Climate change and Tourism: The level of preparedness of tourism operators to the threat of climate change in the Greater Kruger Area

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Abstract

Tourism is a significant contributor to the South African economy, providing employment opportunities and supporting community development as well as funding vital conservation efforts. However, tourism is both a perpetrator and a victim of climate change This research aims to investigate the level of preparedness of tourism operators in the Greater Kruger area to the potential threat of climate change. This is done by conducting a review of existing research on the topic in southern Africa, South Africa, and the Greater Kruger area. The research considers the current policy environment of South Africa and conducts semi-structured in-depth interviews with tourism operators in the Greater Kruger area. While tourism is responsible for as much as 10% of global greenhouse gas emissions, it is also threatened by climate change. Climate change impacts are already being experienced and are predicted to continue to be experienced and possibly worsen, which could have detrimental impacts on tourism operations. The desktop research and interviews confirm that impacts of climate change are already being experienced, and yet there is little sectoral knowledge on the topic and low urgency has been placed on adapting to these impacts or mitigating any further impacts caused by climate change. While there are government-led policies and regulations aimed at minimising the impacts of climate change and encouraging adaptation and mitigation efforts, development and implementation are limited. Any efforts made by operators to become sustainable have for the most part been self-implemented on an ad hoc basis. Greater focus on the challenges presented by climate change, knowledge sharing, and collaboration across all stakeholders is essential to ensure that tourism is prepared for the threat of climate change so that the natural resources of the Greater Kruger area can be enjoyed by generations to come.

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List of Abbreviations

Abbreviation	Definition
APNR	Associated Private Nature Reserves
ESV	Electric Safari Vehicle
GHG	Greenhouse Gas
GKEPF	Greater Kruger Environmental Protection Foundation
GKNP	Greater Kruger National Park
IPCC	Intergovernmental Panel on Climate Change
KNP	Kruger National Park
SANParks	South African National Parks
TCI	Tourism Climate Index
UNFCCC	United National Framework Convention on Climate Change

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1. Introduction

While the climate historically has gone through periods of change, there is unambiguous consensus in the scientific community that the cause of current climate change is due to human activities that are altering the concentration of greenhouse gases (GHGs) in the atmosphere, in turn, modifying the absorption and scattering of radiant energy resulting in global scale changes in the climate such as temperature and precipitation (Oreskes, 2004 in Saarinen et al., 2022). Globally, there is a call to limit the impacts of this anthropogenic climate change, in all economic and social spheres, through adaptation and mitigation measures (Paris Agreement, 2015; Dube and Nhamo, 2020b; Saarinen et al., 2022). The tourism industry is no exception. Unlike other forms of tourism such as cultural tourism, climate and weather strongly influence the natural resources, landscapes, and ecosystems that nature-based tourism relies on (Hambira et al., 2013), making it a victim of the effects of a changing climate (Saarinen et al., 2022: 115; Pandy, 2017). However, the tourism industry is also a villain in this story, as it significantly contributes to the GHG emissions responsible for climate change (Saarinen et al., 2022: 115; Pandy, 2017).

Globally, tourism is a growing industry and these growth patterns are being reflected in the South African tourism industry as well (Becken, 2002; Liu et al., 2012; Amusan & Olutola, 2017). It forms a significant part of the South African economy, directly contributing nearly 3% to the country's GDP in 2018, and accounts for 4,5 % of total employment (Amusan and Olutola, 2017). South Africa's economy is highly energy intensive, based primarily on coal-powered energy (Winkler and Marquand, 2009). However, the tourism industry has been identified as a sector for a low-carbon alternative economic growth path for the country, rather than more emissions-intensive industries such as mining (Amusan & Olutola, 2017; StatsSA, 2021; Brockington and Ponte, 2015; Smith and Fitchett, 2020; Winkler and Marquand, 2009). However, climate change is a significant concern and raises several challenges for the tourism industry in South Africa and southern Africa more broadly (Hoogendoorn & Fitchett, 2018; Pandy and Rogerson, 2018; Pandy & Rogerson, 2021; Baumber et al., 2021). The industry is a significant contributor to global greenhouse gas emissions, particularly through aviation (Pang et al., 2013), whilst also being vulnerable to the impacts of climate change such as temperature increases, droughts, and rainfall changes (Pang et al., 2013; Coldrey & Turpie, 2020). Despite this, the South African government hopes

to grow the industry sustainably, through the concept of "Responsible Tourism" (Department of Tourism, 1996: 5; Department of Tourism, 2011). Responsible Tourism is defined as "Tourism that promotes responsibility to the environment through its sustainable use; responsibility to involve local communities in the tourism industry; responsibility for the safety and security of visitors and responsible government, employees, employers, unions and local communities" (Department of Tourism, 1996: 5). However, the current policy environment of South Africa is said to be insufficient to enable this, particularly when it comes to dealing with the impacts of climate change through disaster risk management, which has not progressed since 2011 (Baudoin et al., 2017; Archer, 2020; Pandy and Rogerson, 2021). Therefore, while tourism may be considered a more environmentally friendly, lower-carbon option for growing the economy than other more emissions-intensive industries, this does not make it the most effective solution (Amusan & Olutola, 2017; Azam et al., 2018). The push for sustainable tourism, defined as tourism that "meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future" (Liu, 2003: 460) and that manages resources in such a way that needs are fulfilled but their integrity is maintained, will have to be carefully navigated by all tourism stakeholders, including but not limited to tourists, lodges and government(Preston-Whyte & Watson, 2005).

As with much of southern Africa's tourism industry, South Africa's tourism is predominantly nature-based (Preston-Whyte & Watson, 2005; Spenceley, 2005; Hambira et al., 2013). An integral factor in this nature-based tourism industry is the protected area systems that form the basis for nature-based tourism in the country. The Greater Kruger National Park (GKNP) area consists of the Kruger National Park (KNP) and the private conservancies that surround it. The KNP itself is the largest of South Africa's national parks and is one of the most visited, with almost 2 million visitors in the 2018/2019 period, second only to Table Mountain National Park which had over 3 million visitors during the same period (Mabibibi et al., 2020). KNP is managed by the parastatal South African National Parks (SANParks) and is a big revenue generator for South Africa's national park system, with the Greater Kruger area generating 2% of tourism contributions to the national Gross Domestic Product (GDP) (Chidakel et al., 2020), and supporting the conservation efforts and job creation (Coldrey & Turpie, 2020; Chidakel et al., 2020). However, the GKNP is particularly vulnerable to climate change impacts. Impacts such as temperature increases and droughts are already being

experienced and are predicted to worsen in the coming decades (Davis-Reddy & Vincent, 2017; Dube & Nhamo, 2018a; Coldrey & Turpie, 2020; Malherbe et al., 2020; Smith & Fitchett, 2020;).

Not only is tourism in the GKNP vulnerable to climate change, but it is also a contributor to global tourism-related greenhouse gas emissions (Gossling et al., 2010; Saarinen et al., 2022: 115). Adding to this double-sided relationship with climate change, tourism's significant contribution to the South African economy, and the relative importance of the Kruger National Park in the South African tourism and conservation landscape, it is important to understand the threats posed by climate change to the tourism operations in this protected area, as well as what is being done by tourism operators in the area to mitigate and adapt to current and future climate change threats. The nature-based tourism industry in the Greater Kruger area has the responsibility and potential to make a significant impact in the fight against climate change. The extent to which operators are prepared to take on this responsibility and have the capacity to meet this potential needs to be more fully understood before further steps can be taken.

Through the use of semi-structured interviews, this research aims to investigate the level of preparedness of nature-based tourism operators in the Greater Kruger Area to deal with the potential impacts of climate change. How prepared are nature-based tourism operators in the Greater Kruger area to deal with the current and potential impacts of climate change?

Further to this, four research objectives are identified:

1. Investigate how the threat of climate change is perceived by tourism operators.
2. Compare the lived experience of recorded impacts by tourism operators and the impacts documented in the research.
3. Investigate the influence of national policy on the operations and sustainability efforts of tourism operators.
4. Establish the extent of collaboration between tourism operators in the area.

These objectives are met through the following steps:

1. Providing an overview of the current and potential impacts of climate change on nature-based tourism in South Africa and southern Africa, with a specific focus on the Greater Kruger Area, as seen in the literature.
2. Presenting the perceptions nature-based tourism operators have of the potential threat of climate change on their operations.
3. Presenting the current level of understanding of climate change mitigation and adaptations among nature-based operators in the Greater Kruger Area.
4. Outlining the current and future plans of nature-based tourism operators in the Greater Kruger Area, to adapt to and mitigate the potential climate change impacts.
5. Making recommendations for mitigation, adaptation, and sustainability actions for nature-based tourism operators in the Greater Kruger Area.

The remainder of the dissertation is structured as follows. In Chapter 2, the current literature on climate change and tourism will be examined, moving from research conducted in southern Africa and the learnings in these areas to the South African context and the Greater Kruger area specifically. Chapter 3 will outline the methodology used for data collection and analysis, as well as the theoretical underpinning of the research. Chapter 4 will outline the results of the data collection and analysis, and Chapter 5 will discuss these results. Finally, the dissertation will end with some recommendations based on the findings of the research for the Greater Kruger tourism operators and concluding remarks (Chapter 6).

2. Literature review

2.1 Introduction

It is important to keep in mind that climate change is a global scale phenomenon. What is seen in one area or a particular region, may also be seen in another, such as in the case of southern Africa. Southern Africa consists of Botswana, Eswatini, Lesotho, Mozambique, Namibia, South Africa, Madagascar, Mauritius and Reunion, and Zimbabwe, and for this research, Zambia is also included given its proximity and similarity of its experience of climate change impacts (Saarinen et al., 2022: 3). It is important to understand the relationship between tourism and climate change in the Greater Kruger Area within the broader context of southern Africa, particularly given that there are many similarities and shared experiences. In southern Africa, tourism is a dominant economic activity and is predominantly nature-based, relying on the array of landforms, landscapes, and diverse and largely endemic flora, and fauna to attract visitors (Preston- Whyte & Watson, 2005: 130; Saarinen et al., 2022). Much of this nature is limited to national parks and conservation areas (Preston-Whyte & Watson, 2005).

Tourism in southern Africa is one of the economic activities that will be forced to make changes in the face of climate change and will need to make changes to move to a sustainable future (Liu, 2003; Preston-Whyte and Watson, 2005). While there have been calls for further research on the topic of tourism and climate change in developing countries, particularly within southern Africa, research remains limited (Becken, 2013; Dube & Nhamo, 2020a). This lack of research, and in some cases old or outdated research, means that a comprehensive understanding of the relationship between climate change and tourism in southern Africa has not been formed nor is it available to relevant stakeholders. This is a cause for concern as, despite being limited, the current research has indicated that national parks and conservation areas will be altered by climate change which will, in turn, affect nature-based tourism operations and activities (Dube & Nhamo, 2020a). Therefore, while the level of knowledge of the relationship between climate change and tourism is poor with the available knowledge, the impact of climate change on tourism is predicted to be “moderately strong to strongly negative” (Hall, 2011 in Dube et al., 2020: 2).

The tourism sector is a significant contributor to the South African economy, with nature-based tourism being a large portion of the sector (Smith & Fitchett, 2020). One of the biggest attractions of nature-based tourism in South Africa is The Kruger National Park, a state-owned and managed protected area (Smith & Fitchett, 2020). The Kruger National Park is one of the biggest protected areas in the Savanna Biome (Preston–Whyte and Watson, 2005). It is surrounded by privately owned and managed protected areas together with the National Park; this area is known as the Greater Kruger National Park (GKNP) (Chikadel et al., 2020). However, the GKNP is also vulnerable to the impacts of climate change (Turpie & Coldrey, 2020). Within the South African policy and regulatory environment, the complex relationship between tourism and climate change is identified (Department of Tourism, 2011). Through the use of the concept of Responsible Tourism, the South African Government and the Department of Tourism, hope to navigate this relationship, while growing the industry and increasing its contribution to the economy. This could be problematic as not only does this create major challenges for climate change mitigation efforts but, as will be highlighted in the research, the tourism industry could be altered or possibly jeopardised by climate change (Saarinen et al., 2022: 139; Hall, 2011 in Dube et al., 2020:2). The concept of sustainable tourism is based on the Sustainable Development paradigm introduced in the Brundtland Report published in 1987 is when sustainable tourism as a concept and practice became popular (Liu, 2003; Saarinen, 2006; Hambira et al. 2013). While a somewhat contentious concept, with many arguing that sustainability and tourism are incompatible given the strong growth trend of the industry, currently sustainable tourism is the dominant paradigm being followed (Gossling et al., 2010). However, for tourism to be sustainable, the relationship between climate change and tourism needs to be fully understood so that it can be navigated and all stakeholders need to be cognizant of this juxtaposition and do what they can to prevent unsustainable tourism (Bramwell et al., 2016; Gossling, et al., 2010;).

