources, e.g. LED lighting, solar panels, room keys to operate lights, light sensors; and promoting energy consciousness and energy saving behaviour on the part of the tourist and tourism industry employees (Becken 2005; Chapman, 2007; Hernandez & Ryan, 2011; Mendes & Santos, 2008; Romm, 2018; Scheelhaase & Grimme, 2007; Hambira & Mbaiwa 2020). The loss of biodiversity, especially among wildlife species, due to climate change, has resulted in Southern Africa countries adopting conservation frameworks like the SADC Protocol

on Wildlife Conservation and Law Enforcement. This therefore shows that Southern Africa has adopted adaptation and mitigation measures to address not only tourism development but other sectors of the economy as well, especially agriculture.

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6

Regulating climate change in tourism: Implications of international governance and law for destination competitiveness

T.T. Onifade and I.I. Akinbola

6.1 Introduction

Climate change impacts, and is impacted by, tourism. Seen from a macro level of analysis, this climate change-tourism relationship has implications for destination competitiveness, which is defined as having three major elements: attracting tourists and providing them with memorable experiences; increasing profitable tourism investment; and enhancing the wellbeing of the residents and the natural capital of the tourism destination (Ritchie & Crouch, 2003; also quoted by Rey-Maquieira & Ramos, 2016). There are numerous attempts to understand these implications.

Of these attempts, the emerging central discourse seeking to guide policies and practices for addressing the relationship between tourism and climate change, championed by the United Nations World Tourism Organisation (UNWTO), calls for a better understanding of the impacts of the state climate regime regulating tourism, including the implications for destination competitiveness (WTO & UNEP, 2018). The UNWTO and its partners ask governments to consider "tourism in the implementation of existing commitments under the United Nations Framework Convention on Climate Change" (WTO & UNEP, 2018: 13). Existing studies (e.g. Dong, 2004; Chatarayamontri, 2009; Becken & Clapcott, 2011; Zeppel & Beaumont, 2014) provide the insights to respond to this call, by exploring the intersections of tourism and the state climate regime, including the United Nations Framework Convention on Climate Change (UNFCCC) and other state regulatory systems interacting with it. However, they do not focus on the evaluation of how the UNFCCC,

particularly since the arrival of the Paris Agreement, has been impacting destination competitiveness.

We aim to fill this research gap while at the same time contributing to answering the call of the UNWTO. Although we focus on Africa, much of our analysis also applies to other developing countries to varying degrees, given that we look at international regulation as applicable to a continent. To be more comprehensive, we do not limit our analysis to the UNFCCC based on the call of the UNWTO, but instead create a broader theoretical and regulatory framework that encompasses the international governance and legal architecture within which the UNFCCC operates. Accordingly, we ask a broad question: what are the implications of the international regulation of climate change on destination competitiveness in Africa? As a central implication, we argue that the international regulation of climate change undermines destination competitiveness in Africa.

Two steps lead us to this thesis. First, guided by the elements and context of destination competitiveness, we use public and private interest theories to explain why and how governments use international governance and law to regulate climate change and impact destination competitiveness in Africa, culminating into our governance and legal framework and leading us to policy issues impacting destination competitiveness. Second, extracted from this framework, three broad implications of international climate regulation for Africa — adaptation, loss and damage; sustainable development; and financial transfer — become the themes for our discussion of the implications of the international regulation of climate change for destination competitiveness in the continent.

Our analysis is qualitative, relying on primary and secondary sources, and adopts a macro level view. To understand the context and issues, we start with secondary sources. We review the literature on four broad areas: climate change impacts, mitigation, and adaptation; the relationship between climate change and tourism; tourism destination choice, management, and competitiveness; and the regulation of climate change for destination competitiveness. Most of these bodies of literature do not focus on Africa, perhaps because climate change and tourism are both global subjects, but they provide inroads for zooming in on Africa. Although we found broader issues cutting across global, regional, subregional, and national contexts, we relied mainly on their contributions relevant to the impacts of the international (global, regional and subregional) regulation of climate change on tourism in Africa. After reviewing the literature, we strengthen our analysis by reviewing, applying,

and carrying out a doctrinal legal analysis (Bodig, 2010; 2015; Hutchinson, 2015) of provisions of primary legal sources and legal aspects of other policy documents. Doctrinal legal analysis is a method used in law to understand, interpret, and apply doctrines, for instance rules and standards found in legislation, terms in contracts, and court judgements. Leveraging our training in law, we use this method to interpret legal provisions that impact tourism, for instance those in the Paris Agreement and the Glasgow Climate Pact. Also, as a delegate from Canada to the Twenty-Sixth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 26), the lead author directly observed the relevant state negotiations, plenaries, panels and side events at COP 26 that have had an impact on the climate-tourism issues we discuss. His observation gave him direct access to the status of negotiations on issues such as adaptation, loss and damage, finance, human rights, and stakeholder participation. Based on this direct participation, he evaluates the status of these issues as they impact tourism destination competitiveness.

6.2 International regulation of climate change in Africa: A governance and legal framework

Despite the well-known links between climate change and tourism, we must caution that there is limited western science to fully understand how climate change impacts Africa, compared to what we know about the industrialised countries (IPCC, 2014). Nonetheless, abundant evidence from experts and the people affected by climate risks, confirms that of all continents Africa is increasingly considered the most vulnerable to climate change (Thompson et al., 2002; Fields, 2005; UN, 2006; ADB, 2011; IPCC, 2014; WMO, 2020), especially with respect to the reduction of food and water security and the constraints imposed on sustainable development (IPCC, 2022). Leading studies by Simms, Reid, and Magrath (2004), Nobel peace prise laureate Wangari Maathai (2007), Saunders (2008), UNEP (2012), the IPCC (2014), World Bank (2018), WMO (2020), and several others (Kala, Kurukulasuriya & Mendelsohn, 2012; Scott et al., 2012; Alagidede, Adu & Frimpong, 2016; Hyams & Byskov, 2020) identify, and offer data on, numerous climate vulnerabilities within, across and with impact on African communities, countries, and subregions. While understanding that Africa also contributes to climate change, we focus more on how the regulation of this vulnerability impacts destination competitiveness.

Theoretical framework

African governments and civil society groups have used regulation and other strategies to address these climate vulnerabilities. There are many ways to make sense of their actions. However, we adopt public and private interest theories, which are among the most influential perspectives, to understand the response of Africa's governments within a global context. Based on these theories, how have African governments responded to climate vulnerabilities through regulation?

As explained by dominant public interest theories, governments tackle vulnerabilities to remedy market failure and promote public good (Posner, 1974). As a public good problem (Drahos, 2004) subject to the tragedy of the commons (Hardin, 1968) and the challenges of collective action (Ostrom 1990) that cannot be addressed by small-scale institutions, all countries benefit from activities causing climate change, but most do not want to pay the costs (Hall & Persson, 2018), including addressing the impacts it has on Africa. Responding to this problem, African governments mostly use international governance and treaties and domestic constitutions and policies (legislation, including statutes, regulations, and bylaws) to regulate climate as a public good. However, they have been limited in their efforts. To match the scale of the public good problem of climate change, African governments regulate internationally, which then informs domestic action, but at that level they have faced many challenges.

Private interest theories offer the most influential explanation of what is behind the challenges African governments are facing. Stigler, a leading representative of private interest theorists, blames regulatory capture, suggesting that "as a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit" (Stigler, 1971: 3). The best known illustration is that industries, for instance transnational oil and gas corporations, influence international and domestic regulation in the interest of their members. Regulatory capture (Stigler, 1971; Hepburn, 2010) is thus the best-known challenge. However, private interest theories also accommodate other explanations. Not only powerful interest groups but also a country's national economic and political interests undermine international regulation. Citizens and stakeholders in developed countries influence how their governments regulate climate change at the international level. To advance the good of their citizens, economies, and other domestic objectives, developed countries have pursued their self-interest in global climate policy negotiations (Onifade, 2021a).

Regulatory framework

Informed by these public and private interest theories, we create a typology of the major regulatory pathways and instruments that African governments have used to combat climate change and its impacts, and the most fundamental challenges they have faced, as depicted in Table 6.1 below. They also use other strategies to regulate and face other challenges, but we consider those outlined below as the most important ones for understanding our governance and legal framework.

Table 6.1
A typology of state climate regulation in Africa

Actor	Major pathways		Major challenges
Government	International level	Global, regional, subregional, multilateral, and bilateral state governance	Regulatory capture National self-interest
		Global, regional, subregional, multilateral, and bilateral state treaties and agreements	
	Domestic level	National constitutions	
		National and subnational public laws and policies such as legislation (e.g. statutes, regulations and bylaws) and market instruments (e.g. taxes, subsidies, charges, and tradeable permits).	
		Judicial decisions and activism	

Table 6.1 shows a typology of government climate regulation in Africa. The typology provides the broader context for understanding the international regulation of climate change in Africa. It classifies Africa's efforts to regulate climate change into two levels: international and domestic. At the international level, governments regulate through global, regional, sub-regional, multilateral, and bilateral governance, treaties and other forms of legal agreements. Turning to the domestic level, the supreme law is the national constitution, but governments also use public laws and policies that apply to specific sectors (Onifade, 2019).

Of these regulatory pathways shown in Table 6.1, we focus on how governments regulate at the international level through international governance and treaties, and we exclude domestic constitutions, public laws and policies, and judicial decisions and activism. Also, there are several aspects of international governance and treaties regulating climate change in Africa, so we pay more attention to the pathways (actors and instruments), promises (strengths) and perils (limitations), with implications for destination competitiveness. Based on our analysis, we find that international governance and treaties are extremely limited, compromising destination competitiveness in Africa.

International governance

Governments and regulators address climate vulnerabilities at the international level through various governance pathways. Due to the conventional delimitation of the nation-state, they variously operate at the global, regional, sub-regional, multilateral, bilateral and national levels of international governance. Of these levels, African governments and regulators mostly negotiate and shape climate policy through blocs of countries at the global and regional levels. There are also efforts within the subregional, multilateral, and bilateral levels, but they are not as significant. Perhaps the most noteworthy blocs are the eight officially recognised sub-regional organisations of the African Union (AU). However, these sub-regional organisations offer very little specifically on climate regulation, although their broader work and legal instruments regulating the environment, natural resources, human rights, and sustainable development (Onifade, 2019) have implications for climate vulnerabilities.

Given the international and cross-boundary nature of climate change and its impacts, global climate governance is truly the most realistic platform for Africa to tackle climate vulnerability at the international level. To address climate change, African countries have participated as members of negotiating blocs such as the Group of Seventy-Seven (G77), the Least Developed Country (LDC) Group and the African Group of Negotiators in global climate governance, largely coordinated under the United Nations (UN) system. For instance, they have negotiated the UNFCCC under the G77 bloc.

However, African countries have limited financial and technical capacity, among other things, in global climate governance, making them less powerful and influential. For instance, industrialised countries have given more money and exercised discretion in their contribution to the Green Climate Fund (Ferreira 2018), which African countries have had limited access to; and this

has slowed down the progress with regard to the negotiation of adaptation, loss and damage (see also Bodansky, 2016; Bodle, Donat & Duwe, 2016; Okereke & Coventry, 2016; Onifade, 2021a).

African regional climate governance is an alternative platform. The African Union (AU) is working at the regional level to complement global climate governance. African governments have used several AU platforms to address climate vulnerabilities on the continent, including the Conference of African Heads of State and Government on Climate Change, the African Ministerial Conference on the Environment, the framework of the New Partnership for Africa's Development, and the African Development Forum (Jarso, 2011). For instance, under the platform of the African Ministerial Conference on the Environment, in 2009 African Ministers adopted the Nairobi Declaration on the African Process for Combating Climate Change, calling for Africa's active participation in developing climate policies, with the understanding that the "failure to reach a fair and equitable outcome will have dire consequences for Africa" (Paragraph 1 of the Nairobi Declaration on the African Process for Combating Climate Change). Also, the Conference of African Heads of State and Government on Climate Change, a standing committee of the AU Heads of State and Government (Silva, 2020) established in 2009 (Jarso, 2011), calls "for developing nations to receive at least $67 billion a year by 2020 to support adaptation and $200 billion (0.5% of the GDP of OECD countries) to support mitigation efforts" (Beer, 2014: 87).

Despite its desire and modest efforts to address climate change, the AU has its own issues. Many member states have conflicting needs and development challenges such as poverty and poor healthcare which they prioritise over climate change (Lisinge-Fotbang et al., 2017), face urgent conflict and insecurity situations that make climate change the least of their worries, and, invariably, struggle to meet their financial commitments to address climate change (Pharatlhatlhe & Vanheukelom, 2019). Also, the AU has a structure that makes it difficult to address climate change (Biswaro, 2012). Unlike the European Union whose membership is strictly by invitation with stringent criteria for membership and enforcement capacity (Adamu & Abraham, 2016), the AU is more of a political organisation with a bureaucratic "talking shop" that has little power to regulate members and enforce mandates (Awung, 2005). Still on the structure, the AU has no leader responsible for climate change issues. To address this gap, there has been a proposal for an AU Special Envoy for Climate Change and Security (Krampe & Aminga, 2019).

International treaties

Compared to the regional AU system, the global UN system remains the most comprehensive and influential governance platform that has shaped the central international legal regime, the UNFCCC, impacting climate vulnerability across African countries. Now with the Paris Agreement, recently expanded by the Glasgow Climate Pact, as its implementation treaty, the objective of the UNFCCC is to "strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius" (Article 2 of the Paris Agreement). To achieve this objective, the Paris Agreement orchestrates other state and non-state initiatives to regulate climate change, for instance through market and non-market approaches to sustainable development, voluntary cooperation, and new initiatives such as the Global Climate Action agenda.

So far, negotiations and efforts under the Paris Agreement reveal several policy issues (Bodansky, 2016; Bodle, Donat & Duwe, 2016; Onifade, 2021a; 2021b) impacting Africa's climate vulnerabilities: voluntary contributions, adaptation, loss and damage, finance, human rights, sustainable development, and stakeholder participation. As an instrument to implement the Paris Agreement, the Glasgow Climate Pact, the main outcome instrument of COP 26, touches on these themes; however, as a subsidiary legal instrument it does not radically deviate from the Paris Agreement. The most fundamental distinguishing feature of the Paris Agreement, the voluntary system of contributions, remains in place, and the pact does not make significant progress on sustainable development, human rights, and stakeholder participation, partly because it is subject to the limitations of the Paris Agreement and has relegated these agendas at COP 26 (see Onifade, 2021).

However, the Glasgow Climate Pact increases the ambitions on adaptation, finance, and loss and damage. For instance, it seeks to double adaptation finance, it incorporates the Climate Finance Delivery Plan to support mitigation and adaptation to ensure that funds get to developing countries that need them, and it explores loss and damage in more detail than has previously been the case, including urging "United Nations entities and intergovernmental organisations and other bilateral and multilateral institutions, including non-governmental organisations and private sources, to provide enhanced and additional support for activities addressing loss and damage associated with the adverse effects of climate change" (Article 40, Glasgow Climate Pact,

2021). However, one of its biggest gaps is the failure to produce a dedicated loss and damage fund (Masood & Tollefson, 2021), like those for adaptation.

6.3 International regulation of climate change and destination competitiveness in Africa: Discussion

Seeking to understand and respond to the challenges that climate change raises for tourism and vice versa, UNWTO has led two influential international conferences on climate change and tourism. These conferences and the actions resulting from them have remained among its most important contributions to the discourse on tourism and climate change. UNWTO partnered with WMO, UNEP, the United Nations Convention to Combat Desertification, the United Nations Educational, Scientific and Cultural Organisation (UNESCO), and the Government of Tunisia to host the First International Conference on Climate Change and Tourism in Djerba, Tunisia, in 2003. Subsequently, stakeholders and experts further developed the agenda of this conference using various platforms (Simpson et al, 2008), including: The Ministers' Summit on Tourism and Climate Change at London, United Kingdom, in 2007; the UNWTO General Assembly Resolution on Tourism and Climate Change at Cartagena de Indias, Colombia, 2007; and the Statement by Francesco Frangialli, Secretary-General of UNWTO, during the UN Conference on Climate Change at Bali, Indonesia, 2007. UNWTO again partnered with UNEP and WMO, with support from the World Economic Forum and the Swiss Government, to convene a follow-up Second International Conference on Climate Change and Tourism at Davos, Switzerland, in 2007. During this second conference, the Executive Summary of the influential review report, "Climate Change and Tourism - Responding to Global Challenges", commissioned by the UNWTO, UNEP and WMO to further understand the relationship between tourism and climate change, including impacts, adaptation, demand patterns, emissions, and mitigation policies and measures, was presented.

Alternative contributions to the discourse on tourism and climate change are emerging, but they are not yet developed, tested or influential like the UNWTO-led discourse. For instance, during COP 26, several countries created the Glasgow Declaration on Climate Action on Tourism (One Planet Sustainable Tourism Programme, 2021). Unlike the UNWTO contribution, this declaration is an initiative of the One Planet network, a multi-stakeholder, global community of those interested in tourism, including practitioners, policymakers and experts from governments, businesses, civil society, academia and international organisations.

However, focusing more on research and knowledge mobilisation with respect to the relationship between climate change and tourism, the UNWTO-championed collaborative initiatives have made the most significant contribution to our understanding of how the regulation of climate change affects destination competitiveness. For instance, it has established the connection between tourism and climate change beyond what was previously known, including shedding light on the challenges of destination competitiveness, and addressing how the tourism sector should deal with climate change and its impacts, for instance as seen in the programme of the second conference in 2007 (Second International Conference on Climate Change and Tourism, 2007).

Still, although the Davos Declaration of the second conference calls for the incorporation of "tourism in the implementation of existing commitments under the United Nations Framework Convention on Climate Change" (WTO and UNEP, 2018: 13), among other things, this emerging framework says little about how the current regulation of climate vulnerabilities under the UNFCCC regime actually and potentially impacts destination competitiveness, just as it does not pay much attention to the unique experience of African countries and communities often discussed through the lens of climate justice, not taking into consideration the developments under the Paris Agreement and the Glasgow Climate Pact. Taking this experience into account, the policy issues below focus specifically on the climate justice implications for the destination competitiveness of African countries and communities under the Paris Agreement and the Glasgow Climate Pact.

Policy issues

To complement the UNWTO discourse and other contributions, we extract three key interwoven policy implications of current international governance and law regulating climate vulnerabilities on destination competitiveness in Africa, as seen particularly from the UNFCCC regime, especially the Paris Agreement and the Glasgow Climate Pact. There are other impacts, but we consider the three we discuss here as the most dominant and far-reaching ones. First, the UNFCCC regime has done too little regarding climate adaptation, loss and damage, undermining destination competitiveness. Second, the UNFCCC regime threatens the sustainable development of Africa, which is needed for destination attractiveness. Third, global climate governance and the UNFCCC have failed to transfer adequate finances for climate change mitigation and adaption in Africa to make them competitive.

Adaptation, loss and damage

Adaptation, loss and damage are the most discussed implications of the regulation of climate change for tourism in developing countries. Given their far-reaching climate vulnerability, African countries must be able to adapt and address loss and damage for their tourism sectors to be competitive. Failure to adapt and manage loss and damage would make their natural capital unattractive. Additionally, their social conditions may become precarious, with wide-ranging implications for less developed countries in Africa and their populations that are at the risk of losing their lands and resources.

To tackle these challenges, several initiatives address aspects of adaptation to enhance destination competitiveness. For instance, the UNEP Tourism and Environment Programme, UNWTO's work programme on the Sustainable Development of Tourism, and the WMO provide environmental data for mitigating the impacts of natural disasters on climate-sensitive sectors such as tourism (Simpson et al., 2008), and the WMO Commission for Climatology Expert Team on Climate and Tourism, UNEP and UNWTO collaborate to provide data, assess climate impacts and variability, and improve the relationships between National Meteorological Services and tourist countries, especially those in small islands, coastal zones and mountains.

These initiatives and others are commendable, but the most influential global regime, the UNFCCC, does little to help. Unlike mitigation, which countries and stakeholders see as a global public good (Drahos, 2004), adaption is considered a domestic interest, making the incentives for global collective action weak (Bodansky, 2016). Consequently, the Paris COP and Agreement make limited contributions on adaptation. Resulting from the negotiations of the Paris COP, the Paris Agreement includes no requirement that parties should submit plans to address or support adaptation efforts in NDCs, which are expected to focus more on mitigation (Bodle, Donat & Duwe, 2016). While the Paris Agreement acknowledges that adaptation is challenging, recognises how developing countries suffer from their inability to adequately adapt, and recommends ways to cooperate on adaptation (Bodansky, 2016), there are no mandatory expectations of what parties should do about adaptation or how they should support developing countries. The Glasgow Climate Pact reflects the approach of the Paris Agreement. While it welcomes "the national adaptation plans submitted to date, which enhance the understanding and implementation of adaptation actions and priorities" (Article 7, Glasgow Climate Pact, 2021), it does not make their implementation legally mandatory or coerce countries that do not have these regulations to create them.

Thus, rather than imposing legally binding adaptation requirements, the UNFCCC encourages parties to contribute to adaptation through non-mandatory means. There are challenges to this voluntary approach. First, the position that parties should undertake and communicate ambitious plans to address adaptation (Ferreira, 2018) is flawed. While the Glasgow Climate Pact has made it more clear how parties should do this, there is still no legal requirement that they should communicate within any time frame (Bodle, Donat & Duwe, 2016) or based on compulsory standards. Second, the actions parties should take, including how much they should provide to finance adaptation, are qualitative and precarious. The Paris Agreement merely hopes to achieve a "balance" of financial resources directed towards mitigation and adaptation, and the Glasgow Climate Pact also does not make financial provision mandatory. Third, there is no distinct institution responsible for managing adaptation issues. Although parties should consider the Cancun Adaptation Framework (Bodle, Donat & Duwe, 2016), this requirement does not make adaptation the responsibility of any institution (Mattar, Kansuk, & Jafry, 2019).

As with adaptation, the UNFCCC COP negotiations, the Paris Agreement and the Glasgow Climate Pact have made limited progress on loss and damage. Adaptation deals with limiting impact, but the idea of loss and damage is about addressing harms that we can already see (Bodansky, 2016). Although there is no agreed definition, stakeholders tend to see loss and damage as what could not be addressed by adaptation (Bodle, Donat & Duwe, 2016). During negotiations, industrialised countries avoid loss and damage as much as possible out of fear that developing countries might raise compensation claims (Bodansky, 2016; Bodle, Donat & Duwe, 2016; Okereke & Coventry, 2016). The Paris Agreement has now included loss and damage, which the Glasgow Climate Pact expands on, while the Warsaw International Mechanism for Loss and Damage is a permanent institution that addresses climate displacement as part of loss and damage (Bodle, Donat & Duwe, 2016). However, there is no legal liability or enforcement included.

Sustainable development

Global drivers of destination competitiveness include markers or indicators of sustainable development (Cvelbar et al., 2016). Countries with favourable sustainable development markers such as infrastructures, technology, skilled population, and effective management generally have more competitive tourism sectors. Conversely, countries lacking in these indicators are not as competitive. Many African countries are just ramping up on these drivers of competitiveness, making them comparatively less competitive.

Unfortunately, the Paris Agreement has introduced a voluntary approach, inherited by the Glasgow Climate Pact, that threatens Africa's sustainable development, with far-reaching future impacts for tourism. Unlike the Kyoto Protocol which relied on top-down binding emissions mitigation commitments, the Paris Agreement relies on a voluntary, largely bottom-up approach wherein countries submit their NDCs, setting out non-binding emissions mitigation actions such as targets, policies, and measures (Ferreira, 2011). Countries have neither submitted nor implemented adequate NDCs that can effectively mitigate the global impacts of climate change. An implication of inadequate NDCs and climate mitigation is that African countries, increasingly considered the most vulnerable to climate change, will have limited options for future sustainable development.

For African destinations to be able to build adequate infrastructures, train experts, and perform well across indicators of sustainable development in order to make them competitive, the assumption is that nature will keep on providing reliable and predictable ecosystem goods and services (Adams-Schoen et al., 2015), for instance disease regulation to empower human capital and natural resources and flood control to support infrastructural development. However, without adequate GHG mitigation, global warming will intensify climate change, which will then stretch the ecosystem to a breaking point, with consequences for ecosystem goods and services. Radical ecosystem disruption will limit the available resources for development in Africa. Limited resources directly translate to restrained sustainable development and destination competitiveness.

Financial transfer

Having established that competitive tourism sectors depend on addressing adaptation, coping with loss and damage, and achieving sustainable development, it becomes clear that African countries will need enormous financial resources to make these things happen. Ten years ago, the cost of coping with climate change was estimated to be as high as US$ 20-30 billion per annum for the following 10 to 20 years (ADB, 2011), and Africa has committed to a range of US$ 7 to 15 billion per year for adaptation from 2020 onwards (Schaeffer et al, 2013). The likelihood of irreversible damage rises as the magnitude of global warming increases (IPCC, 2014), with more tipping climate events (Cai, Lenton & Lontzek, 2016), making it clear that some impacts cannot be reversed (Pörtner et al., 2022). Long-lasting emissions make for more pronounced impacts on destination competitiveness and exorbitant costs to cope with climate change. How well Africa will deal with these worrisome

climate impacts largely depends on funding, and the funding required is estimated to rise rapidly after 2020 (Schaeffer et al., 2013).

Starting in 1992, global climate negotiations and outputs, such as the Kyoto Protocol, have acknowledged the financial need of developing countries and asked industrialised countries to transfer finance to them. Article 3 of the UNFCCC ascribes a leading role to industrialised countries in providing financial support to developing countries. Although the differential responsibilities of developed and developing countries with regard to mitigation have transformed (Onifade & Orifowomo, 2015), the Paris COP Decisions and Agreement and the Glasgow Climate Pact maintain the leadership position of industrialised countries on finance. Industrialised countries should take the lead, although all parties and diverse stakeholders across public, private, national and international levels have financial responsibility (Whitley et al 2018).

