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Botswana tourism operators' and policy  
maker's perceptions and responses to the  
tourism-climate change nexus: vulnerabilities  
and adaptations to climate change in Maun  
and Tshabong areas

Wame Lucretia Hambira

**ACADEMIC DISSERTATION**

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# Abstract

## **Botswana tourism operators' and policy makers' perceptions and responses to the tourism-climate change nexus: vulnerabilities and adaptations to climate change in Maun and Tshabong areas.**

Hambira, Wame Lucretia, Geography Research Unit, University of Oulu, 2017

Keywords: adaptation, Botswana, climate change, nature-based tourism, policy makers, tourism operators.

Nature-based tourism is dependent on natural capital. However, this natural capital is under threat due to global climate change. The effects of climate change are predicted to result in changes in the quantity and quality of natural capital leading to reduction in ecosystem integrity and resilience as well as loss of biodiversity. This situation makes nature-based tourism highly vulnerable since it relies largely on climate and weather to maintain its natural resource base. Subsequently, nature-based tourism is arguably susceptible to global climate change because of its heavy reliance on the environment in many destinations for their attractiveness. This requires adaptation measures to be put in place by affected parties in order to cope with or reduce the effects of climate change on the tourism business as well as to safeguard the industry's contribution to the growth of national economies.

This study aims to determine the possible impacts of climate change on Botswana's tourism industry as perceived by operators and policy makers with a view to identifying adaptation needs. Two ecologically distinct areas were targeted as case studies; these were Tshabong in dry land Kgalagadi south and Maun in the wetlands of northwest Botswana. The tourism industry was also screened for vulnerability using the Okavango Delta as a case study in order to determine appropriate adaptation needs. Empirical data on the operators and policy makers' perceptions and reaction to climate change were sourced through in-depth interviews of purposefully selected interviewees. The research material were analysed qualitatively using a simplified codes-to-theory/assertion model for qualitative inquiry. Given that the effects of climate change, like those of other global environment change constituents, take time to manifest themselves physically in a manner that is clear to observers, the results show a nonchalant stance to climate change by both tourism operators and policy makers. The results indicate that the tourism operators of Maun and Tshabong areas perceived the impacts of climate change somewhat differently given the particular spatialities of the two areas and the type of tourism activities that the two areas offered. In addition, the tourism operators in both areas were not proactive in institutionalising adaptations against the potential impacts of climate change because they saw the consequences affecting their operations only

in the future. The policy makers also decried limited information and uncertainty as constraints to appropriate responses to climate change. In the end the thesis advocates that appropriate adaptation strategies need to be devised while the search for more knowledge and data in the field continues.

Even though research on tourism-climate change nexus has evolved impressively especially in recent years, it has been mainly concentrated on winter tourism in the Global North. Quite recently, however, the tourism-climate change research has been increasing gradually in the Global South and more especially southern Africa. This research therefore contributes to an improved understanding of the tourism-climate change nexus in the Global South.

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*Role: Conceptualisation, data collection and analysis, literature review and write up.*
- ii. Saarinen, J., W.L. Hambira, J. Athlopheng, & H. Manwa (2013). Tourism and Climate Change in Southern Africa: Perceived impacts and adaptation strategies of the tourism industry to changing climate and environment in Botswana. In Reddy, V. & K. Wilkes (eds.): *Tourism, Climate Change and Sustainability*, 243–254. Routledge, London.  
*Role: data collection and analysis, literature review and write up*
- iii. Hambira, W.L., J. Saarinen, H. Manwa, & J. Athlopheng (2013). Climate change adaptation practices in nature-based tourism in Maun in the Okavango Delta area, Botswana: How prepared are the tourism businesses? *Tourism Review International* 17: 19–29.  
*Role: lead author, data collection and analysis, literature review and write up*
- iv. Saarinen, J., W. Hambira, J. Athlopheng, & H. Manwa (2012). Tourism industry reaction to climate change in Kgalagadi south district, Botswana. *Development Southern Africa* 29: 2, 273–285.  
*Role: data collection and analysis, literature review and write up*
- v. Hambira, W.L., & J. Saarinen (2015). Policy-makers' perceptions of the tourism–climate change nexus: Policy needs and constraints in Botswana. *Development Southern Africa* 32:3, 350–362.  
*Role: lead author, data collection and analysis, literature review and write up*

## Foreword

While I acknowledge the stringent demands associated with obtaining a PhD, the challenges inherent in the process of acquiring the degree may have been grossly underestimated. To start with, I found my enrolment for the program as an opportunity to do great things. Interestingly, I did not even know that the University of Oulu existed until Professor Saarinen came to the University of Botswana as a Visiting Professor. At the time, he had teamed up with some colleagues to respond to an Office of Research and Development call for a proposal which had a PhD component of which I became the sole beneficiary. Although unaware of the criteria for selecting the right candidate, I reckon that certain individuals (including my Head of Department at the time –Professor Julius Athhopheng) may have played a key role in adjudging me as a suitable doctorate student. I am particularly grateful for this kind gesture.

Having to attend to the demands of a full time job as well as being a mother and wife was certainly not a walk in the park in pursuing this degree on a part time basis. In spite of all the pressures and daunting challenges here and there, I quickly realised that I needed to get the job done. My employer's non-approval of my application for conversion to a full time student when the opportunity presented itself demoralised me. Nonetheless, I was determined to achieve my ultimate goal. Although unanticipated, personal matters forced me to take up another job opportunity which halted the progress of consummating the PhD program in record time.

Despite all the hiccups, my family, church mates and colleagues (to whom I will forever be indebted) believed in me and encouraged me not to give up on my dream. Most of all I would like to deeply appreciate my main supervisor Professor Jarkko Saarinen who took interest in my work and from time to time asked about the progress made in the PhD research. In some cases, it was difficult to provide an answer to such enquiries because of the slow pace at which I moved. To circumvent the unwholesome scenario, I quickly made a decision to go back to the University of Botswana as a Faculty member. Expectedly things began to take shape as soon as I returned to work as an academic staff in the university. Worthy of mention is a close colleague - Professor Oluwatoyin Dare Kolawole - who I refer to as my 'God sent mentor'. In addition to providing me encouragement, he offered to read my drafts with a view to ensuring that the work is grammatically in good shape. His effort and support are commendable. Special appreciation also goes to my supervisory team members; I thank Professor C. Michael Hall for his guidance and patience as well as Dr. Sennye Masike for his encouragement. I also thank my Follow-up Team, Dr. Eva Kajan and Professor Toni Ahlqvist for their direction. My pre-examiners, Professor Raynald Harvey Lemelin and Professor Gijsbert Hoogendoorn also provided invaluable comments that improved my final manuscript even more; I will forever be indebted for their time. Special thanks also go to Professor Gijsbert Hoogendoorn and Professor Gustav Visser for playing the role of opponent and making my public defense memorable.

Dr. Monkogoi Lenao's guidance is noteworthy for offering the tips on how to succeed at Oulu. I also want to thank Dr. Kaarina Tervo-Kankare for her hospitality during my visit to Oulu and Mr Goitsemodimo Koorutwe for generating the maps that appeared in the journal articles and the thesis. Special thanks go to my mother for believing in me that I

could achieve greatness. I also applaud my father who taught me the value of education at an early age through his wise saying: “people may take away your inheritance, but no one can take away your education”. More importantly, I cannot but commend my husband, Meshack, and kids, Letang and Paki, for bearing with me when my time appeared to be skewed towards this degree. I would also like to acknowledge all the tourism business operators and policy makers who took time off their busy schedules to sit for the interviews conducted during field survey activities. Much appreciation also goes to the University of Botswana’s Office of Research and Development and University of Oulu Geography Research Unit without which this research would have been impossible.

As I look towards the future with high expectations of the great things to be accomplished in conjunction with acquiring a new status associated with a PhD, I have a strong faith in God and trust that a well fulfilled academic life awaits me. And to the only wise God who always makes all things possible for me, to Him I return all glory and honour, now and forever.

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# 1 Introduction

The relationships between tourism and global environment change have been studied in tourism geographies and tourism studies in general since the 1980s (Gössling 2002; Scott *et al.* 2005; Gössling & Hall 2006; Kaján & Saarinen 2013). More recently, issues focusing on the impacts of climate change on tourism and the industry's capacity to adapt to evolving and estimated future changes have been emphasised (Scott *et al.* 2012; Kaján, & Saarinen 2013; Hall *et al.* 2015a; Scott *et al.* 2016). In addition, the role of policy-making and its implications for the tourism sectors have been highlighted (Butler *et al.* 2016; Konrad & Thum 2014; Kunreuther *et al.* 2014). These issues form the core of this research.

The International Panel on Climate Change (IPCC) (2014c:5) defines climate change as “a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer”. Similarly, the United Nations Framework Convention on Climate Change (UNFCCC) (United Nations 1992:7) declares that climate change “means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” It is widely agreed among the scientific community, that the main contributing factor to climate change is anthropogenic activities which result in the release of greenhouse gases into the atmosphere (IPCC 2013; IPCC 2014a; European Climate Foundation 2014; Maibach *et al.* 2014; Hall *et al.* 2015a; Hall *et al.* 2015b). Greenhouse gas emissions from anthropogenic sources have resulted in an increase in temperature ranging between 0.65°C to 1.06°C since 1850, and it is expected that if the emission of greenhouse gases (GHG) continues unabated, the temperatures would rise by approximately 1.8°C to 4.0°C by the end of the 21<sup>st</sup> century (Simpson *et al.* 2008; IPCC 2013; IPCC 2014b).

Temperature scenarios are predicted to exceed 2°C by the year 2050 in some parts of southern Africa, including Botswana, while in the coastal margins temperatures are likely to increase by 1.5°C (Preston-Whyte & Watson 2005; Niang *et al.* 2014). This would lead to an increase in rainfall during the wet season which will, however, be offset by the decrease in rainfall in the remaining months of the year. However, the net result will lead to increased aridity in the region. Niang *et al.* (2014) opine that projected rainfall change over sub-Saharan Africa is uncertain, reinforcing Preston-Whyte and Watson's (2005) findings that even though climate scenarios predict warming there is less confidence in rainfall scenarios although rainfall would possibly decrease in some parts of southern Africa. The general consensus, however, is that the region will be warmer and drier (see Preston-Whyte & Watson 2005; Viljoen 2013; IPCC 2014a; IPCC 2014b, Niang *et al.* 2014). These effects will invariably affect the economic performance of sectors such as agriculture and food production, water resources, health and tourism (Simpson *et al.* 2008; Batisani & Yarnal 2010; IPCC 2014a; Niang *et al.* 2014). Of particular interest to this study is nature-based

tourism which is often regarded one of the fastest growing forms of tourism globally (Kuenzi & McNeely 2008; Organisation of Economic Corporation and Development (OECD) 2009), especially in areas where there is a high concentration of biodiversity, but which is also potentially at risk because of the potential impacts of climate change on biodiversity (see Awuor *et al.*, 2008; Balmford *et al.* 2009; Christ *et al.* 2003)

Nature-based tourism is a broad term for leisure travel based on natural capital and it includes a range of tourism forms including ecotourism, wildlife tourism and aspects of adventure tourism and rural tourism (see for example, Kuenzi & McNeely 2008; New Zealand Ministry of Tourism 2009; Anderek 2009; Zeitlin & Burr 2011; Chen *et al.* 2014; Matilainen & Lähdesmäki 2014; Ardoin *et al.* 2015). It comprises a number of outdoor activities undertaken by tourists in the natural environment such as bush walking, wildlife viewing, scenic tours, boat cruising, jet boating, skydiving, mountain climbing, 4WD sports, canoeing, trekking, fishing, hunting, nature photography, backpacking (Potts & Rourke 2000; Kuenzi & McNeely 2008; OECD 2009; New Zealand Ministry of Tourism 2009; Chen *et al.* 2014). Studies in recent years have shown the potential effects of climate change on nature-based tourism as well as the contribution of the tourism sector as a whole to climate change (Gössling & Hall 2006; Gössling *et al.* 2009; Scott *et al.* 2012; see also Hopkins 2015).