This literature review examines this somewhat limited research that has been conducted on the impacts of climate change on tourist destinations and attractions, focusing on the Greater Kruger while also examining research conducted on the southern African region. It also examines the complex relationship between tourism and climate change and the current perceptions and understanding of tourism stakeholders and tourism operators as well as the

policies and regulations related to tourism and climate change, which potentially guide the industry's operations.

2.1 The observed and potential impacts of climate change on nature-based tourism in southern Africa and the Greater Kruger Area

There has been evidence of climate change impacts throughout Africa (Sifolo & Henama, 2017). As part of the Global South, the African continent is a light polluter, since the level that it suffers from the impacts of climate change and global warming far outweighs its contribution to global emissions (Paris Agreement, 2015; Sifolo & Henama, 2017; Saarinen et al., 2022: 138). Some of the ways that climate change could impact the African continent include changes in weather patterns, impacts on vulnerable populations, and impacts on ecosystems, amongst others (Deonarain, 2014 in Sifolo & Henama, 2017: 195). Climate change impacts will differ between regions on the African continent (Sifolo & Henama, 2017). Southern Africa is currently experiencing changes in rainfall patterns and temperature increases (Turpie & Coldrey, 2020). These impacts are already affecting the predominantly nature-based tourism industry in southern Africa, an industry that is of importance for the economic growth of the region (Sifolo & Henema, 2017). These impacts are predicted to continue and even worsen over the coming decades, threatening the sustainability of the tourism industry (Dube & Nhamo, 2020b).

2.1.1 Temperature

Temperature increases are one of the current and predicted impacts of climate change. There is consensus that southern Africa has experienced and will continue to experience overall warming (Davis-Reddy & Vincent, 2017; Preston-Whyte & Watson, 2005). While these trends will be experienced by the region as a whole, there will be significant variability within the region and countries (Davis-Reddy & Vincent, 2017; Preston-Whyte & Watson, 2005). A study conducted on the vulnerability of nature-based tourism to climate change and variability in the resort town of Kariba, Zimbabwe, provides on-the-ground evidence of these temperature trends (Dube & Nhamo, 2020b). Over 51 years, from 1963 to 2014, the average maximum temperature in the town of Kariba increased by about 2°C, already exceeding the 1.5°C temperature rise cap that the Paris Agreement seeks to impose to avoid dangerous climate

change-induced weather extremes and impacts (Dube & Nhamo, 2020b). In addition to this, temperature increases have been witnessed in both winter and summer months, with the 1990s seeing the most significant increases (Dube & Nhamo, 2020b). High temperatures such as those experienced in Kariba have implications for tourism operations, presenting challenges for both tourists and employees (Dube & Nhamo, 2020b). These trends are being seen elsewhere in the southern African region with the tourism industries facing similar challenges. One such example is the Kruger National Park, which research has shown is echoing these temperature trends (Dube and Nhamo, 2020b; Dube and Nhamo, 2020a; Coldrey and Turpie, 2020).

As shown by several researchers, there is clear evidence of temperature increases in the Kruger National Park (van Wilgen et al., 2015; Dube & Nhamo, 2020a; Coldrey & Turpie, 2020). At this point, it should be noted that while the studies on climate change impacts have focused on the National Park, for this literature review, these trends will be extended to the Greater Kruger area, given its proximity. However, it should be noted that there may be slight variances in the extent and intensity of the impacts, as evidenced by the drought experienced in the area starting in 2015 (Smith & Fitchett, 2020). Through the examination of historical meteorological data and semi-structured informal interviews with key role players in the national park and tourism operations, Dube and Nhamo (2020a) found evidence of climate change and temperature variability in Kruger National Park. They found evidence of rainfall changes and extreme weather events, but the evidence was especially clear regarding temperature increases (Dube & Nhamo, 2020a). Over the 41 years examined (from 1977 to 2018), data from the Skukuza Camp weather station revealed a 2°C increase (Dube & Nhamo, 2020a: 4). The highest average temperature was recorded in 2010 and the warmest year on record was 2016, which showed a 0.56°C increase above 1997 levels (Dube & Nhamo, 2020a). Some have expressed concerns that this may result in a temperature increase of 2.5°C by 2050 in the worst-case emissions scenario, that is if the world were to continue with business as usual with little to no emissions-reduction efforts (Dube & Nhamo, 2020a: 4). Monthly temperature increases were also recorded for all 12 months of the year, with statistically significant increases being recorded for February, March, May, June July, August and September (Dube & Nhamo, 2020a). As in the case of Kariba, the increase in temperature observed at the Skukuza Camp weather station has already surpassed the global target of

1.5°C outlined by the IPCC (Dube & Nhamo, 2020a). This is concerning from a biodiversity perspective, which is the bedrock for nature-based tourism in the Kruger National Park area and South Africa at large. There are concerns over species extinctions, bush encroachment, and other similar biodiversity impacts associated with climate change-induced temperature increases (Bunting et al., 2016; Dube & Nhamo, 2020a). This, in combination with the challenges of operations and discomfort experienced by tourists, poses a threat to tourism operations in the GKNP area. As temperatures are predicted to continue to increase, this threat will worsen (Tadross et al., 2017). As noted by Tadross et al. in their 2017 publication, the IPCC's 5th Assessment Report projects that mean annual global temperatures will increase 2.5°C above 1985-2005 levels by 2050; however, temperatures over Africa are projected to increase at a faster rate than this (Tadross et al., 2017). The IPCC has since released its 6th Assessment Report, reaffirming this (IPCC, 2021). Sub-Saharan Africa's temperature is expected to increase to 2°C, reaching 3°C in the mid-century (IPCC AR5 in Dube & Nhamo, 2018a: 2028). By the end of this century, under RCP8.5, temperatures over the interior region of southern Africa are predicted to increase by up to 8.5°C (Tadross et al., 2017). In addition to this, projections show that extreme temperatures will increase, with an increase in the annual frequency of very hot days (the number of days with a maximum temperature of more than 35°C) in the future. This could prove dire for tourism in GKNP, with predictions that occupancy of the Kruger National Park could drop by as much as 6.5% by 2050 due to temperature increases (Coldrey & Turpie, 2020).

2.1.2 Rainfall

Generally, rainfall patterns are less obvious and trickier to detect than temperature patterns (van Wilgen et al., 2016; Dube & Nhamo, 2018a; Preston-Whyte and Watson, 2005). While there is some certainty that there is an increase in the variability of rainfall patterns over southern Africa, there is less agreement in the literature over whether there is an overall drying or wetting of the region (Davis-Reddy, 2017). There have been some who have pointed to an overall drying of the southern African region in recent decades (Preston-Whyte and Watson, 2005), yet rainfall patterns in Livingstone, Zambia, between 1976 and 2016 did not exhibit any statistically significant evidence to support this (Dube & Nhamo, 2018a). This finding was echoed in Kariba, Zimbabwe, when rainfall between 1963 and 2014 was examined and no statistically significant changes in annual average rainfall were identified (Dube &

Nhamo, 2020b: 6) In the case of Kruger National Park, and the Greater Kruger area in general, while some studies found that rainfall is becoming more variable in this region (van Wilgen et al., 2016), others showed that there were no statistically significant changes in annual rainfall patterns (Dube & Nhamo, 2020a: 6). This disparity between the research conducted could, in fact, point to the variable rainfall patterns in the region, with areas showing overall drying patterns and others showing wetting patterns and some with no change at all.

Despite the uncertainty and the lack of statistically significant evidence of rainfall pattern changes over southern Africa more generally and GKNP specifically, an overall declining trend has been observed (Dube & Nhamo, 2020a: 6). This trend could pose a threat to KNP, an already dry savanna biome (Dube & Nhamo, 2020a). Decreases in rainfall, and in some cases drought, have led to significant losses in vegetation. This harms wildlife, both primary and secondary consumers, which in turn impacts wildlife tourism of the Park, altering the tourists' experiences (Dube & Nhamo, 2020a; Preston-Whyte and Watson, 2005).

2.1.3 Droughts

A drought is defined as a period "in which significantly less precipitation occurs than what is considered to be the normal range for the spatiotemporal context" (Smith & Fitchett, 2020: 107; South African Weather Service in Baudoin et al., 2017). South Africa is naturally prone to droughts (Baudoin et al., 2017), and it is an important part of climate variability and impacts in the Kruger area (Malherbe, et al., 2020). One of the most severe droughts in recent history was experienced in South Africa between 2015 and 2017, with many arguing that this was the worst drought experienced in the country since the drought of 1991-1992 (Baudoin et al., 2017; Smith & Fitchett, 2020). The eastern part of the country and Kruger National Park in particular were hard hit (Smith & Fitchett, 2020; Archer, 2019; Baudoin et al., 2017). This prolonged dry period coincided with one of the most extreme El Nino events in southern Africa (Dube et al., 2020; Baudoin et al., 2017), amongst other things (Smith and Fitchett, 2020). The impacts of this drought period were considerable, particularly in terms of tourism operations (Smith & Fitchett, 2020). The initial decrease in vegetation enhanced the tourists' experience, allowing better game viewing experiences through easier sightings as well as animals congregating at water sources. However, the end of the drought period saw a significant shift in this experience, with reports of trauma and stress experienced by travellers

due to witnessing animals suffering (Fitchett & Smith, 2020). Despite this, there was no reported direct loss of visitors due to the drought, and income from tourism was largely unaffected (Smith & Fitchett, 2020). However, profit margins were affected due to increased operating costs caused by the drought, such as increased food prices (Smith & Fitchett, 2020). Further, this being one of the most severe droughts experienced in the area, it follows that environmental impacts were significant. The response of animals to this drought, in particular, was notable, with grass-dependent species being the hardest hit due to grass and vegetation decline. However, the spatial heterogeneity noted within the park could have been an advantage (Smith & Fitchett, 2020). The impacts of the 2015/2016 extreme drought events were more focused on the central and southern areas of the KNP (Malherbe, et al., 2020), and resilience to the stress caused by the drought was improved through migration potential (Smith & Fitchett, 2020).

Over the same period, drought events were being experienced in other parts of South Africa and southern Africa, similarly impacting tourism operations there. The most recent 2015 – 2018 drought in Cape Town received worldwide media attention (Smith & Fitchett, 2020; Dube et al., 2018). The drought inadvertently harmed the tourism sector in Cape Town and the wider Western Cape province, particularly through the Day Zero phenomenon and the various operational impacts (Dube et al., 2018). Due to the significance of Cape Town as a tourism destination in South Africa and southern Africa more broadly, decreases in arrivals over the drought period had far-reaching impacts on tourism for much of the region (Dube et al., 2018). The hotel industry felt the most significant knock-on effects of the droughts, being particularly affected by low occupancy and loss of revenue in conjunction with increased operating costs. It is important to note, however, that within this subsector, there were some differences, with the high-end luxury hotels being in a better position to invest in innovative technology that would lessen the impacts of the drought (for example, investing in desalination plants) (Dube et al., 2018). Over a similar period in 2016, the resort town of Kariba in Zimbabwe experienced its third-worst drought, which was also attributed to the longest and most severe El Nino (Dube & Nhamo, 2020b). Here too, the years of drought coincided with the lowest levels of hotel occupancy (Dube & Nhamo, 2020b). It was also found that this area experienced at least 16 droughts between 1990 and 2017, marking an increase in drought episodes in the area (Dube & Nhamo, 2020b). This is concerning given the severity

of the impact of drought periods experienced in Cape Town and Kariba, both significant travel destinations in their respective countries. Evidence points to a potential increase in drought periods in the region, leading some to believe that they are "the single most significant threat to tourism" (Dube et al., 2018:8).

2.2 The relationship between climate change and tourism

Climate change has the potential to have significant impacts on the global tourism industry as well as the predominantly nature-based tourism industry throughout Africa (Dube & Nhamo, 2020a; Coldrey & Turpie, 2020; Lenzen et al., 2018). Climate change and its impacts, predominantly rainfall pattern variability, drought, and temperature increases, pose a potential threat to wildlife conservation and nature-based tourism throughout Africa (Dube & Nhamo, 2020a; Amelung et al., 2007).