However, this position on financial leadership has serious limitations. First, the Paris Agreement and the Glasgow Climate Pact do not quantify the required financial commitment. While countries pledged to mobilise US$100 billion every year in new and additional financial support for adaptation in the Green Climate Fund by 2020 (Mattar, Kansuk & Jafry, 2019), recently reaching USD10.3 billion (with USD 8.31 billion confirmed at 31 July 2020) (Pledge Tracker, 2020), industrialised countries have the discretion on what they contribute, making this financial support precarious. For instance, Australia withdrew from contributing to the Green Climate Fund in 2019 (Beitsch, 2019). Second, for countries to get support from the Green Climate Fund, they need to find co-financing, which is problematic for Africa. How will African countries that are still trying to feed their people, achieve primary health care, provide housing and education, and deal with the aftermath of COVID-19, be able to get adequate co-financing, which often depends on what they have to offer in return? Additionally, and as the previous point suggests, considering how the Green Climate Fund has operated so far makes one see it as a climate investment scheme rather than a climate adaptation fund that Africa would meaningfully benefit from. Of the projects approved by the Green Climate Fund, only 18% of the funds go to the poorest economies that desperately need them, including African countries, while the bulk of the funds, as much as 65%, go to investment destinations that are promising in the short-term, across middle-income countries such as Mexico and India (Mattar, Kansuk & Jafry, 2019).

Looking for solutions

Public interest theories provide a lens for thinking about the efforts of African governments to address these problems. According to dominant strands (Posner, 1974), governments regulate climate change to remedy market failure and promote public good. As a public good problem, all countries have benefited from the activities causing climate change, but they do not all suffer the consequences at the same level. African countries have disproportionately suffered the consequences of climate change, but other countries and regions, especially industrialised ones, have largely failed to address the impacts, leaving low-income Africans and their weak social systems to deal with the problems on their own.

As private interest theories tell us, governments have not done enough to regulate this global market failure and address the public interest issue, pointing us to another well-known problem: government failure. Most governments, including those in Africa, fail to take adequate climate action. Governments of developed countries act in the self-interest of their economies and people. For instance, studies have shown neoclassical economic thinking (Van den Bergh, 2017) and sovereignty (Onifade, 2021a) on the part of developing countries' governments as fundamental barriers to climate policy and action at the international level, and many Africans are familiar with the challenges of African governments, including limited financial and technical capacity, lack of political will, regulatory capture, and several other problems traceable to the elephant in the room, corruption. Because of these fundamental barriers at international and domestic levels, climate policy negotiations have not made fast progress on adaptation, loss and damage, financial transfer, and sustainable development, with implications for destination competitiveness.

There are emerging ideas to combat these challenges of international climate regulation. However, we suggest that litigation and south-south finance hold promise for filling climate policy deficits in tourism, including enhancing destination competitiveness. Across international and domestic levels, civil society groups, especially activists, vulnerable communities, and NGOs, use litigation to challenge climate actions and inactions. At the international level, governments of developing countries cooperate in the area of finance and in other areas, and south-south cooperation is emerging as way to make up for some of the gaps in global climate policy. For instance, south-south finance complements the Global Climate Fund, Adaptation Fund and other funds under the UNFCCC that have not been adequate to address the needs of developing countries. We take a closer look at these two strategies as practical solutions to

the key policy issues we discuss as undermining destination competitiveness: loss and damage, sustainable development, and financial transfer.

Litigation: Courts are becoming powerful venues to challenge the climate policy inadequacies of governments around the world. For instance, as of May 2021, up to 1,387 cases had been filed before courts in the US while up to 454 cases had been filed elsewhere, spread over 39 countries and 13 international and regional courts or tribunals (Setzer & Higham, 2021).

However, although climate court cases are rising in some developing countries and could help fill climate policy gaps for countries most vulnerable to climate impacts (Peel and Lin, 2019; Setzer & Benjamin, 2019), including those we have identified as implicating tourism destination competitiveness, Africa has not yet caught up with this surge. Kotze and Du Plessis (2020) provide reasons for this, including the most common one: fossil fuel dependence makes governments ignore alternative economic pathways, (as explained by the Dutch disease (Onifade 2015a)), for instance adaptation and transition activities that enhance tourism destination competitiveness. African countries need to catch up. Meanwhile, many of them already have the environmental law structures to accommodate climate litigation (Akinbola & Onifade, 2013; Kotze & Du Plessis, 2020), and should leverage these.

South-South Finance: South-south finance can complement multilateral climate funds, private finance and other sources of money that could make African countries more competitive. For instance, China pledged US$3.1 billion to a South-South Climate Fund, going above what Australia, Canada and the USA other developed countries have provided, and other developing countries, including Indonesia and Mexico, are voluntarily contributing to the Green Climate Fund (Ferreira, 2019). Meanwhile, some developed countries have withdrawn their contributions to the basic Green Climate Fund. For instance, Australia withdrew its contribution to protect its national interests (Onifade, 2021). Leveraging this ambition of developing countries to boost south-south finance could enhance the ability of African countries to address adaptation, loss and damage, and other challenges.

However, the Paris Agreement and the Glasgow Climate Pact do not yet regulate south-south finance. While regulating it would not ensure that there would be a greater financial flow, it might create a structure that would motivate participation.

6.4 Conclusion

What are the implications of the international regulation of climate change on destination competitiveness in Africa? The analysis reveals that the central implication has to do with undermining destination competitiveness. The UNFCCC COP negotiations and instruments have addressed several climate vulnerabilities over the years. However, the current instrument guiding the implementation of the UNFCCC, the Paris Agreement, has made things worse. While the Glasgow Climate Pact does better, it is subject to the fundamental flaws of the Paris Agreement, especially its "voluntariness", which undermines sustainable development.

Guided by our theoretical and regulatory framework, we have outlined three reasons why international regulation undermines destination competitiveness. First, the Paris Agreement makes limited provisions on adaptation, loss, and damage. Poor adaption and management of loss and damage make vulnerable African countries, especially those depending more on natural capital, less competitive for tourism opportunities. The Glasgow Climate Pact does better on adaptation, loss and damage, but, considering we are already in a climate emergency, the progress is too little, too late. Second, the Paris Agreement relies on a voluntary, largely bottom-up, approach that does not guarantee adequate global climate mitigation. African countries will suffer more from the increasing hazards of the climate emergency and have limited access to ecosystem services to support their sustainable development. They might be less competitive as a tourism destination. Third, the UNFCCC and the Paris Agreement fail to transfer adequate finance that can help African countries deal with climate adaptation, loss, and damage, and enhance sustainable development. While the Glasgow Climate Pact seeks to address this problem, it suffers from the "voluntariness" problem that does not facilitate financial transfer in an urgent manner. Ultimately, inadequate climate finance will make African countries unable to address climate impacts and develop sustainably, leading to their unattractiveness as tourism destinations.

As they continue to enhance the Paris Agreement, we suggest that African countries should find more urgent solutions outside the UNFCCC. They should leverage litigation and south-south finance to move faster. Although these mechanisms also have their challenges, which stakeholders continue to address, they are promising complements in that they are not subject to the fundamental flaw and other limitations of the Paris Agreement, including those inherited by the Glasgow Climate Pact.

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7

The call of 'thinking wild' in times of climate disaster: Indigenous wisdom from Southern Africa

C. Boonzaaier and H. Wels

7.1 Introduction

'Can "thinking wild" help' (Brown, 2019: 4) to start decentring the human in the Anthropocene and in the context of the current climate disaster[3]? Can 'indigenous cultures'[4], like the Khoisan in southern Africa, but also others on the African continent and around the world, help us explore this 'wild thinking', in which '(a)ll beings and all landscapes connect and interact in reciprocal ways' (Bekoff, 2014: 6)? It is these cultures that have been able, against all odds and despite processes of systemic marginalisation, to keep ideas alive about 'the vitality of Nature', recognising that mountains, rivers, and ancestral spirits are intimate aspects of their lives (Robins, 2022). We think they can, in our times of mass extinctions[5], or, as Griffiths refers to it, "the age of the endlings" (2021: 75), by means of both learning and unlearning (cf. Olson, 2012). Smith (2022) ends his book on Khoisan history with a quote from Ian McCallum: "For all the so-called advances and advantages of modern civilisation, we have to be aware that something important has been lost in the process. Many of us, perhaps too many, have lost our sense of wildness" (2022: 208).

3 Secretary-General Warns of Climate Emergency, Calling Intergovernmental Panel's Report 'a File of Shame', While Saying Leaders 'Are Lying', Fueling Flames | Meetings Coverage and Press Releases (un.org), accessed 7 April 2022.

4 We are very much aware of the critical debates surrounding the concept of 'indigenous' (Peters & Mika, 2017), but we find many of the alternatives and synonyms, like 'aboriginal, autochthonous, born, domestic, endemic, native' (https://www.merriam-webster.com/thesaurus/indigenous, accessed 7 April 2022) all also come with their own problematic complexities and connotations. Therefore for this chapter we stick to the word 'indigenous'.

5 The 6th Mass Extinction Really Has Begun, Scientists Warn in Newly Published Study (sciencealert.com), accessed 22 March 2022.

As a result of her 'elemental journey', exploring what it means to think wild, Griffiths tells us how she "felt a kind of *radical empathy* with everything" (2006: 403, italics added), and that, "(e)ven months later, seeing a bird that had been shot out of the sky made me leap back in pain because I felt the stab of the bullet in me" (ibid.). Tsing (2015: 17) speaks about empathy as the 'art of noticing' (see also Barnes, 2018). This is a radical empathy that leads to a wild and essential kindness that is wise. "In its etymology, what is kind is natural and therefore, '(w)hat is most natural is most wild and what is most natural (…)' is most kind" (Griffiths, 2006: 147). This kindness and "unsentimental tenderness" (ibid.) is what ideally leads to coexistence (cf. Bekoff, 2013) amongst species in animate landscapes on this planet. There is no room for anthropocentrism within a wild thinking, where "the boundaries between person and place, or between the self and the landscape, dissolve altogether" (Ingold in Smith, 2022: 40), leading to a 'becoming with' alterity (Haraway, 2008; Wels, 2013).

In this short essay commemorating our beloved colleague and friend Bob Wishitemi, whose kindness and wisdom spoke to all authors contributing to this edited volume, the authors tell stories about what is often referred to as 'indigenous'[6] cultures and 'indigenous' research methodology (Chan, 2021), based on their own modest personal, professional and 'elemental journeys' in search of 'thinking wild' and striving towards radical empathy. They relate how these endeavours have contributed to both learning and unlearning along the way (with no claim whatsoever that they have reached their destination).

7.2 Storytelling by Chris

At the heart of landscape is land. In pre-colonial times there were no fixed boundaries between different indigenous communities who lived on the land. Communities occupied land in clusters of clans. Each cluster clan settlement was composed of closely related families. All these clans communally shared land, which the community leader held in trust for the community. The clans usually had a headman who was their political link to the community leader.

The land was still so open and in abundance that there was little pressure on it. As one old man explained to me, the extent of a community's territory was determined by the criterion of "as far as the eye could see", when standing

6 We realise that the concept 'indigenous' is contested (Stewart, 2017), but we will not delve into that discussion in this chapter in this particular edited volume.

on a mountain. With these unfixed frontiers between communities, land was regarded as a shared resource in which people and livestock moved and that they could use freely. This freedom of movement was possible because people lived in relatively small communities (such as clans), and because of the abundance of land space and availability of natural resources such as grazing and water. As people were few, conflicts were initially minimal.

As more groups entered and invaded the formerly open spaces, natural features such as rivers, hills and mountains were used as markers of boundaries between them. Where such natural markers did not occur, groups often fought each other, especially over natural features that they considered essential to survive, such as pastures and water.

When clans of a particular community grew and expanded and moved further afield, the land they had covered was automatically regarded as belonging to the community leader of these clans[7]. Anthropological field research that the author conducted in recent times has revealed that this view has not changed, as land occupied by communities is still regarded as belonging to the community leader of whose area of jurisdiction they form a part.

Traditional communities put more emphasis on people than on boundaries. Land was only important as a form of exchange for political alliance. In other words, land was only used as a means of attracting valuable assets, of which people were the most important. Groups switched allegiance without tensions and hostilities (cf. Setumu, 2012). An excellent example is found in the Lowveld of South Africa, where families from different ethnic groups (Sotho and Tsonga) have lived together peacefully for decades on land that is now being claimed by them. Tsonga families had no problem recognising the authority of a Sotho headman and vice versa when they drifted into the unoccupied land as family groupings from different ethnic groups.

The community leader held the land on trust for all the groups which paid allegiance to him. He could allocate land for settlement to a particular group in exchange for acknowledgement of his authority. The question of allegiance far outweighed the other uses of land which that particular group could derive.

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7 This situation has a specific implication for land claims in present-day South Africa. Clans that had broken away from the mother unit (community), being relatively few in numbers, often settled on land which was later surveyed and demarcated by government surveyors as farms. The whole farm was usually claimed by the clan/community who had settled on it before it was demarcated by the government surveyors, irrespective of the fact that the claimant clan/community had only occupied a small piece/portion of the farm.

The reason why people would seek political alliance with a community leader often depended on the particular attributes of a leader. Rainmaking powers, for instance, played, and still play, a considerable role in attracting people to a particular leader. In the South African context, the rainmaking powers of the so-called Rain Queen, Modjadji, are well-known and in the past attracted many different groups to pay allegiance to her. Other leaders were given names related to their rainmaking powers, like in the case of *Mnisi* (literally: rainmaker), a Tsonga community leader in South Africa. Because of his rainmaking powers, people used to pay allegiance to him as he would ensure that the land would get rain and hence produce heavy crops.

Figure 7.1
***Thabana ya Kgoši* (left) ("little mountain of the chief"), *Thaba ya badimo* (right) ("mountain of the ancestors"), and Ntebele mountain (centre) ("where the Ntebele clan once lived")** (photographed by Boonzaaier, 2013)

The worldview of indigenous peoples with regard to land reveals itself clearly when looking at nature reserves or wilderness areas, like for instance the Masebe Nature Reserve, situated in the Limpopo Province of South Africa. The case of the Masebe Nature Reserve is telling its own story. According to the geological record, this nature reserve is characterised by impressive sandstone mountains that were formed about 650 million years ago. However, the people who occupied it[8] before it was developed into a nature reserve have

8 The Langa-Ndebele migrated from KwaZulu- Natal in the 17th century and eventually settled west of present-day Mokopane in Limpopo Province of South Africa.

different culturally determined views about it, as they have attached intangible meanings to these tangible objects. Some of the mountains are regarded as the abode of the ancestors and have been accordingly named "mountain of the ancestors" (see Figure 7.1). Since particular mountains are regarded as the abode of the ancestors, over time the land has also acquired social and religious value.

On top of other mountains are pools that are regarded as the dwelling place of a mythical snake, called *mamogašwa* in Sotho language, that can harm people should they enter these pools. Other mountains have historical significance because battles were fought there against other ethnic groupings and even against Europeans who invaded the Langa-Ndebele land and space (Boonzaaier & Wels, 2016). The shared cultural values and worldview regarding these wilderness objects have undoubtedly contributed to the community's sense of identity. Moreover, no distinction was made between nature and culture. Nature was culturally meaningful, as much as cultural meaning was built on spirited natural features of the landscape.

Masebe Nature Reserve has been developed by relocating the people who lived there to locations outside the fenced area, leaving their ancestors' graves behind. Like most other nature reserves in South Africa, Masebe Nature Reserve has become inaccessible to the people who once lived inside the fenced area. This situation causes a lot of discontent since people cannot access to the graves to bring offerings. In times of crises such as drought and famine, people need to bring sacrifices to the ancestors' graves to acquire relief. When interviewing community members in one of the settlements adjacent to the Masebe Nature Reserve, one man expressed his frustration with the situation by jumping up and down, holding his hat in his one hand and shouting: "The fence must go down"! (Boonzaaier, 2010: 60). In the people's view, they have been deprived of land that was the abode of their ancestors.

As such, the people do not only depend on the Nature Reserve and all its natural features (fauna and flora) for their survival, but also on their ancestors. Land has indeed a more profound meaning to indigenous peoples/communities than only the physical features that characterise it from an outsider's perspective (Figure 7.2). Therefore, the Masebe Nature Reserve serves as a telling example of the important role that land plays in creating community identity.

Figure 7.2
***Ntona Daniël Malope* pointing out to *ntona Mathekga* a feature in the landscape to which cultural meaning is attached** (photographed by Boonzaaier, 2013)

From the Masebe Nature Reserve example, it is clear that any project concerning land, such as the development of nature reserves in areas occupied by indigenous communities, should consider the ancestral spirits as possible role players/actors.

The sacred Lake Fundudzi and Baleni hot spring are yet two other examples of the close association between nature and culture. An incident that occurred some 15 years ago at Baleni hot spring (Figure 7.3) suffices to illustrate this point. Baleni is a geothermal spring which is situated about 30 kilometres east of Giyani, the capital of the former Gazankulu homeland under the previous political dispensation. Harold Kolkman (2002: 38) when conducting research for his Master's dissertation on Baleni, describes it as follows:

> This spring issues at an altitude of 380m in a reed-covered swamp near the south bank of the Klein Letaba River. The swamp, which is oval-shaped, is about 415 m in length with a maximum width of 150m. Hot water issues near the south-western end in a small pool that is surrounded by exceptionally tall reeds… The principal eye is at the southern end of the pool, marked by a vigorous emission of gas bubbles with a strong odour of hydrogen sulphide. Temperatures of 40°C to 44°C and a water flow rate of 1.5 litres to 3 litres per second have been measured.

Tsonga women occasionally visit here to extract salt from the pan around the margin of the swamp.

Some 15 years ago the hot spring suddenly started to cool down. Since the whole area surrounding the spring is regarded as sacred land, this strange event was ascribed by the Tsonga in the nearby settlements to the wrath of the ancestors. The reason for this wrath was that the necessary rituals had not been performed since a cultural camp[9] had been erected in the proximity of the spring for the accommodation of visitors to the spring. However, after a brief period of cooling down the spring started heating up again. Geological records show that the same thing had happened some forty years before this event. It is not clear whether the event can be explained geophysically. However, in the minds of the people the whole event has re-affirmed their worldview regarding the inseparable link between nature and culture. Nature is seen as a shared entity of which they are a part.

Figure 7.3
Baleni hot spring. In winter, when the water level drops, a salt crust forms. This crust is scraped off by the local women to produce salt (Source: Terblanche, 1994: 77)

9 The cultural camp forms part of the African Ivory Route concept, in which an integrated series of camps, in traditional homestead style, have been erected in selected areas of the Limpopo Province for the purpose of tourist accommodation, accompanied with traditional cultural experiences (History of the African Ivory Route | African Ivory Route, accessed 6 May 2022).

To conclude, when indigenous people talk about land, they imply people. In the Bantu languages, the term for land always implies people. Space without people, such as a wilderness area, is meaningless; culture and nature are not seen as opposites, or binaries. On the contrary, nature and landscapes become filled with meaning when they become a spirited place for the living, shared with the ancestors. 'Thinking wild' in these stories does not separate people from nature or natural landscapes, but instead recognises them as an integral part of nature, next to, and together with, other tangible and intangible features.

7.3 Storytelling by Harry

I was not, like Chris, born and bred in South Africa. Instead I was born, and have lived ever since, in the Netherlands. My knowledge of the region of southern Africa, its landscapes and its people, is limited to my research life in academia, that started in the second half of the 1980s. After spending time in Zambia for my MA research, in the 1990s I went to Zimbabwe to do my PhD research. Ever since I have been doing research in South Africa on nature conservation. My stories on southern African 'indigenous wisdom' in this chapter are derived from both my lifelong reading on a wildly-wide range of South and southern African topics (although I will not constantly refer to literature as it would interrupt the flow of the story), and my many research visits, long and short, over a period of close to forty years, as well as teaching and supervising many generations of students on all of these topics. In this chapter I want to focus on how, through this life of research, reading and teaching on South and southern Africa, I have both learned and unlearned with regard to the 'art of noticing'.

Nature conservation in southern Africa is soaked in neo-colonialism. It has been, and to a large extent still is, a white men's affair (cf. Adams, 2004). For quite some years, this prevented me from noticing, or paying sufficient attention to, indigenous African cosmologies, not specifically on nature conservation as such, but on how they lived in and with nature before colonial powers 'invented' nature conservation in southern Africa and branded every African almost automatically as a potential poacher to be kept as far away as possible from what was conserved (cf. Steinhart, 2005). In that way I perpetuated the marginalisation of African knowledge in my research and writings on nature conservation. In trying to 'unlearn' that bias, by reading and talking to African colleagues, I came to understand something that Chris mentioned above: there is no separation between nature and culture in (most) African cosmologies and

ontologies. That distinction came along with Western colonialism. As one of its consequences, the Yellowstone National Park model was used to inform management models for protected areas in Africa (Beinart & Coates, 1995). Going beyond this nature-culture divide also made me aware that the distinction between human and animal has been colonially imposed and is not recognised nor shared in its Cartesian sense by most of the indigenous ontologies in southern Africa. Cascading even further, I started to notice also that the strict binary between mind and body is not common to most southern African ontologies. The essentialist mind-body binary, as well as the culture-nature divide which is in sync with, and paralleling the mind-body binary, were both discarded for embracing inclusivity as enchanted webs of significance, inspired by San cosmologies and tracking practices. Empathy is no longer restricted to humans, but stretches as far as the senses and the mind can carry it, into enchanted and spirited landscapes full of shared sentience, sensuality and multiple meanings and ambiguities (cf. Myburgh, 2013; Latour, 2017).

Because of my trajectory over the years I now feel not only more able to make sense of nature conservation in southern Africa, but also of the huge phenomenon of climate disaster and how we as humans have tortured Gaia to the level that her temperatures are rising, as a sign that she is 'ill'. Radical empathy through the art of noticing is based on a wise and kind curiosity and constant alertness on what might be overlooked to the detriment of striving for a radical empathy. Foster (2016: 210), musing at the end of his book about a radical methodology towards understanding earth and its critters, concludes what, to us, is at the heart of his endeavours towards radical understanding … reciprocal love.

Therefore I am concluding my little story with a poem by Harry Owen that touches on many of the (implied) aspects of Chris' and my stories. 'As with Harry Owen's previous collections, *The Cull*, new and resurrected poems, reflects his lifelong fascination with, and growing concern for, the natural world, especially in relation to damaging human interactions with it' (blurb). The world is not only about the human species. We share this world through our senses with fellow sentience. Culture is part of nature and the other way around. Landscapes and earth have agency. Anthropocentric world views salvage and violate the land and the planet. The art of noticing can possibly reunite humanity with planet earth. Poetry can sometimes capture in words what academic writing cannot. Therefore I include the following lines from a poetry book that this other Harry appropriately entitled 'The cull', as a metaphor for the sheer brutality of humans in killing fellow sentience and salvaging the planet while not reciprocating its love:

pay attention

To yourself : body, breath, blood : and listen :
Vibrations in air, flesh, in bone : permit
Slow atoms to rebound, sound yourself

In : out : release, unplug : wax exotic :
Dance : let go : be what you've never allowed
Yourself to be : the taboo of deafness :

Snakes dance too : the very ground vibrates
Gyrates : hearing skin, sensing the earth move :
Upright, prostrate, sin of Eden : become

Serpent, glide : muscle, rib, side : know us, taste
Us : quickening tongue : loam : granular stuff
Of world : root, slide, foam of swept beefwood :

Listen to its thrum, its flow outstretched there
In the sun like an adder : taste the voice of tree/snake/earth/us : trust the turf's fragrance
Pay attention : feel the joys creaking'
(Owen, 2017: 10)

7.4 Final reflections

'Thinking wild', as is clear from the references in our introduction, is not necessarily the same as 'thinking *African*'. So our question about 'thinking wild' has got nothing to do with the 'Wild Africa' that is so often marketed to potential tourists from around the world. Actually, all the authors that we cite on '(thinking) wild' in this chapter have a Western-European background. It seems that it is currently in vogue to write about 'wild' and that these authors turn to 'indigenous cultures' around the world for inspiration, because they have been the custodians of this ancient wisdom. "In an age of climate catastrophe, environmental activists have *returned* to ideas about the vitality of Nature that were once universally held by humanity, and *have been kept alive by indigenous cultures*" (Robins, 2022, italics added). '(K)ept alive' *against all odds*, we would like to emphasise and add. Through the extremely violent times of imperialism, colonialism and post-colonialism, the most marginalised people (Comberti et al., 2016) have been able to keep knowledge and con-

cepts alive that can 'save' us now. They know about the 'web of life' of which humans are a part like anything else on this planet, from critters, to ancestors, to landscapes both urban and rural, wild and domesticated, not less and certainly not more. Southern African ontologies and cosmologies can help us find our way back and forward to the knowledge we once shared as humanity and find back our place *amongst* non-human others instead of on *top* of everything else; in this way decentring humans.