The focus of this study is on the effects of climate change on the tourism sector rather than the role played by the tourism sector with respect to climate change, which are nevertheless considerable and of an estimated range of 5–9% of emissions if radioactive forcing is included (Gössling *et al.* 2013), and are forecast to increase without significant mitigation (Scott *et al.* 2016). Climate change has the potential to significantly change the composition and distribution of ecosystems that support nature-based tourism (Niang *et al.* 2014; IPCC 2014b). According to Niang *et al.* (2014) for example, there is evidence of shifting ranges of some species and ecosystems in Africa due to among other stressors, climate change. Hence, there is attention given to the extent of the effects of climate change on ecosystems and landscapes that generate income for tourism in recent years (see Belle & Bramwell 2005; Crag-Smith & Ruhanen 2005; Dubois & Ceron 2006; Becken & Hay 2007; Moreno & Becken 2009; D'Amore & Kalifungwa 2013; Hall *et al.* 2013). In this context, this research aims to approach an urgent aspect of adaptation by focusing on the Global South context which has received much less attention than Global North in tourism and climate change adaptation research (Saarinen *et al.* 2012; Kajan & Saarinen 2013). However, work in this area has begun to emerge in southern Africa that examines stakeholder perceptions and reaction to climate change, economic impact and policy issues (Hambira 2011; Saarinen *et al.* 2012; Saarinen *et al.* 2013; Hambira *et al.* 2013; Hambira & Saarinen 2015; Hoogendoorn *et al.* 2016; Rogerson 2016)

In spite of emerged research interest in southern Africa and specifically in Botswana, the country is one of the Global South countries in which tourism and climate change research is still lagging behind other regions (Hall 2008; see also Scott *et al.* 2015). Therefore this study, summarising, concluding and contextualising the key findings of recent research on



tourism and climate change in Botswana, has the potential to inform national and regional level tourism and climate change policies and their implementation in this country and elsewhere in southern Africa. For example, “from an industry’s perspective, there is an urgent need to develop adaptation mechanisms and strategies” (Saarinen *et al.* 2013:251). The study approaches the research field from a human geographical perspective with a special emphasis on tourism geographies. The human geographical approach, aims to contribute to the social science goal of understanding society with a focus on space and the study of socio-spatial systems, structures, relations and transformations (Johnston & Sidaway 2004). The impacts of climate change vary for different regions, therefore climate change can be deemed as a relational phenomenon that can be understood with respect to the spatiality and temporalities prevailing at various scales (see Tervo 2008; Brace & Geoghegan 2011).

Hall and Page (1999) note that various approaches to geography have relevance to tourism research specifically in areas of spatial analysis and applied geography. Hence, tourism or particularly nature-based tourism can be considered a deeply spatial phenomenon more so that it is dependent on the ecosystems and natural environments and attractions defined by a geographical location. This interrelation between tourism and space and places has given a fruitful position for geographical research focusing on tourism. Indeed, there is a long tradition of tourism geography originating from the 1930s (see Saarinen 2001), and since then “concepts at the heart of geography such as spatiality, place, identity, landscape and region are critical, not only to the geography of tourism and recreation but also to tourism and recreation studies as a whole” (Hall & Page 1999:35). Although there was a rather long period of low profile and descriptive research approach towards tourism, Hall and Page (1999) see positive signs of change in the role of academic studies in tourism. First, they note a major growth in the number and quality of publications. Secondly, there is a serious attempt to provide a stronger and wider theoretical basis for tourism geography, which is both informed by and able to contribute to contemporary ‘big’ discussions, such as globalisation, commodification, sustainability and global climate change. In recent years debates have been highly prolific with a growing interest by tourism geographers in the Global South (Hoogendoorn & Rogerson 2015) as well as bringing into the global research arena aspects of adaptation, resilience and vulnerability (see Dube & Moswete 2003; Saarinen & Tervo 2006; Simpson *et al.* 2008; Tervo 2008; Moreno & Becken 2009; Moreno 2010; Hambira 2011; Steyne 2012, Saarinen *et al.* 2013).

Ultimately, the issues such as adaptation, resilience or vulnerability of tourism activities to climate change will vary according to location and the type of activity (Wall & Badke 1994; Eriksen & Kelly 2007; Hopkins 2015). As such, tourism operators have an interrelationship with their natural and socio-economic environments and depend on the climate and the wider environment. However, not only does climate change affect tourism products but also the regional patterns of tourism including supply and demand (Tervo 2008). Geographers have pursued the understanding of the interaction of society

and place over the years with studies on environmental impacts of tourism, tourism's benefits to society tourism-climate change nexus (see Hulme 1996; Fankhauster 1996; Wall 1998; Weaver *et al.* 1999; Maddison 2001; Gössling 2002; Moswete & Mavondo 2003; Dube & Moswete 2003; Mbaiwa 2004; Scott *et al.* 2005; Frandberg 2005; Dubois & Ceron 2005; Mather *et al.* 2005; Preston-Whyte & Watson 2005; Aall & Höyer 2005; Hall & Higham 2005; Dubois & Ceron 2006; Saarinen & Tervo 2006; Gössling & Hall 2006; Gössling 2006; Amelung *et al.* 2007; Simpson *et al.* 2008; Mbaiwa & Stronza 2010; Moreno 2010; Steyn 2012; European Climate Foundation 2014). The two main perspectives through which the climate change-tourism nexus can be studied and have scientific literature for over two decades are impact of tourism on climate change and the impact of climate change on tourism (Hall *et al.* 2013; Patterson *et al.* 2006). This has given tourism research in general a new dimension over time with the identification of climate change as a powerful factor shaping tourism activities (Matzarakis *et al.* 2004; UNWTO, UNEP & WMO 2008).

Brace and Geoghegan (2011), however, argue that in as much as climate change can be observed in relation to landscape, it can also be sensed emotionally as part of everyday life whereby acceptance, denial, resignation and action co-exist as personal and social responses to the local manifestations of a global problem. That is, climate change risks are perceived by non-scientific communities in culturally relevant and localised frames (Hopkins 2015) and consequently it is critical to understand how climate change impacts are perceived by tourism stakeholders in a specific geographical context (see Tervo 2008; Wyss *et al.* 2014; van der Keur *et al.* 2016). This is because it has a bearing on the actions or responses that they will pursue. Notwithstanding, there continues to be uncertainties in the impacts of climate change taking into account geographic singularities and characteristics of local communities as well as how the impacts are projected to affect the respective tourism governance in future (Wyss *et al.* 2014).

This study, therefore, endeavours to determine the potential impacts of climate change on Botswana's Tourism industry as perceived by tourism operators and policy makers and the resultant policy responses. The responses of interest for the purposes of this study are however on aspects of adaptation as opposed to mitigation. The study is under the Framework Study sponsored by the University of Botswana Office of Research and Development entitled "Local responses for global environmental change: perceptions and adaptation strategies of tourism industry to climate change in Botswana" which aimed at studying the processes of perception and adaptation in the specific case study areas demonstrating some of the main aspects of the tourism-climate change nexus in Botswana.

Though not the focus of this study, it is worth highlighting that tourism is a significant contributor of human induced GHG. Transportation and aviation in particular, is the main source of tourism's emissions on the tourism environment (see Gössling, 2002; European Climate Foundation 2014; Scott *et al.* 2016). In addition, tourism also contributes to global environmental change through land use and land cover change

(Gössling 2005), exchange and dispersion of diseases (Hall 2006c), and excessive use of water (Gössling *et al.* 2012, 2015) (see Ruttty *et al.* 2015 for a comprehensive overview of tourism's contribution to global environmental change). The various dimensions of global environmental change may also directly and indirectly contribute to climate change as well as its impacts. The sector also emits GHG directly into the atmosphere by means of energy utilisation for purposes related to transport as well as the energy used at the destination (i.e. accommodation and tourist activities) (see Simpson 2008; Gössling *et al.* 2013). The growth of tourism is expected to contribute to increasing anthropogenic emissions into the foreseeable future (Gössling *et al.* 2013; Scott *et al.* 2016).



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## 2 Research aim, structure and process

### 2.1 Rationale and aims of the study

Besides mining, manufacturing and beef, tourism is one of the sectors in Botswana that are most engaged in global value chains (Kariuki *et al.* 2014). Even though mining has been the mainstay of the economy since the 1970s accounting for 19.6% of GDP, 30% of government revenue and in excess of 84.7% of foreign exchange earnings in 2012 (Kariuki *et al.* 2014), tourism has a significant potential for growth (Table 1).

Given its economic potential government has prioritised tourism in its efforts to diversify the economy (Ministry of Finance and Development Planning 2009; Sekwati 2010). To achieve this goal, however, government needs to strengthen the sector by diversifying the tourist sector away from wildlife and other natural resources (D'Amore & Kalifungwa 2013). Furthermore, the sector's capacity to provide services needs to be enhanced, and management of the tourism sector reformed to ensure that a greater proportion of the tourism revenue is retained in the country (see Mbaiwa 2005). However, the sector's vulnerability to climate change also needs attention in order to ensure the intended gains (D'Amore & Kalifungwa 2013). This cannot be ignored as the sector is anchored in nature and thus the anticipated future increase in global temperatures renders the industry at risk (Saarinen *et al.* 2012; Hambira *et al.* 2013; Hambira & Saarinen 2015). Therefore, in order for the sector to serve as a viable alternative for Botswana's economic growth and development, there is an urgent need for adaptation measures to be put in place to safe guard the long-term sustainability of the sector. In addition to adaptation and vulnerability, this study recognises the importance of resilience as an integral aspect of climate change research; however, the subject of resilience is not within the scope of this research. Resilience refers to "The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing

Table 1. Contribution of tourism to national economy.

<b>Tourism related variable</b>	<b>Contribution to national economy</b>
Percentage contribution to GDP	3.3%
Total number of tourist arrivals in 2014	2, 082, 521
Percentage of tourists who visit game reserves and national parks	90%
Percentage contribution of wildlife-based tourism to protected area revenues to total national economy	70%
International tourist expenditure (Botswana Pula) in 2008	2.9 billion

Adapted from: Department of Tourism (DoT, 2010); Dube & Moswete 2003; World Travel & Tourism (WTTC) 2015

in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.” (IPCC 2014c:5).

The aim of this study is therefore to determine the perceived possible impacts of climate change on tourism operations in two ecologically distinct areas of Botswana with a view to identifying the resultant policy implications. In determining the perceptions of policy makers and tourism operators about the potential impacts of climate change in nature-based tourism in Botswana and the resultant policy implications, the research questions are:

- To what extent can the tourism sector be regarded as vulnerable to estimated changes in climate?
- How do tourism operators and policy makers perceive the tourism-climate change nexus?
- How have the perceptions of policy makers and tourism operators influenced their preparedness and responses to climate change?
- What are the implications of their reaction to climate change on policy needs and constraints?

By addressing these questions it is possible to provide information that has value for policy-makers and operators regarding the reality of climate change and the importance of timely responses to the eminent impacts on the tourism industry.

## **2.2 Structure**

This thesis is a synopsis of four journal articles and one book chapter (Table 2) that captures the empirical findings of the study. The first article answers the first research question by screening for climate change vulnerability of Botswana’s tourism sector using the Okavango Delta in Maun, Northern Botswana as a case study. The second article looks at the perceived impacts, practices and adaptation strategies adopted by tourism businesses in Maun and Tshabong. By so doing, an attempt is made to answer the second research question on how the operators’ perceive the tourism-climate change nexus. The third and fourth articles focus on how the tourism operators have responded to the impending effects of climate change on their businesses in Maun and Tshabong, respectively, in line with the third research question on how the operators’ perceptions have influenced their preparedness and responses to climate change. While articles 2–4 focused on tourism businesses, the final article targeted policy makers to identify their perceptions and reactions to the tourism-climate change nexus in order to determine the policy implications and constraints (fourth research question). The articles are attached as appendices and are summarised in Table 2.

Table 2. Summary of published papers that constitute the synopsis.