Climate change and tourism have a feedback relationship (Mushawemhuka et al., 2018). Tourism is vulnerable to the current and potential future impacts of climate change particularly given its dependency on favourable climate (Pang et al., 2013, Dube et al., 2018; Dube & Nhamo, 2018a). However, it is also a significant source of greenhouse gas emissions and a contributor to climate change (Pang et al., 2013, Dube et al., 2018; Dube & Nhamo, 2018a). In 2008, the World Meteorological Organisation estimated that the tourism industry contributed about 5% of global carbon dioxide emissions (Pang et al., 2013: 13; Gossling et al. 2010: 120). This has since increased to approximately 8% (Lenzen et al., 2018: 523). The aviation sector accounts for the largest portion of this global emissions contribution, with international air traveling accounting for nearly 2% of global emissions, with long-haul and frequent flyers being the main drivers of this (Becken, 2002; Pang et al., 2013; Dube et al., 2018; Lenzen et al., 2018: 523;). This is significant for the South African tourism sector's emissions contribution as it is considered a long-haul destination for Global North-originating travelers (Saarinen et al., 2022). Further, with global tourism and aviation set on a growth trajectory, this contribution to global greenhouse emissions will increase substantially (Becken, 2002).

The overall carbon footprint for the global tourism industry is determined by two main factors: the demand for tourism and the carbon intensity of goods and services associated with the sector (Pang et al., 2013). Even though there have been some successes in reducing the carbon intensity of some tourism-related goods and services, the increase in demand for tourism has cancelled this out, with this increase in demand projected to continue in the near future (Pang et al., 2013). Pang et al.'s (2013) research revealed that growth in the global tourism sector is a "stronger accelerator of emissions than growth in manufacturing, construction or services provision" (Pang et al., 2013: 524). This challenges the mindset held by some, that "tourism is a low-impact and non-consumptive development option" (Pang et al., 2013: 256; Amusan & Olutola, 2017).

In South Africa, tourism has been pinpointed as a low-carbon, economic growth alternative to more energy intensive industries, such as mining (Amusan & Olutola, 2017; StatsSA, 2021; Brockington and Ponte, 2015; Smith and Fitchett, 2020; Winkler and Marquand, 2009). Whilst this is a laudable mission, especially given that currently the South African economy is predominantly coal-based and is one of the world's highest emitters, as evidenced above tourism significantly contributes to global emissions (Pang et al., 2013). Further to this, tourism may not be the safest choice, in terms of long-term sustainability or longevity, given the threat posed by climate change (Sifolo & Henama, 2017). Tourism is a climate-dependent and climate-sensitive industry, with many destinations around the world owing their popularity to favourable climates, including South Africa (Amelung et al., 2007; Dube & Nhamo, 2020b; Coldrey & Turpie, 2020; Dube et al., 2018). The Tourism Climate Index (TCI), first developed in 1985, is an index used to measure the suitability of a particular area's climate for tourism activities and the attractiveness for tourists (Amelung et al., 2007). An analysis of the TCI for destinations in the context of climate change shows that climate change potentially could have profound implications for the global tourism industry (Amelung et al., 2007; Fitchett et al., 2016a). Some locations could benefit from a changing climate, but others could become significantly less appealing and experience shifts or even declines in visitor numbers (Amelung et al., 2007). South Africa could be one such example of the latter. Negative perceptions and concerns by tourists of the impacts of climate change on various destinations and attractions in South Africa, in particular the Kruger National Park, could alter choices and travel patterns and could lead to a decrease in visitor arrivals (Dube & Nhamo,

2020a; Coldrey & Turpie, 2020). Temperature increases across South Africa's National Park network as evidenced above could lead to an overall decrease in occupancy levels, with the Kruger National Park predicted to see the most dramatic decline across the national park network (Coldrey & Turpie, 2020). As with the impact of droughts on tourism arrivals, this could have widespread knock-on effects both for South Africa and the southern African region (Dube & Nhamo, 2020b; Dube et al., 2018).

2.3 Climate change adaptation and mitigation in tourism: perceptions and understanding of key stakeholders

Following the research done on the relationship between climate change and tourism in the southern African context, it has been shown that the impacts of climate change, such as increased temperature and rainfall changes, will be detrimental to nature-based tourism in southern Africa (Dube et al., 2018; Mushawemhuka et al., 2018; Smith & Fitchett, 2020). However, it is unclear whether tourism industry stakeholders are aware of the extent of this threat. For example, in their research conducted in 2018, Dube et al. (2018) found that there is limited knowledge and research on the understanding and perceptions of tourism stakeholders on climate change and its impacts on tourism and nature-based tourism in particular in southern Africa (Dube et al., 2018; Mushawemhuka et al., 2018). In addition, some of the research conducted shows that, generally, there is low awareness of climate change impacts and little sense of urgency to adapt to or mitigate climate change impacts within the industry (Dube & Nhamo, 2018a; Mushawemhuka et al., 2018; Pandy & Rogerson, 2020). In contrast, there has been some research, such as that conducted by Smith and Fitchett (2020) in the Sabi Sands Nature Reserve, that found that respondents perceived climate change as a major threat to nature-based tourism. However, it was felt that the effects would be felt in the future, given the adaptive capacity of animals, making the immediate need for action against climate change less urgent (Smith & Fitchett, 2020).

The potential low awareness and consciousness of crucial tourism stakeholders, namely lodges and tourists, is concerning as the tourism industry is increasingly pressured to cut its emissions (Dube & Nhamo, 2018a). There is a need for strong climate change and tourism policy, yet the uncertainty around climate change and its impacts on tourism operators combined with often limited capacity in the Global South to address climate change, means

such policies are often reactive rather than proactive (Hambira & Saarinen, 2015). It is often the case that the tourism sector is lagging on the policy front despite its economic importance in many countries in southern Africa, with sectors such as energy and agriculture receiving more attention (Hambira & Saarinen, 2015). This could also be because tourism and climate change research and literature have seen a slow growth trajectory since the mid-1980s (Scott, 2021). Tourism was not mentioned in the Intergovernmental Panel on Climate Change's (IPCC) First Assessment Report (1990) and it was not until the IPCC's Fifth Assessment Report (2015) that tourism's role in climate change was formally recognised, creating little motivation for policy-makers to focus on tourism and climate change prior this (Scott, 2021; Dube et al., 2018).

An alternative view on this top-down approach to the complicated nexus between climate change and tourism is to look at those who could be considered the most important stakeholders – the tourists themselves. The way tourists view and perceive climate change informs "their actions, in either mitigation and/or adoption of adaptation strategies" (Dube et al., 2018: 2). Research conducted by Dube et al. (2018), looked at tourists' perceptions and knowledge of the impacts of climate change in the Okavango Delta, Botswana. It was found that while tourists visiting this region are aware of climate change and the implications of their travels, this awareness was not translated into meaningful action or change in travel behaviour (Dube et al., 2018). However, regardless of this finding, tourists did show an eagerness to make use of green technology, such as renewable energy or water-saving initiatives, if provided with the opportunity to do so (Dube et al., 2018). While this research is unique in that it focuses on tourist's perceptions, this could point to the need to increase awareness of climate change impacts to encourage a change in behaviour of tourists toward reducing their carbon footprint, which is arguably the responsibility of tourism operators (Dube & Nhamo, 2018a).

Tourism operators' perceptions and decision-making are important in creating an understanding of the climate change – tourism relationship (Mushawemhuka et al., 2018). However, as in the case of policymakers and tourists, there is low awareness of the climate change-tourism relationship and there is a significant number of tourism businesses, specifically in the case of research done by Mushawemhuka et al. (2018) in Hwange National

Park, Zimbabwe, that do not place sufficient urgency on the threat of climate change impacts, despite evidence pointing to the detrimental impacts climate change could have on tourism (Mushawemhuka et al., 2018). A study in Zimbabwe conducted in 2018 found that while most tourism operators were aware of the effects of climate change on the region and their operations, there were still some unconcerned views expressed (Mushawemhuka et al., 2018). These findings echo those of a similar study conducted in South Africa (Pandy & Rogerson, 2020). While this study was conducted some time ago, between 2013 and 2014, the views expressed by tourism operators are still somewhat concerning (Pandy & Rogerson, 2020). Climate change action was perceived as an added benefit by tourism operators interviewed, with other more immediate challenges to tourism operations, such as crime and political instability, taking precedence (Pandy & Rogerson, 2020). However, if tourism is to remain socially, economically, and environmentally sustainable, climate action must be pursued (Pandy and Rogerson, 2018).

Due to the complex tourism-climate change nexus, that of tourism being both vulnerable to climate change *and* a contributor to global emissions, some argue that both adaptation and mitigation need to be undertaken by the industry, simultaneously (Pang et al., 2013; Hambira & Saarinen, 2015). In addition to this, in the context of nature-based tourism, it is very difficult to separate adaptation and mitigation approaches to climate change, particularly in terms of policy (Hambira & Saarinen, 2015). In contrast to this, some argue that, given the extent of climate change impacts already being felt, mitigation measures, such as energy and water conservation measures and renewable energy use (Hambira & Saarinen, 2015; Mushawemhuka et al., 2018), will have minimal effect of greenhouse gas levels already in the atmosphere. This means that adaptation measures are imperative for tourism to be sustainable (Hambira et al., 2013; Pandy and Rogerson, 2018). Adaptation measures can be technical (rainwater harvesting and recycling systems), managerial (such as greening plans and policies, business strategies), policy related (complying with regulations), research, education (for staff, guests, and local communities), and behavioural (encouraging climate conscious and sustainable behaviours). Common adaptation measures include installing air-conditioning units and constructing swimming pools to deal with increased temperatures (Hambira & Saarinen, 2015; Mushawemhuka et al., 2018). However, some adaptation actions are fundamentally in opposition to mitigation efforts such as the installation of air-

conditioning systems, which would increase coal-powered energy use (Mushawemhuka et al., 2018). Therefore, there is a need to be mindful of both climate change adaptation and mitigation in tourism-climate change policy, decision-making and operations.

2.4 Policy and regulatory environment

As evident from the previous sections, the tourism sector in South Africa is highly vulnerable to the predicted impacts of climate change (Pang et al., 2013; Hambira & Saarinen, 2015; Saarinen et al., 2022;). As part of the strategy to reduce this vulnerability and ensure the sustainability of the sector, policies relating to climate change and tourism are needed to support the sector in strengthening resilience and building adaptation and mitigation actions (Saarinen et al., 2022). Despite this, research has found that there is a lack of clear and dedicated tourism-specific climate change policies in the southern African region (Saarinen et al., 2022). In keeping with this, South Africa has several climate change-related policies and initiatives (Saarinen et al., 2022). Among these are the National Climate Change Response White Paper (2011), the Draft Bill on Climate Change (2018), and the Carbon Tax Act (2019) (Saarinen et al., 2022). There are two prominent tourism-specific climate change policies, the 1996 White Paper on The Development and Promotion of Tourism and the 2011 Draft National Tourism Climate Action Plan (Department of Tourism, 1996; 2011). It is important to note that nothing has been published since 2011 on the topic.

The National Climate Change Response Green Paper published in 2010, first identified tourism as a sector vulnerable to climate change (Department of Tourism, 2011). Following this, the Draft National Tourism and Climate Change Action Plan was developed in 2011. The Action Plan aims to assist the industry in building its resilience and capacity to adapt to the impacts of climate change, as well as reducing its contribution to climate change through greenhouse gas emissions reduction (Department of Tourism, 2011). Given this double-sided relationship, the action plan advocates for a balanced approach of both mitigation and adaptation (Department of Tourism, 2011). However, following the publication of the Draft National Tourism and Climate Change Action Plan in 2011, policy development concerning climate change and tourism in South Africa has not progressed, arguably because the focus has been elsewhere (Pandy and Rogerson, 2021).

The Tourism Act of 2014 has the explicit aim to encourage and promote the practice of responsible tourism in the industry (Department of Tourism, 2020). To aid in the achievement of this aim, along with the Action Plan, a Strategic Plan 2020/21 – 2024/25 was developed. In the Strategic Plan, tourism is identified for its potential to "change the fortunes of the country and contribute to the achievement of Government's economic objectives" and the aspiration of 21 million foreign tourists by 2030 is laid out (Department of Tourism, 2020:14 - 15). With this aspirational goal comes the greater need to follow the principles of responsible tourism to ensure that the tourism industry overcomes the threat of climate change and can continue to support and grow the national economy (Department of Tourism, 2011). To further support this goal, and as a way to encourage Responsible Tourism, The Department of Tourism has an online Knowledge Portal freely available for those wanting to grow their knowledge on Responsible Tourism, how to gain Responsible Tourism certification, including local communities and climate change and greening actions through resource efficiency (Department of Tourism, 2023). For a time, tourism operators could apply for financial assistance, through The Green Tourism Incentive programme. When initially reviewed (November 2023) the only application page available was for the 1 October 2021 to 31 March 2022 period, with no further updates (IDC, 2023). Upon a second review (January 2024), applications were open for the period 25 January to 31 March 2024, the large gap presumably due to the after-effects of COVID-19 on the industry (IDC, 2023).