To live up to this challenge of changing our worldview is fundamentally important. And we better do it incredibly fast, according to the three latest IPCC reports, if we want to keep our planet a place for humans to live on. Simon Barnes (2020: 2) writes, "(w)e're not just losing the wild world. We're forgetting it. We're no longer noticing it. We've lost the habit of looking and seeing and listening and hearing". In the rest of his book he presents us with 23 exercises to train our skills of noticing, to make us alert again to the (natural) world around us. Many of the exercises basically refer to rather simple and basic tracking techniques, using the various senses and the interpreting mind to notice. The San of southern Africa are considered by many to be the master trackers of all time (Liebenberg, 1990). Originally without a written language, developing their intimate knowledge of the land and everything on it over thousands of years by literally being *part of* the southern African landscapes, the San are, in a way, the personification of this incredible 'art of noticing'. That is why their ontologies and cosmologies can be read for inspiration for our current dramatic time and age (Guenther, 2020a; 2020b). Once we as humans across the globe start noticing again, we simply cannot remain seated, but will be propelled into action in order to start living *with* the planet again, instead of *off* the planet. As a tribute to, but also in the spirit of, Bob's work on climate change, these stories are a call to 'think wild', and will hopefully lead to a world that is characterised by coexistence rather than anthropocentric plunder leading towards climate disaster.

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8

The nexus between biodiversity, tourism and climate change: Integration adaptation for sustainability in Uganda

W.M. Ahebwa and A. Ochieng

8.1 Introduction

Climate change is of a global nature with adverse effects on biodiversity (Poiani et al., 2011). It is a result of uncontrolled anthropogenic activities responsible for the rapid accumulation of greenhouse gases (GHG) (Crowley, 2000; Stern & Kaufmann, 2014). The current global warming rate of approximately 1°C due to human influence is expected to reach 1.5°C between 2030 and 2052, with adverse effects on people, nature and livelihoods (IPCC, 2021). Climate change also results from an increase in solar irradiance, or reduction in volcanism, which has occurred in many parts of the world (Crowley, 2000; Stern & Kaufmann, 2014).

Earlier, Wilson (1988) warned the world of an unprecedented pending threat to all life forms and the ecological complexes in which they occur (Leadley et al., 2010). The much-anticipated change is already being witnessed in the form of habitat loss and other anthropogenic stressors (Staudinger et al., 2012). The global climatic changes manifest in changing weather and rainfall patterns and distribution, contributing to an increased vulnerability to floods risks, disease outbreaks, famine, and displacement for both human and non-human species. On a large scale, climate change affects economies, social life (human health), physical health (outbreaks of disease), and territorial cultural harmony (induced migration) (Tol, 2009).

Climate change is one of the principal threats to biodiversity in protected areas (UNEP, 2021). It causes many species to shift their geographical ranges, affecting their distributions, richness and abundance, and phenology (Stauding-

er et al., 2012; Blois et al., 2013; Weiskopf et al., 2020). This has an effect on tourist experiences and is a serious planning challenge in many affected destinations. Because different species have a varying capacity to adapt to climate change, new community assemblages and associations among species tend to occur where they have not existed before (Staudinger et al., 2012). Consequently, some species that are at odds with the new environmental conditions end up disappearing. In contrast, others may become invasive by displacing original species in the environment. As such, "integrating climate change into conservation strategies is vital if biodiversity is to be protected in the long term" (Poiani et al., 2011: 186). To this end, the UN-SDG 13 calls for global action to combat climate change and its impacts for a more sustainable future. This is because climate change has already proven to have adverse effects on several other SDGs, which are vital for global sustainable development.

While it is evident that climate change is one of the drivers of negative changes in biodiversity areas and that it influences nature-based tourism experiences and movements, tourism is equally one of the drivers of climate change, through travel-related Green House Gas emissions. Current or future changes in global climatic conditions are likely to cause changes in conditions of wildlife habitat and/or destruction which negatively affects tourism. On the other hand, viable, functional and well-managed biodiversity area networks can play a key role in minimising climate change impacts on terrestrial and aquatic ecosystems (UNEP, 2021). Protected areas help by playing the critical role of safeguarding biodiversity and ecological processes from risks associated with climate change, such as species extinction. As such, biodiversity conservation is an important global agenda that requires governments around the world to set aside expanses of land for the purpose of protecting species. Recently, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC) called for a better understanding of the underlying causes of biodiversity loss and climate change and the obstacles, but also potential, for alternative, more desirable, and innovative solutions. Therefore, the goal of this chapter is to analyse the nexus between biodiversity, climate change, and tourism in Uganda, in order to draw lessons for sustainable tourism and conservation.

8.2 Uganda country profile

Uganda is a landlocked country in Eastern Africa. It is bordered by Kenya in the east, South Sudan in the north, the Democratic Republic of the Congo in the west, Rwanda in the southwest and Tanzania in the south. Uganda is also crossed by the Equator line and is located at 1° N and 4° N latitude, and between 30° E and 35° E longitude. The country's lowest point is about 900 meters above sea level. The highest point is found in the Ruwenzori Mountain range, with its highest peak at 5,094 meters above sea level. Other key features include the volcanic hills and lakes formed due to volcanic activities. With a size of 241,037 km^2 as a total land cover, 2,698 kilometers or about 27% is occupied by lakes, rivers and swamps, and 11% is covered by Wildlife Protected Areas (PAs) (Ochieng & Tumusiime, 2018).

Uganda generally experiences a warm tropical climate characterised by relatively humid conditions and moderate daily temperatures ranging between 25-29°C (77-84°F). The highest temperatures are observed in the northern parts, especially in the north-east (the Karamoja sub-region), while lower temperatures occur in the southern parts (the Kigezi highlands). The spatial and seasonal variations in temperature and rainfall in Uganda are mainly influenced by topography, wind, and the presence of water bodies (Government of Uganda, 2020), with the hottest months being the months of December to February, with temperatures reaching about 30°C (Ministry of Water and Environment, 2015). The total annual rainfall is between 800 and 1,500 millimeters (35 and 60 inches) (Ochieng & Tumusiime, 2018). Variations in rainfall, temperatures and extreme events (USAID, 2017) pose a threat to the survival of both humans and biodiversity. Table 8.1 summarises recent Climate Observations, Trends and Projections for Uganda.

Table 8.1

Recent Climate Observations, Trends and Projections in Uganda

Variables	Climate Observations	Climate Trends since 1950s	Climate Projections by 2030
Temperature	▪ Moderate throughout the year and varied by altitude ▪ Falls below 0°C in the mountain ranges of Rwenzori and Mount Elgon ▪ Reaches 30°C in northern and northeastern areas of Gulu, Kitgum and Moroto	▪ Increase of minimum temperatures between 0.5°-1.2°C ▪ Increase of maximum temperatures between 0.6°-0.9°C	▪ Increase of 2°C in average temperatures ▪ Projected rates of warming are greatest in the coolest season, June-September ▪ Increase in the frequency of days and nights that are considered hot
Rainfall	▪ Two rainy seasons in the south (March-May and September-November) and one season in the north (April-October) ▪ Average annual rainfall ranges from 800-1500 mm, with the south receiving slightly more than the north.	▪ Naturally dynamic with high temporal and spatial variability (mainly due to large-scale oscillations); these make it challenging to find significant trends in the onset or length of the rainy season ▪ No significant change in average annual rainfall ▪ High variability in timing: the onset of rainy seasons can shift 15-30 days (earlier or later), while the length of the rainy season can change by 20-40 days year to year	▪ Potential for increase in precipitation during dry season ▪ Increase in the frequency of heavy rainstorms, flooding, etc.
Extreme events	Uganda has experienced erratic rainfall over the past few decades, leading to floods, landslides and mudslides. Periods of heavy rainfall in 1961/62, 1997/98 and 2007 caused widespread infrastructural damage, human displacement and the destruction of livelihood assets (Uganda Ministry of Water and Environment, 2014). Prolonged dry seasons have also taken a significant toll, as recently as January 2016, when 640,000 people in the Karamoja region faced food shortages due to poor harvests. Existing rainfall variability is intensified under a changing climate, and will continue to increase the intensity and occurrence of extreme events such as floods and droughts		

Sources: Adopted from USAID, 2017; Ochieng & Tumusiime, 2018

8.3 Climate change, biodiversity and tourism in Uganda

On a positive note, climate is a key determinant of biodiversity richness in Uganda (Government of Uganda, 2020). Due to its location, Uganda is divided between the drier East Africa Savannas and the moist West African rain forests. This, combined with high altitude ranges, favours a high level of biological diversity. With just 241,551 sq. kms of land cover, Uganda accounts for about 0.18 per cent of the world's terrestrial and freshwater surface and harbours 4.6 per cent of dragonflies, 6.8 per cent of butterflies, 7.5 per cent of mammals and 10.2 per cent of all bird species in the world (Ahebwa & Aryampika, 2018). While this biodiversity is under threat from climate change, biodiversity provides a natural and economical (through eco-tourism) means of mitigating and adapting to climate change effects (UNEP, 2021). Well conserved ecosystems act as buffers against the devastating effects of climate change, such as floods and storm. Droughts and wildfires can be avoided or reduced by expanding and managing ecosystems appropriately, and the destruction wrought by landslides can be reduced through soil stabilisation provided by plant communities (ibid.). Access to clean drinking water, recently declared a basic human right by the United Nations and rendered increasingly precarious by climate change, is also facilitated through biodiversity areas. In fact, many of the tourism accommodation facilities in Uganda's National Parks rely on biodiversity areas for their water supply. As such, areas with a lot of biodiversity need to be strengthened (e.g., with respect to management and governance), expanded and connected to improve the global response to climate change.

Tourists usually travel to different places to see the varied range of wildlife attractions, including plants, animals, reptiles, birds, butterflies, etc. (Hakim, 2017). Eco-tourism, which emerged in the 1980s, has acted as a great connector between tourism and biodiversity conservation. It provides opportunities for tourism and biodiversity conservation to reinforce each other while working together to achieve sustainability objectives (Stronza et al., 2019). According to Sridhar (2015), eco-tourism provides opportunities for understanding nature. This in turn directly affects tourist choices, including activities that they engage in while at the destination (Kaenzig et al., 2016; Wang et al., 2019). By design, eco-tourism involves responsible travel to a natural environment, positively contributing to environment and biodiversity conservation, local economic growth and development, and strengthening the local community's socio-cultural aspects (Hakim, 2017). In Uganda eco-tourism is mainly practiced in protected areas and community areas. Uganda boasts ten national parks, eight wildlife reserves, four wildlife sanctuaries, and nine Ramsar sites

– making the country one of the most biodiversity-rich nations in the Eastern African region. Eco-tourism activities in Uganda include tracking mountain gorillas in the Bwindi Impenetrable National Park and Mgahinga Gorilla National Park in Southwestern Uganda, chimpanzee tracking, mountaineering, nature walks and bird watching, among others. The country is home to 60% of the world's endangered mountain gorillas and other primates such as the chimpanzees are spread across various protected areas in the country, together with an abundance of other wildlife species, including birds and reptiles, mammals, fish and butterflies. There are also over 342 mammal species, 1076 species of birds, 142 species of reptiles, 89 amphibian species, 350 species of fish and 1242 species of butterflies – making Uganda a largely nature-based tourist destination. The broad range of biodiversity in Uganda is thus exploited to attract ecotourists to the country in order to create employment and generate foreign exchange (MTWA, 2022).

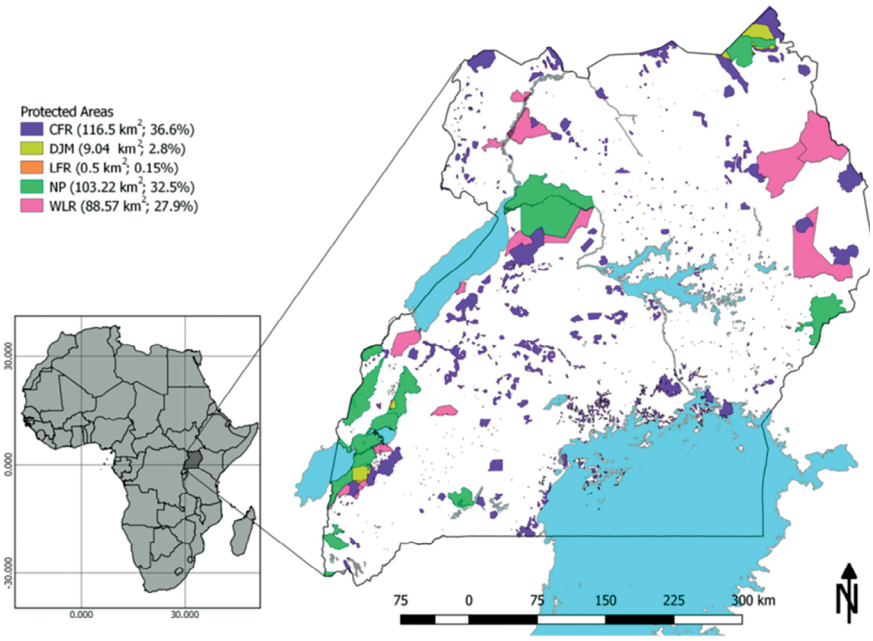

Figure 8.1

Different forms of Protected Areas in Uganda

Source: UWA, 2018- Protected Areas Assessment Report, Uganda. Abbreviations: **CFR**: Central Forest Reserves; **DJM**: Dual Management Areas; **LFR**: Local Government Forest Reserves; **NP**: National Parks; **WLR**: Wildlife Reserves

Like elsewhere in the world, climate change is one of the threats to biodiversity in Uganda's protected areas. The country has not been spared from the terrestrial impacts of climate change. For example, shifting ranges of species and habitats, and altering migration patterns and timing, have adversely affected the popularity of Queen Elizabeth National Park (UWA, 2022).

> We receive complaints from guides and visitors, that our designated tourism zone is having more limited animal populations than it used to have. This seriously affects tourism experiences (UWA Staff, 2022).

Queen Elizabeth National Park (QENP) is reportedly witnessing vegetation cover changes (habitat changes) as invasive species like Indigofera rectus, Imperata cylindrical, Dicrostachys cinerea, Lantana camara, Perthenium species, and Opuntia vulgaris are taking over most of the southern sector of the park. This has led to a reduction in palatable grass in the area. The long dry periods experienced in QENP are also known to reduce the amount of water in water pools and rivers. For example, hippo pools in Ishasha sector and channel track, as well as the rivers Kamiranjojo and Kibwera are drying out. As such, many animal species are reportedly migrating to other areas in search of grass and water. This definitely affects the chances of tourists viewing the animals while on game drives.

The Lake Mburo National Park landscape is linked to what is commonly referred to as the dry cattle corridor of Uganda and is inhabited by pastoral communities, yet it is prone to severe climate and rainfall variations. In Lake Mburo National Park, climatic changes have had direct impacts on wildlife through the destruction of vegetation, especially as a result of uncontrolled wild fires – coupled with lower rates of regeneration especially due to the increased length of dry periods. Also, during dry seasons, the local communities experience shortage of grass and water. This eventually leads to increased mortality of vulnerable animals or changed feeding patterns of browsers – sometimes causing the relocation of some species beyond the park boundaries (USAID, 2017). Further, the outbreak of unexpected/unplanned wildfires in the areas can kill slow-moving species and could eventually result in them becoming endangered or totally going extinct. Moreover, LMNP has witnessed the rapid spread of Acacia hockii, Acacia gerradii and Lantana camara, a perennial shrub which has now spread to many parts of the park. This has also resulted in high management costs especially where the authorities have to hire labour to uproot them (Ochieng et al., 2020). These invasive species have also caused reduced animal sightings of animal species like Oribi

and Reedbuck in the park. This is mainly due to changes in their distribution influenced by changes in their habitat.

> In Lake Mburo National Park, climate change induced invasives – acacia has eaten up the park. A bigger part of the park is a closed-up thicket which is not a conducive ecosystem for grazers that prefer open landscapes to monitor the predators. As such most animals feed outside the park on community farmland that is always cleared of invasives. This has often triggered community-wildlife conflicts affecting sustainable biodiversity conservation (UWA staff, 2022).

Human-wildlife casualties continue to rise in and around Uganda's protected areas as wildlife range outside protect areas in community lands. For example, between 2018 and 2019, over 22 human deaths were reported in Queen Elizabeth National Park (QENP) and Murchison Falls National Park (MFNP). Some 26 people were injured by problem buffalos, hippos and giant forest hogs around QENP alone (MoTWA, 2019). It is estimated that over 50% of wildlife are continually crossing over to community areas outside the formal protected areas. This causes them to cross roads with humans - some of whom poach them for either commercial or for bush meat (Ochieng, 2019).

Currently, the Uganda Wildlife Authority (UWA) has resorted to the use of bulldozers to remove the invasives and create conducive ecosystems for animals. Apart from being an expensive venture amidst limited conservation resources, this has further affected biodiversity richness in Lake Mburo and Queen Elizabeth National Parks (UWA, 2022).

There is also evidence that global warming is affecting the ice caps on the Rwenzori Mountains in western Uganda. Raising temperatures and floods in the Rwenzoris are associated with climate change (UWA Official, 2022). This has led to a receding of snow, and the destruction of habitats and tourism infrastructure in the Rwenzori National park. The comparative study undertaken at approximately the same location in 1958, 1986, 1992 and 2008 indicates that the glacier has shrunk from 23.8 km2 in 1955 to a mere 1.48 km2 in 2008 (WWF Report, 2008). This is consistent with the overall trend of approximately a 0.7 km2 loss per decade since 1906 (Taylor et al., 2006). The glaciers that hold the boulders have melted, and therefore the boulders are easily moved during flush floods, with devastating impacts downstream. The damage to critical tourism infrastructure such as link foot bridges, steps, ladders and rails, disrupt tourism, patrols and rescue operations.

> Tourists wade through waters while hiking the mountains, are delayed when the river is flooded or forced to spend an extra night altogether due to an inability to cross (UWA Official, 2022).

Victims of high altitude sickness (HAS) at the foot of the three highest mountains within the central Rwenzori ranges, Stanley, Speke and Baker, need to be taken in anti-clockwise direction through a higher altitude – Scott Elliot (4,372 m) – as opposed to a direct descent in a clockwise direction to lower altitude, due to a broken bridge, increasing chances of death from HAS – one tourist died because of this scenario in 2008 (RMNP, 2008).

Foot bridges along the central circuit, ladders and trails have been regularly crushed by boulders rolled away by flood waters over the last 5 years.

> This has always been happening, for example, a hanging foot bridge on the confluence of rivers Mubuku and Bujuku, partly fed by melt waters of glaciers on Mountain Stanley and Speke respectively, was severely damaged in 2017… The ladders that facilitate a gentle descend over the Kicucu rocky out crop were carried away by landslide in 2008 … One accident (a tourist who broke a foot) was registered in this section of the trail at an altitude of 3,000m (UWA Official, 2022).

He further indicated that the ladders that were installed at two locations, Omwabitindo (4,830m) and the base of Margherita peak (4,883m) in 2005, had sunk into the glacier by about 0.2m in 2007.

Mountaineering, which is the main tourism product and cash cow for the park, has not been spared. The melting glaciers have exposed the crevices that are covered with snow. In 2008 a team of WWF participating in a RAMSAR expedition could not trace the old ascending route to Margherita peak (WWF, 2021). All the ascending routes to the major peaks on Mounts Stanley, Speke and Baker have been re-routed. In 2019, another expedition registered four incidences of team members falling into different crevices while climbing Margherita peak. The exposed rocks are slippery and it is difficult to progress on them to the peaks. The difficult access requires an enormous investment in safety and support facilities, the training of guides in rock climbing skills, a diversification of tourism products, and first aid and emergency handling procedures. The product will only appeal to experienced mountaineers, who currently constitute a small (31.4%) segment of the market (RMNP, 2022). It is likely to result in reduced visitor numbers and revenue generation which complicates the current financial position in which internally generated revenue can only meet 50% of recurrent budget requirements. Investment in the

development of facilities, the provision of new skills and regular maintenance of safety and support facilities cannot be financed locally.

Habitat and species disruption has also been evident in Uganda. The disappearance of the Rwenzori glaciers threatens the survival of some wildlife species inhabiting the area, such as the Rwenzori leopard and the Rwenzori Red Duiker (Cephalophus rubidus) that depend on the cold climate to breed. Another species at risk is the three-horned chameleon, whose range is shifting upwards as a result of rising temperatures. For example, in 2009, this chameleon species, Chamelio johnsonii, was observed at an altitude of 3,600m in the Rwenzoris. These chameleons were known to occur at lower altitudes in the past (Kapeere's personal communication). Stands of fresh giant lobelias (Lobelia wallastonis) and groundsels (Senecio admiralis) within the bogs are fewer, as most of them were observed to be drying. Lobelia lanuriasis, which thrives on thin and poor rocky soil at upper reaches was observed to be migrating upwards.

> In Queen Elizabeth National park, the park has been eaten up by spear grass and lantan camara as invasive species due to climate change. These are not palatable to wildlife. As such, many animals have migrated to non-tourism zones of the park affecting the tourism experience (UWA Official, 2022).

On the other hand, in the neighbouring region of Teso region, Mount Elgon National Park and its surrounding areas experience frequent landslides and floods. This is already negatively affecting eco-system conservation, also causing adverse effects for the socio-economic activities of the neighbouring communities.

Increased frequency and intensity of fires has equally been triggered by climate change. All Uganda's parks are affected by fires.

> The worst scenario of wildfires happened in Queen Elizabeth in 2021 destroying the habitat and a USD 2M lodge on the fringes of the park (UWA Official, 2022).

Currently UWA is engaged in legal battles with the lodge owner who is seeking compensation because the facility was not insured.

Figure 8.2
Fire incident in Queen Elizabeth National Park, 2021 (Source: UWA, 2022)

In the case of Murchison Falls National Park it was indicated by the field staff that wildfire incidences are frequent in areas close to Albert Nile. Considering the month of January 2021, for example, to pinpoint portions of the park that were hotspots for wildfires, it was observed that portions close to Albert Nile were affected as shown below:

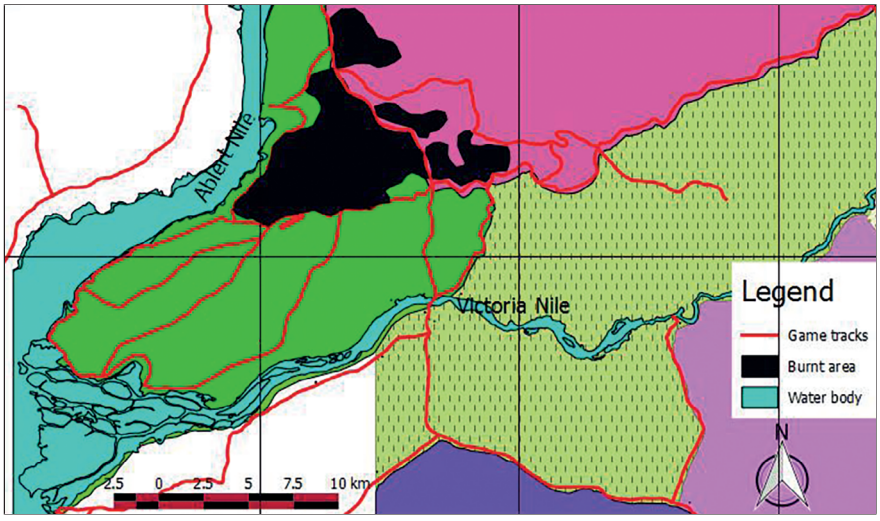

Figure 8.3
Burnt Area in Murchison Falls National Park (Source: MFNP)

However, as of 2019, fire sensitivity in Murchison Falls National park was much higher, as indicated in the map below (UWA, 2020).

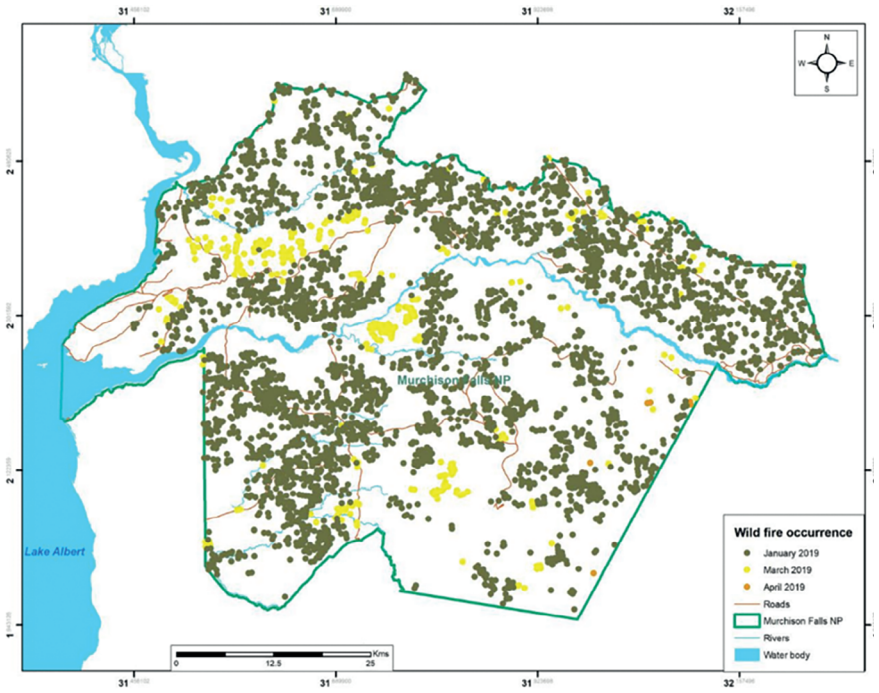

Figure 8.4
Monthly Fire Sensitivity Map of Murchison Falls, National Park, 2019 (Source: UWA, 2022)

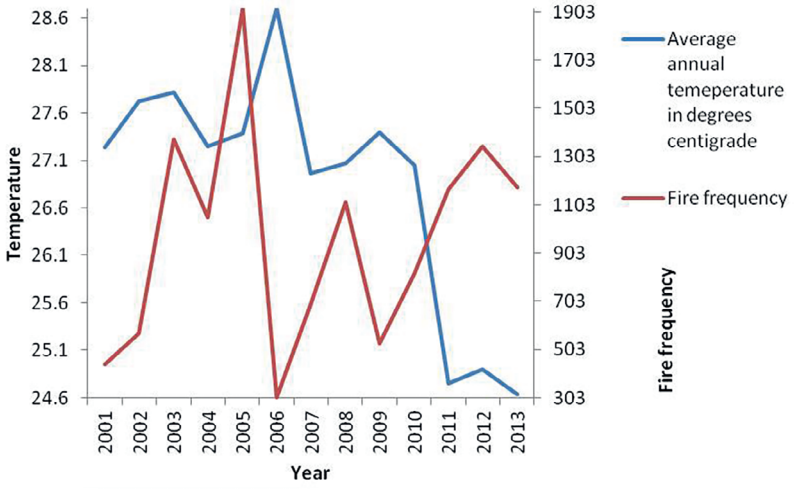

Figure 8.5
Precipitation and fire frequency variation in MFNP (Source: UWA, 2022)

From the graph above, it can be concluded that there is a linked trend between precipitation and fire frequency – with fire frequency being generally lower with reduced precipitation, and temperature and fire frequency – with fire frequency increasing during higher temperatures (UWA, 2020). Kidepo National park in North Eastern Uganda is also not safe from fire, as indicated in the fire sensitivity map below (ibid.).