Article	Objective of the study	Methods and materials	Main findings
1. Hambira, W.L. (2011). Screening for Climate change vulnerability in Botswana's tourism sector in the bid to explore suitable adaptation measures and policy implications: A case study of the Okavango Delta. <i>International Journal of Tourism Policy</i> 4: 1, 51-65. DOI:10.1504/IJTP.2011.046709	To determine the extent to which the tourism sector in Botswana is vulnerable to climate change.	Vulnerability screening model adapted after Leary <i>et al.</i> (2008)	The sector is vulnerable by virtue of its main natural capital base. Vulnerability is reflected through the following: changes climatic variables; changes in the physical environment and ecosystems; threats to livelihoods and socioeconomic issues; weaknesses in governance structures.
2. Saarinen, J., W.L. Hambira, J. Athlopheng, & H. Manwa (2013). Tourism and Climate Change in Southern Africa: Perceived impacts and adaptation strategies of the tourism industry to changing climate and environment in Botswana. In Reddy, V. & K. Wilkes (eds.): <i>Tourism, Climate Change and Sustainability</i> , 243-254. Routledge, London.	To determine the perceptions and ultimately the preparedness of tourism businesses with regards to the impending climate change impacts on their operations	In-depth interviews with managers of tourism businesses in Tshabong and Maun	Even though the operators were aware of the general impacts of climate change, the majority of them did not perceive any critical impacts on their operations and the industry in general. This could explain why they barely had any adaptation measures in place. Hence there is a need to develop adaptation strategies as those currently in place are for visitor's comfort i.e. air conditioners and swimming pools. Some mitigation efforts were also evident in some establishments i.e. energy and water saving mechanisms
3. Hambira W.L., J. Saarinen, H. Manwa, & J. Athlopheng (2013). Climate change adaptation practices in nature-based tourism in Maun in the Okavango Delta area, Botswana: How prepared are the tourism businesses? <i>Tourism Review International</i> 17: 19-29.	To determine how the perceptions of the tourism operators have influenced their preparedness and responses to the impending climate change.	In-depth interviews with managers of tourism businesses in Maun	Most operators had observed changes in the physical environment, livelihoods and weather patterns which they linked to climate change. Consequently operators rendering nature-based outdoor activities deemed their activities vulnerable to climate change as this would lead to loss of quality of attractions and consequently decline in tourist numbers. However, the operators holding this line of thought said they had not experienced any significant impacts on their activities as a result but anticipated the negative effects in the future. Consequently, in many instances, there were no adaptation measures in place except for air conditioners which are not for climate change per se. The lack of proactive stance could be attributed to lack of information and limited awareness on climate change-tourism nexus.
4. Saarinen, J., W. Hambira, J. Athlopheng, & H. Manwa (2012). Tourism industry reaction to climate change in Kgalegadi south district, Botswana. <i>Development Southern Africa</i> 29: 2, 273-285. DOI: 10.1080/0376835X.2012.675697	To determine how the perceptions of the tourism operators have influenced their preparedness and responses to the impending climate change.	In-depth interviews with managers of tourism businesses in Tshabong	Similarly, Tshabong operators alluded to the fact that they were aware of climate change and that it has had effects on their physical environment but has not had an effect on their businesses and the activities they offer. Hence the operators were likely to react to climate change in terms of adaptation as opposed to being proactive due to the slowness of the climate change process and the uncertainties involved in the nature of the impacts.
5. Hambira, W.L. & J. Saarinen (2015). Policy-makers' perceptions of the tourism-climate change nexus: Policy needs and constraints in Botswana. <i>Development Southern Africa</i> 32:3, 350-362. DOI: 10.1080/0376835X.2015.1010716	In-depth interviews were conducted on policy makers; policy makers were purposively selected from departments and organisations known to be directly or indirectly involved in tourism and related natural resource management	To determine the perceptions of policy makers and implications of the climate change tourism phenomenon in Botswana	The following factors will impede effective policy development: uncertainties surrounding climate change; information gaps; inadequate data and poor public awareness; challenges posed by poor coordination and indeed data capture and harmonisation by concerned institutions.

The synopsis is organised into sections as follows: Section 1 comprises the introduction which gives an overview of the study; Section 2 describes the research aim, structure and process. This entails the rationale of the study, research questions, a summary of the published papers that make up the synopsis and a description of how the write up is organised. Section 3 is an articulation of the research setting in terms of the main concepts of the study which are: climate change-nature-based tourism interface; tourism as a development strategy in Botswana; and climate change response mechanisms in the tourism industry. Section 4 expounds on the literature review that situates the study in the discourse of geography and tourism studies. This also includes the conceptual framework that informs the study. Section 5 focuses on the research design and provides the methods and materials which outline the tools and instruments that were used to investigate the research questions. Section 6 is a summary of the main research findings. The discussion and conclusions are laid out in section 7 while appendices (published papers) follow at the end. Figure 1 provides an illustration of the sections that make up the thesis.

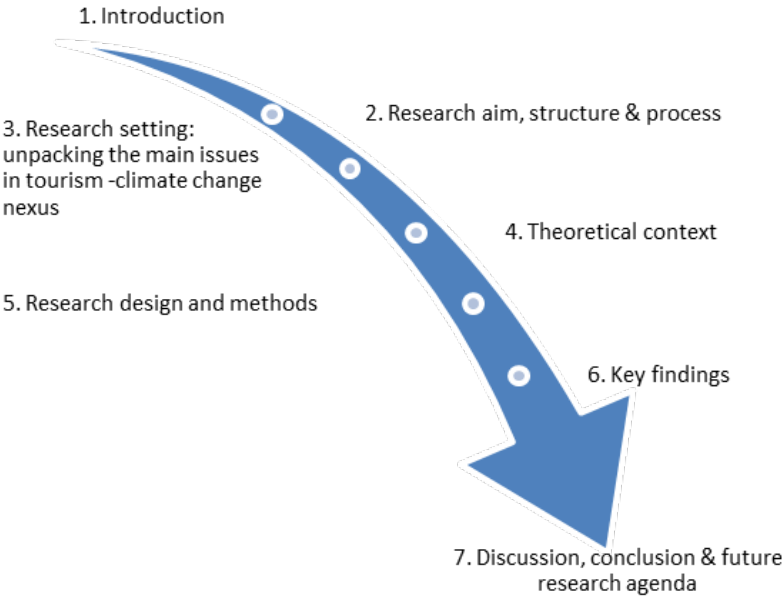


Figure 1. Synopsis structure.



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## 3 The research setting – unpacking the main research issues in tourism-climate change nexus

### 3.1 Climate change and nature-based tourism

The on-going unprecedented changes in climate will primarily result in changes in the quantity and quality of natural capital leading to among other things displacement of wildlife, increased impact on scarce water resources and stress on recreational capacities (IPCC 2013; IPCC 2014a; 2014b). Displacement of wildlife as a result of climate change may lead to increased competition for food and forage and this would negatively impact tourism activities such as hunting while the impact of climate change on the water resources may impede leisure tourism activities such as fishing (Viljoen 2013; D'Amore & Kalifungwa 2013; European Climate Foundation 2014). The resultant stress exerted by climate change on recreational capacities thereby affecting tourism (see Schaeffer *et al.* 2012), would then lead also to a change in perceptions of activities that can be engaged in, patterns of seasonal attraction and associated visitor flows at the affected destinations (see Brace & Geoghegan 2011; Hopkins 2015; European Climate Foundation 2014).

The climate change-tourism nexus is a very complex system to decipher. Consequently, the intricate interrelationships between tourism, development and climate change have presented a significant policy and governance dilemma for many countries (Belle & Bramwell 2005; Gössling *et al.* 2009; Weaver 2011; Scott 2011; Gössling *et al.* 2013). Moreover, decision makers often have insufficient knowledge about climate risks, a deficiency that can and needs to be addressed by better data and public education (Kunreuther *et al.* 2014). That is, policy makers need to understand how climate change actually affects various geographical locations and ecosystems because the impacts differ from one area to another and from one ecosystem to another. Furthermore, policy makers need to know whether the effects will weaken or enhance the tourism appeal of the affected areas and ecosystems (Scott *et al.* 2012). For instance, there has been observed changes in ecosystem types, structure physiology and species distribution in sub-Saharan Africa. These include increase in barren areas, decrease in forest cover, increase in shrub and tree cover in mesic savannas, shifting of some species such as the Namib Desert tree (*Aloe dichotoma*); and tropical coastal forests are likely to expand by 150% by 2050 at the expense of marshes and grasslands which would be at the demise of water animals such as hippos, crocodiles, mangrove swamps and grassland ungulates such the zebra, reed buck and the waterbuck (Hulme 1996; Niang *et al.* 2014). However, there are also positive impacts in that the resultant expanded woodlands in these eco-zones would improve game viewing since it would attract more buffalo, bush buck, bush pig, and elephants if properly managed (Preston-Whyte & Watson 2005). More recent predictions indicate that the most threatened biome in South Africa is the grassland biome which could be encroached by woody vegetation due to increased temperatures and carbon dioxide emissions (Ziervogel *et al.* 2014).

Preston-Whyte and Watson (2005) further posit that in the savanna eco-zones, warmer climates would lead to a decrease in river flow due to less rainfall; increased evaporation and less run off into catchments affecting well known tourist destinations such as the Etosha Pan of Namibia and the Okavango Delta in Botswana. According to Desanker and Magadza (2001), the 2050 scenarios reflect that rainfall is likely to decrease by 15%, evaporation is likely to increase by 25% while runoff is likely to decrease by 40% in this eco-zone. Though this turn of events will pose a predicament for swamp animals, the eco-zone will become more favourable for animals such as the blue wildebeest, eland, giraffe and the kudu which are found in drier areas. On the other hand, the impact of warmer climate on grassland will make them less suitable for habitats for a number of ungulates such as the mountain zebra (Preston-Whyte & Watson 2005). In addition to the complex matters raised above, further issues are brought about by the fact that the different areas and their attractions are associated with visitor preferences and therefore any changes to the areas, ecosystems and associated products would warrant the tourist the choice to seek alternative attractions that would serve his/her taste. Hence Wall (1998) postulates that the tourism industry is likely to be more vulnerable to climate change than the tourists in that only to a limited degree can an industry adapt by moving out of destinations that have lost appeal whereas consumers can just change to a new destination (see Aall & Høyer 2005).

Even though the affected eco-zones under threat are complex, policy makers need to ensure the maintenance of the eco-zones integrity in order for nations to continue enjoying the services they provide. Due to the importance of tourism in terms of economic returns especially in developing countries, any impacts on the industry will have significant economic, social and political repercussions (Hall & Higham 2005; Viljoen 2013; European Climate Foundation 2014). If predictions are correct, southern Africa alone stands to lose specific nature tourism attractions as alluded to above, due to increased global warming and increased aridity. Examples of threatened sites are the desiccation of the Okavango, Chobe, Zambezi, Kafue and St Lucia hydrological systems; rising temperatures in the trout-rich waters of the Drakensberg Mountain foothills and the disappearance of the spring annuals in the succulent Karoo (Timberlake & Childes 2004; Preston-Whyte & Watson 2005; Burg 2007). The European Climate Foundation (2014) observes that the availability of fresh water is already under pressure which poses a threat to tourism operations since increased demand for water would see tourism operators competing with more established industries. Additionally, the impact on wildlife populations and vegetation composition in various ecosystems may indirectly affect visitor behaviour depending on their preferences regarding wildlife viewing and scenery. Moreover, opportunities of other types of recreation maybe expanded due to expanded seasonal availability of such outdoor recreational opportunities (Richardson & Loomis 2005).

## **3.2 Climate change and tourism in the Global South: A review**

Although a body of literatures in tourism-climate change nexus in the Global South has been on the rise in recent years, there is need for further research in the subject. Rogerson and Visser (2011) emphasise that Africa is the least represented continent globally in terms of tourism geographies scholarship and the institutions thereof. Existing studies have focused on the understanding of the relationship between tourism and climate change by key stakeholders (people, policy makers, tourists and operators); key stakeholders' level of preparedness; response measures in place; level of risk and threats to tourism reliant locations and communities; and quantification of climatic suitability of tourist destinations.

Tourists travel decisions are to a large extent influenced by the state of weather variables at tourists' preferred destinations since it has a bearing on their favoured outdoor leisure activities. Becker (1998) examined the way holidaymakers perceive thermal environmental conditions in some South African resorts. The study output is a beach index map showing the number of beach days per month as well as the probability of beach days. The map thus provides information on thermal conditions of the sites from a holiday maker's point of view. A related study by Gössling *et al.* (2006) revealed that climatic characteristics of destinations are an important factor among other factors shaping travel decisions. The study sought to understand the perceptions of climate change by tourists visiting the island of Zanzibar in Tanzania, the importance of climate for travel decisions and the possible outcomes of on-going climate change for travel decisions.

Ahmed and Hefny (2007) wrote on the tourism-climate change nexus in Egypt with specific reference to the Sinai environment (landscape, coral reefs, wetlands, flora and fauna, avifauna). The authors opined that coral reefs are the most sensitive ecosystems to climate change as they are bound to die due to bleaching caused by high temperatures, which could in turn impact negatively on the recreational opportunities thereof. Ahmed and Hefny (2007) purported that climate change could result in salt water (intrusion due to sea level rise and changes in salinity), ecological niches necessary of birds breeding and loss of biodiversity in wetlands environment. The authors further recommend further studies on the impacts of climate change on biodiversity. In South Africa, the impacts on tourism are expected to be severe manifesting in extreme weather conditions, prolonged droughts as well as a rise in temperatures and sea levels leading to a redistribution of tourism resources geographically and seasonally (Steyn & Spencer 2012). The paper advocates for development of planning guidelines for a sustainable tourism industry as well as urban and resort development in the most vulnerable areas. Fitchett *et al.* (2016b) explored climate change threats and perceptions of these threats within the tourist sector in South Africa's coastal towns of St Francis and Cape St Francis. Indeed the results showed that the two were under serious threat from sea level rise even though the tourism accommodation establishments have made small scale adaptations to these threats. Sea level rise due to climate change is also expected to be an issue in Ghana rendering some

tourist facilities at risk (Sagoe-Addy & Addo 2012). Köberl *et al.* (2015) assessed the potential impacts of climate change in Sardinia (Italy) and Cap Bon (Tunisia). The results of the study predicted both climate induced revenue gains and losses depending on the seasons. Elsewhere, Darkoh *et al.* (2013) investigated the trends and impacts of climate change as well as coping and adaptation strategies in Malawi, Botswana and Kenya. In the study, tourism was identified as one of the sectors that are at risk. According to the study, the main challenge facing the countries is a lack of comprehensive response mechanism matching the anticipated climate change impacts.