While the tourism industry plays a significant role in the South African economy, the growth of the industry needs to be navigated carefully (Brockington and Ponte, 2015; Amusan & Olutola, 2017; Smith & Fitchett, 2020; StatsSA, 2021). This is in light of the predictions of the increasing intensity and frequency of climate change impacts as well as the significant contributions the industry makes to global emissions and environmental degradation (Azam et al., 2018; Saarinen et al., 2022). Lessons from climate events that have already occurred need to be taken into consideration when planning the next steps, such as those learned during the 2015 – 2017 drought experienced by much of the country (Smith & Fitchett, 2020; Archer, 2020; Baudoin et al., 2017). Archer (2020), following research on the response to this drought event, recommends that the South African Government needs to take a longer-term more proactive approach, rather than a shorter-term reactive response, with greater government and non-government coordination (Archer, 2020). Further to this, Baudoin et al.

recommend a decentralized, multi-stakeholder approach, which would be more effective in disaster risk than the current centralised, rigid approach taken (Baudoin et al., 2017). However, this rethinking of policy when it comes to climate change impacts and their related disaster risk management needs to be done within the context of South Africa's low-skilled and under-resourced environment (Baudoin et al., 2017).

At the very core of South Africa's policy discourse, the Constitution, the South African Government recognises the importance of a healthy and safe environment for present and future generations (Pandy and Rogerson, 2021). Following this, South Africa has committed to and become a signatory of several important international climate change and environmental sustainability-focused agreements and guidelines, including the Kyoto Protocol, the United Nations Framework Convention on Climate Change (UNFCCC), and most recently the Paris Agreement (Pandy and Rogerson, 2021). The Paris Agreement calls for global economy-wide emissions reduction in a bid to prevent global temperatures from rising 2 degrees Celsius, or preferably 1.5 degrees Celsius (Paris Agreement, 2015; Saarinen et al., 2022). However, this could present challenges to the tourism industry in South Africa and globally, which has been growing in recent years (Saarinen et al., 2022). This growth, if it were to continue, would contribute to a future of increased climate change impacts (Saarinen et al., 2022). Under the Paris Agreement, the South African tourism economy needs to transform into a low-carbon economy and improve its understanding of climate risks to increase climate resilience of tourism-related businesses and the destination as a whole (Scott et al., 2016b: 940 in Saarinen et al., 2022: 138). While climate change presents challenges for all stakeholders in the tourism industry that can only effectively be overcome with collective action (Pandy and Rogerson, 2018), many tourism operators argue that the government's role is crucial in ensuring tourism businesses can overcome the challenges of climate change and continue to grow (Saarinen et at., 2012; Pandy and Rogerson, 2021). The South African government through the Responsible Tourism concept has the potential to do this, but it needs to carefully navigate the convoluted relationship between climate change and tourism and not further contribute to climate change or increase vulnerability to climate change impacts. However, the extent to which these policies can be successfully implemented relies on the perceptions and commitment of tourism operators and businesses to make

meaningful adjustments in their businesses to face the challenges of climate change (Pandy and Rogerson, 2018).

2.5 Conclusion

A review of the available literature in the field of tourism and climate change research in southern Africa shows clear evidence of climate change impacts on tourism, and nature-based tourism operations more specifically. In particular, rainfall variability, drought, and temperature increases will have implications for tourism in southern Africa more broadly and the GKNP area specifically. Climate change is currently altering and will continue to alter both the climate and biodiversity on which tourism is currently dependent, potentially reducing the attractiveness of important tourism destinations like that of the GKNP area. However, tourism is not only a victim of climate change but is also a significant contributor. Tourism operations globally, especially the aviation sector, produce as much as 8% of global emissions, potentially further exacerbating the current and potential future climate change impacts if adaptation and mitigation measures are not taken. Within the South African regulatory and policy environment, there is an attempt to navigate this complex relationship, via the concept of responsible tourism. However, while responsible tourism aims to promote tourism that is environmentally and socially sustainable, there is also the dual focus of pinpointing tourism as a means to achieve economic success for the country, with the ambition of increasing foreign visitor numbers to 21 million by 2030 which could be in contradiction to the move towards sustainable tourism.

Further to this, research shows that the potential for adaptation and mitigation measures to be taken is currently limited by the general lack of awareness and sense of urgency by various tourism stakeholders. Arguably, the tourism operators themselves have the greatest responsibility to take action. As the interface between policymakers and tourists, in addition to the current neoliberal global economy, tourism operators have both the responsibility and potential to ensure that the industry takes strong action against climate change, both in terms of climate change adaptation and mitigation.

3. Methodology and theoretical framework

The following chapter outlines the methodology used in this dissertation. It starts with the theoretical framework used to guide the reach, followed by the research design used, sampling, data collection, and data analysis.

3.1 Theoretical framework: Social-ecological systems framework

Berkes and Folke (1998) originally proposed the idea of a social-ecological system in their book entitled "Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience" (Berkes & Folke, 1998). While they do not give a clear definition of what a social-ecological system is, the idea behind the thinking of the social and ecological as one system is encapsulated as follows:

> "… social and ecological systems are in fact linked, and the delineation between social and natural systems is artificial and arbitrary" (Berkes & Folke, 1998: 4).

Ostrom (2009), a prominent proponent of social-ecological systems thinking, gives a clearer definition in her 2009 paper "A General Framework for Analysing Sustainability of Social-Ecological Systems" (Ostrom, 2009). Ostrom defines social-ecological systems, or SESs, as systems that are "composed of multiple subsystems and internal variables within these subsystems at multiple levels" (Ostrom, 2009: 419).

Protected area tourism is increasingly being recognised as a complex social-ecological system, made up of natural (the protected areas, such as GKNP) and social systems (local communities, employees, tourists) (Strickland-Munro and Moore, 2014). As noted, tourism in South Africa is dependent on the unique landscape and wildlife found in the many protected areas such as the Greater Kruger National Park. Tourism and protected areas have a mutually beneficial and longstanding relationship (Terkeni, 2004 in Heslinga et al., 2017; Strickland–Munro & Moore, 2014). As the tourism industry grows both globally and locally, the impact of tourism on the operational landscapes, particularly protected areas, will also increase (Heslinga et al., 2107). Therefore, for tourism to protect the nature on which it is dependent,

synergies between tourism and landscapes need to be identified (Heslinga et al., 2015). While tourism plays an important role in socio-economic development, such as job creation, its role in the conservation and protection of nature needs to be balanced against this (Heslinga et al., 2017). This research will examine the relationship between tourism and protected areas through the lens of climate change, focusing on the relationships between the natural and social systems of the GKNP. Tourism has a complex relationship with climate change in that it equally contributes to, and is vulnerable to, it. The social-ecological perspective allows for the understanding of this complex relationship as an integrated whole.

Drawing on the works of both Berkes and Folke (1998) and Ostrom (2009), the research has been guided by the social-ecological systems framework (Ostrom, 2009; Berkes & Folke, 1998). In the context of this research examining the relationship between the Greater Kruger National Park, nature-based tourism, and climate change, a complex socio-ecological system is defined here as a multi-stakeholder system (most importantly the biodiversity, tourism operators, tourists, local communities, and policymakers), with multiple interactions and feedbacks between the social system of tourism, the biodiversity, and landscape of the GKNP protected area and climate change impacts.

3.2 Research Design

The research was conducted to gain insight into the dynamic relationship between tourism and climate change. As the research sought to gain a deeper understanding and insight into the dynamics of this relationship of the chosen study area, a qualitative approach was deemed appropriate. The Greater Kruger area and its tourism operators were selected as the case study to examine the relationship between tourism and climate change. The Greater Kruger area, consisting of the SANParks-managed Kruger National Park and privately managed reserves, is an important tourism attraction, income generator, and economic driver (Coldrey and Turpie, 2020). The Kruger National Park hosts high volumes of visitors on an annual basis and supports the SANParks National Park system. Through an analysis of existing research, national policies, and strategies as well as primary data collection through semi-structured, qualitative interviews, an in-depth understanding is formed. This understanding includes the perceptions of the potential threats of climate change impacts on tourism operators; the extent of understanding of mitigation of and the adaptation to

potential impacts of climate change on nature-based tourism by the various operators as well as the current and future actions being taken to mitigate and adapt to these potential impacts.

Given the case-study approach, the research does not aim to make generalisations about the broader South African tourism context, as the area and sample are not representative of this.

3.3 Research Method

3.3.1 Sample and Sampling

The participants were chosen using purpose sampling. Using contacts and knowledge gained via employment within the tourism industry in South Africa, the researcher put together an extensive list of close to 200 tourism operators in the Greater Kruger Area. For this research, a tourism operator is a lodge or lodge group situated in the Greater Kruger area that offers accommodation and nature-based experiences to guests. Each operator was classified based on whether they operated in private and public protected areas that make up the GKNP, on the comfort level offered (e.g. 5-star luxury or entry-level self-catering), and whether they were permanent or semi-permanent structures. Operators were selected from each category, ensuring representation of all categories. Once all categories were represented, a total of 60 operators were contacted via email, requesting their participation in the research. The emails included a brief explanation of the research and its focus and outlined what would be required if the operator chose to participate. Sampling ceased once the redundancy of all categories was reached. By using this comprehensive list, researcher bias was limited through heterogeneous sampling. As COVID restrictions still applied and the cost of travel to the Greater Kruger area was deemed too expensive, hence the use of remote, online interviews. This was deemed sufficient as a focus group or participant observation was not needed as this was a perceptions study.

The initial aim of the sampling process was to reach a point of saturation of the themes of the research in the interview process. However, there was a lack of response to the initial email, and despite follow-up emails and phone calls, only 6 operators, all high-end 4 or 5 star lodges in private reserves and concessions, or 10% of the initial proposed sample size, agreed to

participate. Due to time constraints and the lack of interest from the majority of operators, the sampling process was stopped. This lack of response or interest in the subject was treated as a finding of the research to be reflected on.

3.3.2 Data Collection

Over the course of three months, semi-structured, in-depth interviews were conducted with participants. As each operator responded and agreed to participate, semi-structured, qualitative interviews were conducted. The interviews were conducted on an individual, one-on-one basis via online conference call, specifically using Zoom software. Online (via the use of Zoom) was chosen due to concerns around the spread of COVID-19 and to remove the need for travel by the researcher. The interviews were between 30 and 45 minutes in duration and were recorded using Zoom. Before starting each interview, the participant was again given a short explanation of the purpose of the research, and the ethical aspects of participating in the research were reiterated. Informed consent forms were signed ahead of each interview. The interviews were manually transcribed from the recordings by the researcher.

Ten broad, open-ended questions were formulated beforehand based on the aims and objectives of the research (see Appendix). This allowed the researcher some control over the direction of the conversation and ensured that the topics pertinent to the research were covered. However, a semi-structured interview style was chosen to allow for flexibility within the interview. If the question or theme was covered in the answer to a different question, the question was left out. This flexibility and open-ended approach allowed the participants to freely express their perceptions and understanding of climate change and its relationship with tourism in the area.

3.3.3 Data Analysis

Once the interviewing process came to an end, recorded interviews were transcribed. The data were then analysed then using thematic analysis. Initially, each transcript was combed through and various sections or answers were categorised into broader themes of the

research. Individual, more specific themes were identified within this, as well as new themes that were brought to light during the interviews.

Following this, one document was created with all these themes and sub-themes, and the relevant excerpts associated with each theme. Each transcript was read again to ensure no similarities or differences were missed until each transcript had been thoroughly thematically coded (see Appendix).

3.4 Limitations and Ethical Considerations

The semi-structured nature of the interviews could be seen as being too restricting for the participants and could hinder their ability to express themselves fully. This is the case particularly concerning the perceptions and understandings of the threat of potential climate change impacts and associated adaptation and mitigation measures needed. This was mitigated by keeping the questions open-ended, and carefully wording each question to ensure the responses were not influenced in any way.

The way the interviews were conducted may not have been conducive to open communication, given that some of the participants were in an office environment with limited privacy. The interviews were also conducted via Zoom rather than in person. An online platform such as Zoom means that it is harder to create an environment conducive to a relaxed, open conversation. An attempt was made to mitigate this by ensuring cameras remained on during the interviews, however cues such as body language were harder to pick up than if the interviews were in person.