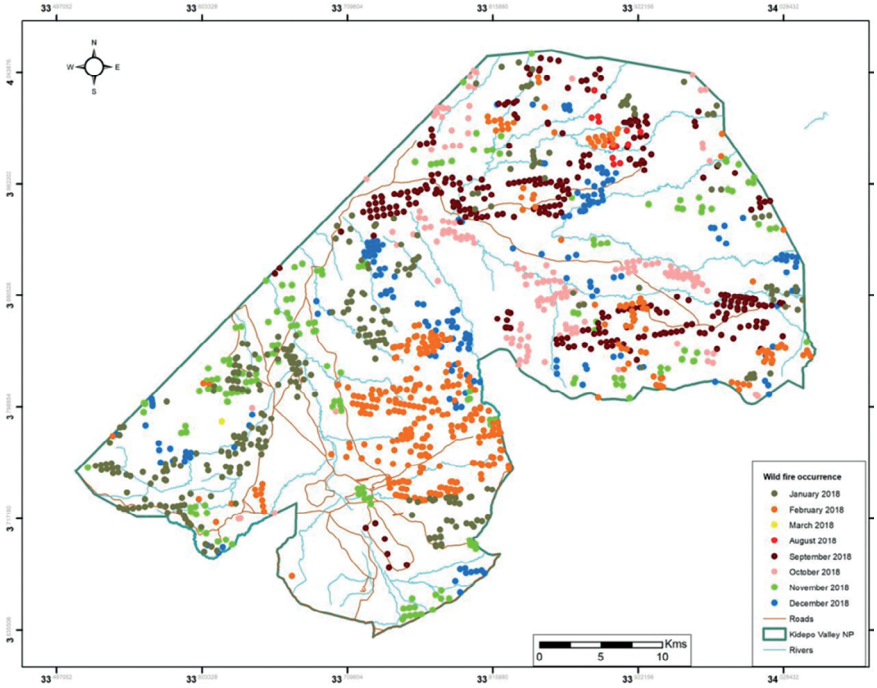

Figure 8.6
Monthly Fire Sensitivity Map Kidepo Valley National Park, 2018 (Source: UWA, 2022)

8.5 Integration of biodiversity conservation, tourism and climate adaptation

In order to guarantee improved capacity to adapt to these extreme climatic changes, the Uganda government through the Uganda Wildlife Authority (UWA) is working with other stakeholders like the local communities and civil society organisations to implement activities that promote climate justice for both people and wildlife. This is based on the understanding that ecosystem-based adaptation approaches can achieve local communities' resilience from climate change effects. Tourism is one such approach that uses collab-

orative arrangements to manage and share resources derived from the use of wildlife resources. Uganda's tourism industry relies on the natural ecosystem to generate revenue and contribute to ecosystem restoration, an important carbon stock (UWA, 2022).

To enhance local resilience to climate change effects and to promote climate adaptation while conserving biodiversity, the government of Uganda, through the Uganda Wildlife Authority, uses tourism revenue to maintain the ecosystem, by (i) employing park rangers to protect the park boundaries from encroachment, (ii) conducting regular ecological monitoring to gather climate change adaptation information to facilitate management and climate justice decisions, iii) promoting tourism revenue sharing arrangements where 20% percent of gate collections is channeled to communities from neighbouring parks as conditional grants (Ahebwa et al., 2012), iv) direct community involvement in tourism (Ahebwa & Van der Duim, 2013) and v.) promoting Private Community Partnerships that offer tourist services (Ahebwa et al., 2013) in addition to other collaborative management approaches. In LMNP for example, under the collaborative agreement, the government (i) grants the communities limited access to watering points and drought reserves within the park for their livestock, (ii) allows the communities limited access to collect firewood (mainly deadwood) within the park, and (iii) gives permits to others to uproot the acacia trees (that are considered invasive) for commercial charcoal production. This enhances local resilience and results into (i) 'peaceful' co-existence between wildlife and people and their livestock, (ii) improved local attitudes towards wildlife, and (iii) increased wildlife numbers both within and outside the park. All these are important to guarantee a sustained tourism industry and improved local livelihoods.

There are also carbon projects being implemented by conservation organisations. For example, around Kibale National Park (KNP), a FACE (Forests Absorbing Carbon dioxide Emission) project was initiated in 1994 as a collaboration between the Uganda Wildlife Authority (UWA) and the Face the Future Foundation to purposively restore Kibale forest environs – a rich primate ecosystem in western Uganda which has greatly suffered from degradation. This also meant that the local communities neighbouring the park and the species therein were exposed to climate risks and vulnerability. Experiences from this project show that positive impacts have been registered for both people and wildlife. Today, the park boasts 13 primate species and is therefore one of the biodiversity hotspots in Uganda. Eco-tourism activities, involving chimpanzee tracking and habituation, bird watching, nature walks and night walks, are conducted to enable tourists to view some of the nocturnal primate

species in the area. Moreover, the restoration of the degraded part of the park also motivated the local communities to start the conservation of the previously degraded Bigodi Wetlands. Today, the Bigodi Wetlands form a successful community eco-tourism project generating millions of dollars to improve local livelihoods in the area (see Ahebwa et al., 2018).

More recently, the government of Uganda through the UWA with support from the World Bank launched a six-year project (2020-2026) to invest in Forest and Protected Areas for Climate Smart Development around protected areas. The project is intended to cover seven National Parks, four Wildlife Reserves, and 28 Central Forest Reserves. It aims to address the problem of increased vulnerability of economic tourism products, biodiversity, and livelihoods to the effects of climate change due to declining forestry eco-systems, goods, and services. However, these actions mainly favour communities that immediately neighbour protected areas while leaving those that are further away disadvantaged while they face climate vulnerability risks as well and need programmes to support adaptation processes to enhance their resilience to the constantly changing climate.

The latest initiative is an effort to promote green tourism in Uganda. Green tourism is defined as environmentally sustainable travel to destinations where climate impacts are minimised with the aim of respecting and preserving natural resources, and adapting programs to fit the context of fragile resources (NCC, 1996; Graci and Dodds, 2008). Furqan et al. (2010) highlight the four components of green tourism that promote long-term resilience in the industry. These are:

- Environmental responsibility – protecting, conserving, and enhancing nature and the physical environment to ensure the long-term health of the life-sustaining ecosystem;
- Local economic vitality – supporting local economies, businesses and communities to ensure economic vitality and sustainability;
- Cultural diversity – respecting and appreciating cultures and cultural diversity so as to ensure the continued well-being of local or host cultures;
- Experiential richness – providing enriching and satisfying experiences through active, personal and meaningful participation in, and involvement with, nature, people, places and cultures.

While the concept of green tourism is relatively new in Uganda, stakeholders are increasingly adopting it and integrating its principles into their operations. The interest has been demonstrated by private sector actors who have registered a new tourism association in Uganda with the name Exclu-

sive Sustainable Tour Operators Association (ESTOA). The association was launched by the Minister of Tourism, Wildlife and Antiquities on 24 March 2022. ESTOA sets out to promote sustainable tourism practices, support the transition process and market Uganda as a responsible tourism destination so that local communities, businesses and the overall biodiversity keep flourishing. While results of ESTOA's activities are yet to be expected, this motivation is derived from the fact that, over time, the pressure to promote sustainable travel has largely been consumer-derived, while producers (operators and hoteliers) equally have a crucial role to play in achieving the greening of the industry at large in Uganda.

8.6 Conclusion

This chapter has demonstrated that biodiversity, tourism and climate change are intrinsically linked. They can reinforce each other if managed well, but can damage each other when neglected. Currently, the damage scenario tends to overpower the reinforcement scenario as demonstrated in the case of Uganda. Climate adaptation actions currently tend to mainly favour communities that immediately neighbour protected areas while leaving those that are further away disadvantaged.

Biodiversity conservation and associated eco-tourism must remain on the global agenda, which requires governments around the world to set aside expanses of land for purposes of protecting species. It has been demonstrated in this chapter that protected areas if well managed can play a critical role in safeguarding biodiversity and ecological processes from climate change-related risks. Eco-tourism generates the much-needed revenue to fund conservation activities and to support communities to become resilient. Tourism as a tool for biodiversity conservation should be reinforced to mitigate climate change impacts.

Uganda is no exception to global climate change, and its direct or indirect impact on biodiversity and tourism is likely to continue. Mitigation mechanisms will only slow the pace and enable people to adapt. For more informed actions, there is need for a continuous, detailed and quantifiable assessment of the effects of climate change on the conservation values of the Ugandan biodiversity areas and for the development of models to predict long-term impacts. There is also need for an ecological monitoring and risk management plan to adapt the management practices of protected areas to climate change scenarios. Sustainable financing mechanisms are required to support the im-

plementation of plans to mitigate impacts and adapt the management of the biodiversity areas to the changing circumstances.

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9

The future of wildlife and conservation in Tsavo-Amboseli landscapes, Kenya

M.M. Okello

9.1 Introduction

The importance of biodiversity conservation (wildlife included) lies in its critical role in ecological processes and services to humanity. It is humanity's ethical responsibility to conserve and ensure the continued survival of other species, which also has socio-economical and spiritual benefits for humanity. Among these are posterity reasons, especially for the enjoyment of future human generations, and building a support system for other industries and human activities such as tourism leisure and recreation, among others (GoK, 2018; Western & Ssemakula, 1981; Western, 1989; Campbell et al., 2000). For Kenya specifically, wildlife and the diverse conservation areas are among the country's most valuable assets. Wildlife is the foundation for the tourism industry that contributes 10% of National Gross Domestic Product (GDP) and 11% of total formal workforce (GoK, 2018; Okello & Grasty, 2009). In addition to providing direct economic benefits, Kenya's wildlife habitats and conservation areas – including terrestrial and marine National Parks and Reserves, Sanctuaries and Conservancies – are also vital for water catchment, carbon sequestration, fresh air and recreation (Munyao et al., 2020; Mukeka et al., 2018).

Conflicts between humans and wild animals occur when either the need or behavior of wildlife impacts negatively on human livelihoods or when the humans' pursued goals impact negatively on the needs of wildlife. Wildlife often interacts with humans in different ways; however, when such interactions adversely affect, or are perceived to affect, the lives and livelihoods of people, then conflicts occur. These common negative interactions include crop raiding, livestock depredation, and attacks on humans (Thouless, 1994). The main drivers for human-wildlife conflicts include human population increase,

changing land use, habitat loss, degradation and fragmentation, high livestock population density, low abundance and restricted distribution of wild prey, high wildlife population density, and climatic factors (GoK, 2018; Okello et al., 2010; Western, 1975). Furthermore, unpredictable events such as fires, the impacts of tourism and resource use competition (such as water, pasture, land and salt licks) also contribute to increased human-wildlife conflicts (HWCs). In Kenya, elephants and carnivores are leading species in HWCs (Hoare, 1999; Hazzah et al., 2017; Thouless, 1994; GoK, 2018; KWS, 1995). Human-elephant conflicts (HECs) are attributed to the increasing human population and changes in land use (Hoare, 1999; Thouless, 1994), that have increased the interface between people and wildlife.

The exponential increases in human population in Kenya and changes in land use, including human settlements, urbanisation, large infrastructure projects and agricultural expansion, are edging out wildlife in the critical wildlife dispersal areas (Campbell et al., 2000). Human-wildlife conflicts, bush meat trade and commercial poaching remain substantial threats to wildlife conservation in Kenya and in the region (Kiringe et al., 2007). It is likely that if these challenges are not addressed, the future of wildlife and conservation in Kenya will be bleak, with far-reaching consequences for ecological well-being, economic development and livelihood sustainability.

The application of practical mitigation of human-wildlife conflicts is critical to the success of conservation in the Tsavo-Amboseli conservation area, and wildlife conservation in Kenya in general. Dozens of mechanisms and strategies have been initiated to reduce and manage human-wildlife conflicts and provide long-term solutions to the prevalent resource use conflicts (Hazzah et al., 2017; Conover, 2002; Western, 1982; Okello et al., 2014; Okello et al., 2009; Munyao et al., 2020; Hackel, 1999; Okello and Kiringe, 2004). However, there has been an increase in the human-wildlife interface problem, with serious consequences for sustainable conservation practice (Okello et al., 2014a; Okello et al., 2014b; Sombua, 2013; Okello et al., 2016; Makindi et al., 2014; Mukeka et al., 2018). The extension of the designated protected areas, as well as forced evictions and restrictive access to resource use by local communities from the area, coupled with incompatible land use practices, have further exacerbated the problem (Campbell et al., 2000; Okello, 2005; Okello et al., 2010).

A more passive approach to dealing with conflicts between local communities, wildlife and conservation authorities involves influencing in a positive way the attitudes of affected communities to wildlife and the conservation

institutions (Western, 1989; Adams & Hulme, 2001). This can be achieved by ensuring that communities and individuals become active participants in, and enjoy tangible benefits from, wildlife management (Adams & Hulme, 2001; Western, 1982). Such initiatives may include education programmes, consolation payments and broader sharing of benefits associated with the presence of wildlife.

Although many studies have been carried out on HWCs, describing their nature and effects, causal determinants and how they interact for the future of wildlife conservation as influenced by persecution of wildlife, perception, and benefits, have not been established. Such a study would be insightful in creating a further understanding of the mechanisms, influences, and relationships between multiple indicators of HWCs, persecution, wildlife benefits, perceptions of wildlife and how all of these factors determine the future of wildlife and conservation in different wildlife-rich landscapes. This study explores the relationships between factors and indicators using Structural Equation Modelling (SEM) (Stanner et al., 2008) with a view of defining the relationships between them, and how in particular they help determine the future of wildlife and conservation in the Tsavo-Amboseli landscapes. The findings are critical in examining detailed relationships in other landscapes, but can also help in formulating theories and predictions.

9.2 The SEM conceptual model

Human-wildlife conflicts and wildlife persecution were conceived as directly and indirectly influencing the future of wildlife conservation. However, the key question was whether wildlife harm (from human wildlife conflicts and persecution) is an important determinant of the future of wildlife conservation, given the intervening factors of wildlife benefits and community perceptions about the importance of the future of wildlife and conservation (Figure 9.1). These two factors (human-wildlife conflicts and associated wildlife persecution) were perceived to either directly affect the future of wildlife conservation, or to have an indirect effect, through intervening factors like wildlife benefits and perceptions on wildlife conservation, in the Tsavo and Amboseli landscapes (Figure 9.2).

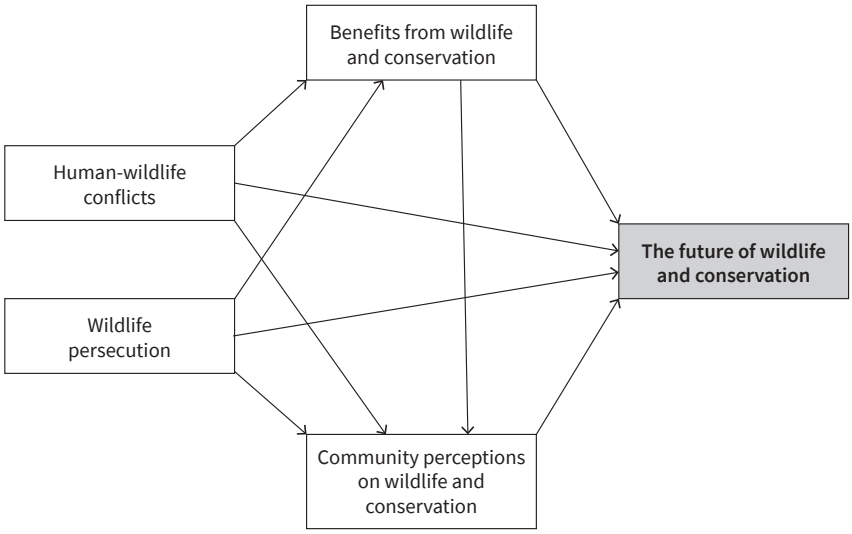

Figure 9.1
The conceptual framework

Indicators for each factor and indicators for HWCs, Wildlife Persecution, Wildlife Perception, Wildlife Benefits and Future of Wildlife Conservation were identified as comprehensively as possible, while also evaluating the relationships of the indicators and factors to each other and the future of wildlife conservation in the Tsavo-Amboseli landscapes (see Table 9.1). This exploratory research was driven by the observation that HWCs and wildlife persecution are now key causes of wildlife mortality in the landscapes and are likely to determine whether viable wildlife populations can be sustained in these landscapes in the future.

9.3 Study landscapes

This study was conducted in the Amboseli Ecosystem (Kuku, Kimana, Mbirikani / Ololorashi) in Kajiado County and in the Tsavo Ecosystem (Taita, Mwatate, Voi, Wundanyi and Taveta sub-counties) in Taita Taveta County in November 2020. These landscapes are located in Southern Kenya, on the borderland between Kenya and Tanzania in East Africa. The Amboseli and Tsavo landscapes represent one of the main wildlife conservation blocks in Kenya that also shares these landscape with Tanzania. There are six national parks in the landscape (Tsavo East, Tsavo West, Chyulu and Amboseli in Kenya; and Mkomazi and Kilimanjaro in Tanzania) and many community and pri-

Table 9.1

Factors and their indicators considered for the future of wildlife conservation in Kenya

Main factors	Factor indicators
Intensity of Human Wildlife Conflicts	▪ Increasing local wildlife population ▪ Increasing human population ▪ Crop raiding by wildlife ▪ Human injury by wildlife ▪ Property damage by wildlife ▪ Killing of livestock by carnivores (predation) ▪ Competition for resources (water, pasture and space) ▪ Local depressed livelihoods (poverty) ▪ Incompatible land uses to conservation in landscape
Wildlife persecution by people	▪ Persecution by spearing wildlife ▪ Retaliatory killing by poisoning wildlife ▪ Snaring wildlife for meat and other products ▪ General harassment of wildlife by people ▪ Blocking wildlife migration routes ▪ Decreasing wildlife dispersal space areas
Benefits from wildlife and its conservation	▪ Benefits of conservancies as a land use option ▪ Benefits from community welfare projects to support wildlife / tourism investments ▪ Revenue sharing by conservation stakeholders ▪ Provision of educational scholarships ▪ Benefits from ecotourism investments ▪ Employment of local people in wildlife-based investments
Local perception on wildlife	▪ Positive attitude with regard to wildlife presence ▪ Indifferent attitude with regard to wildlife presence ▪ Negative attitude with regard to wildlife presence
The future of wildlife and conservation	▪ Securing more conservation space for wildlife ▪ Increased funding and investment in wildlife conservation ▪ Increased wildlife tolerance and co-existence ▪ Adoption of wildlife as a land use option

vate wildlife conservancies (Figure 9.2) and dispersal areas for wildlife in the landscapes. The land comprises protected areas and communal lands, called group ranches, as well as private lands. It is inhabited by several ethnic groups which practice mainly pastoralism, subsistence and cash agriculture, as well as commercial livestock ranching and wildlife conservation.

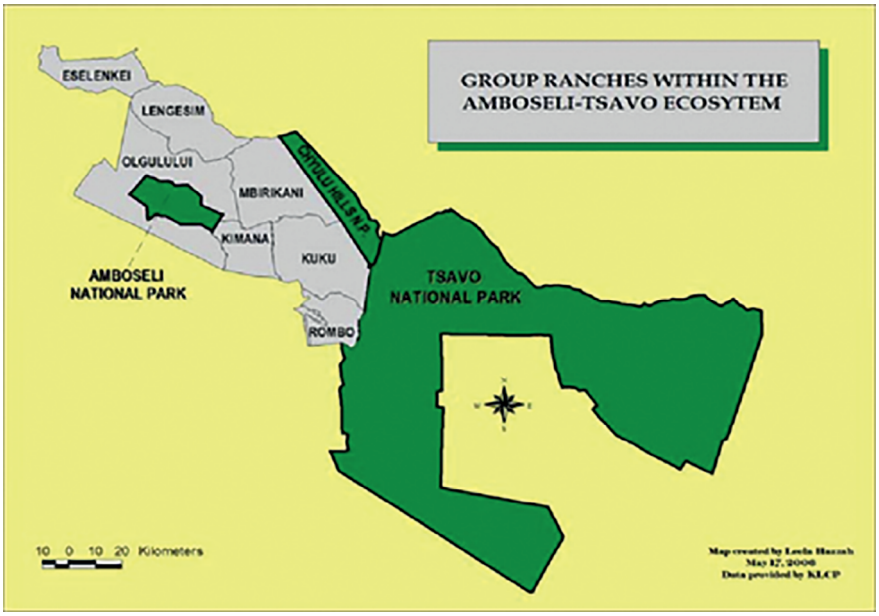

Figure 9.2
The Tsavo Amboseli Ecosystem (drawn by Leela Hazzah)

9.4 Methods

Quantitative data was collected using an explanatory research design, which allowed for establishing patterns, relationships and explanations, to form a theory on the importance of causal factors of the future of wildlife conservation, using structural equation modelling or SEM (Ewards & Bagozzi, 2000). The SPSS Amos programme was able to allow for the construction of a model similar to the conceptual framework (Figure 9.1). We used a formative structural model because indicators were regarded as causal effects to the factors (Ewards & Bagozzi, 2000; Stanner et al., 2008). Furthermore, since data was being used to create insights and theory, a formative rather than a reflective SEM model was adopted (Stanner et al., 2008). Human-wildlife conflicts (HWCs) and wildlife persecution were considered exogenous variables,

whereas wildlife benefits and perceptions on wildlife were regarded as intervening (but endogenous) factors to the future of wildlife conservation, which was regarded a higher factor exogenous variable.

A total of thirty-three (33) variables (Table 9.1), which included specific related factors, were scored on an ordinal scale, with nine (9) indicators being related to the Human Wildlife Conflicts-factor; six (6) causal indicators being related to the Wildlife Persecution-factor; three (3) causal indicators being related to the Wildlife Perception by the Community-factor; six (6) causal indicators being related to the Benefits from Wildlife-factor; and four (4) causal indicators being related to the Future of Wildlife in the Landscapes-factor.

Data was obtained by interviewing key informants in scheduled interviews from a total of 100 people purposively chosen from the two landscapes. Purposive sampling was preferred because it allowed us to carefully choose knowledgeable people from the community for interviews and maximise not only their experience and knowledge but also their importance and leadership in the community with regard to conservation and community livelihood matters. Fifty (50) informants were chosen from the Amboseli Ecosystem, while the other fifty (50) were chosen from the Tsavo Ecosystem. These key informants were people who belonged to, and lived among, the local community, who had a wide knowledge of conservation issues, had participated in activities of conservation organisations, held leadership positions in the community, and had been involved with Kenya Wildlife Service (KWS) in articulating issues around the promotion of wildlife conservation while advocating for the rights of local communities (farmers, pastoralists, landowners).

A five-point Likert Scale of rank ordinal data scored as a degree of indication from 1 (low) to 5 (highest) prevalence (1=very low occurrence; 2=low occurrence; 3=average occurrence; 4=high occurrence; and 5=very high occurrence) was used. This scale was similar and consistent with a 5-Likert scale of concurrence for statements of concurrence (1=strongly disagree; 2=disagree; 3=somewhat agree; 4=agree; and 5=strongly agree) that was also adopted.

Data was carefully checked to remove any multicollinearity before analysis was done. Further, the statistical analysis used (non-parametric tests) did not make any assumptions regarding the requirements of normal distribution of the data. Data analysis was done using mathematical summaries of mean and standard errors of factors and indicators. Comparisons of ranks was done using Mann-Whitney nonparametric U tests that compared the equality of means between Tsavo and Amboseli landscapes, while chi square cross tabu-

lations were used to establish the relationship between factor scores and landscape location (the Amboseli and Tsavo landscapes). Stepwise linear regression was used (on logarithmic transformed data). Ordinal regression between factors and indicators was done using SPSS, following a significant (at alpha < 0.05) normal distribution test using the Kolmogorov-Smirnov method that confirms violation of normal distribution (Zar, 1999). All statistical tests were done using SPSS version 18 (2009) and STATIGRAPHICS PLUS version 4 (1994-1999).

9.5 Results

Average indicators and differences between Amboseli and Tsavo

The human wildlife conflict factor was found to be high (4.08 ± 0.08) across both landscapes, and particularly in the Tsavo landscape (4.28 ± 0.09), compared to the Amboseli landscape (3.88 ± 0.12). The difference in the human conflict factor between the Tsavo and Amboseli landscapes was significant (Mann-Whitney U=1563.0, p=0.02) and dependent on the landscape (Chi square cross tabulations χ^2=8.21, df=3, p=0.042). Among the nine indicators associated with the HWCs factor, the highest was predation (3.87 ± 0.09) followed by property damage by wildlife (3.77 ± 0.09), injury inflicted on humans by wildlife (3.63 ± 0.09), and competition for critical natural resources (3.61 ± 0.05). Amboseli led in increasing human population, increasing local wildlife population, predation by carnivores, competition for critical resources (water, pasture, salt licks and space), and incompatible land use indicators. The Tsavo landscape led in depressed livelihood (poverty) and crop raiding associated indicators. However, human injury caused by wildlife and property damage indicators were similar (p > 0.05) in the two landscapes.