Key stakeholders' understanding, awareness or perceptions of the tourism climate change nexus plays a role in the resultant response measures. Dillimono and Dickinson (2014) analysed Nigerian tourists' understanding of travel and tourism linkages to climate change. The study revealed that the tourists had conceptual confusion. For instance, climate change and ozone depletion were used interchangeably by tourists who also were not keen to change their travel patterns in order to reduce their contribution to climate change. In Egypt, Marshall *et al.* (2011) tested for climate change impacts and tourism operators' awareness in the Red Sea region. According to the study, there was a perception gap between the operators and the dive tourists with the former showing moderate awareness level and the latter being mostly aware of the environmental and climate change issues. Furthermore, the operators were not aware of the perceptions and choices of the dive tourists and hence faced the risk of losing market share to more responsive competitors. Mbaiwa and Mmopelwa (2014) analysed tourism operators' perceptions on how changes in flood patterns in the Okavango Delta would affect their businesses. Depending on the distance of the business from the flowing channels, the perceived impacts on turnover were both positive and negative with the former accruing to businesses that were relatively far away from the flowing channels. Hence the study indicated that high volume flooding would not be favourable for outdoor tourist activities such as game viewing and bird watching due to poor road conditions caused by flooding; tourists are likely to cancel their bookings in such situations for fear of disease outbreaks or being killed by floods.

Awour *et al.* (2008) investigated the risks faced by the coastal city of Mombasa and the ways in which its population's vulnerability could be reduced. Although the study was not specifically focused on tourism, it was, however, mentioned as one of the economic sectors that might be affected by climate change. The paper asserts that low altitude, high temperatures and humidity renders the city vulnerable to climate change. The findings show that some areas will be rendered inhabitable due to flooding and water logging; agricultural land would cease to be suitable for use due to salt stress; tourist attractions and facilities would possibly be affected by sea level rise; and the heat stress anticipated from high temperatures and humidity is expected to cause ecosystem disruptions. Adaptation measures that have been established against climate change include public awareness raising through installation of automatic message switching and early warning systems in strategic places, installation of frequency modulation radios

and internet transmitter stations for vulnerable communities; reforestation of degraded forests in order to strengthen the sea wall; an assessment of requirements for roads and bridges to withstand heavy rains associated with climate variability and long term change; formulation of relevant policies such as the Coastal Management Policy and the Tsunami action plan; capacity building through regional climate outlooks, user workshops and pilot application projects. The paper however concluded that the above initiatives are mainly aimed at dealing with extreme events as opposed to preparedness aspects that should form part of adaptation.

The sustainability of the tourism industry does not depend only on 'saving' it from the impact of climate change but also ensuring that its contributions to emissions that result in climate change are managed. Gössling & Schumacher (2010) analysed the energy usage and emission levels in Seychelles' tourism sector and explored ways to reduce them with the aim of making the island state a carbon neutral destination. Likewise, some countries have established climate policies in order to reduce emissions emanating from the tourism industry. Thus, Gössling *et al.* (2008) have reviewed these policies and their potential implications on travel costs and tourism demand in 10 tourism dependent island states. Indeed, the study shows that international tourist arrivals in these states were likely to be negatively affected by global climate policy focusing on air travel. Nonetheless, it has been argued that 'greening of tourism' and carbon neutral destinations should top the policy agenda given the increasing evidence of climate change-tourism nexus (Rogerson 2012; see also Rogerson & Sims 2012).

One of the reasons why research on climate change and tourism in the Global South is still scanty could perhaps be due to lack of data. For example, data issues have led to some well-established methods such as the Tourism Climate Index (TCI), widely used in the Global North, being barely applicable in the African context. Fitchett *et al.* (2016c) have, therefore, facilitated the adoption of this method in Africa by providing a viable approach of applying TCI for locations in which no sunshine hour data is available. This would allow the use of TCI scores in the Global South in order to determine the climatic suitability for various tourist destinations. Furthermore, Hoogendoorn and Fitchett (2016) reviewed existing literature on adaptation strategies of Africa's tourism sector and made a case for more research in the continent in order to improve understanding of the tourism-climate change nexus for purposes of informing appropriate adaptation strategies. Another research gap that has been identified is a lack of common understanding of the emerging thematic area of sustainable adaptation as it pertains to the tourism industry (see Njoroge 2015b).

### **3.3 Nature-based tourism as a development strategy in Botswana: is there a future in the face of climate change?**

The vulnerability of the tourism sector to various shocks has cast a cloud on the sustainability of tourism led economic development (see Visser & Ferreira 2011). Notwithstanding the recent developments, tourism continues to be a trusted and embraced engine of economic growth in developing countries like Botswana (Rogerson & Visser 2011). The Africa component of the fifth IPCC report of 2014 recognised the economic importance of tourism (Niang 2014). The sector makes direct contributions to national incomes and improvement of balance of payments or indirectly through multiplier effect as well as infrastructure that connects countries (World Economic Forum 2013). The economic impact of tourism in Botswana is substantial hence the industry has been identified as one of the key sectors that could help diversify the economy beyond diamond mining (Kalikawe 2001). This is due to the country's comparative advantage in abundant wildlife and natural resources ranging from the Kalahari Desert in the south to the internationally acclaimed Okavango Delta and the Chobe-Linyanthi River to the north. These ecosystems are still relatively pristine and hence attract tourists from around the globe (see DoT 2000; DoT 2010). As such, the tourism sector holds major potential for sustainable economic growth and job creation in Botswana.

Even though more can still be done, improvements in infrastructure and accessibility to Botswana's wilderness areas have elevated tourism to become a key economic sector. The *2013 Travel and Tourism Competitiveness* report (an in-depth global analysis of travel and tourism conducted annually by the World Economic Forum) provides the following Travel & Tourism (T&T) indicators that offer a measure of T&T activities in Botswana: 2,145,100 international tourist arrivals who stayed at least one night in a collective or private accommodation in 2010; USD218, 000, 000 international tourism receipts earned from expenditures made by visitors from abroad on lodging, food and drinks, fuel, transport in the country, entertainment, and shopping in 2010 (World Economic Forum 2013). In 2014, the industry's direct contribution to total Gross Domestic Product (GDP) amounted to 3.3 % and it is expected to grow by 5.2% annually (3.8% of GDP) by 2025 (WTTC 2015). According to the WTTC (2015), this contribution is made up of economic activity generated by industries such as hotels, travel agents, and passenger transportation services such as airlines but excluding commuter services. The jobs provided by the industry accounted for 4,200 of total employment in 2007 (DoT 2010) and 8,000 in 2012 (World Economic Forum 2013).

The predominant tourist attractions in the country are: The Okavango Delta, Moremi Game Reserve, Chobe National Park, and Southern and Central Kalahari (Table 3).

The Okavango Delta is regarded as one of the most important attractions in Botswana and it is the second most visited destination by leisure tourists in the country (DoT 2010, see also Mbaiwa, 2005). Tourism in the Delta is highly seasonal, with the peak season being from July to October. The Delta is home to various biota which offers rich aesthetic

Table 3. Nature based tourism attractions and their relative importance.

Type of nature-based tourism	Attraction	Relative scale of contribution to tourism	Comments
Natural tourist magnet	Okavango Moremi	Major	Globally unique ecosystem
	Chobe	Major	Excellent wilderness experience
	Southern & central Kalahari	Limited	Remote wilderness
	Pans	Limited	Remote wilderness
Eco	Wilderness experience, Okavango, Kalahari, pans	Major	Ranging from wetlands to Kalahari wilderness
	Birdlife	Medium	Wilderness birders paradise
	Parks/conservation facilities	Major	Major scope
Scenic beauty	Topography/scenery	Limited	Limited topographical diversity
	Vistas/sunset	Major	Some of the best
Adventure	Limited	Limited	Limited development
Heritage/culture	Cultural diversity	Limited	Limited depth/diversity
	Botswana heritage/lifestyle	Limited	Underdeveloped/exposed
	Museum, history/architecture	Limited	Few sites, poorly developed
	Ancient culture, San, rock art, fossil sites	Medium	Various sites, interactive experiences
Food	Unique tastes and flavours	Limited	Local cuisine not well developed and exposed
	Affordable quality cuisine	Limited	Limited 'local' restaurants

Adapted from Botswana Institute for Policy Analysis (2002)



value comprising meandering palm and papyrus fringed waterways, palm-fringed islands and woodland, lush vegetation and rich wildlife (Department of Environmental Affairs (DEA 2008). The major activities in the Delta are game drives, safari walks, bird watching, boat cruises, elephant back safari, horse riding, boating in the traditional canoe known locally as *mokoro* and photography (DEA 2008; Harry Oppenheimer Research Centre 2009). With changing climate, weather would cease to be a reliable resource especially for tourist outdoor/nature activities (see Becken 2005; Gössling & Hall 2006). Examples are wildlife safaris, back packing, water sports, horse riding, and trail walking. It is anticipated that increased global temperatures of about 3°C would result in changed rainfall patterns, droughts, and decreased biodiversity and ecosystems services in southern Africa in general including Botswana (Hulme 1996; Hulme *et al.* 2001; Van Jaarsveld *et al.* 2005; Bates *et al.* 2008; Allen *et al.* 2010; IPCC 2013). This scenario obviously casts doubts on the sustainability of nature-based tourism as a major development strategy for Botswana unless measures are taken to ameliorate the potential negative impacts of climate change.

### **3.4 Responding to climate change – climate change policy**

The preceding sections confirm that it is imperative that governments, especially those whom nature-based tourism is key to their development path, respond proactively to the impending effects of climate change. In general, climate change policy can be defined as any response measures that specifically addresses the need to reduce GHG emissions or to reduce vulnerability to climatic changes in the future (Mather *et al.* 2005; Becken & Hay 2007; Gössling *et al.* 2008; IPCC 2014c; Kunreuther *et al.* 2014). Consequently, the response policy measures prescribed by the United Nations Convention on Climate Change (UNFCCC) are adaptation and mitigation (UN 1992; Klein *et al.* 2007; Steyn 2012; European Climate Foundation 2014; Ziervogel *et al.* 2014).

Since by far the major cause of contemporary climate change is the emission of GHG emanating from anthropogenic activities, it makes sense that one way of curbing climate change is by reducing these emissions, that is, mitigation (Forsyth *et al.* 2007; European Climate Foundation 2014). The other strategy would be to find ways of cushioning affected stakeholders against the effects of climate change such that they find means of survival under the circumstances and continue to benefit from the natural environment under threat. This is adaptation and the policies thereof entail reducing the adverse impacts of global warming through adjustments that reduce society's vulnerability to climate change (Fankhauser 1996, Steyn 2012; Kajan & Saarinen 2013; European Climate Foundation 2014; Ziervogel *et al.* 2014). This would enable affected stakeholders such as communities, tourism operators and economies to cope with the impending impacts and thus ensure the sustainability of the tourism sector (Frankhauser 1996; Kelly & Adger 2000). Although alluding to mitigation as a concept may be unavoidable, the major scope of this study is confined to climate change adaptation.



While both mitigation and adaptation are urgent issues in climate change policy-making, the role of adaptation has been emphasised in the Global South, especially in Africa (Omari 2010). This implies that adaptation is perhaps more crucial for southern Africa and Botswana, more so that the entire continent's contribution to the global emissions is negligible (IPCC 2001). But then some scholars (Chandler *et al.* 2002) argue that both the Global North and South are faced with the same challenge posed by climate change which calls for a concerted effort by both developed and developing countries to join forces to put in place international mitigation measures in order to alleviate the adverse effects of the phenomenon (Ipsen 2001; Rübhelke 2011). The 2015 21<sup>st</sup> climate Conference of Parties held in Paris also adopted a common framework that equally commits both developing and developed countries while taking into consideration the difference in national capacities and capabilities (UNFCCC 2015).

Climate change policy provides formally planned adaptation strategies led by an external entity such as government and tourism organisation (Simpson *et al.* 2008; Mimura *et al.* 2014). Examples of such strategies are provision of information about climate variability and change processes, effects and available adaptation options; provision of financial, technical, legal and other assistance to facilitate the implementation of adaptation options in cases where individual organisation's lack resources (Becken & Hay 2007; Mimura *et al.* 2014). Governments are often better placed in investing in research to provide climate change information for effective decision making; ensuring compliance with environmental protection regulations and building codes (Keeney & MacDaniels 2001; Faling *et al.* 2012). On the other hand, especially in the context of sustainable tourism development, it is the responsibility of the operators to also drive climate change adaptation providing conservation education to staff and guests, adopting greenhouse gas offsetting programmes and conservation initiatives such as rainwater harvesting and recycling (see Simpson *et al.* 2008).