Due to the purposive nature of the sampling, the data collected are not representative of the whole of the South African tourism industry's perceptions, understanding, and measures taken. However, generalisation and representativeness are not the aims of this research as the research was qualitative.

There were time constraints imposed on the researcher due to the proposed timeline of the research project. In addition, there were time constraints placed on the participants due to prior responsibilities and commitments which could lead to incomplete interviews.

The researcher made use of prior connections to the tourism industry and Greater Kruger operators. The researcher accounted for these prior connections in the sampling, data collection, and data analysis, by creating a comprehensive list of all tourism operators in the area, categorising them, and selecting several operators to approach from each category to ensure that all sectors of the Greater Kruger tourism operators were represented and no bias was shown to any particular operator.

Given these prior connections, the researcher took every measure possible to maintain the confidentiality, of both the participants involved as well as their associated companies and tourism operators. An informed consent form was given to each participant outlining the purpose of the research and the manner of information that is required of each participant. No physical or psychological harm was imparted to any of the participants.

4. Results

In this chapter, the results of the semi-structured, in-depth interviews conducted with tourism operators in the Greater Kruger area are outlined. While fewer interviews were conducted than originally intended, there were still several common themes found across the interviews. These were grouped to reflect the research aims and objectives outlined at the beginning of the dissertation. To maintain anonymity, the participants are numbered 1 – 6 and will be referred to as P1 – 6.

After a brief outline of each participant's background and some information on their operations, the main themes of the research were discussed during the interviews. The following section outlines the main results in line with these themes of current and future impacts of climate change, the perception of the participants of the threat of climate change to their operations, the level of understanding of climate change and its associated concepts of adaptation and mitigation, and any current or future plans in place to deal with the potential threat and impacts of climate change. Given the loose structure of the interviews, other themes and topics were also discussed, which are outlined at the end of the section.

4.1 Background

Out of almost 200 operators in the Greater Kruger area, 60 were contacted, including the parastatal that manages the Kruger National Park, SANParks. A total of 6 lodge operators agreed to participate and were interviewed. These 6 participants represented lodges located in four different private nature reserves. In addition, one participant had lodges in a private concession within the Kruger National Park itself. All participants focus on wildlife safaris in the Greater Kruger area and are therefore dependent on the ecosystems, wildlife, and natural landscapes to operate.

In terms of the types of guests that frequented the lodges interviewed, these were predominately international visitors to South Africa, pre-COVID. However, following the start of the pandemic and the associated travel restrictions, all participants pivoted their businesses to attract the local market. For a time, during the initial waves of COVID-19, while

the country's borders were closed for travel, the local market was the sole source of revenue for many tourism operators, including those interviewed. As travel is returning to pre-COVID patterns, many lodge operators are once more targeting international travelers. However, now domestic travel makes up a slightly bigger portion of guest structures than pre-COVID, given the separate resident rates and discounts put in place during the peak of COVID. For example, P3 had a domestic–international split of 15% to 85% respectively pre-COVID, which was sitting at a 60% to 40% split as international travelers at the time of interviewing, when travelers had started to return in early 2022. One participant, P6, came up with an innovative membership scheme for locals, asking for a membership fee upfront which was then donated to charitable causes, and in return members would be entitled to discounted rates on a sliding scale, depending on how close to time of travel the guests booked.

4.2 Experienced and potential impacts of climate change on the Greater Kruger area

Research question no. 3 deals with the lived experience of climate change impacts compared with the research. Therefore, the main climate change impacts highlighted in the research were discussed with participants. These were namely temperature increases, rainfall changes, and increased drought events. In addition to this, while not focused on in the literature, a number of the participants also mentioned flooding as a potential impact of climate change(P1, P2, P3, P4, P6, 2022). One such example of this was the mention by P6, of a flooding incident in 2012. P6 said that in the area of their operations "we had our year's rainfall in 35 hours" (P6, 2022). There was so much water that P6 witnessed something that they had not witnessed in their many years being based in Kruger, water spouting up through insect and small animal holes in the ground (P6, 2022). Flooding was similarly discussed with P1, P2, and P3. P4 said they are unaffected by flooding as they are "right on top of a crest so um so we have no problem with flooding." (P4, 2022).

4.2.1 Temperature

There were mixed responses to the proposal of temperature increases as a potential climate change impact. P4 said:

"Temperature I don't think too much. We're a human species and we're adaptable and we're very clever, so as it gets hotter we just put more air conditioning you know unless it becomes you know really significant. We get hot temperatures anyway so whether the temperatures goes from an average you know 32 degrees in summer to an average of 34 in summer I don't think that going to be noticeable for a guest on a 3/ 4 day stay. So temperatures I don't think too much" (P4, 2022).

P2 echoed these feelings stating that they hadn't noticed colder temperatures, and when it is hotter they have air-conditioning, so they are not affected (P2, 2022). In contrast to this, P5 said that they had noticed a change in temperatures during the winter seasons, remarking that these have become milder and have shortened (P5, 2022). Echoing this, P6 also felt that temperatures in winter are gradually getting warmer (P6, 2022). P3 said that they had "definitely seen increased temperatures" and had noticed that more and more guests are inquiring as to whether there is air-conditioning available at the lodge (P3, 2022). P1, while not saying whether they had noticed any changes, was aware that any long-term changes in temperature could alter some of the ecosystems in which they operate and that it could have an impact in the future (P1, 2022)

4.2.2 Rainfall changes and drought

When asked about any noticeable changes in rainfall, most participants tended to focus on a lack of rainfall or drought. P4's response focused on the ecological and guest impact of low rainfall and drought, saying

"You know extended periods of droughts where animals are suffering, that will have obviously an ecological impact, significantly, but also a very emotional impact from the guest point of view, they won't want to come and see. You see it in some of the other places, um I think [lodge in the Kalahari area] is going through quite a serious drought at the moment um and we had a guest here that he sent me an album of his trip. He was here for about a week and a week at [lodge]. And his stay at [lodge] was very negatively impacted by the drought. Um, and the loss of animals. They had to remove animals because the carrying capacity was down. So even if that wasn't attributed directly to climate change just a severe drought there has hit them badly and now he might not, unless the drought ends, won't book there again

for a while. So there will be a massive impact on our bottom line if that starts happening" (P4, 2022).

P2 made the point that dry weather can benefit lodge operators. In the Kruger area, the dry winter months between June and August are the most in-demand months of the year due to the low vegetation cover providing good game viewing conditions (P2, 2022). If the dry weather occurs for an extended period or severe or prolonged drought occurs, this can negatively impact game drives as, due to the lack of fences between reserves in many cases and the spatial variability across the Kruger area, animals can move into a less impacted area, allowing for less game viewing opportunities for guests (P1, 2022). P6, who has lived and worked in the Kruger area and at the particular lodge for many years, also mentioned the spatial variability in the area, saying "The difference between North and South, and East and West it quite drastic. You can see the areas of drought and other areas not" (P6, 2022).

Two participants spoke of specific droughts that they had experienced during their time in the Greater Kruger area (P3, P6, 2022). P3 spoke of a drought period between 2017 and 2018 where they lost many of their grazing species, including buffalo (P3, 2022). However, they then saw this cycle come back around and had some of their best rainfall over 2020/ 2021, seeing an abundance of plant life and grazing species (P3, 2022). P6, located in the central Kruger area, recalled the 2015 drought as the most recent serious drought, and one before that was in 1991/ 1992. However, they did clarify that they see these two drought events as what they called "serious drought" (P6, 2022). While there were other low rainfall and drought periods in the area, these did not have the same intensity, in his opinion, as the droughts of 1991/92 and 2015 (P6, 2022).

The level of threat of climate change in terms of time frame was also discussed. The answers to whether the participants felt that climate change was a short--, medium- or long-term threat to their operations were varied. P5 and P1 felt it was a long-term risk. P3 said it was all three, justifying their answer by saying "I think if we don't start making a shift in the short term, ja the long term impact is just going to be exponential" (P3, 2022). P2 said it was a medium-term risk. Finally, P6 said it depended on your age, saying that if you are 50 years old or older it would be short-term, but if you were much younger then it would be a medium-term risk (P6, 2022).

4.3 Perceptions of nature-based tourism operators of climate change as a potential threat to their operations

Per research objective no. 1, to gauge the perception of the severity of the threat of climate change to participants in terms of their operations, the participants were asked to list and rank all possible threats to their operations. Given that the interviews were conducted at a time when the tourism industry was slowly beginning to recover from the devastation of COVID-19, COVID-19 as a threat to operations was mentioned by all but one participant. At the time interviews were conducted, tourists were returning and hotels and lodges were slowly seeing money coming back into their businesses, with one participant remarking "COVID… but we seem to be over that now. So at the moment it's looking pretty good" (P4, 2022).

Other threats mentioned by participants included community unrest, poaching, fire, flooding, inconsistent water supply, human-animal conflict, and unstable energy supply. P1 explained that community unrest and protesting, often around election time, can threaten operations as it can disrupt the ability for guests to get into the reserves and to the various lodges as the roads are often blocked and unsafe to traverse (P1, 2022). The media coverage of such periods of unrest can also create negative perceptions of the safety of tourists visiting the area. Community unrest was also framed as land claims by the participants. Poaching, in particular rhino poaching, was mentioned by half of the participants as a threat to their operations. P1 explained:

"It's difficult to quantify that but we have seen a marked increase in poaching incidences over the last 6 – 9 months. And again in the Kruger area, there's a sort of amplified problem because you have this high unemployment in the communities surrounding the reserves so that is a definite risk… it is obviously just a risk, you know you don't want to see parts of your ecosystem disappearing. So a risk from that perspective" (P1, 2022).

P6 also highlighted the fact that lodges and their rangers and any associated anti-poaching units are acutely aware of the cycles of the moon, as poaching incidences often happen during a full moon, due to the increased visibility (P6, 2022).

Climate change was also mentioned as a potential threat to operations by the participants, although not all participants mentioned this despite it being the topic of the conversation. A common theme throughout the interviews was confusion around whether a weather event was or wasn't attributed to climate change. For example, P4 stated "ja as I say it's hard to see it, I've been at [lodge] for 15 years and guiding for 20 years, so in that 20 years there was a very wet cycle for, since ah the floods of 2000. Um and then up until about 2014, I think it was a very wet cycle and we have been in a dry cycle. So I've only had one cycle of each ah as an adult working in this industry. So hard to see the changes in that sense but most definitely" (P4, 2022). However, they then continued to say that any extended weather events, such as droughts or floods, would have a massive effect on the tourism and lodge industry (P4, 2022). They went on to say, that for example, an extended drought would affect the animals and change the landscape, which could then affect the lodge's bottom lines. Visitors would not want to visit a lodge and see animals dying (P4, 2022).

4.4 The level of understanding of climate change, associated concepts, and its impact on operations

To gauge the level of understanding of climate change and some of the associated concepts that were relevant to the study and tourism operations, the participants were asked to define climate change, climate change adaptation, and climate change mitigation.

The majority of the participants attempted to define all three concepts. The majority of participants had a limited understanding of the term climate change adaptation. There was a better understanding of the concept of climate change mitigation, as most seemed to have an understanding of what it is to mitigate an impact, even when not in the context of climate change. P1 deferred to those with more expertise on the matter, such as ecologists or others working on the ground within the park and reserves, but admitted that operationally it's not something that they and their team speak about (P1, 2022). P4 had somewhat of an understanding but was not entirely sure of what climate change meant or how it affected lodges and protected areas in particular, saying "Um I guess, um you know it will obviously start off with ah a global ah kind of perception of what climate change is. The effects of the ozone gases and industrialisation, covering up or increasing the temperatures…you know it's affected by the classic rising CO2 levels affecting the temperatures of the earth, which in

effect has a massive impact on um the ice packs and the rising sea levels and all of that nonsense. Um to be completely honest with you, how it affects us on a more micro-scale and with us, I'm not too sure" (P4, 2022). P5 confessed that they knew very little about climate change and that they were using the interview as an opportunity to learn more about it, starting with the difference between weather and climate (P5, 2022).