The persecution of wildlife by people was average (3.20 ± 0.08) across the landscapes, but higher in the Tsavo landscape (3.70 ± 0.10) and lower in the Amboseli landscape (2.70 ± 0.09). The difference in the persecution of wildlife-factor between the Tsavo and Amboseli landscapes was significant (U=420.0, p < 0.0001) and dependent on the landscape (χ^2=37.56, df=3, p < 0.0001). Among the six indicators associated with the persecution of wildlife-factor, the highest was blocking of migration routes (2.38 ± 0.12), followed by general harassment of wildlife (3.32 ± 0.08), retaliatory killing through spearing (3.29 ± 0.07), and retaliatory killing through poisoning (3.21 ± 0.07). Amboseli led (p < 0.05.) in all the associated indicators (killing of wildlife by poisoning, snaring, spearing, general har-

assment of wildlife, blocking of migration corridors and conversion of wildlife dispersal areas from neighbouring protected areas).

The wildlife benefits-factor was average (3.03 ± 0.11) across the landscapes, higher in Amboseli (3.86 ± 0.08) and lower in Tsavo (2.20 ± 0.18). The difference in the wildlife benefits-factor between the Amboseli and Tsavo landscapes was significant (U=420.0, $p < 0.0001$) and dependent on the landscape ($\chi^2 = 71.96$, df =4, $p < 0.0001$). The highest indicators associated with the benefits from wildlife-factor were revenue sharing from government agents and NGOs (2.89 ± 0.11), followed by educational scholarships (2.86 ± 0.10), benefits from employment in investments (2.84 ± 0.09) and benefits from ecotourism investments (2.83 ± 0.10). Amboseli led ($p < 0.05$) in all the considered indicators.

The local wildlife perception-factor was the lowest (2.68 ± 0.11) among the factors considered in this study across the landscapes. Wildlife perception was above average in Amboseli (3.58 ± 0.10) but low in Tsavo (1.78 ± 0.10). The difference between Amboseli and Tsavo was significant (U=2389.5, $p < 0.0001$) and dependent on the landscape ($\chi^{2=} 75.35$, df =4, $p < 0.0001$). Among the indicators associated with the local perception of wildlife-factor, the highest one was the degree of negative attitude (3.11 ± 0.10), followed by the degree of positive attitude towards wildlife (2.38 ± 0.08), followed by, lastly, the degree of indifference towards wildlife (2.20 ± 0.06). Amboseli led (U=619.0 $p < 0.0001$) in the degree of positive attitude towards wildlife. However, Tsavo led ($\chi^2=44.23$, df=4, $p < 0.0001$) in the degree of negative attitude. Even though there was a slight lead for Tsavo in the degree of indifference towards wildlife over Amboseli, the level of indifference was similar (U=1042.5 $p = 0.10$).

The future of wildlife conservation-factor was above average (3.50 ± 0.08) across the landscapes. Amboseli had an above average score (3.74 ± 0.11), while Tsavo had an average score (3.26 ± 0.09). The difference in the future of wildlife conservation-factor between the Amboseli and Tsavo landscapes was significant (U=891.0 $p = 0.007$) and dependent on the landscape ($\chi^2=16.45$, df=3, $p = 0.001$). Among the causal indicators associated with the future of wildlife conservation-factor, the highest were expanding conservation space for wildlife (3.49 ± 0.05), and accepting and adopting wildlife conservation as a form of land use (3.36 ± 0.07). Increased tolerance and co-existence with wildlife, and funding and investment in wildlife and ecotourism had similar but lower ratings. Amboseli led over Tsavo with respect to securing more space (in wildlife conservancies), the degree of acceptance and adoption of wildlife conservation as a land use option, and the degree of increased funding and investment in wildlife and ecotourism by stakeholders ($p < 0.05$). Even though Tsavo had a slightly

higher degree of tolerance and coexistence with wildlife than Amboseli, this was not significant (U=1330.5, p=0.51) and so tolerance and coexistence with wildlife was similar between the two landscapes.

The big sample size and careful examination of the data reduced problems of multicollinearity. Regression diagnostics for the presence of multicollinearity showed that the data was largely compliant except for a few variables (tolerance value and VIF) in indicators for the benefits from wildlife-variable.

Relationships between indicators and factors

The relationship between the human wildlife conflicts-factor and its indicators (Table 9.2) was strong (Ordinal regression: Log Likelihood χ^2=149.60, df=22, p < 0.001) with a good fit (Chi square goodness of fit: χ^2=30.18, df=50, p=0.99). The indicators explained 86.6% of variability in Human Wildlife Conflicts (Negelkerke R^2=0.866). The test of parallel lines for intercept was not significant (χ^2=0.00, df=44, p=0.10) indicating that that slope coefficients were the same across the response categories. However, no indicator had a direct significant relationship with the human wildlife conflicts-factor (all p > 0.05). Using CFA, crop raiding (β=-0.41, p < 0.001) and increasing local wildlife population (β=-0.92, p < 0.001) had a negative relationship with human wildlife conflicts, while injury to people (β=0.27, p=0.02) and depressed livelihood (poverty) (β=0.81, p < 0.001) had a positive relationship with the human wildlife conflicts-factor. All other indicators had no significant relationship with the human wildlife conflicts-factor (p > 0.05).

The relationship between the wildlife persecution-factor and its indicators (Table 9.2) was strong (χ^2=190.28, df=18, p < 0.001) with a good fit (χ^2=13.70, df=56, p = 0.100). The indicators explained 93.5% of variability in the wildlife persecution-factor (Negelkerke R^2=0.935). The test of parallel slope lines for intercept was not significant (χ^2=0.00, df=38, p=0.10) indicating that that slope coefficient was the same across the response categories. However, no indicator had a direct significant relationship with the wildlife persecution-factor (all p > 0.05). Conversion of wildlife dispersal space (β=-0.38, p < 0.001) and wildlife poisoning (β=-0.38, p=0.005) had a negative relationship with the wildlife persecution factor. However, blocking of migration corridors (β=0.27, p < 0.001) and snaring indicators (β=1.00) had a positive relationship with the wildlife persecution factor. General wildlife harassment and spearing indicators had no relationship with the wildlife persecution-factor (p > 0.05). The wildlife persecution-factor had a significant positive relationship with the human wildlife conflicts-factor (β=0.31, p < 0.001).

Table 9.2

The CFA relationship between factors and indicators and between factors and factors

Model factors	Model indicators	Estimate	S.E.	P
Human Wildlife Conflicts	Predation on livestock	0.146	0.112	0.193
Human Wildlife Conflicts	Property damage	0.066	0.109	0.549
Human Wildlife Conflicts	Crop raiding	-0.405	0.107	< 0.0001
Human Wildlife Conflicts	Increased human population	-0.050	0.098	0.608
Human Wildlife Conflicts	Incompatible land uses	1.000	—	—
Human Wildlife Conflicts	Depressed livelihoods	0.813	0.158	< 0.0001
Human Wildlife Conflicts	Resource competition	-0.088	0.187	0.640
Human Wildlife Conflicts	Increased wildlife population	-0.912	0.142	< 0.0001
Human Wildlife Conflicts	Human injuries inflicted by wildlife	0.268	0.117	0.022
Wildlife Persecution	Blocking migration routes	0.267	0.073	< 0.0001
Wildlife Persecution	Dispersal area conversion	-0.378	0.080	< 0.0001
Wildlife Persecution	General wildlife harassment	-0.013	0.116	0.912
Wildlife Persecution	Spearing wildlife	-0.160	0.124	0.198
Wildlife Persecution	Poisoning wildlife	-0.382	0.135	0.005
Wildlife Persecution	Snaring wildlife	1.000	—	—
Benefits from Wildlife	Employment from wildlife	0.266	0.079	< 0.0001
Benefits from Wildlife	Revenue sharing	-0.502	0.067	< 0.0001
Benefits from Wildlife	Ecotourism revenue	-0.597	0.072	< 0.0001
Benefits from Wildlife	Educational scholarships	1.000	—	—
Benefits from Wildlife	Benefits from conservancies	0.272	0.090	0.003
Benefits from Wildlife	Welfare projects benefits	0.576	0.073	< 0.0001
Perception of Wildlife	Positive attitude to wildlife	0.591	0.121	< 0.0001
Perception of Wildlife	Indifferent attitude	-0.195	0.157	0.215
Perception of Wildlife	Negative attitude to wildlife	1.000	—	—
The Future of Wildlife	Secure more wildlife space	1.000	—	—
The Future of Wildlife	More tolerance for wildlife	-0.185	0.127	0.145
The Future of Wildlife	Wildlife as a land use option	0.212	0.110	0.053
The Future of Wildlife	More funding for wildlife	-0.304	0.077	< 0.0001
Wildlife Persecution	Human Wildlife Conflicts	0.310	0.054	< 0.0001
Benefits from Wildlife	Wildlife Persecution	-0.021	0.064	0.746
Benefits from Wildlife	Human Wildlife Conflicts	-0.187	0.048	< 0.0001
Perception of Wildlife	Wildlife Persecution	-0.044	0.085	0.607
Perception of Wildlife	Human Wildlife Conflicts	-0.499	0.066	< 0.0001
Perception of Wildlife	Benefits from Wildlife	1.021	0.060	< 0.0001

Model factors	Model indicators	Estimate	S.E.	P
The Future of Wildlife	Human Wildlife Conflicts	0.166	0.055	0.002
The Future of Wildlife	Benefits from Wildlife	0.287	0.067	< 0.0001
The Future of Wildlife	Perception of Wildlife	-0.006	0.050	0.909
The Future of Wildlife	Wildlife Persecution	0.262	0.064	< 0.0001

The relationship between the wildlife benefits-factor and its indicators (Table 9.2) was strong (χ^2=214.87, df=17, $p < 0.001$) with a good fit (χ^2=36.03, df=51, p=0.94). The indicators explained 94.6% of variability in the wildlife benefits-factor (Negelkerke R^2=0.946). The test of parallel lines slopes was not significant (χ^2=0.00, df=51, p=0.10) indicating that that slope coefficient was the same across the response categories. However, no indicator had a direct significant relationship with the wildlife benefits-factor (all $p > 0.05$). From SEM analysis, benefits from welfare projects (β=0.58, $p < 0.001$), benefits from employment (β=0.27, $p < 0.001$), educational scholarships (β=1.00) and benefits from conservancies (β=0.27, p=0.003) had a positive relationship with the wildlife benefits-factor. Ecotourism revenue benefits (β=-0.60, $p < 0.001$) and revenue sharing (β=-0.60, $p < 0.001$) had a negative relationship with the wildlife benefits-factor.

The wildlife benefits-factor had a negative relationship with the human wildlife conflicts-factor (β=- 0.19, $p < 0.001$), but no relationship with the wildlife persecution-factor (β=- 0.02, p=0.75).

The relationship between the local wildlife perceptions-factor and its causal indicators was strong (χ^2=52.46, df=9, $p < 0.001$) but with a poor fit a (χ^2=212.90, df=79, $p < 0.001$). The indicators also explained only 43.1% of variability in the perception of wildlife-factor (Negelkerke R^2=0.431). Further, the test of parallel lines slopes for intercept was significant (χ^2=80.35, df=27, $p < 0.001$) indicating that the slope coefficient was not the same across the response categories. Furthermore, no indicator had a direct significant relationship with the wildlife benefits-factor (all $p > 0.05$). In SEM analysis, the degree of positive attitude towards wildlife ($\beta = 0.59$, $p < 0.001$) and negative attitude towards wildlife ($\beta = 1.00$) had a positive relationship with the wildlife perception-factor. However, the degree of indifferent (neutral) attitude had no relationship with the wildlife perception-factor (β=-0.20, p=0.22). The wildlife perception-factor had a positive relationship with the wildlife benefits-factor (β=1.02, p=0.002), but did have a negative relationship with the human wildlife conflicts-factor (β= -0.50, $p < 0.001$).

The relationship between the Future of Wildlife factor and its causal indicators) was strong (χ^2 =31.63, df=10, $p < 0.001$) with a good fit (χ^2=52.69, df=38, p=0.057). However, the indicators explained only 30.5% of variability in the future of wildlife-factor (Negelkerke R^2=0.305) implying that other factors, beside the considered indicators, were important. Further, the test of parallel lines slopes for intercept was significant (χ^2=58.57, df=20, $p < 0.001$) indicating that the slope coefficient was not the same across the response categories. However, only the increasing funding-indicator (p=0.039) had a direct significant relationship with the future of wildlife-factor in the regression model. Securing more space for wildlife (β=1.00) and adopting wildlife conservation as a land use option (β=0.21, p=0.05) had a positive relationship with the future of wildlife-factor. However, increased wildlife funding (β=-0.30, $p < 0.001$) had a negative relationship with the future of wildlife-factor. Increased tolerance for wildlife by the community had no relationship (β=-0.19, p=0.15) with the future of wildlife-factor. The future of wildlife-factor had a positive relationship with the wildlife persecution-factor (β=0.26, $p < 0.001$), the human wildlife conflicts-factor (β=0.17, p=0.002), and the wildlife benefits-factor (β=0.29, $p < 0.001$). The future of wildlife-factor had no relationship with the wildlife perception-factor (β=-0.006, p=0.91).

9.6 Discussion

Both the Amboseli and Tsavo landscapes suffer HWCs costs, with the only difference between them the amount of investment in mitigation measures and wildlife benefitting programs in Amboseli compared to Tsavo. The other explanation could be found in the poverty levels which are relatively higher in Tsavo than in Amboseli communities. Given the relatively higher degree of depressed livelihoods in Tsavo, costs and impacts of wildlife conservation through HWCs seem to affect Tsavo more deeply than Amboseli. Relatively higher poverty, unmitigated HWCs and poor investment in wildlife benefiting programs in Tsavo seems to have also led to more negative perceptions and attitudes towards wildlife in Tsavo compared to Amboseli. Therefore, looking at the results holistically, it seems that both landscapes suffer heavily from HWC incidences but investments in mitigation measures, beneficial programs and awareness are higher in Amboseli compared to Tsavo, leading to better prospects for the future of wildlife and conservation in the Amboseli landscape compared to the Tsavo landscape.

The results indicate a relatively high amount of injuries and casualties among people. Increase in land use changes and human population also furthers the

chance of wildlife encounters with humans. This frequent interaction increases the likelihood of human injury or death inflicted by wildlife (especially by elephants, buffalo, hyena, and lions). Every time a human injury/death occurs, however rare, it leads to flare-ups and serious conflict with conservation agencies because loss of life is personal and emotional for communities. This especially happens when the government and conservation agencies do not respond instantly and with empathy (including meeting all the costs of injury, and compensation for death and related expenses). When the government does not respond immediately and empathetically, this reinforces the feeling among community members that the government values wildlife more than human life. This leads to instant retaliation (spearing, poisoning and harassing wildlife) and displacing wildlife from all private land (dispersal areas) near protected areas.

From the study results we can see that, as crop raiding and local wildlife population increases, HWCs decline, and vice versa. This is an unexpected result because we expect that as crop raiding increases, then HWCs also increase. This result can only make be explained if one realises that increasing crop raiding will also lead to increased human mitigation actions (electric fencing, vigilance, problem animal control, local mitigation strategies, abandonment of agriculture close to wildlife ranging space, wildlife elimination and persecution, etc.) that eventually reduce HWCs over time. The second explanation may be through the wildlife persecution and displacement that will follow increased wildlife population and crop raiding. It could also be that the persistent loss of crops and property by wildlife will lead farmers to move away or abandon farming in wildlife areas, or that the accompanying intensity of wildlife persecution (through poisoning, spearing, converting wildlife habitat to other land uses, blocking their routes, general wildlife harassment, etc.) will permanently displace wildlife from those humanised landscapes and therefore end HWCs over time. This results in a kind of permanent separation between man and wildlife by means of barriers and the persecution of wildlife (Makindi et al., 2014; Sitati & Walpole, 2006; Western, 1997).

Wildlife persecution is a key wildlife mortality factor in the Tsavo-Amboseli landscapes as it is associated with all HWC incidences (KWS, 1995). From the study results, it turned out that leading indicators of the persecution of wildlife were the blocking of wildlife migration corridors, the general harassment of wildlife, retaliatory killing by spearing, and the poisoning of wildlife. These results show that persecution involves both direct harm (snaring, poisoning, and spearing) and indirect harm (blocking migration corridors and converting dispersal areas). It is not clear which of the two poses a greater threat to

wildlife, but immediate direct harm seems to be a short-term threat, compared to long-term indirect harm. Nevertheless, both these actions eventually lead to the permanent displacement and exclusion of wildlife from its range, compromising their future. HWCs (impacts of wildlife on humans) and wildlife persecution (impacts of humans on wildlife) are both serious threats to the future of wildlife and conservation in Kenya. Additional mitigation strategies such as fencing off parks (Thouless & Sakwa, 1995), enhanced problem animal control by agencies, and community efforts like vigilance, noise making, using lights, early warning bells etc., can reduce HWCs and wildlife persecution due to separation.

The persecution of wildlife by people can decline with the conversion of wildlife dispersal areas and the poisoning of wildlife. Blocking migration routes displaces wildlife movements and directs them into more hostile habitats inhabited by humans, hence increasing other forms of persecution (spearing, poisoning, and snaring). This is an expected outcome of this study. It is also expected that as conversion of wildlife dispersal space increases, the persecution of wildlife will decline due to displacement and separation. Normally, we expect that such a conversion of space will lead to higher persecution, but this view ignores the displacement factor, as wildlife (especially elephants) are able to perceive threat levels and choose to range in safer areas. An unexpected result is that as persecution increases, poisoning will decline. However, this is also explained by the displacement and separation effect, in that poisoning may permanently eliminate wildlife from such areas and hence remove the need to persecute the wildlife anymore. These findings suggest that the permanent removal of wildlife, through direct mortality and permanent displacement from spaces they use as range, may be a more serious forms of wildlife persecution, and therefore could become the most serious threat to the future of wildlife conservation in Kenya today (Western, 1997).

When wildlife persecution is initiated, the persistent intention of the community (farmers and pastoralists) is to displace wildlife permanently and to separate themselves from wildlife so that they can engage in alternative livelihoods (farming or pastoralism). Little and late mitigation strategies or benefits will not change their resolve, nor change their negative attitudes and poor perception of wildlife. At this point, it has taken many years of HWCs and persecution to change the community's viewpoint. This may explain why the persecution of wildlife has not been affected by either benefits or general wildlife perception. It implies that controlling HWCs and wildlife persecution at an early stage is critical if stakeholders hope to forestall entrenched negative interaction between wildlife and local communities. However, more studies are

needed to clearly establish the relationship between wildlife persecution and both wildlife benefits and the future of wildlife conservation through specific case studies.

Benefits from wildlife is a key success factor, as this is what the community expects and values most when considering whether they will accept and adopt wildlife and conservation a land use option (Okello et al., 2009). The benefits from wildlife-factor grows when there is an increase in welfare project installations, the employment of local people, educational scholarships for the community, and revenue from ecotourism investments. This is expected because general investments into the local economy, livelihoods and direct household income will enhance the feeling that wildlife is beneficial, and not a cost to the community. However, the increase in revenue sharing from nearby protected areas and the revenue from ecotourism were negatively associated with the overall wildlife benefits factor. This was an unanticipated outcome, as it was expected that increase of revenue from wildlife/ecotourism investments, and revenue sharing programs developed by government agencies and NGOs, would lead to enhanced overall wildlife benefits to the community.

As expected, the increase in wildlife benefits was also associated with low HWC incidences, which implies that wildlife benefits alone are not sufficient if HWCs are not controlled. The net wildlife benefits must outweigh the costs incurred from HWCs. This condition is best met in situations where communities directly and significantly benefit from wildlife, especially when they own conservancies and are paid as landowners and stakeholders. This relationship increases their tolerance for wildlife and improves their perception of wildlife as an asset rather than a liability. As results indicated, wildlife benefits were associated with a positive perception of wildlife and with a better prospect for the future of wildlife conservation. Therefore, tangible significant benefits from wildlife are an important factor that will change local community wildlife perceptions, thereby increasing tolerance for wildlife and even encouraging the community to adopt wildlife conservation as a land use option, which by extension guarantees the future of wildlife and conservation. Therefore, the future of wildlife conservation will depend on tangible benefits accruing from wildlife and controlled HWCs, instead of passive methods such as the creation of awareness and tokens (revenue sharing and education scholarships) from the side of government and conservation NGOs.

The perception of wildlife is a key factor in in moderating behavior and interaction between wildlife and people through HWCs and the persecution of wildlife. Perception is a response to a complex set of interactions and factors

between people and wildlife. Increased costs of wildlife conservation and little or no benefits derived from this will reinforce negative perceptions of wildlife. If wildlife benefits are not tangible and consistent, the overall perception will be negative. The increasingly frequent violent retaliations against wildlife when there has been an injury or loss of human life, as well as political grievances, indicate that the investments, wildlife benefits, and awareness of the importance of wildlife have not completely taken root in Amboseli, let alone in Tsavo. There seems to be a threshold and a balance between costs and benefits to communities over time, beyond which the persistent intention of the community will be to displace wildlife and separate themselves from wildlife permanently. Such a threshold requires further investigation, but it is clear that Amboseli may have reached a point of diminishing returns especially with regard to the younger generations, who seem to be more opposed and negative to wildlife conservation and prefer other careers over wildlife conservation, or alternative livelihoods instead of conservation. It is important to target the attitudes and perceptions of the community (especially the increasingly educated youth) as their support is critical, being the community's future elite and opinion leaders (Thompson & Homewood, 2002).

The future of wildlife and conservation prospects increased for both wildlife persecution and HWC incidences. This unexpected relationship with persecution and HWCs may be operating through an indirect mechanism where HWCs and wildlife persecution lead to the permanent displacement of offending wildlife and therefore the reduction or removal of the conflicts in question. Such separation includes the current clamor for putting up electric fences and fully fencing off protected areas in order to minimise HWCs and wildlife persecution. This may work in the short term but will be detrimental for long-term viability of wildlife due to insularisation (Woodroffe & Ginsberg, 1988; Western & Ssemakula, 1981). The call for electric fences and total separation by many local communities in response to HWCs, so as to allow them to engage in alternative livelihood options, has been a persistent request to government and stakeholders. In fact, the future of wildlife and conservation-factor increased with the securing of more space for conservation (such as conservancies) and the adoption of wildlife conservation as a land use option. This may include purchasing space for wildlife when areas close to conservation areas are being sold, as is done by some conservation NGOs such as Nature Conservancy. Securing more land for conservation is one of the sure ways to secure the migration corridors and dispersal areas needed by wildlife from protected areas, as human population increases and land use changes that are incompatible with wildlife conservation occur. This option is still available for both the Tsavo and Amboseli landscapes.

According to the National Wildlife Strategy 2030 (GoK, 2018) there are four pillars of action intended to secure the future of wildlife and conservation in Kenya. Two of these pillars are relevant to this chapter. One of them is concerned with ensuring that there are resilient ecosystems. It involves a comprehensive assessment of the status and conservation priorities for ecosystems and species, the development of frameworks for integrated planning, and the effective coordination and implementation of species protection and wildlife security in the country. The second pillar is concerned with the engagement of communities to appreciate the potential value of wildlife and embrace their role in its conservation through appropriate collaborative initiatives. This study contributes specific actions and priorities that should be considered to support these two pillars of national wildlife strategy, in order to secure the future of wildlife in the two landscapes under study, and in Kenya at large. The future of wildlife and conservation depends on the action of local communities, stakeholders in conservation and tourism, and conservation actions and strategies by the government. These need to be purposeful, intentional, strategic, and prioritised in collaboration with local communities to secure the future of wildlife and conservation for posterity.

9.7 Conclusions

The most important causal indicators associated with the future of wildlife conservation-factor were adopting wildlife conservation as a land use option in the landscapes, increasing wildlife conservation space (by establishing conservancies), and increased wildlife benefits to communities. The positive relationship between the future of wildlife conservation with HWCs and the persecution of wildlife, and the negative relationship with increased tolerance for wildlife was unexpected. Direct significant wildlife benefits, as well as reduced HWCs, are key factors in determining the future of wildlife conservation in Kenya. We must avoid the mechanism of complete wildlife separation/elimination (through barriers such as electric fences, or through complete wildlife displacement from humanised landscapes) from people as a solution for guaranteeing the future of conservation in Kenya. When wildlife is permanently displaced, or separated from humans, then HWCs and persecution will decline and tolerance for wildlife becomes irrelevant (Western, 1997) in the short term. However, the long-term effects of such displacement and separation may compromise the wildlife population, which may need more space outside protected areas for their ecological viability.

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10

Community-based conservancies and tourism in Kenya: The case of the Melako Conservancy

D. Kieti and R. Nthiga

10.1 Introduction

According to Büscher and Dietz (2005) organised and regulated biodiversity conservation efforts in Kenya can be traced back to the 19th century. The colonial administration's initial efforts included the formulation of hunting regulations and licenses due to the decline of species for sports hunting (Adams, 2004). After World War II, National Parks and Reserves were set aside to preserve land occupied by wildlife (Mburu & Birner, 2007). The setting aside of land for conservation, popularised as the 'fortress', 'fences and fines', 'coercive', 'top-down', or 'preservationist', model of conservation, was the dominant conservation and environmental governance approach until the late 1970s (Adams, 2004; Adams & Hulme, 2001; Akama et al., 2011; Hutton et al., 2005; Nthiga, 2014). Fischer et al. (2005) argue that nature was seen as wilderness in the preservationist model, whereas local people were considered to be a threat and were therefore excluded and kept away from protected areas. In the 'top-down' conservation model, the state was the main actor, and other stakeholders, such as Non-Governmental Organisations (NGOs), were engaged in activities meant to complement those of the park authorities (Van Wijk et al., 2014).