In as much as climate change issues are complex, climate change policy decisions are similarly often complex and marred with conflicting objectives, scientific uncertainty about impacts, fragmented institutional arrangements sometimes with counter policies (Camco Advisory Services Limited 2010; Hambira 2011). Investment in climate change often competes with present economic and social needs because its effect takes a long time to manifest (see Keeney & MacDaniels 2001; Tompkins & Adger 2004). Elsewhere, European Climate Foundation (2014) asserts that academic research has revealed that tourism operators either do not believe climate change is real or that they will easily be able to adapt or that the uncertainty around it is too great for early responses. On the other hand a study focusing on winter tourism has shown that climate change awareness has increased among operators in Finland whereas the industry's responses seem not to have developed at the same pace (Tervo-Kankare 2012). Keeney and MacDaniels (2001) assert that in designing climate change policy, governments need to think carefully of what they want to achieve given the problem at hand and the response options available. Sound decision-making (by affected stakeholders) that anticipates, prepares for and

responds to climate change depends on information about the full range of possible consequences and associated probabilities (Kunreuther *et al.* 2014). Notwithstanding the above challenges, governments should take a proactive stance with regards to climate change policy development regardless of the complex issues surrounding the nature of climate change (see Konrad & Thum 2014). Fortunately, there is a growing recognition that today's policy choices are sensitive to uncertainties and risk associated with the climate system and the actions of other decision makers (Kunreuther *et al.* 2014).

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## 4 Tourism-climate change research

### 4.1 Positioning the study

“...the fragility of tourism activity and the broader tourism system appears to often escape academic and policy scrutiny” (Visser & Ferreira 2011:326). Nonetheless, the response of the tourism community to the challenge of climate change has visibly increased over the last decade (Simpson *et al.* 2008; Scott *et al.* 2012; Kajan & Saarinen 2013; Scott *et al.* 2015). The evolution of climate change research can be identified through four stages namely: the formative stage; stagnation stage; emergence of climate change; and maturation stage (Scott *et al.* 2005). The formative stage marked the initial period and it occurred in the 1960s and 1970s. It was followed by a period where very little publications were produced hence the stagnation stage in the 1980s. Significant work became visible thereafter hence the ‘emergence of climate change’ stage in the 1990s and finally the maturation period which started in 2000 to present whereby growth has been tremendous. Kajan and Saarinen (2013) further interrogated climate change-tourism research with particular interest in the adaptation discourse which they posit has been emphasised as an urgent research need in tourism and climate change studies.

During the formative stage, research in tourism-climate change nexus focused on two areas: the influence of weather on recreation activities at local scale; secondly on the development of approaches to assess the suitability of climate for tourism and recreation (Scott *et al.* 2005). According to Scott *et al.* (2005), the inactivity in climate-tourism research in the 1980s (stagnation stage) is attributed to bias towards research in atmospheric science issues and at the time, the anthropocentric global warming was not widely accepted and therefore climatologists were wary of making suggestions on how the various economic sectors were bound to be affected. However, it was during this period that the first study on climate change adaptation in the tourism sector was done by Wall *et al.* (1986) who looked at perception of campers to changing conditions and considered adaptation measures taken by tourists (Kajan & Saarinen 2013).

Scott *et al.* (2005), suggest that the emergence of climate change stage was, among others, characterised by speculative overviews of the possible effects of climate change on tourism with no rigorous studies to substantiate the projections (see also Scott *et al.* 2015). They continue to observe that methodological limitations in this stage included: uncertainties and limited spatial and temporal resolution of climate models; the universal application of the simplifying assumption of a static tourism sector whereas it is well known that ‘not all will remain equal’ in the future; the inadequate consideration of adaptation which is critical to understanding the vulnerability of the tourism sector to climate change. Although adaptation was mentioned in the early approaches, wider adaptive perspectives in research were largely none-existent (Kajan & Saarinen 2013). Scott *et al.* (2005) continue to assert that the maturation stage, which commenced in

2000, saw an increase in the number of publications, researchers and diversity of research approaches and academic disciplines involved in climate change and tourism research. One major limitation in this stage is the low level of involvement from tourism and recreation experts as evidenced by most publications in climatic and meteorological, geographical-environmental management and planning journals with a few in tourism-recreation journals (Scott *et al.* 2005)

During this period, the 2003 Djerba Declaration resolved that international organisations should be encouraged to advance research on the relationships between tourism and climate change (World Tourism Organisation 2003). Examples include a growing recognition of the tourism and climate change nexus in the IPCC assessment reports (Hall 2008; Scott *et al.* 2015). Hall (2008) suggests that the reason for growth in research in the relationship between tourism and climate change is attributed to: the fact that tourism is a potentially sensitive sector to climate change; on-going policy discussions regarding mitigation and adaptation; and that tourism has become a significant component of IPCC reporting.

Kajan and Saarinen (2013) further reveal that studies that moved from merely examining climate change effects to understanding the points of vulnerability and the associated adaptation measures were only recently properly considered in tourism research. They also postulate that past adaptation related articles covered the following categories: adaptation measures by businesses (response measures by tourism businesses e.g. product diversification, change of business location and replacing natural attractions with artificial ones); changing behaviour of tourists (involves understanding how tourists will respond to changes in their preferred destination); destinations and regional structures of tourism in change (understanding the varying range of spatial scales and operations in tourism); and lastly, developing policies and frameworks.

Initially, climate change research concentrated on other sectors of the economy especially agriculture, energy and water while relatively little attention was accorded to tourism and cognate fields. Roselló-Nadal (2014) notes that the uncertainty and complexity of expected tourism demand reactions to climate change could explain why tourism has been relatively overlooked compared to other sectors. This led to speculative commentary in tourism and recreation in the early IPCC reports (Scott *et al.* 2015). According to Hall and Higham (2005), the early relative lack of interest in tourism and climate change research may have been attributed to the following factors: non-recognition of the importance of the subject matter in the physical and social sciences as well as a lack of interaction between the two disciplines in terms of impact analysis; lack of research funds in the area; relative lack of baseline data and methodological difficulties in data analysis; as well as diversion to other areas that could easily attract research funding. Furthermore, Scott *et al.* (2005) assert that improved technology, climate change modelling, forecasting, archiving and extensive publicity of extreme events prompted substantive government investment in climate research programs.

## 4.2 Conceptual Framework

The Driver-Pressure-State-Impact-Response (DPSIR) framework is adopted in this research to summarise and explore the research problem and draw conclusions from the findings as presented in the individual papers emanating from the study. Sheaves *et al.* (2016) support this view by suggesting that climate change is better illustrated in the context of the DPSIR model. This conceptual framework explains the relationship between specific components of the study. The DPSIR is an extension of the Pressure State Response (PSR) model that is based on the idea that anthropogenic activities impact the environment and that adverse environmental impacts drive humans to control the pressures (Ojeda-Martinez *et al.* 2007; Florke *et al.* 2011). The DPSIR adds to the PSR model two additional categories being ‘driving forces’ and ‘impacts’ which in turn represent two concepts affecting the environment being human welfare and environmental quality as well as societal behaviour and economic pressures (Ojeda-Martinez *et al.* 2007).

As articulated in the preceding sections, contemporary climate change is mainly a result of GHG emissions emanating from anthropogenic activities and consequently the environment and natural capital upon which tourism depends are altered. The pressures from the altered natural capital compel affected stakeholders to take measures to mitigate the resultant adverse impacts. The approach thus helps to identify vulnerability indicators that could feed in effective adaptation and policy formulation. It thus attempts to address fundamental questions pertaining to: the cause of the problem; the nature of the problem; and the solution to the problem (Ojeda-Martinez *et al.* 2007). The problem that this study is trying to solve is the seemingly troubled future of nature-based tourism and its sustainability in Botswana as a result of climate change, among other factors. The study intends to unravel the source and nature of the problem by providing insight to the tourism-climate nexus as it applies to Botswana. The possible solutions are interrogated through the climate change policy measures of adaptation and mitigation, with the emphasis primarily on the former. These are addressed by determining the extent to which the industry is vulnerable to climate change; how the tourism operators and policy makers perceive the problem and how their perceptions in turn affect their preparedness and response to the phenomenon. Finally, policy needs and constraints with regards to the tourism-climate change relationship are explored.

Adaptation (and mitigation) policy efforts should serve to reduce vulnerability by reducing exposure and sensitivity as well as increase adaptive capacity. Vulnerability can be understood as a measure of potential future impacts and a range of political, institutional, socio-economic and technical components (see Florke *et al.* 2011). Furthermore, the ‘cause’ is represented by the driving forces and the pressure categories in the framework, while the ‘problem’ itself is represented by the state and impact categories (Figure 2). Additionally, the ‘solution’ to the problem is represented by the ‘responses’ category of the framework (see Pirrone 2005; Ojeda-Martinez *et al.* 2007). The different components of the DPSIR framework are explained in figure 2.

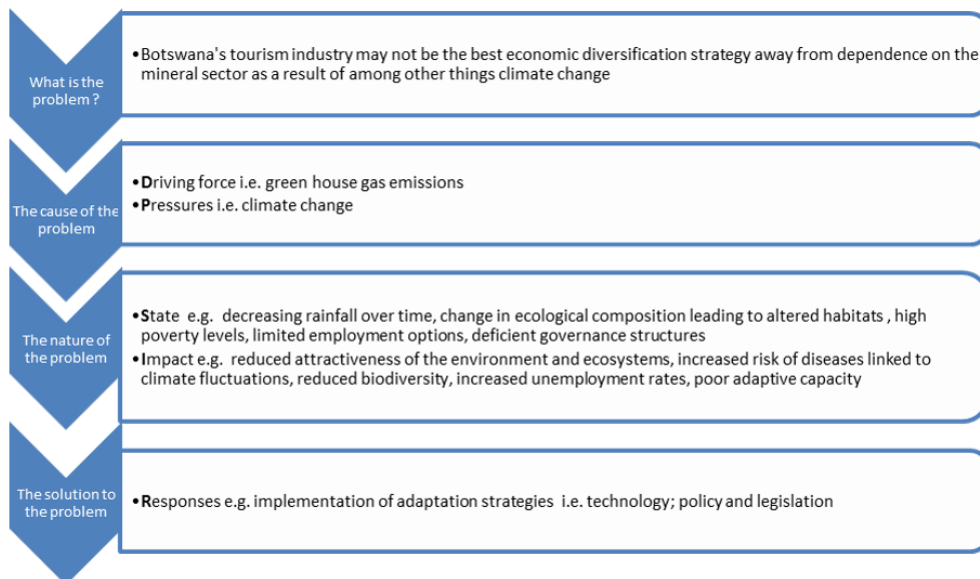


Figure 2. The DPSIR model in the context of Botswana's nature-based tourism.

The driving forces refer to underlying factors that cause changes in the system (Pirrone 2005; Florke *et al.* 2011; Kelble *et al.* 2013). The variables may be social, economic or ecological and can have positive or negative influences on pressures. All things being equal, the emission of GHGs is the principal driving force in this case. These emissions emanate from anthropogenic activities including those related to tourism (Pirrone 2005; Kelble *et al.* 2013; IPCCa 2014; European Climate Foundation 2014; Maibach *et al.* 2014). Drivers work through human activities which may, intentionally or unintentionally, exert pressures on the environment.

Pressures describe the human activities directly affecting the environment e.g. climate change as a result of carbon dioxide or methane emissions (Pirrone 2005; Florke *et al.* 2011; Kelble *et al.* 2013). They include changes in hydrological and climate extremes and in long-term average climatic and hydrological variables such as precipitation. Pressures are generated by the driving forces and may lead to changes in the state of the ecosystem, e.g. land use change resource consumption or releases of substances (Pirrone 2005; Kelble *et al.* 2013).

'State' refers to the observable changes on the environment i.e. the condition of the system at a specific time (Pirrone 2005; Florke *et al.* 2011; Kelble *et al.* 2013). The system condition is depicted as descriptors of the system features such as water quality, habitat structure and species composition. For the purpose of this study, the state would be the system consequences of human and natural process such as availability of natural resources that form the basis of nature tourism. Examples include rising global temperatures and changes in precipitation. Changes in the quality and functioning of the ecosystem have an impact on human wellbeing and economic conditions.

Impacts refer to the effects of a changed environment or the ultimate effects of changes of state on human health and/or ecosystems resulting from the pressure (Pirrone 2005; Florke *et al.* 2011; Kelble *et al.* 2013). In this case, the outcome of the interacting human and natural processes on tourism. These may include stress on natural resources paramount to nature-based tourism, reduction in biodiversity, prevalence of diseases and unemployment (Pirrone 2005; Florke *et al.* 2011; Kelble *et al.* 2013). Decisions are made in response to the impacts on ecosystem services.

Responses are actions taken by the society to adapt, prevent or alleviate vulnerabilities and take advantages of the opportunities (Pirrone 2005; Florke *et al.* 2011; Kelble *et al.* 2013). Responses take the form of technological changes, policy and legislation and other program activities that foster adaptation of the tourism industry to climate change (Pirrone 2005; Kelble *et al.* 2013).