The impact of climate change on operations, both day-to-day and long-term, was particularly tricky to get to the bottom of. P5 described this best by saying

"And your question about how does it affect your operations … that's a very difficult question to answer that one. Um, I don't see how it can affect our operation in the sense that unless you have severe droughts for 5/10 years then yes, animals will die. But if you're getting the cycle that we're getting at the moment, like 2 or 3 years of drought which apparently in a nasty, sort of black, black way or dark way, whatever you want to call it is good in the sense that old animals die off and the strong ones stay on type thing. That's good. But over 5 or 10-year droughts then, we haven't experienced that yet but that will obviously have severe implications on the game's survivability. Cause you can't feed game indefinitely over that period. I'm talking about elephants, rhinos, and all the grass eaters basically. And then moving on to extreme rain, or heavy rains. With floods, how does that affect our operation? It doesn't really in the sense that long term it doesn't. Long term it's actually very good. Obviously it's, it fills up the water tables, and they come right back up again so that is good for the boreholes, etc. ah but short term obviously if you have floods then you get cut off. That's an obvious effect for the immediate term". (P5, 2022)

P4 echoed this, saying

"… to answer that question from a lodge point of view, I'm not 100% sure what the effects have been and will be for us." Conversely, P6, who showed some understanding of the climate change concepts raised during the interview, explained that climate change has been happening since the start of Earth, but the difference now in "the modern era, we do not talk about the earthly climate change of natural climate change, we talk about human-induced climate change. That's what we are dealing with at the moment" (P6, 2022).

Many participants expressed confusion around whether a weather event was or wasn't attributable to climate change. P1, P3, P4, and P6 all mentioned this uncertainty (P1, P3, P4, and P6, 2022). P4 mentioned the normal fluctuations they have seen in weather patterns in

their time working in the Kruger area, as one participant explained: “Go back 100 years in the climate records of Kruger there’s generally a 10-year fluctuation between a wet and a dry cycle so you know suddenly we have a massive drought and everyone says ah ja it's global warming you know” (P4, 2022). P6 added, “We get random weather patterns which you can’t just blame that on climate change” (P6, 2022).

4.5 Current and Future Plans of Nature-based Tourism Operators to Deal with Potential Climate Change Impacts

Research objective no. 3 focused on national policy influence on the actions of tourism operators to become more sustainable and climate change conscious. Therefore, both internal and the influence of external or national policies was discussed during the interviews.

4.5.1 Internal: plans and policies

All of the participants lodges had various sustainability policies and practices in place. These were in place to various degrees, ranging from formal policy documents put together with the help of outside consultants to ad hoc practices put in place as and when needed. However, none had anything specifically relating to climate change, rather the policies focused on overall sustainability goals. However, lightening the footprint of a business, in any capacity, ultimately contributes to the fight against climate change. In saying this, P5 was keen to put something together and mentioned again that that was one of the reasons they agreed to participate in the study, to see whether they would gain any guidance on this (P5, 2022).

The sustainability initiatives mentioned by the participants included: plastic reduction, water saving, reducing the reliance on fossil fuels and the Eskom grid power supply, green audits, re-evaluating where they source their goods and produce from, and encouraging staff and guests to follow a primarily plant-based diet. In addition, 5 out of the 6 participants mentioned that they already make use of solar power or have plans to move over to solar power (P1, P3, P4, P5, P6, 2022). In a similar thread, 3 of the participants mentioned they are looking into making use of Electric Safari Vehicles (ESVs) rather than traditional safari vehicles that run on diesel (P1, P3, P4, 2022). There is a double benefit from taking these actions, as P4 pointed out “We are not only for climate change but just from a reducing cost [point of

view], you know with the rising costs of fossil fuels so there's a double benefit" (P4, 2022). However, some of these actions can be costly, most notably solar power, however as P6 said "its short short-term pain for long-term gain, you'll save your costs in 10 years" (P6, 2022). It should also be noted that having sustainability measures in place could also improve the marketing and reputation of a lodge in the view of customers or guests, as P4 also pointed out as "they're looking for places that are acting green" (P4, 2022).

4.5.2 External: Influence of South African Government policies and regulations

The actions already in place were generally internal policies, that the businesses had decided to put in place. While outside organisations did contribute to some of these actions and policies, such as the GKEPF (Greater Kruger Environmental Protection Foundation), APNR (Associated Private Nature Reserves), and SANParks (South African National Parks), the implementation of the initiatives was driven and maintained by the lodges. However, there was no mention of specific government policies and regulations surrounding sustainable tourism operations and practices or the use of the term Responsible Tourism. Even though there are resources that aim to guide and assist tourism operators in this regard. Until recently there were also financial resources available, through The Green Tourism Incentive Programme, to aid and encourage businesses to take, often costly, measures towards the Responsible Tourism objective of the South African Government and Department of Tourism. In addition, one participant conveyed that it is the government's role to take the lead on such matters and encourage all tourism businesses to operate in a climate-conscious manner (P4, 2022). They felt that they needed to wait for the government to change relevant regulations before taking any measurable steps towards this (P4, 2022). Echoing this, P5 felt that it was the government's responsibility to invest in more costly measures, using desalination plants as an example (P5, 2022).

On a more global scale, international agreements and organisations were also not mentioned. The Paris Agreement, IPCC, and UNFCCC are often mentioned in the media, exposing businesses to the terms and conditions of such organisations and agreements. These were not mentioned by participants in a discussion focused on climate change.

4.6 Related findings

Beyond the topic of climate change, other points of interest were raised during the interviews. A point raised by two participants centred on the general human impact of tourism on the surrounding natural environment of the Greater Kruger (P1, P3, 2022). P1 said in their interview "just the impact, the human impact on the reserve. You know, whether it's through walking, whether it's through driving, I suppose it's just human impact on the reserve. What that could do to the ecosystem, you don't want to be killing off, or clearing scores of areas, trees, and things like that" (P1, 2022). P3 spoke of the volume of humans and guests that visit the area and how this needs to be managed, saying

"sheer volume of guests on the ground that we have to, that we would have to deal with… and then on the ground from our point of view is how do we manage that impact on the ground from a waste management point of view, power generation." (P3, 2022).

P1 also mentioned, that even though they are a luxury lodge offering, they have taken a stand against offering private vehicles to guests, to reduce the number of vehicles traversing the area (P1, 2022).

In addition to this, while the topic of the conversation was climate change and the responsibility that tourism operators have to adapt to and minimise these impacts, two participants expressed a contrasting view. P2 felt, that due to their location, lodges are at the forefront of conservation, and simply by operating in conservation or protected areas such as the Greater Kruger, they are contributing to conservation and protecting the environment, as they are bringing in both revenue to support these efforts and creating awareness as guests can see and experience for themselves the flora and fauna and the need to conserve this (P2, 2022). P4 also said that their footprint is relatively small compared to other businesses and business sectors such as retail, saying

"Our footprint here is relatively small. Obviously, in terms of capita, it is quite large cause you know it's 5 star so lots of air conditioners, lots of waste food but in a total percentage of the lodge it's not that big" (4, 2022).

There are close to close to 200 tourism operators in the greater Kruger area. Of these approximately 60 operators were contacted to request participation, and only 6 interviews were successfully conducted. There were a notable number of non–responses and declines.

This lack of response and participation could point to a lack of concern or prioritization of the issue of climate change with regards to lodges operations. Amongst those that declined were prominent and long-standing operators in the area who, past and present are leaders in the conservation and sustainability efforts of the South African tourism industry. A brief look at these operator's websites will confirm this. Reasons for the decline included not being comfortable participating and deferring to others in the industry with more knowledge, who then, in turn, declined participation as well. This lack of participation was unexpected and is significant in itself.

5. Discussion

This chapter investigates the main themes of the overall research and those that arose from the participant interviews. It will explore the meaning and identify the importance of the issues and themes raised by the participants and will relate them to the overall aims of the research. These aims are to provide a broad overview of potential climate change impacts on nature-based tourism operators; to understand the perceptions of nature-based tourism operators to the potential threat of climate change to their operations; to investigate the level of understanding of climate change-related key concepts; and to gain insight into any current and future plans to adapt to and mitigate against potential climate change impacts.

5.1 Perceptions of nature-based tourism operators of climate change as a potential threat to their operations

Research aim no. 2 focused on investigating the level of perceived threat climate change poses on tourism operations in the Greater Kruger area. Therefore climate change as a threat is discussed in this section concerning the recent threat of COVID – 19, community relations and policies.

5.1.1 Climate change vs COVID-19

All participants in the interviews mentioned COVID-19 in several capacities, the most notable being that of a current threat to their operations. Given the time at which the interviews took place (early 2022) the COVID-19 pandemic was still very much top of mind for the participants. It could be argued that if the interviews were to have been conducted before the pandemic or at a time when the operators had had more time to recover from its effects, these responses would have been different. However, due to the timing of the interviews and the level of impact of the pandemic, greater urgency was placed on recovering from this threat than was given to the threat of climate change. This points to the long-term nature of climate change as a threat to tourism operations, compared to other more immediate threats such as the pandemic, or more immediate climate events such as flooding.

The COVID-19 pandemic brought tourism operations in South Africa almost to a complete standstill. The industry saw job losses, financial losses, and in some cases closure of parts of or whole operations. For an industry that had experienced an overall growth pattern in the

years leading up to the pandemic, this came as a shock. Those operations that survived had been forced to change their business structures to cater to the local market, given that international travellers were all but banned from visiting the country. All participants outlined that their guest structure had gone from being majority international guests to mostly local visitors. By doing this, operations could continue, but at much smaller profit margins given the lower rates given to these guests. While perhaps not explicitly stated, participants were waiting for international visitor numbers to return to pre-COVID levels to resume a more business-as-usual approach.

In the time since the interviews took place, the world was in its third year since the start of the pandemic, and international visitor numbers have risen substantially in South Africa. This points to the relatively short-term nature of the COVID-19 pandemic as a threat to nature-based tourism operations in South Africa. In contrast, the ramifications of climate change impacts, both current and future, "will fundamentally change the tourism sector globally and will have major long-term impacts" (Saarinen et al., 2022: 4). Therefore as the authors of the recently published book, Climate change and Tourism in Southern Africa (2022), point out "It is important to keep the long term consequences of climate change in mind rather than the relatively short – term impacts of COVID-19" (Saarinen et al., 2022: 4).

5.1.2 The role of local communities

In keeping with the social-ecological systems framework used for this research, the role of local communities in lodge operations and the impact of climate change is a key finding. Three participants mentioned community unrest as a challenge they faced in their daily operations. This unrest was said to be caused by the uncertainty around land claims, unemployment, and poor service delivery (P2, P1, and P4, 2022). Land claims can often be very difficult to navigate and to come to a decision that meets all parties' needs. While the injustices of the past need to be appropriately rectified, so too do tourism operations need to continue to provide jobs and funding to maintain protected areas (Ramutsindela, 2015). For conservation areas to thrive, they need to balance conservation needs as well as the needs of local communities, ensuring that communities enjoy the benefits as well (Preston-Whyte and Watson, 2005; Hambira et al., 2013). One such way for communities to benefit from conservation and protected areas is through jobs, revenue, and assistance in community development from

nature-based tourism operations. Participants in this research and many other tourism operators try to benefit local communities in some way, through community development projects, funds and foundations. Although it is pertinent to bear in mind that when it comes to the philanthropy of tourism operators, in the form of community development and conservation, a critical eye needs to be cast, as these initiatives aren't always as they seem and could be of more benefit to the business than to communities and wildlife (Ramutsindela, 2015).

However positive relationships with communities were also mentioned by P3 and P4 (P3 and P4, 2022). This was namely through an innovative integrated waste management programme that was tackling two prevalent problems with one programme – waste removal from lodges and unemployment in the local communities (P4, 2022). This positive relationship with local communities is important if tourism is going to work together with local communities to continue on a sustainable path. The notion of responsible or sustainable tourism balancing the complex social and ecological systems and their needs. Not only do tourism operations need to alter their operations in the face of climate change impacts, but they need to do this with the participation of the local communities in which they operate. In the Kruger area, nature-based tourism and community-based tourism go hand in hand. While it seems that this mindset is already in place to an extent, as mentioned by P4 who said there has been a "push over the last 20 years to include local communities and ensuring they see the value of tourism and the national parks", this also needs to be done through the lens of climate change, so that tourism operations can help to increase the resilience of these local communities to the impacts of climate change (P4, 2022).

For a lodge to be fully sustainable, social systems need to be considered and its practices and operations need to include or benefit the local communities (Preston-Whyte and Watson, 2005). As climate change was the topic of discussion in the interviews, the participants chose to focus on their greening practices. However, through community development projects, such as the waste removal program mentioned, and overall positive and strong relationships with local communities, their sustainable practices were more extensive than they realised. P2 felt that they did nothing in terms of greening their operations, but on a review of their website, the lodge has a community development project in a nearby community. In addition,

on review of their websites, all six tourism operators that participated in the interviews mentioned community projects, with some also mentioning green actions and conservation projects. These operators do not operate in isolation of local communities, particularly given the proximity to local and marginalised communities and their business practices must include local community members.