In the late 1970s and early 1980s, in line with the development paradigm of the time, the state-centric conservation model began to be viewed as unsustainable and untenable since local people were alienated (Brown, 2002; Gibson & Marks, 1995) as they were viewed as a threat to biodiversity conservation; consequently, resource governance shifted away from local resource users to the state. The 'community conservation' paradigm thus emerged as a park outreach strategy to rectify the human costs of the 'fences and fines'

model, enhance the biological integrity of national parks and reserves, and engage local people in conservation (Barrow et al., 2001; Van der Duim, 2011). As a result, various approaches emerged, such as Community-Based Natural Resources Management (CBNRM) and the Integrated Conservation and Development Projects (ICDPs), among others (Chapin, 2004; Murphree, 2004).

Since the early 1980s, conservation interventions in Kenya have aimed at enlisting local people as key stakeholders and partake in benefits arising from wildlife. The most notable interventions are conservancies, which communities, groups, and private landowners have established to guarantee wildlife safety outside government-protected areas (AWF, 2016). According to AWF (2016), conservancies are parcels of land set aside by communities and/or private landowners for conservation purposes. They note that conservancies play vital ecological, social and economic roles, such as complementing state-protected areas ecologically, providing a diversification of tourism products and allowing engagement and participation of landowners and communities. Though critiqued as a form of 'green grabbing' (Green & Adams, 2014), conservancies have been established to give communities more control over natural resources and revenue derived from the various income-generating activities, including tourism. Community-Based Tourism (CBT) activities that have been established in community conservancies include eco-lodges, campsites, adventure operators and cultural villages (Butcher, 2011; Kieti et al., 2013; Saarinen, 2010; Van der Duim, 2011).

According to Northern Rangelands Trust (NRT) (2015), forming community conservancies and their models of operations evolved over the years in the absence of a legal framework, which resulted in a diversity of conservancy models. Nonetheless, for conservancies to achieve their intended conservation outcomes and community benefits from tourism-based activities, there is a need for a favourable policy environment. The first policy committed to the Community-Based Conservancies (CBC) was initiated in 1990 by the Kenya Wildlife Service (KWS) under the famous COBRA project, which facilitated the first conservancies in Kenya (Il Ngwesi and Namunyak conservancies) (Western et al., 2015). Later, the Kenya Constitution 2010 underscored the policy framework for community-based conservation. Article 69 of the Constitution obligates the state to ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources for the benefit of its people (Kenya government, 2010). Furthermore, through the constitution, the government recognises the need for public participation in the management, protection and conservation of the environment, as well as equitable sharing

of the accruing benefits. Therefore, recognising conservancies provides legal recognition and an avenue for the government to fund some of their activities. Further, in 2013, the Kenyan parliament passed the Wildlife Conservation and Management Act (WCMA), which provided a legal framework for establishing conservancies and sanctuaries to meet the government's obligation toward sustainable management and conservation of wildlife resources. The WCMA recognises conservancies as a legal land use option. Therefore, any person or community who owns land inhabited by wildlife, may individually or collectively establish a wildlife conservancy or sanctuary (Kenya Government, 2013). According to the Act (i.e. WCMA), establishing a conservancy has been standardised and devolved to the county level. Arguably, management by local people accompanied by devolved decision-making is preferable since it can be more accountable and sustainable in the long run (Bob & Mutinda, 2017). The governance structures and the legal recognition are also entrenched in the registration documents, as stipulated in the Act (GoK, 2013). In addition, the Act provides for the creation of wildlife conservancies. Consequently, most conservancies are integrated with umbrella organisations such as the Kenya Wildlife Conservancies Association (KWCA) and the Northern Rangelands Trust (NRT) (Kalvelage et al., 2012), important actors in the creation and support of community conservancies.

This chapter provides an updated overview and synthesis of community-based conservation in Kenya. We present the policy framework, governance and benefit-sharing structure using the case of Melako community conservancy, one of the most expansive community conservation areas operating under the NRT. To disentangle the complex dynamics of governance and benefit-sharing arrangements, we address the following issues: How the selected conservancy emerges; how the conservancy is governed and how such governance relates to the traditional customers, leadership and beliefs; and, finally, how the benefits are accrued from the conservancies shared. Although the chapter does not question the current achievements, or limitations, of community conservancies, it aims at understanding the contexts in which they operate, as well as governance and benefit-sharing structures and the communities' development priorities.

10.2 Methodology

Conservancies in Kenya have, over the years, evolved in diverse ways and at different levels (Tambara, Chiles & Waugh, 2016), with a major focus on engaging communities in conserving wildlife outside protected areas. Three

types of conservancies are recognised, based on the land-ownership and land-use arrangements. These are Private, Community and Group Conservancies. While a private conservancy is set up on private land by a private individual or company for wildlife conservation, a community conservancy is set up by a community on community land. Conversely, a group conservancy is often created by the pooling of land by contiguous private landowners for wildlife conservation. By using the case of Melako community conservancy, this chapter sheds light on the existing governance and benefit-sharing arrangements, in the hope of highlighting the lessons and future direction of community conservancies in Kenya. The case of Melako was chosen because it is the largest community conservancy in Kenya.

10.3 Status of community conservancies in Kenya

According to Bersaglio and Cleaver (2018), conservancies, mainly found in Kenya's Arid and Semi-Arid Lands (ASALs), are decentralised, common property governance arrangements for transhumance pastoralism and biodiversity conservation. The Northern Rangelands Trust (NRT 2015: 10) defines a conservancy as 'a community-owned and community-run institution that aims to improve biodiversity conservation, land management and livelihoods of its constituents over a defined area of land traditionally owned, or used by the constituent Community'. The WCMA (2013) further describes a conservancy as land set aside by an individual landowner, body corporate, group of owners or a community for wildlife conservation purposes (GoK, 2013).

According to Kalvelage et al. (2012), community conservancies in Kenya were developed since the 1980s as protected areas across community lands in zones that were marginalised by colonial and post-colonial state authorities. Kalvalage et al. (2012) and Western et al. (2015) argue that the conservancies were meant to contribute to community empowerment and communal ownership. However, conservancies gained formal recognition as a land use option in 2013 in the Wildlife Conservation and Management Act 2013. This implied that the community conservancies established before the Act emerged without a clear policy framework (NRT, 2015).

The pioneer community conservancies, which include Kimana (1992), Namunyak and Koiyaki-Lemek in 1995 and Il Ngwesi in 1996, were created through the COBRA project in the 1990s, implemented by the Kenya Wildlife Service (KWS) and funded by the European Union and USAID (Damania et al., 2019; Kalvelage et al., 2021; Western et al., 2015). The assumption here-

in was that the majority of the local people lacked education and training, as well as access to credit and knowledge of the tourism market, and hence needed external assistance (Kieti, 2017).The purpose of such partnerships was to jointly respond to the needs and concerns of each stakeholder, with special emphasis on the local communities as the 'nucleus' of establishing community conservancies. Furthermore, the main aim of conservancies was to stimulate communities and landowners to be custodians of wildlife, since over 65% of wildlife exists outside state-protected areas (Damania et al., 2019; KWCA, 2016; Western et al., 2015). The conservancy model for the Northern Rangelands Trust (NRT) also aims to develop resilience, improve livelihoods, and promote security among pastoralists (Bersaglio & Clever, 2018). However, the emphasis with regard to community conservation has been on participation, empowerment, and community ownership (Adams & Hulme, 2001; Brockington, 2002; Murphree et al., 2009). Power relations, which could lead to overdependence, elite capture and possible exclusion of certain community groups (Homewood, 2004), have always been pushed to the periphery. As a result, most community-based conservancies fail to capture and enjoy the full potential and benefits of any such endeavours.

The main promoters and supporters of the establishment of conservancies have been landowner associations, including the Northern Rangelands Trust (NRT), the Laikipia Wildlife Forum (LWF), Amboseli Ecosystem Trust (AET), South Rift Association of Land Owners (SORALO), and the Maasai Mara Management Association, among others (Western et al., 2015). The Kenya Wildlife Conservancies Association (KWCA), an umbrella association for all the conservancies in Kenya, notes that conservancies provide employment to over 2,900 rangers, host over 140 tourism lodges, and benefit over 700,000 community households (KWCA, 2016). According to KWCA (2016), KWCA (2020), and KWS (2018), there are over 160 conservancies that cover 11% of Kenya's landmass, of which 89% falls under community conservancies, which translates to more than 6.3 million hectares of land.

10.4 Governance and the policy framework of community conservancies in Kenya

Governance

Governance generally relates to the who, the how, and the why of decision-making (Robinson et al., 2021) and is, therefore, concerned with matters of voice (Graham et al., 2003). Salerno et al. (2021) further argue that govern-

ance entails how society determines goals, the rules (both formal and informal) that govern human behaviour and decision-making processes, as well as decisions themselves.

In community conservancies, decisions are made about structures, processes, traditions, and interactions. Robinson et al. (2021) define the three aspects of decision-making: i) Structures, including committees, boards of directors, or other types of organisations that make plans and decisions; ii) Processes, which include procedures for making and enforcing rules for selecting leaders or representatives and developing collective plans; and iii) Traditions, which entail structures and processes associated with culture and traditional institutions, norms, ideas, and habits around how things are done. Robinson et al. (2021) define governance for CBNRM, which is by extension applicable to community conservancies, to mean: a particular set of structures, processes, and traditions, and the interactions among them, through which communities make decisions relating to their local natural resources.

Governance for community conservancies incorporates diverse actors, including state, non-governmental, and community actors. There is, therefore, a combination of both formal and informal governance structures, processes, and traditions. This has been referred to by Bersaglio and Cleaver (2018) as hybrid institutional arrangements, formed by diverse actors with multiple identities and scales, participating consciously and unconsciously to shape and reshape the institutional arrangements. Nelson et al. (2020) note that conservancies are an important element in the mainstream national conservation approach, and that they are integrated into, and supporting of, traditional pastoralist rangeland management practices. These multiple roles result in a complex governance structure with regard to conservancies. Nonetheless, the institutional arrangements, both formal legal rules and informal social norms, that define the distribution of rights over natural resources, have continued to shape resource use and conservation arrangements with community-based conservancies. In communal regimes, as is the case with most pastoralist communities, the rights to use resources are shared by a group of people, with the membership of that group in some way defined, and rules and regulations communally adopted, which govern resource use.

Policy framework

According to Bersaglio and Cleaver (2018), community conservancies have been in existence in Kenya since the 1980s but were formally recognised as land use form in 2013 through the amended Wildlife Management and Con-

servation Act No 47 of 2013. As argued by Bersaglio and Cleaver (2018) and Cleaver et al. (2013), community conservancies, as part of the CBNRM approach, reflect a hybrid form of governance that combines formal rules and practices with informal customary norms and informal practices to produce institutions that reconcile the policy imperatives of donors and governments with the needs and realities of rural communities. The governance of community conservancies is through collaborative, decentralised arrangements for managing communal lands and natural resources (Bersaglio & Clever 2018). Kalvelage et al. (2021) note that community conservancies have reshaped the governance of natural resources in Kenya through a negotiated arrangement among state agencies, non-governmental organisations, and local communities. As a result, conservation is pursued within working landscapes.

According to the WMCA (2013), the basic governance structure of a community conservancy consists of the conservancy board, the chiefs, a manager appointed by the board, and a representative of the KWS (GoK, 2013). Therefore, conservancy governance recognises traditional institutions in decision-making and combines formal, administrative, and customary institutions in conservancy management boards (Bersaglio & Cleaver, 2018). In addition, conservancies are funded by international organisations such as USAID and DANIDA, among others. They are managed through alliances with conventional and non-conventional conservation actors (Bersaglio & Cleaver, 2018).

A policy framework for community-based conservation stems from the Kenyan Constitution 2010, article 69, which obligates the state to ensure sustainable exploitation, utilisation, management, and conservation of the environment and natural resources for the benefit of the people (GoK, 2010). The constitution also recognises the need for public participation in the management, protection, and conservation of the environment, as well as equitable sharing of the accruing benefits.

The main legislation for wildlife management in Kenya is the Wildlife Conservation and Management Act (WCMA, 2013). Previous legislation, such as the National Parks of Kenya Acts of 1962 and 1976, did not recognise community conservation initiatives. This 2013 Act of parliament provides the legal framework for establishing conservancies and sanctuaries to support the government's mandate toward sustainable management and conservation of wildlife resources. The WCMA legally recognises conservancies and sanctuaries as a form of land use. Therefore, individuals, groups, and communities who own land inhabited by wildlife, may individually or collectively establish a wildlife

conservancy or sanctuary (GoK, 2013). The main legal requirements include a constitution that describes the governance structure of the conservancy and the description of the conservation area in terms of location, as well as how it recognises the customary land and natural boundaries.

The WCMA provides for the management of the conservancies, which should be in line with an established management plan prepared by the Kenya Wildlife Service (KWS) in consultation with the various stakeholders. The contents of a conservancy's management plan are stipulated in the WCMA 2013 fifth schedule. The management plan should spell out the prerequisite for active conservancy management, responsibilities, and actions to meet its obligations. More importantly, the WCMA 2013 obligates communities, landowners, groups of landowners, and existing representative organisations to establish a community wildlife association and register under appropriate law or, in the case of an individual owner, register as a recognised wildlife manager, with the County Wildlife Conservation and Compensation Committee. The sole purpose of such associations is to facilitate conflict resolution and cooperative management of wildlife within a specific geographic region or sub-region. Other provisions of the Act include the establishment of an endowment fund to support conservation outside national parks, the creation of a compensation fund to reimburse communities for deaths, injuries, or property destruction caused by wildlife, and the imposition of punitive penalties for poaching (UNDP, 2015). The WCMA 2013 also provides rules for wildlife conservation and management (conservancy and sanctuary), which are meant to promote harmonised procedures for establishing standards of management of conservancies. Nelson et al. (2020) further argue that the 2013 legislation has provided greater support for community conservancies from the government and civil society, especially through the Kenya Wildlife Conservancies Association (KWCA).This standardisation addresses the haphazard establishment and management of conservancies witnessed before the enactment of the Act.

The Community Land Act 2016 is another critical legislation in securing community land rights, which are important for the success of any conservation efforts by communities. According to KWCA (2017), the community Land Act of 2016 has been of great importance. Over 85 conservancies in Kenya are located on community land, accounting for over 65% of conservancies and over 15 million hectares of land under conservation. In addition, most community conservancies are situated on trust land and group ranches. This Act of parliament attempts to address the challenges posed by the lack of clear decision-making structures, uncertain boundaries, unclear membership, and lack of evidence for ownership. The Community Land Act also addresses the

challenges of group ranches, such as a lack of accountability in group ranch affairs, elite capture, and inequitable benefit-sharing, among others.

According to Robinson et al. (2022), the Constitution of Kenya of 2010 and the Community Land Act of 2016 have established a land tenure category of community land that is of equal standing with private land and state-owned land. In other words, the above two policy instruments provide for property rights of group ranch and trust land areas, which is where the majority of the community conservancies are situated. In addition, the County Government Act of 2012 mandates every county to develop a County Spatial Plan, which guides land-use planning, including provisions for the set-up of conservancies.

The Wildlife Draft Policy (2017) provides for measures and actions to respond to wildlife conservation challenges. The policy, among others, seeks to balance the needs of Kenyan people with opportunities for sustainable wildlife conservation and management. It aims to mainstream wildlife conservation as a land-use option, ensure ecosystem-based wildlife management, and decentralise planning and decision-making at county levels. The policy also provides incentives and user rights for communities and other stakeholders, stimulating cooperative management of wildlife and natural resources.

The National Wildlife Strategy 2030 (Ministry of Tourism and Wildlife, 2018) is an important policy tool that envisages the engagement in wildlife conservation of all Kenyans through appropriate collaborative initiatives. The strategy provides for four pillars of wildlife management in Kenya. These pillars are: resilient ecosystems, engagement of all Kenyans, evidence-based decision-making, and sustainability and governance. Moreover, the strategy is a call for action and a blueprint for empowering Kenyans in managing wildlife, providing participation and equitable benefit-sharing from wildlife resources.

Community conservancies and tourism

Kalvelage et al. (2021) argue that communities' incentive to establish conservancies has been the possibility of income through the commodification of natural resources such as wildlife, wilderness landscapes, and valuable trees. According to KWCA (2016), over 140 tourism facilities are hosted by conservancies in Kenya, with a bed capacity of over 2397 beds, and over Kshs. 369 million (USD 3.690.000) paid in land leases in the Maasai Mara area. Safari Tourism contributes up to 75% of national tourism earnings. However, the share of tourism income obtained by conservancies is significantly low at 1.3%

of the total tourism earnings, and yet, 65% of Kenya's wildlife lives outside national parks and reserves (Damania et al. 2019).

The Ministry of Tourism and Wildlife (2018) notes that wildlife is a source of national pride in Kenya and the foundation of the tourism industry, which contributes 10% of the country's Gross Domestic Product (GDP) and 11% of the total formal workforce. According to Damania et al. (2019), conservancies target high-value international tourists, and members of conservancies share tourism benefits directly or through various benefit-sharing arrangements. The main sources of income for conservancies from tourism, according to Damania et al. (2019), are in three main categories: a) Conservation fee: fees paid per visitor or occupied bed as payment for conservation services, b) Bednight fee: a proportional fee paid per occupied bed to the conservancy, and c) Leasehold fee: a set monthly or annual fee paid as rent for land or building infrastructure for an agreed period. Under the community conservancy paradigm, individual landowners in critical wildlife dispersal areas are encouraged to pool their lands and form private wildlife conservancies to exploit the lucrative tourism potential. It is envisaged that such potential will reverse the fear of negative impacts of sub-division and move forward the processes of expanding wildlife range outside the network of protected areas.

10.5 Melako community conservancy

Melako is one of 43 community conservation areas operating under the Northern Rangelands Trust (NRT). NRT is an umbrella organisation for community conservancies in Northern Kenya and beyond. It comprises community, institutional and private-sector members (Glew et al., 2010) and assists communities living within the 43 community conservancies in protecting their land, wildlife, livestock, and culture for present and future generations. Melako is the northernmost conservancy, stretching towards the Ethiopian and Somali borders. Melako community conservancy covers an area of 546,777 ha. The core conservation area covers 1,850 ha (Melako Community Conservancy Management and Community Development plan (MCMDP, 2016-2020). The Melako conservancy covers five administrative locations: Laisamis, Koya, Lontolio, Merille and Logo Logo. It is home to over 29,000 Rendille people and some Samburu, whose livelihoods revolve around semi-nomadic pastoralism. The inhabitants own large herds of cattle, sheep, goats and camels, which they shepherd across the semi-arid landscape.

The vision for Melako conservancy began when the Rendille community approached the Lewa Wildlife Conservancy – a privately owned ranch for biodiversity conservation (Glew et al., 2010), to develop their wildlife conservation initiative in order to recognise real development opportunities presented by wildlife conservation and eco-tourism in their area. The overall goal of the conservancy was to develop a successful community conservation initiative to conserve and increase viable populations of the Grevy's zebra and other wildlife, to enhance the capacity of the local Rendille community found in the area to benefit from conservation and sustainable use of natural resources, and to improve security and relations with neighbouring tribes.

The specific objectives of developing Melako community conservancy included: to increase direct income to the local community and diversify their economy; to expand access to clean water and improve health, infrastructure and education among the local community; to manage natural resources within the conservancy sustainably and improve the quality of the rangeland; to preserve people's culture whilst responding to external changes and promoting tourism; to improve security in Melako and stimulate better relations with neighbouring communities. Basically, the top priorities for Melako community conservancy include: water, health, education, peace, wildlife conservation, livestock management, enterprise development and rangelands management (MCMDP, 2016-2020). The Melako community conservancy was registered as a Trust in 2004 and a not-for-profit company in 2013 (MCMDP, 2016-2020).

The operations, management, and development of the Melako community conservancy are linked to its partnership with the Northern Rangeland Trust (NRT). Presently, the conservancy is being assisted by the NRT to market its products, both locally and internationally. In its management and community development plan (2016-2020), the conservancy envisages a close working partnership with Marsabit County Government, NRT, KWS, and other NGOs to enhance mentorship support, grant funding, and technical expertise, training, and investment.

Tourist activities

The Melako community conservancy is one of Kenya's largest eco-tourism areas. It provides the best eco-tourism activities with a high diversity and abundance of wildlife. In addition, the conservancy is a good showcase of a symbiotic relationship between wildlife and local communities. The conservancy is well endowed with myriad wildlife species, including Grevy's zebras, elephants, Beisa oryx, giraffes, lions, gerenuk, and various bird species. These

species gather in the thousands at water points in the dry season, which creates a unique attraction for the conservancy. The main tourist activities practiced in the conservancy are wildlife viewing, night game drives, camel rides, and visits to the cultural centre and villages. The conservancy hosts the Melako '*bandas*', which comprise a fully furnished kitchen and two ensuite bedrooms with three beds in each *banda*. The bandas are privately owned; however, no clear framework/structure details how the host communities are involved or benefit from them.

Melako community conservancy management and governance structures

In recognition of the critical role of good governance for its long-term stability, Melako community conservancy has embraced the following governance institutions:

(i) The Conservancy Board, which is the primary decision-making institution of the conservancy. Being communally owned, the conservancy has an elected Board of 13 members representing the five administrative locations of Merille, Laisamis, Lontolio, Koya and Logo Logo. The board appoints and oversees a workforce of 37 employees, including a security force of 34 rangers and 3 administrative staff. There are 11 members of the rangelands committee.

(ii) The Conservancy Committees, which are formed based on the activities or tasks undertaken by the conservancy. For example, the Conservancy grazing committee and elders govern community grazing patterns, particularly during drought periods. However, there are no specific organs in the conservancy charged with the responsibility of fund-raising activities for the conservancy, initiating, managing and overseeing all the income-generating projects of the conservancy, recruiting, remunerating and disciplining staff working in these income-generating projects, as well as drawing up the strategies for wildlife management and community development in the conservancy. As noted in the MCMDP, 2016-2020 (p.6), members of the environment, water, grazing and peace committees are usually taken from the *LoipLapayian*, an elders' forum which sits during the day (and of which women and morans (young unmarried males of the warrior group of the pastoralists community) are not members) and the *Naapo*, which sits during the night. However, there are several registered women and youth groups. Whereas the women's groups engage largely in livestock, beadwork sales and small retail busi-

nesses, the youth is mostly preoccupied with livestock and hides and skin sales. The women have been trained in product development, basic accounting, and leadership skills to manage their businesses. Moreover, micro-credit programmes are available to women's groups who wish to expand their businesses or set up alternative sources of income.

(iii) The Annual General Meeting (AGM), which provides an opportunity for the Board and management to present progress to their members, and for community members to question the Board's performance and ensure accountability to the members. An Annual General Meeting (AGM) is held once a year to deliberate on conservancy matters, especially regarding revenue sharing, management policies, electing management, and reviewing conservancy development progress. All conservancy employees are recruited from the local community, except where special technical expertise or qualifications are required, in a transparent process, equitably shared between the four administrative locations that make up Melako Conservancy (MCMDP, 2016-2020). While the AGM remains the most important event for community-wide communication, the Board, sub-committees and conservancy staff play an important role in raising awareness and informing the community about decisions made.

It is important to note that security is a critical element for the management and development of Melako conservancy. Historically, conflict over natural resources has been part of the Rendille people's way of life. Indeed, the area has experienced decades of volatility, with armed gangs poaching wildlife and invading livestock. Although the community rangers patrol the conservancy daily, cooperation with other communities is critical to maintaining security in the area. Consequently, the neighbouring community conservancies hold an annual Sports for Peace event to compete, create networks, and improve dialogue among the participating communities.

Community services and revenue sharing

The Melako community conservancy provides benefits in terms of employment, revenue and other community benefits. According to NRT (2020), the Melako *bandas* generated approximately Kshs. 1.4 million (USD 14,000) for the conservancy in 2020. Additionally, the county government of Marsabit (where the conservancy lies) committed Kshs. 2.5 million (USD 25,000) for constructing rangers' houses in the conservancy (NRT, 2020).The beadwork income to the conservancy in the same year was Kshs. 1,760,374 (USD

17,603.74) and conservation fee of Kshs. 354,311 (USD 3,543.11) (NRT, 2020). Visitors pay a conservancy fee which provides valuable revenue for the community. In 2020, tourism income was approximately Kshs 1,469,000 (USD 14,690) (NRT 2020). Basically, the community holds a community social fund generated from tourism revenue, NRT's livestock programme revenues and other community projects. The spending priorities are made at the AGM. The community account is audited annually and the expenditure of funds is declared at the AGM. However, detailed plans for benefit sharing are still missing. This may explain the lack of capacity to develop or facilitate a consultative process of developing benefit-sharing plans.

10.6 Discussion

This section provides a discussion on benefit-sharing and governance of community-based conservancies with reference to the case of Melako community conservancy.