In summary, the DPSIR model is therefore adopted in this study to conceptualise the cause-effect of the seemingly troubled future of sustainable nature-based tourism in Botswana as a result of climate change, among other factors, and to explore possible solutions (Figure 3). The driving force that causes the problem is mainly the emission of GHGs emanating from anthropogenic economic activities. The emission of GHGs results in climate change which, in turn, exerts pressure on the environment and natural resources which are the impetus of the tourism industry in Botswana. Consequently, the state of the environment is described by observable changes on the environment and habitats having been affected by climate change. These observable changes are

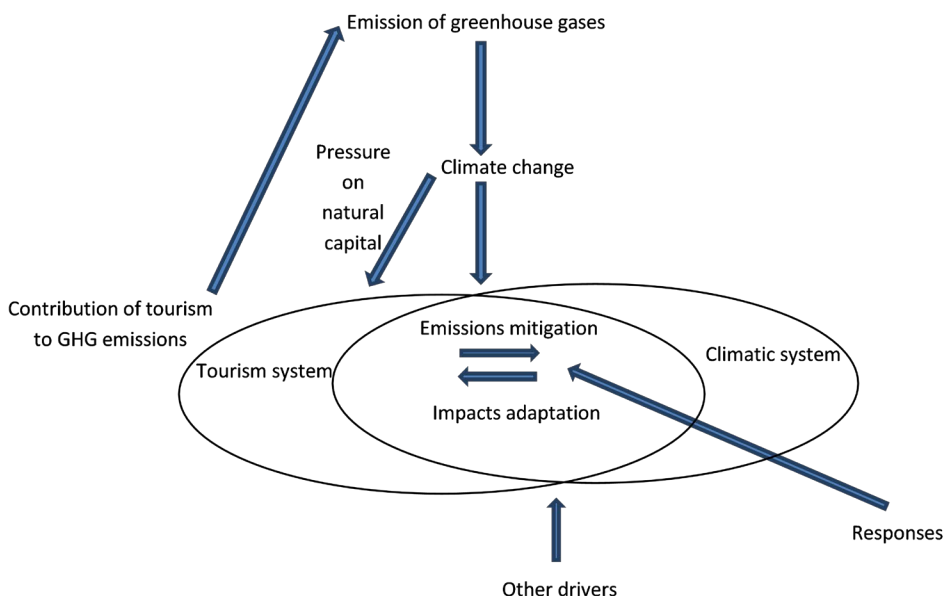


Figure 3. The tourism-climate change nexus and associated policy responses (adapted after Moreno, 2010).

essentially the effect of climate change on the environment as depicted by changes in weather variables such as changes in normal temperatures, precipitation and hours of sunshine. Consequently, visitor enjoyment of outdoor activities either affected positively or negatively. The potential impacts of the state of the environment may be reduced attractiveness of ecosystems and the environment, increased risk of diseases associated with increased rainfall and temperatures, and reduced biodiversity (Desanker & Magadza 2001; Preston-Whyte & Watson 2005; Hall 2006b; Simpson *et al.* 2008; Hall *et al.* 2011; IPCC 2013; 2014a). In addition to the ecological impacts, it might mean reduced tourism demand and hence reduced benefits resulting in other socioeconomic impacts such as increased unemployment rates and decreased revenues (see Hall & Higham 2005; Viljoen 2013; European Climate Foundation 2014). Faced with all of this, individuals, organisations, operators and governments will need to respond accordingly in order to ameliorate the negative consequences facing the tourism sector. This will be done through adaptation and mitigation strategies that address policies, technology and management strategies among other things.



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## 5 Research design and methods

### 5.1 Case Study Sites

This research work focuses on two study areas with distinct environmental features and tourism products, which to a large extent, are influenced by the climatic conditions that prevail in each area. These are Maun, located in Ngamiland District in northern Botswana and Tshabong, situated in south-western Botswana in Kgalagadi South District (Figure 4).

The Maun area is semi-arid and is characterised by climatic conditions associated with hot temperatures, wet summers and cold dry winters. The average rainfall of 500mm per annum occurs mainly from November to March and is among the highest in the country. Temperatures range from 15.6°C in winter to 27.2°C in summer (see Turpie *et al.* 2006; DEA 2008). Maun is known as the ‘tourism capital’ of Botswana and the Maun

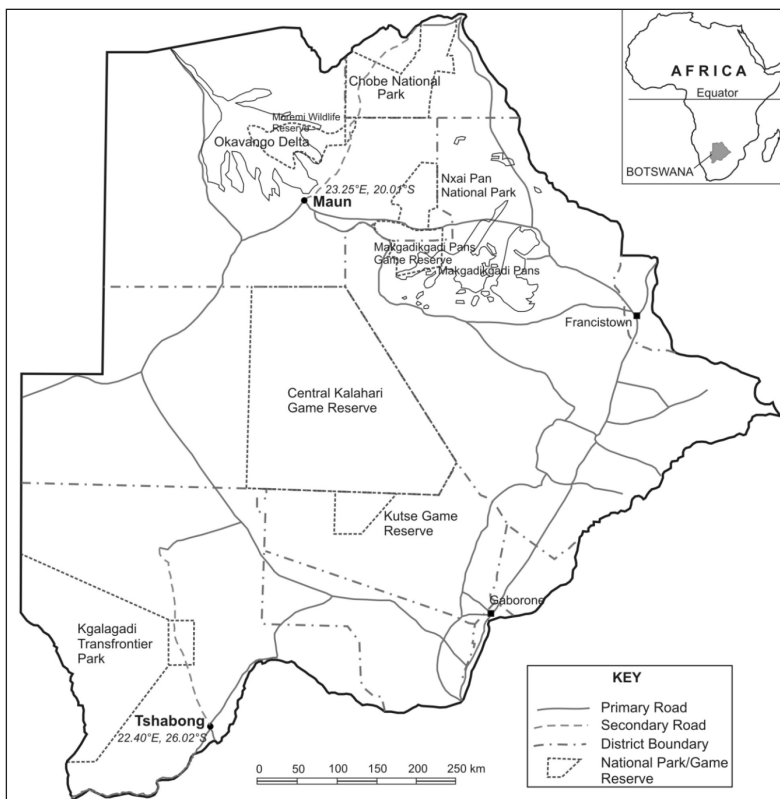


Figure 4. Map showing study sites (By G. Koorutwe, Chief Cartographer, University of Botswana).

international airport is one of the busiest in southern Africa, specialising in small charter flights to different parts of Botswana, especially the Okavango Delta region (see Mbaiwa 2005; Moswete *et al.* 2009).

According to the DoT (2010), Maun received 10.2% of international tourists who visited Botswana in 2009. It is also highlighted that 32% of international tourists visiting the Okavango Delta from Johannesburg and Windhoek pass through Maun International Airport. The main attractions of the region are based on wilderness and wildlife. The Delta, which is located in the region, is an internationally acclaimed inland wetland, and which received the Ramsar site status in 1997 (Mbaiwa 2005; DEA 2008). The Botswana Tourism Board (2008) outline the following examples of tourist activities available in the Delta: game drives, traditional canoe rides, boat cruises, safari walks, bird watching, elephant back safari, horse riding, and photographic safari (figure 5). Maun also offers its own attractions such as Nhabe museum and facilities such as camps and lodges and consequently 70% of the jobs in the Ngamiland district are dependent on tourism or tourism-related activities (WTTC 2007; DoT 2010).

Tshabong on the other hand is located in the south-western part of the country in the Kgalagadi South District. Tshabong is technically a village and a growing administrative centre of the district serving mainly as a transit area to Kgalagadi Trans-frontier Park. The area has a highly variable annual rainfall averaging 285mm (which is among the lowest in the country) with isolated extreme events and frequent droughts (Zhou *et al.* 2005; Batisani & Yarnal 2010).

The seemingly harsh climatic conditions of Tshabong could easily be mistaken as barren for tourism activity which may explain why for a long time tourism development and marketing in Botswana has always been skewed towards the Northern part where the Okavango Delta is located. However, this area has a lot of potential for 'desert tourism' (see figure 6) (Moswete *et al.* 2009; Saarinen *et al.* 2012). According to Philip Johnson Associates (1996) and the Botswana Tourism Board (BTB 2008), its potential lies in its red un-vegetated dunes, grasslands, scrub bush, woodlands, white pans, abundant wildlife, and the rich cultural history of the San people (*Basarwa*). Moreover it is the gateway to the Kgalagadi Trans-frontier Park, a peace park between South Africa and Botswana. All these render the Kgalagadi 'The ultimate wilderness destination' (BTB 2008).

The choice of these two study sites, Maun and Tshabong, was therefore based on the fact that the first location has major tourist sites in the country while the second location has a lot of growth potential. Furthermore, the two areas were deemed to have the potential to offer interesting tourism-climate change nexus perspectives due to their unique and diverse geographic attributes.

As earlier mentioned, factors driving the vulnerability of these contrasting ecosystems depend on local conditions and response measures adopted for one area may not necessarily work for the other (Ericksen *et al.* 2007). That is, impact of climate change depends on spatial climatic heterogeneity (Ackerly *et al.* 2010) therefore since the two research sites are located in two geographically distinct areas with respect to the physical



Figure 5. Picture of a tourism activity in the Okavango (Photo: Jarkko Saarinen).



Figure 6. Picture of tourism facility in the Kgalagadi (Photo: Jarkko Saarinen).

environment, the two sites would respond differently to the impending impacts of climate change. This is because “Climate consists of numerous components (temperature, precipitation, wind, etc.), each with its own spatial and temporal signature” (Ackerly *et al.* 2010:478). Therefore, issues of spatiality need to be taken into consideration when formulating climate change adaptation policy.

## 5.2 Methods and material

Material was gathered between 2011 and 2012 by means of in-depth thematic interviews analysed qualitatively. They are defined as qualitative research techniques that involve “conducting intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program or situation” (Boyce & Neale 2006). The qualitative approach was deemed the most appropriate since the study is focused on the views and opinions of selected stakeholders on the subject matter. It is normally applied “when a researcher is interested in understanding the “why” behind people’s behaviours or actions” (Rosenthal 2016:509 see also Boyce & Neale 2006; Gill *et al.* 2008; The Wallace Foundation *undated*). This correlates well with the research aim which seeks to unravel the perceptions and responses to the climate change phenomenon. One is able to get information that they would otherwise not get in quantitative studies since the latter uses predetermined survey questions with no room for follow up, probing or rephrasing the questions. In-depth interviews help to reveal the interviewee perspective on the phenomenon as they see it as opposed to how the researcher sees it and in the process, the interviewer is able to make follow up questions (Marshall & Rossman 2006; Gill *et al.* 2008; The Wallace Foundation *undated*). Both the tourist operators and policy makers were targeted using this approach. All the interviewees were purposively identified. Purposive sampling refers to “non-random ways of ensuring that particular categories of cases within a sampling universe are represented in the final sample of a project” (Robinson 2014:32). This is an acceptable sampling strategy in cases whereby expert information is required and thus the interviewees are identified by the researcher (de Vaus 1991; Hoggart *et al.* 2002). The interviews for both the tourist operators and the policy makers took approximately 30 minutes to an hour. Recording was by means of note taking and summaries of the interviews were done to capture the information while it is still fresh in the mind. With respect to the tourism businesses, operators and managers in Tshabong area and Maun were interviewed while in the case of policy-makers, government officers in senior management positions and based in Gaborone were interviewed.

In the case of Tshabong, there were eight known tourist operators and seven of them were interviewed (one was not available at the time of the field work). These comprised four accommodation facilities, two camp sites (in Werda and Tshabong respectively) and one development trust (in Khawa) offering guiding and hunting safari services. In Maun, there were 135 known tourism establishments offering activities and or services such as

accommodation, camping, safaris, scenic flights, *mekoro* (local name for dugout canoe) rides and boat cruising. Of these, 24 establishments were approached with the aim to cover different kinds and scales of service providers. Whereas the use of sampling in quantitative studies is to create a representative sample, in the case of qualitative studies, sampling is done to identify relevant categories in the population at work in a few cases (Neuman 2014). That is where as cases chosen in quantitative studies are regarded as carriers of features of a social world, which stand in for the larger population, the logic behind qualitative sampling is to sample features of the social world (Neuman 2014). “We pick a few to provide clarity, insight, and understanding about issues or relationships in the social world” (Neuman 2014:247). Luborsky and Rubinstein (1995:91) further buttress this notion by saying that qualitative researchers are concerned with the question “what are the components of the system or universe that must be included to provide a valid representation of it?” as opposed to “how many of what type of cases or observations are needed to reliably represent the whole system and to minimise both falsely identifying or missing existing relationships between factors”.

As for the policy makers in Gaborone, the researcher purposively identified and approached 18 public policy departments directly or indirectly dealing with tourism and environment (climate change) issues. Nine departments out of the 18 agreed to participate in the research. These include the Department of Tourism, Department of Meteorological Services, Department of Energy Affairs, Department of Water Affairs, Department of Wildlife and National Parks, Department of Waste Management and Pollution Control, Department of Animal Production, Department of Crop Production and the Ministry of Environment Wildlife and Tourism. The interviewed policy makers held senior management positions with considerable work experience and the majority of them (six) were males. Table 4 displays the interviewees’ profiles.