Local communities are an integral part of sustainability in the tourism industry. The triple-bottom-line approach, that of people, profit, and planet, is a prevailing approach to business. The three pillars of sustainability are the environment, the economy, and the socio-cultural (Adu-Ampong, Kimbu, and Saarinen, 2020). In business, all three are essential for a sustainable and successful business model. However, this model can be seen as problematic as profit (or economics) is often dominant in business practice and some have argued that it needs to be rethought to better align the three elements (Adu-Ampong, Kimbu and Saarinen, 2020). It can be argued, on the other hand, that for a business to be financially sustainable, it needs to make a profit to continue to operate. Given this, the triple bottom line concept is understandable and accessible to many businesses and can still be a helpful concept, as even if profit is the goal, it can often serve as a means to an end, as sustainability, community development, and conservation are often good for business. As long as the outcome is positive and beneficial for all, the means to the end is less important.

5.1.3 Policies

To gain a clearer understanding of the level of priority given to the threat of climate change to operations, the topic of internal policies of the tourism operators and external influences was discussed in the interviews. The policy environment in which tourism operates is an important consideration in understanding this complex Social-ecological system. It was found that only one operator who participated (P1, 2022) had a formal, overarching policy in place, that was created by an external expert consultant in the area of sustainability and climate action in the South African tourism industry. In saying that, this policy was only completed shortly before the interview took place, so it has not been implemented to its full extent. The other participants had policies relating to particular sustainability actions, such as waste management, plastic reduction, energy and water-saving methods and green audits. The

policies discussed were internally driven, rather than done in compliance with external policies or regulations.

Further to this, it was found that SANParks had very little influence, given that the majority of the lodges interviewed operated in private reserves, except P1 who had lodges in both the Kruger National Park and on a private reserve. Strikingly, P1 mentioned that there were cases of unsustainable practices being witnessed at SANParks operations, such as sprinklers being run on dry grass for the majority of the day.

Given that the lodges interviewed operated in several different private reserves, two governing bodies were discussed, including the APNR (Associated Private Nature Reserves) and GKEPF (Greater Kruger Environmental Protection Foundation). Each lodge and governing body was found to have different policies and standards by which they had to abide, rather than one set of common rules and regulations that were followed.

None of the participants mentioned national climate change or tourism-specific climate change policies, such as the Draft National Tourism and Climate Change Action Plan, or the concept of Responsible Tourism outlined in the White Paper on The Development and Promotion of Tourism in South Africa mentioned previously. However, there was a broad opinion expressed that this leadership should also come from the government level. Two participants mentioned that they felt that it was the government's responsibility to put policies and standard operating procedures for lodges and other tourism stakeholders in place (P4, P5, 2022). P2 mentioned that they have been waiting for the government to put such things in place, and in the meantime had taken pre-emptive measures for when such a time comes, such as participating in green audits (P2, 2022). P2 felt that the government needed to take a more active and forceful role in adapting to and mitigating climate change, both in the travel industry and in South African society more broadly (P2, 2022). P5 felt that infrastructural development that would require large investments, should be led by the government, rather than small businesses (P5, 2022). This is in keeping with research done in the southern African region, such as that conducted in the South Kgalagadi South District in Botswana where tourism operators believed that the government's role and the policies and regulations put in place are crucial in ensuring the sustainability of the tourism industry

(Saarinen et al., 2012). While there are educational resources available, such as The Department of Tourism's Knowledge Portal mentioned earlier, the fact that key concepts featured here such as Responsible Tourism, Greening and Resource Efficiency and other key Climate Change organisations such as the UNFCCC were not mentioned by the participants could mean that these resources are not being used or accessed by the tourism operators and that more needs to be done to increase awareness and understanding of the value of these tools any others that may be available. This could be an indication of the low awareness of the topic and low urgency given to the potential threat of climate change. In addition, the fact that these tools as well as financial assistance such as the Green Tourism Incentive Programme are not being used could hinder tourism operators' ability to effectively implement measures to combat climate change. This perhaps points to a disconnect between the knowledge of researchers and policymakers as opposed to stakeholders (tourism businesses), leading to a missing link between climate change knowledge and climate change action (Pandy and Rogerson, 2018).

5.2 Impacts experienced by participants vs. those featured in research and predicted impacts

As per research question no. 3. when comparing the research to the lived experience of the participants, there are similarities and differences. The research shows that there is clear evidence of climate change impacts in the Greater Kruger area, in the form of rainfall changes and temperature increases. However, for those on the ground, with a more limited understanding of climate change and its impacts than in the research, these changes can be harder to pinpoint. The research conducted by Coldrey and Turpie (2020), showed clear evidence of temperature increases in the Greater Kruger area (Coldrey and Turpie, 2020). However, when this was discussed with the participants, the responses were peppered with uncertainty on whether temperatures were increasing due to climate change or climate variation. This uncertainty comes from a lack of understanding about whether a weather event can be attributed to climate change or not. This uncertainty stems from a lack of understanding of what climate change is, that is a long-term, broad phenomenon, that is inherently uncertain, rather than a series of directly attributable weather events.

Despite this uncertainty on whether changes could be attributed to climate change carried through in the interviews, there were some accuracies in climate events mentioned by the participants when compared to the research. Two participants mentioned a drought event occurring between 2015 and 2018. While the exact dates did not match those of the research, this could be due to the spatial variability and heterogeneity across the Greater Kruger area or perhaps due to a memory recall issue (Smith and Fitchett, 2020). However, it is encouraging that participants mentioned this drought event and made this connection, as the 2015 – 2017 drought is said to be one of the worst in recent history (Smith and Fitchett, 2020). This shows that, while knowledge and understanding may not be at the level of researchers and experts in the field of climate change and tourism, the lived experience is still an important factor to consider when understanding the relationship between climate change and tourism, and shows the importance of a mixed – methods approach in this field and ensuring all stakeholders are included.

5.3 Level of understanding

5.3.1 Timelines

To gain insight into the level of understanding of climate change and its impacts on tourism operations, a discussion was had with each participant around timelines. In this discussion, short-, medium-, and long-term timelines were identified by participants. This research defines short-term as anything up to 5 years, medium-term being 5 – 10 years, and long-term being longer than 10 years. However, during discussions, it was evident that there was some confusion around this. Some participants spoke about the timeline of a specific impact. P4 said that if a drought is short-term, then the impacts would be manageable, whereas if it was a drought that lasted longer, for 10 – 15 years, then the impacts would be worse for lodges and the ecosystem.

Speaking to the urgency of climate change as a threat to lodge operators, P5 felt that climate change could become more of a problem for operators in as soon as in 10 years. Other participants also felt that climate change would become more of a threat in the medium to long term. However, research has shown that impacts are already being felt in the greater Kruger area. Therefore, while COVID was an immediate threat at the time the interviews took

place, operators should turn their focus to the threat of climate change as soon as possible. Sustainability projects take both time and resources to implement and the sooner operators turn their attention to implementing sustainability and climate-friendly measures, the more more resilience they will build when climate change impacts worsen.

5.3.2 Geographical Scales

As with the concept of timelines of the impacts of climate change, so too was it evident that there was confusion about the locality of climate change impacts. Climate change is very much a global phenomenon, creating the perception or misconception that it is something that happening far away. However, while the problem of climate change is global in scale, the impacts are being felt at the local scale. The global scale of the problem leads to the perception that nothing that is done on a local or micro level, in a local community or on a private game reserve, will make enough of an impact or change things enough to make a difference.

Comments were made such as "[climate change is] one of the big problems with climate change, as an individual you know what can I do on a global problem?" (P2, 2022). While lodges are taking steps to reduce, reuse, recycle, and lighten their footprint, there is a disconnect between the steps being taken, sometimes at great expense, and how this translates into tangible action against climate change. Climate change may often be seen as an intangible concept, spoken about by scientists and politicians at big global conferences such as the COPs (Conference of the Parties), and is not seen as something that business owners, travellers, and lodge staff should be involved in.

5.4 Related themes

5.4.1 Conservation vs climate change

In discussing climate change and the steps that operators are taking to minimise and adapt to its impacts, one participant took a slightly different approach in answering the interview questions. They felt that tourism operators are increasingly being pressured to take steps to become more sustainable (P2, 2022). However, P2 was becoming increasingly resistant to this pressure (P2, 2022). By operating in the Greater Kruger area, lodges are at the forefront of

conservation. Lodges and more broadly tourism provide the revenue and jobs that are required for conservation and protected areas to continue existing. P2 felt that in operating, eco-lodges that focus on photographic safaris are providing a low-density, low-impact alternative to more harmful methods of revenue generation and land uses, such as golf courses and hunting safaris.

Therefore the question of whether lodges operating in conservation and protected areas in southern Africa should be held responsible for minimising the impacts of climate change needs to be addressed. Not only are they already providing a vital source of revenue for these areas to continue to be conserved and protected, but southern Africa as a region produces a very small proportion of global greenhouse gas emissions (Saarinen et al., 2022; 34).

However, as stated earlier, tourism as an industry contributes between 8 – 10% of global greenhouse gas emissions (Saarinen et al., 2022; Lenzen et al., 2018: 523). It can be argued that it is not insignificant in a time where every person, business, and industry needs to do their part in halting or preventing the impacts of climate change. With nearly 200 lodges operating in the area, P1 and P3 mentioned the concern of the human impact of tourism on protected areas, through the number of guests and tourists that pass through the area and its lodges, as well as the impact of vehicles and land clearing for operations (P1 and P3, 2022). In addition, in the 5 star lodge space, while the density of guests is relatively low, the per capita impact would be high due to the higher use of resources needed to deliver a standard to guests in accordance to the prices charged.

5.4.2 Supply vs demand

The question of climate change responsibility is often a topic of discussion in the climate change conversation. In the tourism and climate change context, it is a question of whether it is the responsibility of the tourism suppliers, lodges, hotels, and airlines, to take steps to mitigate against and adapt to climate change, or whether it should be the tourists that put pressure on these suppliers to make the necessary changes to their operations. One participant felt that it was the responsibility of the lodge to educate guests (P6, 2022). Particularly in a lodge setting, guides spend many hours a day with their guests, either on game drives or hosting meals, and it is their responsibility to take this time to have

conversations with guests about the importance of taking steps to help ensure that areas such as the Greater Kruger are still around for future generations to enjoy and how guests can help to ensure that. It was the opinion of P6 that education is the single biggest step that can be taken in combating climate change, whether that is at a grassroots level in schools or about how individuals can take steps to reduce their impact, such as a change in diet or the impact (both positive and negative) of travel. P6 said that it is often the case that guests have little knowledge or interest in the efforts of lodges to conserve and protect the surrounding natural environment until the conservation is started by a guide or staff member (P6, 2022). It is also through this that a lodge can distinguish itself, especially in an area so saturated with lodges in the Greater Kruger area, through its positive and social responsibility efforts.

5.4.3 Lack of responses

The lower-than-expected participation in the research could have been due to several reasons. It could be an indication of low awareness or engagement on the topic. Further to this, as seen in the interviews that were conducted, there is an overall low level of urgency when framing the threat of climate change to tourism operations. In addition, there are other threats regarded as more immediate and therefore are seen as more pressing, such as COVID-19, poaching, or community unrest. This is not to say that these threats do not deserve and require time and resources to overcome. However, the potential threat of climate change could be detrimental to tourism if not dealt with timeously. Some of those who declined participation cited that they were not comfortable to participate. The information discussed in the interviews was confidential and anonymous, which was communicated to those approached to participate, but there could still be the perception that by participating they may have been required to expose themselves or their business strategies to their competitors or others in the industry. In saying this, while participation in the research was voluntary, participation would have been beneficial for all stakeholders and would have allowed the opportunity for knowledge sharing and growing, benefiting tourism in the area and more broadly in the country.

6. Conclusions and recommendations

The potential benefits of tourism in South Africa are numerous and substantial. Not only is it an important and significant contributor to the South African economy, but also plays an important role in community development and conservation (Preston-Whyte and Watson, 2005). However, this potential is being jeopardised by the threat of climate change. While there is some uncertainty in the research and predictions, there is an overall consensus that climate change will have adverse impacts on the tourism sector, through an overall warming and drying of the climate as well as the increase in frequency and intensity of climate events such as droughts. These impacts are already being witnessed by those on the ground, and the consequences of these impacts have to be navigated. The threat is imminent, but, as has been found in prior research, this dissertation found that tourism operators do not perceive climate change as an urgent threat. Given this, the concern is that, if predictions are accurate, the impacts will worsen and the time to act will be too late.