Benefit-sharing

Community-based conservation offers two advantages to participating communities: economic benefits, such as employment or dividends from tourism profits, and non-economic benefits, such as community capacity building and strengthening social networks (Oburah et al., 2021). As pointed out by King and Kaelo (2015), a conservancy, through its board, should set out a Benefit Distribution Plan (BDP) and oversee its implementation. Linda and Kaelo (2015) further state that the plan should be based on clear and equitable sharing of benefits accrued in terms of employment, revenue, and other communal benefits. As evident in the case of Melako, substantive revenues are generated from tourism and related activities. However, a clear BDP is lacking, including a benefits distribution mechanism and a benefit-sharing policy, making it difficult to grasp the different forms of benefit-sharing arrangements in the conservancy. This calls for assistance and oversight to develop the benefit-sharing systems envisaged in WCMA 2013, in order to direct benefit-sharing plans to address community expectations. For example, at the Melako community conservancy, the communities face limited economic proxies, insecurity, and unemployment; hence, the benefit-sharing system must address these social challenges to enhance positive attitudes and appropriate behaviours towards wildlife and conservation.

Furthermore, community members try to balance the costs and benefits of natural resource conservation. Consequently, their support depends on the

outcome of this cost-benefit equation. Arguably, local communities are willing to conserve resources if they receive more benefits than costs. Hence, the local communities who find the exchange beneficial for their well-being are likely to be keener to support resource conservation initiatives. In contrast, residents who view the exchange as a problem are more likely to resent it.

Given the large population size in Melako conservancy, distributing revenue to households may not be feasible as people only receive little revenue per annum. This suggests that a benefit-sharing mechanism promoting community-wide benefits, including investing in education and health infrastructure, might be more appropriate and in line with the priorities of the conservancy. However, as Silva and Mosimane (2012) observe, communities will always advocate for a combination of direct and community-wide benefits for a greater impact on their livelihoods.

According to Matseketsa et al. (2018), studies have demonstrated that local people hold favourable attitudes toward wildlife conservation when individual and household benefits are derived from conservation initiatives. However, arguably, most wildlife-induced costs, including crop raiding and livestock predation, are borne and felt at the household level rather than that of the entire community. Hence the need to consider a careful balance between individual and communal benefits in the BDP.

It is noteworthy that benefit-sharing encompasses multiple interests with divergent expectations and experiences, often identified by the features of the community (Nkhata et al., 2012). In Melako community conservancy, the communities are made up of individuals who have lived together in the same area for generations and have developed shared norms and culture. Such norms and culture, reinforced by extant traditional authority structures, enable social cohesion amongst community members and a common interest in livelihood and the shared use of natural resources. Therefore, establishing a BDP should reinforce the common interest that binds members to a particular common purpose (Silva & Mosimane, 2012). All in all, conservancy benefits must be determined by the communities and landowners and designed to meet their needs (AWF, 2016). They must look beyond the conservancy benefit-sharing approaches to credit schemes to provide more equitable and effective benefit-sharing opportunities.

Governance in community conservancies

The Conservancy Board is the primary decision-making organ of the Melako community conservancy. Thus, the board functions as the main local governance institution for the conservancy. The board comprises of 13 elected members representing the five administrative locations within the conservancy. In addition, the Melako community has its own formal and traditional institutions. Sensitivity to culture is incorporated by recognising local institutions, particularly the council of elders. For example, the environment, water, grazing, and peace committees are usually taken from the *LoipLapayian* and *Naapo*. The elders are the pivot of conservancy initiation as they are often instigators of conservancy establishment. In the case of most conservancies in Kenya's northern region, the elders and other community elite approach the NRT to discuss conservancy formation. However, according to Tambara, Chiles and Waugh (2016), the conservation committee and board are more stable and perform better when they have equitable representation, ex-officio representatives from the government, tourism, and conservation sectors; they meet regularly to review progress and communicate with their members regularly. As is the case with Melako community conservancy, women and youth are excluded from key decision-making organs. For instance, *LoipLapayian and Naapo* are forums of the elders where women and *morans* are excluded. Consequently, they are denied the opportunity to inject their needs and interests into the conservancy and thus to influence policy directions.

By disaggregating community participation into working groups/committees, individuals within the community can develop a better sense of ownership over activities. Sub-committees coupled with low-level platforms, such as village *barasas*/gatherings, allow community members to have a say in operations planning and to receive information first-hand from the conservancy management. This participation leads to stronger support for conservancy activities. In addition, any new developments can be discussed fully before implementation, rather than implementation preceding community reaction and queries, thereby increasing chances of success.

A devolved management and governance structure that permits community members to properly govern resources through local organisations and institutions, rule development and enforcement, and shared responsibilities, strengthen CBC (Lichtenfeld et al., 2019). Of critical consideration is negotiation and renegotiation of decision-making power between communities and other stakeholders. The representation of each of the five administrative locations within the Melako conservancy in the board is critical in governance

and power dispersal, hence minimising the emerging of 'supermen' within the conservancy.

10.7 Conclusions

This chapter has offered an examination of community conservancies, focusing on the case of Melako community conservancy. The 2013 Wildlife Conservation Act legally defined and promoted the establishment of 'conservancies' for the first time in Kenya. This provided a clearer legal structure for community-based conservation initiatives. In recognising the legal structure provided for in the Act, Melako community conservancy has embraced a governance structure premised on three essential structures that must be complied with: a conservancy board, conservancy management committees, and AGM. However, no clear Benefit Distribution Plan (BDP) is in place; hence, there is a need to review the current governance structure to create an enabling environment for local people to share in the benefits accruing from the development of tourism and other conservation activities. Moreover, the distribution method of revenue and other benefits earned by communities needs careful legislation. Finally, there is a need for the conservancy to entrench partnerships with other stakeholders in their management and governance structures to strengthen sub-committees and ensure the long-term institutional stability of the conservancy.

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11

Identifying tourism hot spots and estimating visitors' travel patterns in protected areas among selected Sub-Saharan countries through Flickr

G.K. Riungu, D.L. White, U. Kanchan and D.C. Ukpabi

11.1 Introduction

Social media is one of the fastest-growing categories of media. Its popularity has been propelled by increased internet access and low-cost internet-enabled mobile devices (e.g., smartphones and tablets). Social media platforms like Facebook report that more than half of their traffic comes from mobile devices (European Publishers Council, 2015). As a result, these platforms now play a major role in constructing destination images and travel decisions (Mariani, Di Felice & Mura, 2016).

When using social media platforms, tourists share information in the form of text, photos or videos about their whereabouts with their friends and contacts. In addition, people upload content of places visited, landmarks such as historical buildings or popular locations, and events or activities they have participated in. Such content (like photos) may be geotagged, hence providing the location of shared information. User-generated geographic content (UGGC) from social media can help better understand tourists' interests and behaviours by indicating travel patterns and identifying tourist hotspots (Zhou, Xu & Kimmons, 2015).

A key reason for understanding tourists' patterns is the economic significance of the tourism industry. Tourism is a major export product for many economies. As a result, it makes significant contributions to the Gross Domestic Product (GDP) of individual countries and the overall development of host communities. Specifically, the total contribution of travel and tourism to GDP

in sub-Saharan Africa in 2019 was USD 107 billion, or 6.5% of GDP (World Travel & Tourism Council, 2020).

One of the largest and fastest-growing tourism market segments is Nature-Based Tourism (NBT) (Balmford et al., 2009; Tisdell & Wilson, 2012). NBT has the potential to generate income for biodiversity conservation and to positively benefit destinations. However, there are concerns about resources and social impacts resulting from visitations to protected areas. Specifically, inland wetlands (i.e., lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, mangroves, and reservoirs) are vulnerable to human activities (Ramsar Convention Secretariat, 2013). Tourism activities around these areas may disturb nesting sites and introduce invasive species (Flanagan, Richardson & Ho, 2015). Wetlands have a rich biodiversity, and the ecosystem services they provide directly impact lives far beyond the immediate host community.

Protected area managers may need to limit visitation levels to sensitive ecosystems such as wetlands to better manage tourism-related impacts. To achieve this, managers need a better understanding of visitors' spatial behaviour (Riungu, Peterson, Beeco, & Brown, 2018). Traditional methods of estimating visitors' travel patterns may involve conducting surveys or on-site observations by park personnel. However, this is often labour intensive, expensive and may not be appropriate for large areas. Alternatively, issuing a Global Positioning System (GPS) to tourists can help determine visitors' travel patterns more accurately. However, participants' knowledge about the GPS receiver may affect their spatial behaviour (Wolf, Hagenloh & Croft, 2012).

Data from social media platforms such as Flickr can be used as a low-cost participatory data collection method. Photographs uploaded to Flickr carry metadata about the time and location they were taken. Users who upload photos can choose to automatically include the location metadata. Spatial information can also be added after photos have been uploaded on Flickr; however, this is a manual process. Most geo-tagged metadata are likely to be uploaded automatically from GPS-enabled devices (Barchiesi, Moat, Alis, Bishop & Preis, 2015). This study extends the potential of using UGGC to examine visitors' spatial patterns in protected areas found in selected sub-Saharan countries. Such information may reveal changes in trends and bring up emerging activities in protected areas. This is crucial for conservation agencies to inform visitor management approaches in order to mitigate environmental impacts. The first objective of this paper was to determine areas people visit by analyzing geotagged photographs shared publicly on Flickr. This may in-

dicate popular tourist destinations, and thus constitute a significant aid to destination marketing organisations in deciding where they need to amplify their marketing campaigns. The second objective was to determine the extent to which Flickr points were distributed around inland wetlands. Specifically, the study examined the relationship between the density of Flickr points between protected area sites with wetlands and the ones without. Accordingly, the findings will also be useful for relevant authorities vested with the responsibility of guarding these areas, who can highlight specific points with higher clusters, thereby channelling more surveillance activities to such hotspots to promote conservation and management of protected area biodiversity.

11.2 Background and literature review

Cheung and Fok (2014: 29) conceptualise nature-based tourism (NBT) as "special interest tourism in which the tourists are primarily concerned with the direct enjoyment of a relatively undisturbed natural phenomenon". NBT has received tremendous attention in the tourism body of knowledge with its explication in the context of a sustainable ecosystem (Tyrväinen, Uusitalo, Silvennoinen & Hasu, 2014), preservation of national parks (Mayer, 2014) and tourists' cross-cultural perceptions and attitudes (Packer, Ballantyne & Hughes, 2014). As one of the fastest-growing sectors in the tourism industry, visitors' motivation for NBT is summarised as an interest in a natural environment such as landscape, wildlife, scenery, species, habitat, and freshwater (Cheung & Fok, 2014). In most cases, tourists' cultural values influence their interest in NBT. In evaluating Chinese and Australian tourists' attitudes towards key NBT dimensions such as animals, global warming, environment, conservation, and sense of connection with animals, Packer, Ballantyne and Hughes (2014) found that cultural values indeed play a significant role in NBT activities. Accordingly, while the Australian tourists held a more moralistic attitude towards animals, the Chinese visitors had a more natural connection with animals and support for conservation activities than their Australian counterparts.

Current scholarly evidence suggests that NBT as a homogenous travel product is no longer tenable, as travellers are motivated by pluralistic motivations (Arnegger, Woltering & Job, 2010), implying that interests at the NBT sites determine where they spend most of their time (Tangeland & Aas, 2011). Consistent with this line of argument, Tangeland (2011) conducted segmentation analyses among Norwegian NBT visitors to understand their attributes, motivations and the activities within the NBT areas that attract the most attention. He found that social and quality standards were the dominant moti-

vations. At the same time, mountain/glacier hiking, guided tours in the nature area, rock climbing and mountaineering constituted dominant NBT interests. Wildlife has been noted for increasing tourists' interest in NBT. It stimulates tourists' appreciation for nature, raises awareness of environmental issues, and enhances their adoption of sustainable living patterns (Ballantyne, Packer and Sutherland, 2011). Similarly, tourists' experiences of aquarium and marine-based wildlife evoke different emotional and sensory connections with different aspects of underwater species. Thus, Ballantyne et al. (2011) reported that while some tourists expressed their emotional attraction to the living patterns of the turtles, some others reminisced about the site of the powerful whales and sharks.

Nature-Based Tourism is often purported to be a mechanism that enhances conservation of species and ecosystems (Kuenzi & McNeely, 2008), although empirical demonstrations of this are relatively few (Morrison, Simpkins, Castley & Buckley, 2012). Furthermore, an increased interest in nature-based activities is placing a higher demand on protected areas (Chace & Walsh, 2006). Tourism and recreational activities have been shown to have negative effects on the environment, for example on bird populations (Steven & Castley, 2013).

A stream of inquiry within the NBT body of literature has been critical of the effect of NBT on the ecosystem (Steven, Pickering & Castley, 2011), with the argument that government and local authorities are adopting unsustainable land reforms to accommodate visitors to these sites (Tyrväinen et al., 2014). Specifically, Geffroy, Samia, Bessa and Blumstein (2015) argue that NBT alters species' natural behaviour. Similarly, Steven, Pickering and Castley (2011) contend that the increased presence of humans in birds' habitats increases their heart rate, lowers the level of reproductive success or the number of breeding sites and overall responses to their environment. In some instances, tourists get very close to these species and may want to touch them for their emotional satisfaction. This may leave a lasting negative effect on the species as they always feel the danger associated with sensing the presence of visitors who are not part of their natural environments. To this end, Karanth and DeFries (2011) call for stronger regulations for local authorities to provide guidelines on tourists' use of vehicles, water, and wood in protected areas.

Wildlife-Based Tourism in Africa

The African tourism industry is steadily growing, with wildlife tourism as the fundamental attraction of many African countries (Okello, 2014). However, the overall contributions of wildlife tourism in Africa are often difficult to

quantify due to limited data. Price (2017) reports that a typical wildlife watching tour lasts for about 10 days, with an average cost of about $433 and an additional cost of $55 per person per day. Therefore, wildlife tourism makes a considerable contribution to local economies.

African wildlife tourism boasts different species. Accordingly, many visitors prefer a visit to national parks and reserves for a wildlife safari. Different African countries have different policies with respect to protecting and managing wildlife safaris. An evaluation of the different sub-Saharan African countries' different policies on wildlife safaris and biodiversity reveals a common approach to wildlife conservation and protection. In conjunction with the local authorities, the government marks out the national parks/marine parks/game-controlled areas and wildlife management areas (Sindiga, 1995; Okello & Novelli, 2014). National parks are protected areas and exclusively belong to and are managed by the state, for the purposes of tourism attraction, cultural, scientific and recreational reasons (Sindiga, 1995). Human activities such as pastoralism, hunting, and other activities detrimental to flora and fauna are prohibited in protected areas. On the other hand, wildlife management areas are community-based wildlife conservation methods whereby communities rich in wildlife conserve, and benefit from, the wildlife in their area (Okello & Novelli, 2014). This form of conservation allows villagers and communities to set aside portions of land for sustainable wildlife conservation.

The benefits of wildlife, such as fees paid by tourists for wildlife watching, depend on the particular place where such activity occurs. In some cases where joint control and management between the state and the local authorities is in place, conflicts have been reported with regard to revenue sharing (Benjaminsen, Goldman, Minwary & Maganga, 2013). From another perspective, attracting more visitors and wildlife watchers economically translates into more revenues. To this end, intense marketing and promotional campaigns among the actors continue to rise in numbers (Akama, Maingi & Camargo, 2011). Akama et al. (2011) argue that these marketing messages are based on the stereotypical perceptions that major attraction hotspots constitute areas where elephants, lions, giraffes, and cheetahs are located, with the likelihood of neglecting other areas considered as attraction hotspots by tourists. Thus, Maciejewski and Kerley's (2014) study found that besides major species such as elephants, lions and leopards, other extralimital species ('those that did not historically occur in an area') are also major points of attraction. However, tourists' time and interest in these extralimital species depend on their location. Accordingly, relying on the traditional surveys and visitor statistics method to determine the attraction of hotspots is likely to yield a biased result.

Measuring visitors' spatial patterns within NBT sites

Limitations in assessing the potential role of NBT to support biodiversity conservation in protected areas include the lack of data on visitor counts, activities and interests (Heikinheimo et al., 2017). Conversely, this negatively affects a destination's ability to conduct accurate tourism spatial planning. Spatial planning is a tool that assists decision-makers at different administrative levels to identify and manage trade-offs for various human activities in protected areas (Kim, Chun, Kim & Kim, 2021). Tourism spatial planning initiatives are established to minimise the impact on protected area ecosystems while sustainably developing tourism industries that take place in these areas (Papageorgiou, 2016). Hotspot analysis using UGGC makes it possible to visualise where visitors go and interests lie (Kim et al., 2021). This information may then be overlayed with satellite imagery related to the specified protected area to identify sensitive habitats. In turn, this would assist protected area managers to understand how infrastructure and nature can be interwoven to support both the economy and biodiversity (Echeverri et al., 2022) or to develop strategies restricting human activites that cause biodiversity loss (Dirzo et al., 2014).

Scholars have long adopted official statistics on demographics and economic indicators (García-Palomares, Gutiérrez & Mínguez, 2015) and surveys to study visitor patterns, points of attraction and satisfaction at NBT sites (Wood, Guerry, Silver & Lacayo, 2013). According to DeFranzo (2012), surveys constitute vital scientific tools for research, and their popularity has been underpinned by cost considerations, more extensive coverage, flexibility and dependability. Therefore, studies have often relied on surveys for conducting studies in NBT sites.

Critics of using surveys at NBT sites maintain that a large investment in time, costs and efforts are required (Wood, Guerry, Silver & Lacayo, 2013); thus, using 'big data' to analyze visitor patterns and predict future visits using geo-data is gaining traction within the tourism research stream (García-Palomares et al., 2015). Big data also presents considerable opportunities for tourism geography because of the difficulty of extracting information about tourist behaviour from official statistics, especially in sub-Saharan Africa.

The emergence of social media has facilitated researchers to obtain information on geographic locations, with deep insights into visitors' activities around places of attraction (Wood, Guerry, Silver & Lacayo, 2013). Scholars have integrated social media data into geographic information systems (GIS)

using geo-tagging and geo-location techniques to successfully analyze activities within and around cities (Sobolevsky et al., 2015). Geotagging implies the addition of geographic information to videos, photographs, short message service (SMS) and social media posts; this results in a unique identification (García-Palomares, Gutiérrez & Mínguez, 2015). Building from the understanding that all activities, natural and man-made, take place in a particular geographical location, GIS is a scientific mechanism that captures, stores, analyses and manages geographic data (Wieczorek & Delmerico, 2010).

The adoption of geolocated data (e.g., photographs and videos) to analyze tourists' behavioural characteristics and patterns has witnessed tremendous growth in recent times. For instance, Sobolevsky et al. (2015) used bank card transactions, geotagged photographs and Twitter posts to quantify the attractiveness of some cities in Spain as tourism destinations. The study found that the temporal variation of visits was spread across different smaller cities during summertime. However, the autumn and spring period saw visitor concentration around major destinations.

Different social media platforms have been used for obtaining visitor data at various NBT sites and their behavioural patterns around different attractions. For instance, Park, Lee, Yoo and Nam (2016) used the big data approach to investigate the South Korean local authorities' use of Facebook to communicate different attractions. The study found a successful integration of Facebook as the governments' drive for a smart tourism ecosystem. By using the information generated from Facebook, authorities could plan and provide more satisfactory services for city visitors. Similarly, Shelton, Poorthuis, Graham and Zook (2014) analyzed residents' responses to Hurricane Sandy in New York City using big data generated from their Tweets. They found that 30% of geotagged Tweets about Hurricane Sandy were generated from within New York City, while the rest were from cities outside of New York. Furthermore, the Tweets contained the emotion of the people during the disaster.

Studies have often used Flickr as a reliable social media platform to estimate visitor behaviour. For example, Zhou, Xu and Kimmons (2015) used a text-mining method with Flickr photos to detect tourists' destinations. They found that Flickr photos provide accurate information about tourists' spatial and temporal activities around tourism attractions. Gu, Zhang, Chen and Chang (2016) investigated the attraction features of a particular tourism destination using Flickr data in China. They found that some tourism attractions attracted more visitors than others based on their unique features. Fisher et al. (2018) compared several methods for counting visitors (e.g., infrared sen-

sors, timelapse cameras, and manual on-site counts) with counts based on the number of geotagged images shared publicly on Flickr for trails in a national forest unit in Washington, USA. The study found strong correlations between conventional measures of recreational use and those measures that are based on user-generated content shared publicly on the internet. Contrastingly, Wu, Lindsey, Fisher and Wood (2017) posit that Flickr images and social media tweets have limitations as proxies for demand for urban trails in the US. This may be attributed to urban trails being used for multiple purposes, including routine commuting and shopping, and that trail users are less inclined to use social media to post trips for these purposes (Wu et al., 2017).

Despite African countries being key tourism destinations, limited studies have applied UGGC in evaluating visitor interaction with space within protected areas in developing economies. Visitation data for specific protected areas in sub-Saharan Africa are in some cases unavailable, restricted or even out of date. This is due to several reasons. First, multiple agencies are managing different units, and each agency may be subject to its own set of rules and regulations. For example, private protected areas may not be mandated to publish visitation data. Second, with local communities residing around protected area units, there are multiple 'unofficial' entry and exit points. Therefore, it is difficult to keep accurate visitation records. Third, units managed by both the national and local governments may fail to provide updated visitation data due to the cost of accurately collecting such information. Data collection exercises are generally time-consuming and require substantial resource commitments. With most parks facing budgetary constraints, data collection may be overlooked. To address this gap, this study uses Flickr to estimate potential tourism hotspots in selected sub-Saharan countries. This may assist protected area managers to actively monitor these areas (that are fragile areas) in order to minimise visitor-induced environmental impacts.

11.3 Methods

To better understand visitors' spatial patterns, social media postings were used in the study. Social media data were retrieved from Flickr (www.flickr.com), a photo management and sharing application using the Flickr application programming interface (API). The Flickr API is open to non-commercial and commercial uses. An R script was developed to query the Flickr API for five sub-Saharan countries, dating from 2012 to 2017, that had latitude and longitude metadata associated for each public record. The five countries were: South Africa (SA), Kenya (KE), Tanzania (TZ), Nigeria (NG) and Ghana (GA).

These countries were chosen because they are leading tourism destinations located to the south, east and west of the African continent. This would help the researchers get a sense of tourist spatial patterns across the sub-Saharan region. The main tourism products for these countries are: natural attractions, culture and heritage, and entertainment.

Metadata for the five countries was downloaded and stored as a comma separated value (CSV) file along with a copy of each picture. Pictures were not analyzed during this aspect of the research. Following the Flickr query and initial data processing, a duplicate removal operation was performed where duplicate latitude and longitude records were removed. It is not uncommon to find multiple pictures having the same latitude and longitude from a Flickr user. The overarching objective was to identify unique Flickr locations per user in each country under study, and removing duplicate geographic positions was the most effective programmatic solution to realise that objective. The study also assumed pictures within a radius of 50 meters by the same Flickr user would likely depict a point of similar interest; hence they also were removed.

After data processing in R, data were imported into ESRI's ArcGIS Desktop 10.5 for mapping and analysis. The CSV files were added to ArcGIS Map and converted to a feature class where data were visualised and final maps created. A World Geodetic System (WGS) 1984 reference coordinate system was applied to each country data set. Following the initial point data mapping, which focuses on mapping the location of individual events, an optimised hotspot analysis was performed using ArcGIS. Hotspot mapping focuses on highlighting areas which have a higher than average incidence of events. These hotspot areas can exist in different scales of interest. The optimised hotspot analysis tool identifies statistically significant spatial clusters of high Z-score values (hotspots) and low Z-score values (cold spots). It also automatically aggregates incident data, identifies an appropriate scale of analysis, and corrects for both multiple testing and spatial dependence. From the Flickr points, maps of statistically significant hotspots were created for each country using the Getis-Ord Gi* statistic.

11.4 Findings

After the process of data cleaning to remove images without geographic information, and those with duplicate latitude and longitude records, a total of 238,794 images from 12,298 Flickr users were used in the study. The images

were represented as points in ArcGIS. SA had the largest portion of points (61%), followed by TZ (17%) and KE (16%). GA and NG had the smallest portion with 4% and 3%, respectively. To determine the spatial distribution of visitors in each country, data was clustered into points within and outside protected areas. The study adopted Dudley's (2008, p.60) definition of a Protected Area (PA) as "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values". Therefore, to determine the protected area boundaries for each country, the study used GIS data from the World Database on Protected Areas (WDPA). The WDPA is compiled by the United Nations Environment Programme and the International Union for Conservation of Nature (IUCN).

There was equal distribution of points between protected and non-protected areas. TZ had the largest portion of its points located within protected areas, while KE and SA had over 50% of their points located within protected areas (see Table 11.1). This was consistent with the common assertion that NBT is a major tourism product in SA, TZ and KE. However, the examination of individual countries revealed that over 95% of the points for Ghana and Nigeria were outside of protected areas. This may be an indication that NBT may not be the main interest in these countries. For example, Boakye (2009) found that tourists over 50 years of age primarily visited Ghana for a cultural experience. Ghana is renowned for its rich heritage, culture and historical sites (Dawodu, 2021). Additionally, only 7.7% of Nigeria's domestic tourists visited game parks/reserves in 1997 (Federal Office of Statistics, 1998).

Table 11.1
Spatial distribution of Flickr points within or outside protected areas from 2012 to 2017

Country	Within protected areas	Outside of protected areas
SA	52.3% (76,390)	47.7% (69,683)
TZ	64.6% (26,161)	35.4% (14,326)
KE	51.7%(19,441)	48.3% (18,141)
GA	4.2% (364)	95.8% (8,202)
NG	2.9% (174)	97.1% (5,912)
Total	**51.3% (122,530)**	**49% (116,264)**

The Flickr points in SA, TZ and KE were mostly clustered around a few protected areas. The study summarised the distribution of Flickr points within 10 protected areas found in each of the three countries (see Table 11.2).