The study targeted only the policy makers in government and did not include organisations that regulate tourism development from the private sector perspective nor did it include the non-governmental and community based organisations that play a role in climate policy advocacy. Though the two are important, the scope of this policy level approach is more on governmental level responses and views towards tourism and climate change relations. Despite new governance discourses governments still remain as key drivers in climate change policy formulation (Konrad & Thum 2014). This is with a view to instituting adaptation and mitigation policies that protect the affected stakeholders who include both the development policy makers as well as the policy advocacy groups. Table 5 summarises the number of tourism operators and policy makers who participated in the in-depth interviews.

The number of interviewees was a limiting factor which however could not be avoided given the existing tourism operators and tourism related departments at the time of the study. Hence a qualitative approach was preferred over and above a quantitative approach. That said, a qualitative study approach based on interviews focuses mainly on the quality of the information of the cases selected. It is, therefore, assumed that the analytical qualities

Table 4. Interviewed policy makers' profiles.

<b>ID</b>	<b>Organization</b>	<b>Gender (Female(F)/ Male(M))</b>	<b>Number of years with department (as in 2012)</b>	<b>Position held</b>	<b>Duration in position (as in 2012)</b>
1	Energy Affairs Department	M	3	Principal Energy Engineer	1 year
2	Department of Animal Production	F	32	Deputy Director	1 year
3	Department of Tourism	F	1	Deputy director	1 year
4	Department of Crop Production	F	27 with the department and 4 with other departments within the Ministry of Agriculture	Deputy Director	2 months
5	Department of Water Affairs	M	15	Principal Botanist (hydrologist, water quality)	4 years
6	Ministry of environment wildlife & tourism	M	1	Climate change coordinator (Principal research officer)	1 year
7	Department of Meteorological Services	M	26	Director	2 months
8	Department of Waste Management and Pollution Control	M	7	Head of research	3 months
9	Department of Wildlife and National Parks	M	13	Principal wildlife officer	About a year

Table 5. Number of interviewed participants.

<b>Participants</b>	<b>Number of entities identified</b>	<b>Number of interviewees</b>
Tshabong tourism operators	8	7
Maun tourism operators	135	24
Policy makers	18	9



of the researcher would play a greater role to ensure quality (Hardon *et al.* 2004). One of the indicators of quality data gathering is reflected when the interviewees' responses produce a pattern to the point where no new information is generated. This is known as saturation point where no further new information is received (Bertaux & Bertaux-Wiame 1981; Hardon *et al.* 2004; Boyce & Neale 2008).

The interview sheet for the tourism operators was structured in such a way that it informs the following topics: environmental changes including weather and climatic conditions that have been observed; the extent to which the tourism activities and services offered were susceptible to climate change; perceived climate change impacts on the activities and services offered; and the response strategies planned or in place to cope with the impending effects of climate change. The specific questions subsumed under these themes ranged from those that prompted information on the background of the business; knowledge of impacts of environmental changes including climate change and how they are likely to impact on the tourism industry as a whole, their business operations and the communities that benefit from the natural capital and tourism in the study areas; and the background of the respondent.

The topics were designed in such a way that they generate answers for the research questions under investigation (see Figure 7). In order to find out whether nature-based tourism is a viable economic diversification strategy for Botswana in an era of climate change, we need to determine whether the industry is vulnerable to climate change in the first place. This can be associated with observed environmental changes as well as how the types of tourist activities offered are likely to be affected by changes in climate. On the one hand, the seriousness with which tourism operators and policy makers perceive the impending impacts would influence the response measures they put in place to protect the industries' operations. On the other hand, their reaction would have implications for policy needs.

In the case of policy makers the interview sheet had the same structure but was tailor made for the purpose. That is: to solicit information on the perceptions of the policy makers with respect to the climate change-tourism nexus. This included their perceptions on the country's climate policy needs with regards to the tourism industry. The interview sheet was structured as follows: background of the organisation, tourism spatiality and economic issues in Botswana, views on environmental changes in Botswana including climate change and what it means for the tourism sector, and lastly policy actions necessary. The topics used to structure the interview protocols for both the operators and the policy makers were important since the analysis and interpretation should reflect the constructs, concepts, language, models and theories that structured the study from the beginning (see Merriam 1998 in Saldaña 2016).

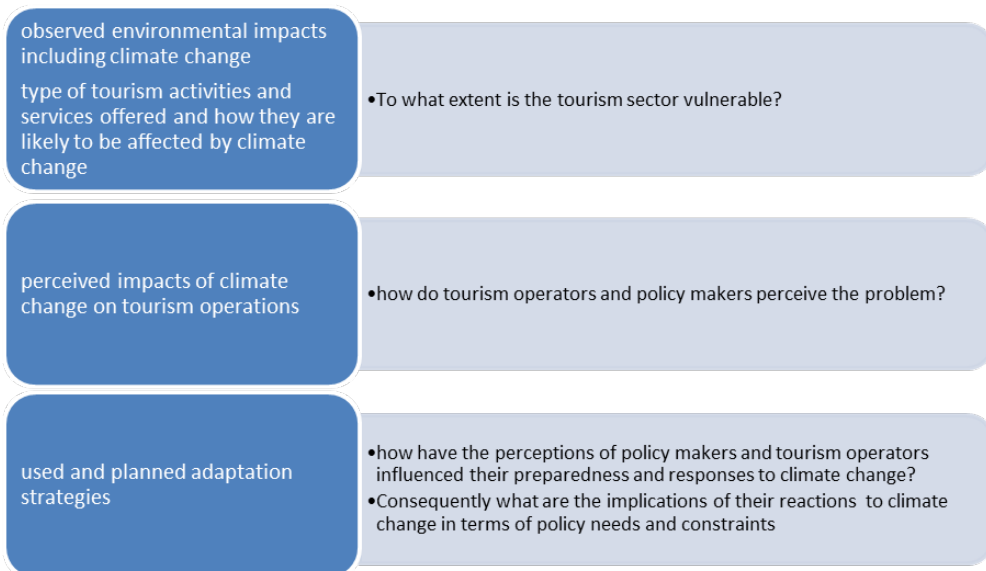


Figure 7. Linkages between interview topics and the research questions.

### 5.3 Empirical research materials and analysis

Boulton and Hammersley (2006) posit that qualitative data analysis is concerned with the identification of perspectives of people from a common cohort, the documentation of the problems they face and the strategies they have devised to deal with the problems. This is said to provide the framework of the analysis while the substance comes from the data. A simplified codes to assertions/theory model for qualitative inquiry was adopted after Saldaña (2016) The approach involves the following steps: data collections interviews; note taking; coding or close reading of the data in order to identify significant aspects and categories; memoing or pulling together some segments of data that are relevant to these aspects and categories; data interpretation or comparing and contrasting the items of data assigned to the same category in order to bring out the meanings of the different categories and how they are related to one another; finally leading to generation of theory or assertion (Boulton & Hammersley 2006; Marshall & Rossman 2006; Saldaña 2016). The initial stages entail organising the data generated from the interviews. This includes making the filed notes retrievable, cleaning up the data, logging it according to dates, times, places, entities and interviewees from whom the information was sourced; as well as immersion in the data, that is reading it over and over again to become intimately familiar with it (Marshall & Rossman 2006). Identifying categories entails detecting recurring ideas, language or patterns of belief, constant comparison until no new categories are identified, assigning codes in the process (Marshall & Rossman 2006; Neuman 2014). The comparison and consolidation of major categories leads to the core of the meaning



of the data i.e. thematic and conceptual levels of data analysis (Saldaña 2016). Finally the findings are explained and conclusions drawn to form a theory or assertion, i.e the ability to show how the themes and concepts relate, leads towards the development of a theory/assertion (Marshall & Rossman 2006; Saldaña 2016). A formal theory could not be formulated from this study but an assertion was developed (see section 6.4). An assertion is “a statement that proposes a summative, interpretive observation of the local contexts of a study” (Saldaña 2016:15). Like a theory, it attempts to infer observations from the particular to the general including predictions of what may happen in similar present and future contexts (Saldaña 2016).

Further analysis on vulnerability was also augmented with a screening exercise of the four vulnerability indicators adapted after Aall and Høyer (2005). These include: climate change vulnerability indicator, the nature vulnerability indicator, the socio-economic vulnerability indicator and the institutional vulnerability indicator. Due to possible high uncertainty in forecasting impacts of climate change on tourism because of lack of reliable local scenarios, one way of managing this challenge could be the use of ‘local vulnerability indicators’ (Aall & Høyer 2005), that is indicators sensitive to local variations. These were deemed relevant to the study since according to Aall and Norland (2005), they provide a ‘local’ indicator system based on cause effect approach in line with the conceptual framework adopted for this study. The indicators have been applied to a Norwegian case study (Aall & Høyer 2005; Aall & Norland 2005). For the purposes of this study, the Okavango Delta was used as a case study.



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## 6 Key Findings

### 6.1 Observed changes on natural capital- the tourism base: can the sector be regarded as vulnerable? (See article 1)

Observations by interviewees as well as the climate change vulnerability screening done in this research have revealed that Botswana's tourism sector is indeed vulnerable to the impending effects of climate change. In terms of the climate change vulnerability indicator, the majority of interviewees in both Tshabong and Maun alluded to having observed high temperatures, erratic rainfall as well as a shift in seasons. One observer in Tshabong said the month of August used to be hot and windy but in recent years it has become very cold and not windy anymore. These observations have also been documented in research. Rainfall patterns have indicated a tendency towards a decline in total annual rainfall in many parts of the country including those being investigated in this research (National Conservation Strategy Coordinating Agency (NCSA) 2002; Batisani & Yarnal 2010; Mphale *et al.* 2014). Batisani and Yarnal (2010) suggest that the decrease in rainfall is associated with a drop in the number of rainy days and this, coupled with a drying trend, suggests that climate change is underway in Botswana. This will in turn have an impact on the country's nature based tourism. Most of the tourism operators in both areas believed that the changes in these climatic variables could be linked somewhat to climate change. However, some believed that these two areas are normally characterised by high temperatures and erratic rainfall. They, therefore, did not think the observed trends had to do with climate change but rather normal weather cycles common in the two areas. Predictions have however signaled decline in precipitation and rising temperatures in the country in general (NCSA 2002; Dube & Moswete 2003; New *et al.* 2006; Batisani & Yarnal 2010)

Similarly, with regards to the nature vulnerability indicator, some changes in the physical environment and ecosystems have been observed. These include poor vegetation cover causing wildlife to graze further away while some in Tshabong study area end up migrating to South Africa. The screening exercise revealed, for example, that the channel distribution of the Okavango Delta has changed while the flooded area has shifted and the changes are attributed to among others, the external climate changes and the El Nino/Southern Oscillation effects (see Harry Oppenheimer Research Center 2005), although there is a lot of uncertainty regarding the extent of future discharge response (Andersson *et al.* 2006).

Interviewees in Maun were concerned that changes in weather patterns and changes in ecosystems would cause decline in tourist visits leading to less revenue for the country. Those in Tshabong area mainly pointed out negative effects on sustainable agricultural production. Observations of stakeholders based on local knowledge especially in ethno-meteorology has been emphasised as key to effective formulation of adaptation strategies so as to deal with climate variability and change (Kolawole *et al.* 2014, 2016)

Screening using the socio-economic vulnerability indicator on the other hand has demonstrated the effect on the local economy and social life through changes in their physical environment and ecosystems triggered by climate change. The Delta is pivotal to many households who depend on it for tourism, livestock farming, agriculture, fishing and gathering of veldt products and crafts (DEA 2008; Motsholapheko *et al.* 2013; Kolawole *et al.* 2016). Therefore, if the Delta were to be negatively impacted by the effects of climate change, many livelihoods would be at risk. Various institutions also offer formal employment with tourism accounting for the majority of jobs. Tourism in the Okavango region has also stimulated the development of allied infrastructure and facilities like accommodation and camping facilities, airport and airstrips as well as wholesale and retail business through its backward linkages (DEA 2008).

In terms of the institutional vulnerability indicator which shows the capacity of local institutions to carry out climate change adaptation measures (Aall & Hoyer 2005), the results have revealed that Botswana has well established institutions with clear mandates. Furthermore, tourism development in Botswana is regulated by pieces of legislation such as the *Tourism Policy of 1990*, *Tourism Act of 1992*, *Tourism Regulations of 1996*. They are, however, deficient in addressing climate change adaptation issues due to bureaucratic structures, inadequate manpower capacity, poor institutional arrangements, inadequate financial resources, gaps in regulatory frameworks, long lead time in policy formulation and legislation enactment, inefficient enforcement and low punitive measures, and inexplicit address of climate change adaptation in the existing pieces of legislation (see DEA 2008). These deficiencies thus further render the sector vulnerable. Sheaves *et al.* (2016) further buttresses the importance of effective governance and instructional arrangements in ensuring effective adaptation responses.