The tourism sector in South Africa will continue to be threatened by climate change and urgent and pertinent steps are not being taken to adapt to and mitigate the current and predicted impacts. The research showed that there was an understanding of climate change, as well as the concurrent concepts of climate change mitigation and adaptation. However, this understanding was somewhat limited, and peppered with uncertainty about what can or can't be attributed to climate change, the geographical scale of the impacts and the actions needed to be carried out, as well as the timescale of the threat itself.

There are some positive takeaways as well. Climate change itself is plagued by uncertainty, even within the scientific community, with some impacts being harder to track and predict than others, such as changes in rainfall patterns. Given this, it is understandable that tourism operators and business owners also have some uncertainty on the topic. In saying that, some similarities can be drawn between the impacts observed in the research and the lived experiences of the participants, namely in the most recent and arguably worst drought event in recent history. This points to an awareness of participants of the climate and weather

conditions in which they operate, and events such as these could help prepare them for the possible worsening of such events that are predicted to occur (Smith and Fitchett, 2020).

In addition, the positive relationship with local communities that the participants have is encouraging. Conservation areas and communities are integrally linked and for conservation areas to be sustainable, they must benefit the local communities, particularly through job creation and community development initiatives. Many tourism operators in the Greater Kruger area, including those who participated in the research benefit the communities either through employment opportunities or community development initiatives, further increasing their sustainability statuses, even though they may not have climate change or other sustainability measures in place.

One of the steps taken to meet the objectives of this dissertation was to make recommendations for tourism operators and other stakeholders in the industry about how best to navigate the threat that climate change poses to the industry. The following section outlines these recommendations:

6.1 Collaboration between operators and the sharing of knowledge

The Greater Kruger area is a large ecosystem following the dropping of fences between many of the private nature reserves and the national park over recent years. Therefore, as animals are now able to roam the area freely, for the most part, the environmental and climatic changes in one part of the Greater Kruger have the potential to affect the whole area. Given this, as in the case of conservation efforts of various keystone species, it is beneficial for tourism operators on both public and private land, to work together to minimise the impacts of climate change and to ensure the longevity and sustainability of the area as a whole. While individual actions are necessary and important in mitigating and adapting to climate change, if these actions are multiplied, the impact could be much greater.

Ultimately, all tourism operators in the Greater Kruger area want the same thing – to allow guests to experience the natural beauty of the area while giving the best experience possible. The hope is that this will continue for generations to come, but for that to happen the natural beauty of the area has to remain intact.

The sharing of knowledge extends further than between tourism operators. It should also extend to researchers and experts in the field of climate change, and in particular climate change and tourism, to share their knowledge and assist in growing the knowledge base and awareness, helping operators to better understand climate change to fully guard themselves against its impacts and to adopt mitigation and adaptation efforts relevant to their particular operations. Experts can help shift perspectives, from a short-term need to know whether something is due to climate change, to a long-term understanding that uncertainty is inherent in climate change and we need to do our best to minimise its impacts regardless.

Civic movements can make climate change action something achievable for everyone. Climate change as a concept and as a phenomenon can be overwhelming to many due to its complexity and the language used by experts and scientists. However civic movements that take this science of climate change and disseminate it into more relatable and understandable pieces, help to reduce the overwhelming nature of the task at hand. Civic movements and organisations working with tourism operators could be hugely beneficial in helping to reduce some of the uncertainty and complexity so that tourism operators are more confident in the steps they can take to minimise the impacts of climate change on their operations.

6.2 Short-term pain vs. long-term gain

A number of the participants mentioned that they already had solar energy systems installed or were investigating the installation of this. However, as mentioned by P5, solar energy systems require a large financial outlay. P5 installed their solar energy system more than 10 years ago and, after some improvements and adjustments, is only seeing the return on their investment now. However, at the time of installation, P5's motivation, to become more sustainable, outweighed the negative impact of the large financial outlay it required. Participant 5's financial sacrifice all those years ago means that their operations have had a head start in their sustainability journey, with 10 or more years of lower consumption of fossil fuel energy, and are now in a position to continue to reduce their footprint in other areas of operation.

The higher upfront financial outlay required to implement renewable energy sources, or to switch to more energy-efficient appliances and other technologies, often serves as a barrier for tourism operators to becoming more environmentally sustainable and reducing their carbon footprints (Saarinen et al., 2022: 123). However for these establishments to increase their climate change adaptation and mitigation efforts, large infrastructural changes and large financial outlays aren't the only options (Saarinen et al., 2022: p96 – 114). In the context of climate change adaptation, tourism operators have three options: larger-cost infrastructural adaptation, medium and low-cost infrastructural adaptation, and non-infrastructural adaptation to climate change (Saarinen et al., 2022: p96 – 114). These three options can be applied depending on the context and scale of adaptation implementation however, perhaps the best place to start for many tourism operators would be to implement non-infrastructural changes (Saarinen et al., 2022). These changes would require a shift in thinking and potential restructuring of business operations to diversify offerings depending on the climatic seasons, ensuring business operations all year round, rather than implementing or building infrastructure to adapt to changing climates (Saarinen et al., 2022). This approach to climate change adaptation in the tourism sector is particularly relevant in the case of planning for "low-probability or low-frequency but high-intensity events" which require forward planning and strategic thinking to ensure a business is flexible and resilient enough to minimise their impact (Saarinen et al., 2022).

6.3 Every bit counts

Climate change may be affecting the world on a global scale, but climate action must be taken locally as well as globally if its impacts are going to be mitigated and adapted to. The global scale of climate change can be overwhelming, leading to feelings of despair and despondency by individuals wanting to take action. However, with a shift in perspective, businesses, like those included in this research, can have a significant positive impact both locally and globally. Travellers from all over the world come to South Africa and the Greater Kruger area in particular to experience the natural beauty of the landscape, flora, and fauna. Lodges, therefore, have a captive audience and can make use of travellers' time with them to spread awareness and educate them on how they can contribute to minimising the impacts of climate change and helping to conserve and sustain this natural resource. This can be through

charitable donations to local foundations, community development projects, and conservation organisations, or messaging by the lodge on saving water, reducing plastic consumption, and perhaps even highlighting the positive impact of a predominantly plant-based diet. As one of the participants mentioned, lodges have a responsibility to educate their guests, in addition to providing them with memorable experiences. This is in the lodges' best interests as well, as for their businesses to be financially sustainable, the physical environment in which they operate and rely needs to be conserved and sustained.

While infrastructural changes and large financial outlays may have a big impact, they are not all that lodges can do to lighten their operations' footprint and become more sustainable. Smaller actions can be as effective, and perhaps more so, as switching from plastic bottles to reusable bottles or thinking of alternatives to cling wrap requires behaviour and thought pattern changes, and in some cases innovation by all staff involved, which can often be translated to their personal lives and to guests.

As tourism is beneficial to the economy, the environment, and society, the approach to decreasing its global emissions contribution needs to be pragmatic (Becken, 2002). With aviation's contribution being significant, focus needs to be given to reducing its emissions contribution while still maintaining the level of travel needed for tourism to maintain its beneficial contribution to host countries (Becken, 2002). One such way would be through behaviour change by travellers, to less frequent and longer stays (Saarinen et al., 2022: 119; Becken, 2002). This would reduce the daily average energy use of travellers' flights, and simultaneously increase the economic benefit of the host country, with longer stays increasing the potential for more spending in the host country (Becken, 2002).

As a way to maintain tourism levels, while ensuring the sustainability of the industry, some have suggested the use of carbon sinks and carbon offsetting (Becken, 2002; Scott et al., 2016). This would be a means of reducing emissions by both the aviation sector and the rest of the industry, such as the accommodation sector, which is also responsible for greenhouse gas emissions, albeit to a lesser degree than the aviation sector. However, these measures have come under criticism, as they are viewed as means to continue with business as usual,

and they cannot be substitutes for more permanent structural, institutional, and behaviour changes (Becken, 2002; Scott et al., 2016).

No matter the pathway to sustainable tourism chosen, it needs to be remembered that the contribution of greenhouse gas emissions is the responsibility of the entire tourism industry and appropriate measures should be taken and encouraged by all tourism operators, including accommodation establishments, tour operators, airlines, and destinations through marketing and promotions. While some measures seem daunting, every small step taken will contribute to the common goal of sustainable tourism, which is beneficial to society, the environment, and the economy.

This research undertook the task of investigating the preparedness of nature-based tourism operators in the Greater Kruger National Park. It was found that this is a convoluted and complex task. Preparedness varied between participants, with some expressing greater understanding of climate change and its many complexities than others as well as varying degrees of implementation of climate actions and policies. Operators expressed an awareness of the threat of climate change, however, a shift in perspective is needed to reframe this threat as being of greater urgency. This need is greater currently, given that the challenges of COVID-19 have for the most part been overcome. The industry now needs to take on the challenge of manoeuvring towards a more sustainable future with more focus and deliberateness, in a collaborative manner. While some recommendations were made, the most pertinent task is to increase awareness and education on the topic to equip business owners and management to effectively put measures in place to achieve this.

This research investigated a particular portion of the South African tourism industry and its relationship and preparedness to the current and predicted impacts of climate change. Further research is required on other tourism hotspots in the country and the tourism operators' levels of preparedness for climate change. Further research also needs to be conducted on current actions taken by various tourism stakeholders, and the effectiveness of these to have a better understanding of what measures should be taken in the journey towards sustainable tourism in South Africa.

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Appendix:

Interview Schedule:

1. To start off, could you give me a brief overview of your operations?
   - where (which reserve)?
   - main target market?
   - type of offering (comfort level, tented vs permanet)
   - etc.

2. I would like to get an understanding of some of the risks and constraints on operations. I recognise that there are a number issues that you currently have to navigate. What are you most pressing issues at the moment?
   COVID – mention – yes – recognise but that not the focus

3. The focus of my research is climate change. Climate refers to the long terms patterns of weather. Therefore climate change
   Difference between climate and weather
   Chat rather than give lots of definitions

   - Refers to the long-term changes in weather patterns over decade to centuries. According to the IPCC these current and future changes are without doubt due to anthropogenic or human- induced greenhouse gas emissions. (Nat geo)
   - Refers to the long-term changes in average weather patterns that have come to define Earths local, regional and global climates (Nasa)
   - Refers to the changes in the state of the climate measured and persists over an extensive period of time, generally a decade or longer (climate not weather). The IPCC states that current climate change is due, beyond doubt, to anthropogenic emissions.

a. Given what I have mentioned, would you amend your list to include climate change? If so, please rank the risks mentioned previously in terms of how severe of a risk they pose on your operations?
b. If climate change included above – where would climate change rank in terms of threats to your operations?

1 = most pressing issue, that requires your immediate attention/ focus

5= of least concern at present

4. Would you categorise climate change as a short, medium or long term risk to your operations? Why?

5. Research has shown that there are potential climate change impacts on tourism operations in Kruger. A lot of the research around climate change is very technical and scientific, and the challenge is to translate this into everyday practise within tourism operations. So I would like to gain some understanding into your knowledge of how climate change is affecting your operations. Could you describe any climate change impacts that have affected your tourism operations?

   [in Kruger the main impacts are: Increased temperatures, rainfall pattern changes, increased drought]

   Common impacts – pre-empt it

   How do you think climate change might impact in the future?

6. We know that climate change is a global issue and that human activities and society are responsible for it. We now need to do what we can to limit it. In terms of your tourism operations, do you understand the term climate change mitigation or mitigating climate change?

7. What do you understand by the term climate change adaptation or adapting to climate change?

8. Do you have any climate change related policies or plans currently place?

9. If yes, please tell me more about them. Are there any improvement or amendments that you plan to take in the future with regards to limiting climate change and its impacts on tourism operations?

10. If yes, are the policies and plans you have in place self-imposed or was there an outside influence? SANParks, concession management, legislation?|

Table 1: example of coded interview grouped by theme

Risks and Threats		
Environmental risks and threats	P1	Cyclone season – “we are always tracking cyclones” Flooding - `'we had a small flood last year, lost one of our bridges…. And we had a little bit of flooding in the spa of [lodge] last year. So it wasn’t too bad, but we have had significantly worse floods in the past." Fire- "Fire is obviously a big one. Obviously more in the winter, when the fire season is it’s something we need to think about."
	P2	Climate change, flooding, fire, human -animal conflict
	P6	Fire “Potentially dangerous animals in camp” Water supply , ground water supply