Table 11.2
List of protected areas for three leading NBT destination countries based on the distribution of Flickr points from 2012 to 2017

No.	South Africa	Tanzania	Kenya
1	Kruger to Canyons Biosphere Reserve	Serengeti National Park	Masai Mara National Reserve
2	Table Mountain National Park	Ngorongoro Conservation Area	Lake Nakuru National Park
3	Kruger National Park	Kilimanjaro National Park	Amboseli National Park
4	Cape Winelands Biosphere Reserve	Tarangire National Park	Lake Naivasha (Ramsar site, wetland of international importance)
5	Gouritz Cluster Biosphere Reserve	Lake Manyara National Park	Nairobi National Park
6	Cape West Coast Biosphere Reserve	Selous Game Reserve, World Heritage Site	Samburu National Reserve
7	Magaliesberg Biosphere Reserve	Burunge Wildlife Management Area	Tsavo East National Park
8	Pilanesberg National Park	Ruaha National Park	Tsavo West National Park
9	Kogelberg Biosphere Reserve	Arusha National Park	Ol Pejeta Conservancy, private protected area
10	Cape Peninsula Nature Area	Enduimet Wildlife Management Area	Mt. Kenya National Park

As illustrated in Figure 11.1, hotspots in SA included the flagship Kruger National Park and its environs, and the area around Port Elizabeth along the cape coast known for its beach access, marine life and historical attractions.

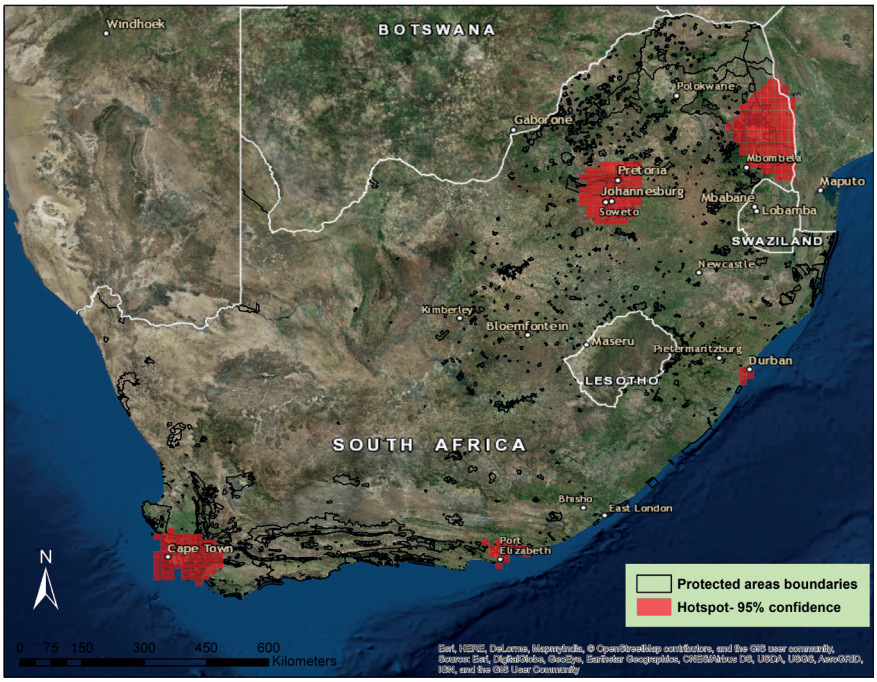

Figure 11.1
A map of South Africa showing significant hotspots (at 95% confidence) from Flickr data

Other hotspots were identified in major inland cities (e.g., Johannesburg and Pretoria) and coastal cities (e.g., Cape Town and Durban). These cities act as major business and administrative hubs that offer diverse amenities, entertainment and recreational opportunities. Also, there are a number of protected areas in close proximity to each other, making it convenient for domestic and international tourists to visit.

In KE and TZ, hotspots were found close to the shared border between the two countries. Habitats like the Masai Mara and Serengeti ecosystems span both countries, resulting in the clustering illustrated in Figure 11.2. Other hotspots were located in large cities; Nairobi and Mombasa in KE, and Dar es Salaam and Zanzibar in TZ. Also, in KE, hotspots were found in protected areas north of Nairobi's capital. Generally, the movement of visitors to dispersed locations is likely to result in more direct benefits to host communities. For TZ, hotspots were clustered together around protected areas located to the north of the country. This may be an indication of high connectivity be-

tween these protected areas but may tie up the benefits derived from tourism to a specific region of the country.

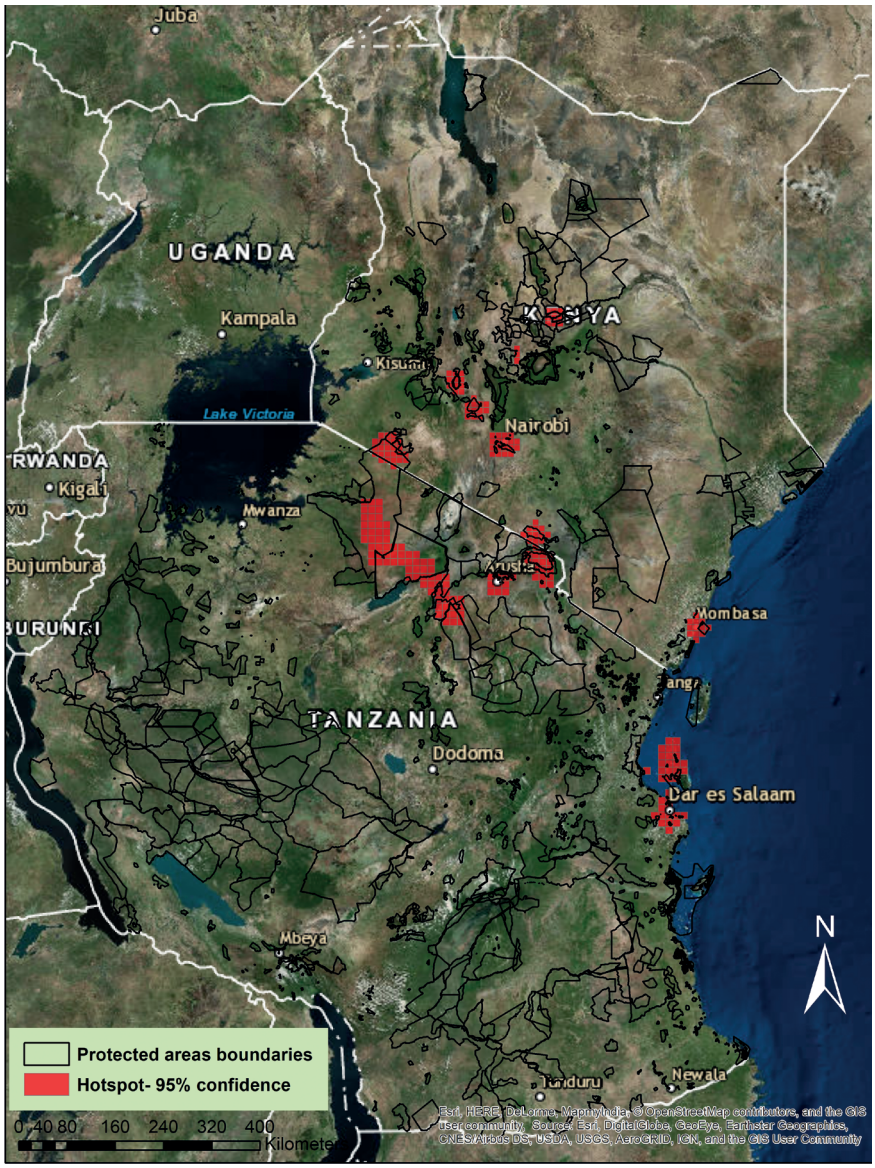

Figure 11.2

A map of Kenya and Tanzania showing significant hotspots (at 95% confidence) from Flickr data.

Hotspots were restricted to the southern part of GA, as illustrated in Figure 11.3. Kumasi is known for its gold deposits and cocoa export, making it one of the largest cities in GA. Kumasi is likely to attract visitors whose main motivation is business. Ghana's capital, Accra, was also identified as an area of significance. It has attractions of historical significance and opportunities for entertainment. Also, the study identified a region around the Cape coast as a hotspot. The area has historical significance and is known for its role in the transatlantic slave trade. Cape coast castle, also referred to as the "gate of no return", was used to hold enslaved people before crossing the Atlantic Ocean.

NG not only had the lowest number of Flickr points but the largest percentage of points being located outside of protected areas. Furthermore, the hotspots were limited to Lagos, Abuja, and a region between them (see Figure 11.3). With Lagos, a port city, being a major international financial hub and Abuja recognised as the administrative capital of NG, this may explain the hotspots found in these two regions. Overall, Figure 11.3 indicates that nature-based tourism may not be considered a major tourism product for either GA or NG.

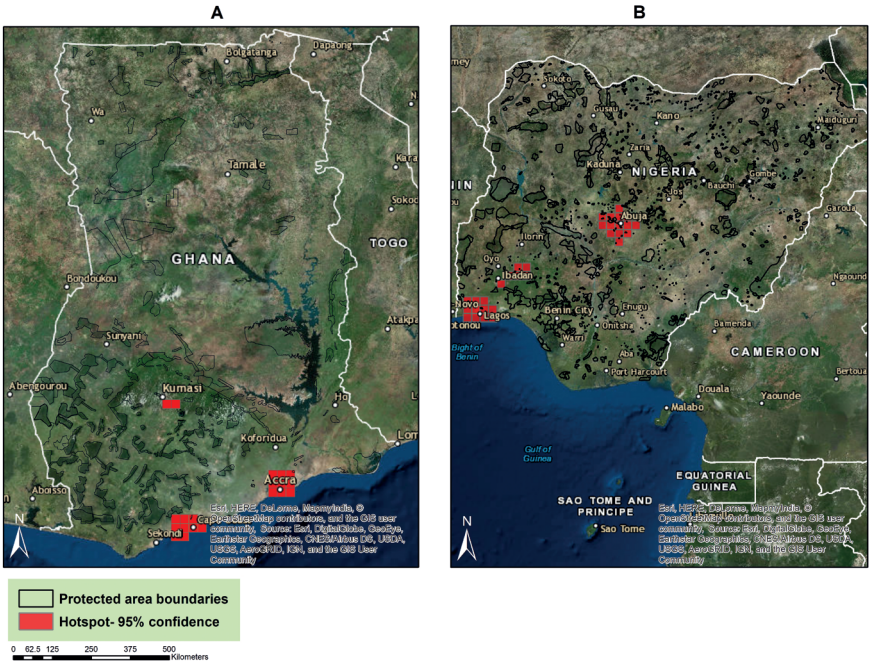

Figure 11.3
A map of Ghana (A) and Nigeria (B) showing significant hotspots (at 95% confidence) from Flickr data

To estimate the extent at which points were located around inland wetland areas for the five countries, the study makes reference to the Global Lakes and Wetlands Database (GLWD) (Lehner & Doll, 2004). GLWD is organised into two different main databases: 1) GLWD Level 1, which comprises the shorelines polygons of the largest lakes with area > 50 km^2 and the largest reservoir of storage capacity > 0.5 km^3, and 2) GLWD Level 2, which includes a digital polygon global map of small lakes and reservoirs with area ≥ 0.1 km^2 excluding the water bodies contained in GLWD Level 1. Buffers of 50 to 150 ft. or greater are known to be effective in protecting a wetland from direct human disturbance (Castelle et al., 1992). Therefore, the study included points found within 150 ft. of the above-identified wetland areas.

For the five countries, the total number of Flickr points located in wetlands was estimated to be 1.01% of the total number of points used in the study. This level may appear negligible, but compared to the cumulative size (km^2) of wetlands against the total size of the five countries, it may be significant. The total size of wetlands and country boundaries was estimated to be 104,445.9 km^2 and 3,907,762 km^2, respectively. Therefore, wetlands occupy at least 2.7% of these countries. By comparing the area wetlands cover to the percentage of points found in wetlands, it can be suggested that close to a third of the wetlands have experienced some level of visitation. The impacts of visits may vary depending on the activities people engage in.

Wetlands may or may not be located within protected areas. The results in Table 11.3 indicate that over 60% of the Flickr points present in wetlands are located in wetlands found in protected areas. Contrary to SA having the largest portion of points (see Table 11.1), fewer Flicker points were found in its wetlands compared to its closest competitors, TZ and KE. This may be an indication of adequate enforcement of buffer zones around its wetland areas. TZ had the highest number of points (44.2%), followed by KE and SA with 30.7% and 10% respectively. GA and NG had the lowest number of Flickr points found in wetlands, but had the highest percentage of points located in wetlands outside of protected areas. This may be an area of concern to agencies in these countries because protected area status often provides additional resource oversight. Further, conservation authorities in these areas may focus on promoting pro-environmental behaviour among the residents and visitors to wetlands outside of protected areas.

Table 11.3
Spatial distribution of Flickr points found in wetlands per country from 2012 to 2017

Country	Wetlands in protected areas	Wetlands outside protected areas	Total
TZ	82.5% (883)	17.5% (187)	**44.2% (1070)**
KE	54% (401)	46% (342)	**30.7% (743)**
SA	77.9%(201)	22.1% (57)	**10.7% (258)**
GA	5.3% (10)	94.7% (178)	**7.8% (188)**
NG	0% (0)	100% (160)	**6.6% (160)**
Total	**61.8% (1495)**	**38.2% (924)**	**100% (2419)**

As illustrated in Table 11.4, the distribution of Flickr points in wetlands was positively correlated with whether a wetland was located in a protected area (r=.267, p< .05). This implied that as the number of Flickr points found in wetlands increased, the wetlands' level in protected areas is also likely to increase. However, the strength of this relationship was moderate. Wetlands can be a point of interest for visitors to protected areas. Lakes, rivers, and reservoirs offer opportunities for active recreation (e.g., boating) and complement other recreational activities like photography, hiking, and beach visits.

Wetlands outside of protected areas may be vulnerable to human encroachment and wildlife disturbance. Therefore, with at least 38% of Flickr points located in wetlands outside of protected areas, resource managers may need to ensure that visitors and communities residing near wetlands are well educated on proper etiquette when recreating in such areas. Additionally, wetlands need buffer zones established around them in order to reduce impacts from adjacent land uses. Wetland buffer zone planning depends on the specific target for protection. For ecosystems, buffers will be covered by native vegetation and offer connectivity to other habitats with minimal disturbances. For water quality, buffers need vegetation to slow runoff and for groundwater to pass through and allow for pollutant extraction (Ma, 2016). Finally, from a social perspective, wetland buffer zones provide nearby properties with aesthetic and recreational opportunities.

Table 11.4
Correlation between the distribution of Flickr points and the location of wetlands from 2012 to 2017

		Is the wetland (or part of it) found in a protected area?	[A] Distribution of Flickr points along wetlands
Is the wetland (or part of it) found in a protected area?	Pearson Correlation	1	.267*
	Sig. (2-tailed)		.023
A Distribution of Flickr points along wetlands	Pearson correlation	.267*	1
	Sig. (2-tailed)	.023	

*. Correlation is significant at the 0.05 level (2-tailed).

[A] Flickr points were clustered according to their spatial features using the GLWD and WDPA databases

11.5 Conclusion

There is a need for comparable data and quantifiable methods to refine the geography of tourism in sub-Saharan Africa. By using photos uploaded and geotagged in imaging sharing sites such as Flickr, social networks can complement other methods used to evaluate visitor movement at particular destinations. In this study, geotagged photos were extracted from Flickr. Next, spatial analytic tools were used to determine areas with a higher than average incidence of events - hotspot mapping. The study identified statistically significant spatial clusters of high Z-scores around cities and protected areas.

The study found Flickr points were clustered around iconic/popular parks and reserves. If left unchecked, visitation to flagship protected areas may not only strain infrastructure and amenities but can also negatively affect wildlife conservation and visitor experiences. Therefore, hotspot analysis may be incorporated into tourism spatial planning initiatives that are aimed at providing sustainable tourism opportunities at a specific destination while minimising the environmental impact within and outside of protected areas (Papageorgiou, 2016). An estimated 1% of Flickr points located in protected areas were found in wetlands. Further, there was a positive relationship between whether a wetland was located in a protected area and the distribution of Flickr points.

This may signify that visiting inland wetlands complements other interests visitors have when going to protected areas. Although the concentration of points in wetlands may be considered low, recreation use in such areas will

inevitably lead to ecological changes (Hammitt, Cole & Monz, 2015). Wetlands provide many benefits to the environment and the local community, such as biodiversity, wildlife habitat, flood protection, water quality protection, shoreline protection, groundwater recharge and discharge, and aesthetics. Therefore, managing agencies need to provide adequate environmental education to minimise impacts.

Limitations of the study

The study had several limitations. First, the distribution of Flickr points was assumed to be a fair representation of the five countries' popularity as tourism destinations, and the study did not incorporate other traditional counting methods for validation purposes. However, previous studies have found a significant relationship between Flickr data and other sources of data such as official tourism statistics (Barchiesi, Moat, Alis, Bishop & Preis, 2015) and tourist survey data (Sonter, Watson, Wood, & Ricketts, 2016). Next, there are other leading social media platforms such as Facebook and Instagram. However, Flickr also has a large community of users and remains relatively open to commercial and research purposes. Third, there was variation in the number of photos uploaded by Flickr users. The study tried to control for this by focusing on identifying unique Flickr locations per user, removing images with the same geotags and those within a radius of 50 meters belonging to the same user. Finally, the study did not collect user characteristics such as length of stay and number of previous visits. Such information can be used to estimate the consumption level of tourism products at destinations.

Areas of further research include: comparing traditional methods for counting visitors with counts based on the number of geotagged photographs; determining the tourism image of destinations in sub-Saharan Africa by classifying pictures extracted from Flickr based on predetermined themes (e.g., nature, heritage, culture, and tourism services); and conducting sentiment analysis on the verbal tags of photos uploaded on Flickr. This can help evaluate the onsite emotions of visitors. Additionally, future studies may overlay hotspots with satellite imagery and social data related to the specified protected area to examine the relationship between visitation and sensitive habitats. This would assist protected area managers in making decisions on park infrastructure development and establishment of policies that mitigate against biodiversity loss.

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12

Conclusion

V.R. van der Duim, D. Kieti and R. Okech

The major challenges facing sustainable development of sub-Saharan Africa in general, and tourism in this part of the world in particular, are climate change and biodiversity loss. The two are closely intertwined and linked with many other sustainability issues, such as SDG1 (no poverty) and SDG12 (responsible consumption and production). As Dube (2022) warns us, nowhere has the impact of environmental degradation been felt more than in sub-Saharan Africa, as the livelihoods of many people directly depend on nature: "Therefore the environmental degradation warrants severe and immediate attention" (Dube, 2022: 161). Hence, it is vital to address biodiversity loss together with climate change mitigation and adaptation, since "there are both synergies and trade-offs among biodiversity and climate change efforts" (Visseren-Hamakers & Kok, 2022: 6). The development of tourism policies and management initiatives should be supported by research projects that substantiate the essential choices to be made at the project or destination level, and that underpin the need for transformative change and governance.

Scientific research

In the last decades, the relationship between tourism and biodiversity in sub-Saharan Africa has been extensively covered in scientific research and publications (e.g. Ahebwa et al., 2012; Hulme & Murphree, 2001; Saarinen et al., 2009; Suich et al., 2009; Van der Duim et al., 2011; Van der Duim et al., 2017). Nevertheless, Stone et al. (2022: 275) recently concluded that "there is a shortage of comprehensive or robust underpinnings that can help to illuminate the understanding of the complex relationships between conservation, tourism and livelihoods". In an attempt to address these complexities, for example Van der Duim, Lamers & Van Wijk (2015) presented a comparative analysis of different institutional arrangements for tourism, conservation and development in eastern and southern Africa. They range from private game reserves, conservation enterprises, sport hunting arrangements, transfrontier

conservation areas, to community-based projects or conservancies, like the case of the Melako conservancy as discussed by Kieti and Nthiga in chapter 10. Most of these arrangements emerged in the 1990s, aiming to address some of the challenges of 'fortress conservation' by combining principles of community-based natural resource management with a neoliberal approach to conservation. However, climate change will significantly impact the future of these institutional arrangements. For instance, climate change affects vegetation cover, biodiversity distribution and water resources in tourism destinations and is therefore likely to negatively affect the ecosystem services on which tourism depends. At the same time, "climate change mitigation policies might also contribute to the protection of these services, as carbon-related income is already developing in a land-use option for private and communal landowners in ecotourism" (Van der Duim, Lamers & Van Wijk, 2015.: 252). These developments require a systematic examination of potential synergies and conflicts between carbon-related programs and nature-based tourism.

As a relatively quiet period preceded the only recent specimen of literature on the topic of tourism and climate change (Saarinen, Fitchett & Hoogendoorn, 2022), there is an urgent need for a comprehensive research effort on tourism and climate change. A systematic literature review by Hambira and Mbaiwa (2020) identified 35 papers dealing with tourism and climate change in Africa: 14 papers dealing with perceptions, views, understanding, awareness, knowledge and attitudes of various stakeholders towards climate the change-tourism nexus, 12 papers describing the impacts of climate change on tourism destinations, nine papers dealing with policy responses by tourism stakeholders towards climate change, four on knowledge inquiry and methodological issues surrounding research within the tourism-climate change nexus, and one paper investigating the vulnerability of a tourism destination. Based on this review, Hambira and Mbaiwa (2020) concluded that limited research has been carried out on the vulnerability of the tourism sector to climate change. "Without adequate information on the extent of vulnerability of tourism attractions to climate change as well as impacts thereof, efforts to put in place appropriate response measures would be futile" (ibid.: 112). Fortunately, since then new literature has been added to this collection (see for example Saarinen, Fitchett & Hoogendoorn, 2022; Hoogendoorn, 2021; Hoogendoorn & Fitchett, 2020; Hambira, Saarinen & Moses, 2020; Dube, 2022). According to Saarinen, Fitchett and Hoogendoorn (2022), who, as of September 2020, identified at least 57 publications on climate change and tourism in southern Africa, the year 2020 has been the most productive year thus far with 16 publications. The chapters in this book also show that the southern and eastern African regions have gradually become a productive research locale with an

increasing body of research on tourism and climate change emerging from the region since the mid-2000s (Hoogendoorn & Fitchett, 2020; Saarinen et al., 2022). This small, but significant, body of knowledge will allow for the development of strong new research foci and assist a variety of stakeholders in the tourism industry, government, and non-governmental organisations to address the need for transformative change and governance.

Need for transformative change and governance

It is now widely recognised that transformative change is needed to fully address the enormous challenges sub-Saharan Africa is facing related to climate change and biodiversity loss. According to Visseren-Hamakers et al. (2022: 20-1), "transformative change can be defined as a fundamental, system-wide reorganisation across technological, economic and social factors, including paradigms, goals and values". Such fundamental change is required since demographic, sociocultural, economic, technological and political indirect drivers "represent the underlying causes of the most significant direct drivers of global ecosystem change, namely: land and sea-use change, direct exploitation of organisms, climate change, pollution, and invasive alien species" (ibid.: 21). Transformative change should, therefore, comprehensively address the indirect drivers with sensitivity to – in this case – the particular context of sub-Saharan Africa.

However, the discussion on how to catalyse, speed up and govern transformative change is still in its early stages. Obviously, transformative change and its governance are inherently political since the desired direction of transformation is often contested and subject to changing power relations. Visseren-Hamakers et al. (2021: 25) argue that four governance approaches are needed for governance to become transformative:

> "Integrative governance ensures all sustainability aspects (across places, governance levels, sectors and issues) are addressed, and combining integrative and inclusive approaches is necessary to ensure that stakeholders across these sectors, places, issues and governance levels are involved. Pluralist governance ensures the representation and application of different knowledge types, and through adaptive governance, stakeholders reflect on the extent to which governance is becoming and remains transformative. Transformative governance then becomes a reflective process in which stakeholders ensure governance is on track to transform our currently unsustainable societies into truly sustainable societies and take the initiative to improve and elaborate governance mixes in order to do so".

Over the last years a range of proposals to transform biodiversity conservation has been put forward, advocating for different goals and means of transformation. Popular proposals are for example 'half earth' or '30 by 30', which respectively argue that terrestrial and marine protected areas should increase so that they cover at least half of the earth, or 30% by 2030 (Massarella et al,, 2022). As a radical alternative to these approaches, Büscher and Fletcher (2020) have advocated 'convivial conservation', which calls for a structural change of the current global economic model and the inequalities it creates – both among people and between humans and non-humans. Convivial conservation proposes: "1) conservation spaces that integrate rather than separate humans and other species; 2) direct democratic governance arrangements that challenge elite technocratic management; and 3) novel finance arrangements that redistribute existing wealth and resources" (Massarella et al., 2022: 60).

The case studies in this book, as well as recent studies on landscape governance in Kenya and Namibia (Mugo, 2021; Van der Duim & Pellis, 2021), have shown the intricacies involved in bringing about any of these proposals that aim at fundamental change. Transformations cannot be realised through single initiatives or governance instruments, but only by concerted efforts at all levels of governance and in multiple places, coming together in 'governance mixes' (Visseren-Hamakers, 2021) aimed at simultaneously addressing the indirect drivers of biodiversity loss and climate change. These 'governance mixes' should be supported by research projects that, as Wels and Boonzaaier argue in their contribution to this book, recognise different knowledge systems and types of knowledge that are currently underrepresented.

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This book honours Prof Bob Wishitemi. Commemorating his death in 2021, this book includes articles by his former colleagues and other scientists who worked with him over the years. The volume contains 12 articles and presents a variety of approaches to tourism, climate change and biodiversity in sub-Saharan Africa.

A significant legacy of Prof Wishitemi is his contribution to academia. His works on biodiversity, conservation (protected) landscapes, culture, communities and tourism are used as reference materials in tertiary level teaching and research in Kenya, East Africa and beyond. He was not only a mentor to many, but a friend to a lot more. He was everyone's favourite.

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