Based on this, we can then conclude that the tourism industry in Botswana is vulnerable to the effects of climate change. This vulnerability is demonstrated by exposure of the industry to climate change, how much damage will occur as a result of climate change and possible adjustments outside planning by government and other entities (Konrad & Thum 2014). Njoronge (2015) posits that the tourism sector is highly vulnerable to the challenge of climate change because tourism is highly dependent on climate change and the environment as such its viability is at stake especially in developing countries where tourism plays a significant role (see also Viljoen 2013). However, according to Konrad and Thum (2014), the vulnerability of the industry is not fully clear and will depend on the level of changes in precipitation and temperature and how the preferences of the tourists will develop in future. Further vulnerability is posed by the measures that may be brought into place to control climate change internationally or in source markets, i.e. aviation taxes (Scott *et al.* 2015).

## 6.2 Impacts of climate change on tourism industry as perceived by tourism operators and policy makers

### a) Operators' perceptions (article 2)

As discussed in the preceding section, the interviewees said they observed changes in the environment and some of which were attributed to the pressures of climate change. The observed changes included changes in the physical environment, ambient temperatures and rainfall patterns. Their perceptions on how these changes are likely to affect tourism operations were, therefore, sought.

The interviewed tourist operators had differing views on the impact of climate change on their business operations in general and on their specific activities and attractions now and in the future. Some operators in both research sites believed that these changes are normal and not attributed to climate change. Given the observed conditions of the environment, most still did not recognise any impacts on their own operations nor the tourism industry in general especially in Kgalagadi. Climate change was perceived as futuristic as most respondents in both research sites perceived the negative impacts of climate change as likely to occur in the future.

While operators offering mainly nature based activities such as boat cruise, game viewing, scenic flights, nature walks perceived their activities to be vulnerable to climate change; on the contrary, operators who offered mainly conferencing did not anticipate any negative impacts on their operations. This goes to show that indeed tourist activities are dependent on climate. However, some operators in Maun indicated that their clientele base has already gone down since people began to reduce their movement in the wake of too much heat episodes. The rise in temperatures were also said to not favour scenic flights over the Okavango Delta due to the resultant poor visibility of some attractions, hence confining operations to earlier charters. Some interviewed tourism businesses had not experienced any impacts on their operations and activities and did not foresee experiencing any impacts in the future.

At a national economic scale, future challenges to the industry were however envisaged to impede future business growth and competitiveness. Examples given were decline in tourist numbers due to expected extreme temperatures and decline in wildlife in the Kgalagadi trans-frontier park. Furthermore, the operators envisaged a decline in tourist numbers in future as international tourists stop long haul trips in the endeavour to reduce emissions (Boley 2014; Scott *et al.* 2015). This would however in some instances lead to a reduction in the redistribution of wealth from rich to poor countries that tourism currently provides (European Climate Foundation 2014). These observations are further emphasised by other scholars who purport that as temperatures rise, the attractiveness of many destinations will fade including the natural phenomena that millions of tourists travel to see such as forests, fauna and rich savanna (Hall & Higham 2005; Gössling &

Hall 2006; Michailidou *et al.* 2016). Furthermore, some resorts may end up unusable rendering them ‘stranded assets’ resulting in financial crisis (Australian Climate Institute 2006; European Climate Foundation 2014; Scott *et al.* 2016).

#### **b) Policy makers’ perceptions (see article 5)**

Similarly, most of the interviewed policy makers were of the view that climate change is real as evidenced by changes in rainfall, low dam levels, changing seasons. They alluded to the fact that these observations pose a risk to the industry as they have a bearing on tourism attractions such as wildlife, wetlands and vegetation. Examples given were changes in vegetation structure and composition, negative effect on activities such as boat riding and bird watching due to anticipated decrease in precipitation, flooding and increased malaria prevalence in cases of too much rainfall. The interviewees therefore saw these impacts leading to changes in tourism patterns and a decline in visitor numbers.

### **6.3 Botswana tourism operators and policy makers’ preparedness and response to climate change: Used and planned adaptation strategies**

#### **a) Operators preparedness and response (article 3 & 4)**

Given the observed changes on the natural capital upon which tourism is anchored and the perceptions on how these will affect tourism operations in the country, what then are stakeholders doing about the situation? Although some tourism operators appeared to view climate change with nonchalance, there was a clear distinction between the tourism operations in Tshabong and Maun with regards to their preparedness and response to climate change. In Tshabong the businesses interviewed did not really have any specific adaptation measures or strategies in place while those in Maun had adaptation strategies in place or under ‘active’ planning. The establishments had in place some adaptation measures and in some instances had planned adaptation strategies targeted at the physical environment, business operational policies and standards as well as those addressing customers’ comfort.

Physical environment adaptation strategies in place or planned in Maun included tree planting as well as the construction of open structures that allow free air flow. In terms of business operational policies and standards, the adaptation strategies included increased use of renewable energy, development of environmental management plans, establishment of environment units, adherence to government regulations i.e. carrying capacity and product diversification. Those addressing customer’s comfort included swimming pools, air-conditioners, airport shuttle and complementary refreshments for visitors on arrival.

Adaptation strategies in place or planned for in the Tshabong area primarily emphasised visitors' comfort by way of providing air conditioners which, ironically, could aggravate GHG emissions because of their energy use (Gössling *et al.* 2015). They had however planned for construction of swimming pools, shaded areas and tree planting, public education as well as research. It should however be noted that construction of swimming pools may also be tantamount to maladaptation (See Gössling *et al.* 2015; Aall *et al.* 2016). Some establishments had planned some adaptation strategies but failed to implement them because of budgetary constraints, while the majority of the establishments' future plans did not cover climate change adaptation strategies at all. The government's role was seen by the interviewees as crucial to providing financial and technical resources and support for the implementation of their adaptation strategies. Also seen as important was the development of telecommunication and public transport systems and support for regional tourism marketing. The perception of pushing the impacts of climate change to the future could explain why their response was not precautionary or proactive. Corner (2014), however, cautions that the precautionary principle rests in the idea that less than complete knowledge is no reason for inaction. Action includes providing the right policy environment to deal with climate change.

## **b) Policy makers preparedness and response (article 5)**

In line with the policy makers' readiness to address the issue, most interviewees were of the opinion that Botswana needs a climate change policy urgently in order to guide the different players in the government agencies and industry to cope or deal with the probable impacts of climate change. However, they lamented that the tourism-climate change nexus was still shrouded in uncertainty, knowledge gaps, inadequate data availability and accessibility all of which may constrain effective policy formulation and implementation.

In terms of what must be done in response to climate change in Botswana's tourism sector, the interviewees suggested policy responses ranging from adaptation and mitigation measures (energy and water efficient technology). In addition, they also called for more research to provide information and data. With respect to adaptation, the most common response given by the interviewees was with regards to diversification from products that are vulnerable to climate change such as cultural and sports activities. In terms of mitigation, investment in technology and infrastructure in the energy and water sector was mostly pointed out. Concerning information and awareness, interviewees echoed the need for more research, public education and awareness creation. Based on their observations, there was lack of knowledge as to what climate change is all about and how everyday life and the tourism sector will be affected.

Other research concurs with the views of the interviewees that the ability to react to climate change is a function of the availability of resources, information and technology (Easterling III *et al.* 2004; IPCC 2014; Konrad & Thum 2014). There are insufficient

adequate examples of how to operationalize adaptation strategies in developing countries (see Butler *et al.* 2016) due to a lack of information about the impact of climate change and choice of adaptation measures. Konrad and Thum (2014) further agree that climate change responses may be proactive or reactive and the latter occurs when there is a considerable amount of uncertainty. Considering that the significance of climate change on tourism is not in some distant future (Michailidou *et al.* 2016) it is advisable that businesses take a proactive stance. Konrad and Thum (2014), however, argue that it may be efficient to fix damages reactively rather than to try to prevent all possible damages proactively.

## **6.4 Policy needs and constraints: what are the implications of the tourism operators and policy makers' reaction to climate change?**

### **a) Tourism operators (articles 2 & 4)**

Based on the perceptions and responses to climate change, what are the implications in terms of policy? The preceding results have revealed that the responses differed per geographical location, i.e. between Tshabong and Maun operators. This implies that adaptation policies should take cognizance of the varying abundance in natural capital that form the basis for nature-based tourism across the country in that what may bear fruit in one area may not necessarily work in another (see Icarus Foundation 2009). Furthermore, lack of plans directly aimed at dealing with the impending impacts of climate change in some businesses, implies that environmental issues, including climate change and adaptation have not been institutionalised, nor was there a dedicated budget for such. Consequently, there will be no significant investment in climate change adaptation mechanisms that could reduce the vulnerability of the business operations. Integration of climate change issues at an operational level is of paramount importance as it would position the operators to put in place adaptation measures timeously. The reaction of the tourism operators to climate change as discussed in the preceding section, could also imply poor adaptive capacity since it is usually attributed to lack of awareness of what climate change adaptation is; the organisation's willingness to adapt to climate change, lack of information and the futuristic nature of the impacts. Indeed capacity challenges are common in developing countries hence the need to increase adaptive capacity in nature-based tourism organisations (Scott *et al.* 2012). An organisation's adaptive capacity is shaped by internal factors of the organisation including self-determination and learning processes. These factors influence the organisation's capacity; ability and willingness to implement climate change adaptation strategies (see Lonsdale *et al.* 2010). This therefore calls for urgent action from national governments to facilitate climate change adaptation



at business operational level. As Dodds (2010:3461) observes “more effort is needed to provide industry with necessary tools to transform their product into climate friendly attractions”

## **b) Policy makers (article 5)**

Similarly, having seen how the policy makers perceive and respond to the tourism-climate change nexus, one would be interested in the implication of their reaction moving forward. As previously mentioned, the interviewed policy makers, though they see the urgency for a climate change policy, emphasised that the issues of uncertainty and lack of information with regards to climate change matters are a major challenge and hence they called for more research and public education and awareness. This implies that even though the policy is still under development, it will need regular reviews and amendments in order to be at par with prevailing trends and available information over time. Moreover, once the general climate changes policy is in place, there will be a need to hewn from it, a tourism specific policy and implementation strategy to drive tourism operations specifically. This will only be made possible with up to date information and data pertaining to the tourism climate change nexus in the country. Hence the need for deliberate investment in Research and Development by government and other relevant stakeholders in order to advance climate change adaptation initiatives in the tourism industry.

From the analysis, one can therefore conclude that the assertion that emanates from this study is that the perceptions and responses by tourism operators and policy makers are influenced by the type of tourism activities offered and their geographic location, information available on the subject matter, the futuristic nature of the consequences of climate change and adaptive capacity. This is illustrated in figure 8.

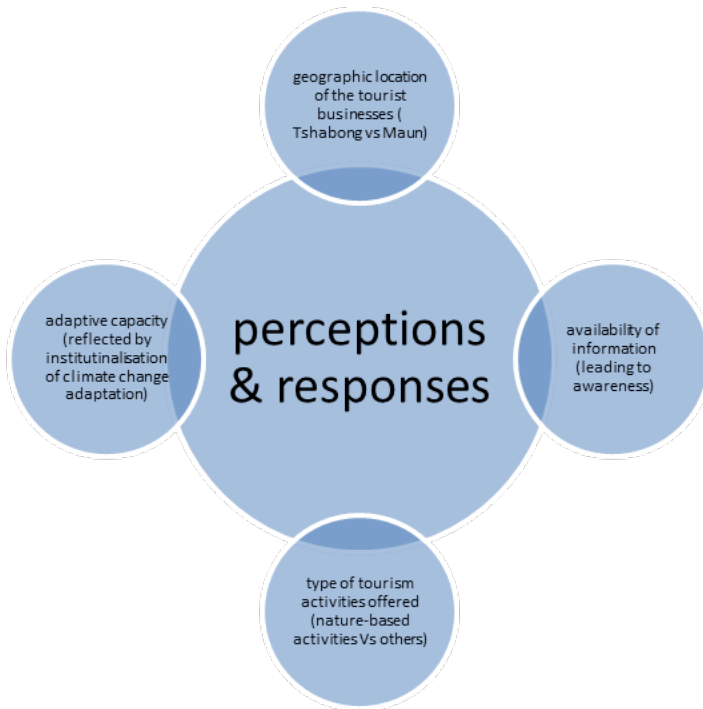


Figure 8. Factors influencing perceptions and responses of tourism operators and policy makers.

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## 7 Discussion, conclusions and future research agenda

Climate influences tourism and subsequently the tourism industry is climate dependent. Besides, many destinations owe their popularity, in part, to their pleasant climates (Amelung *et al.* 2006; Hall *et al.* 2013). Climate change may lead to changes in climatic seasonality, alteration of ecosystems natural capital which forms the basis for some forms of tourism leading to changes in tourist flows and income generation from the industry (Amelung *et al.* 2006; Simpson *et al.* 2008; Twomlow *et al.* 2008; Eriksen & Watson 2009; European Climate Foundation 2014). For instance, the European Climate Foundation (2014) posits that rising temperatures will lead to species shift that will significantly affect ecotourism such as safari operations. They further argue that in sub-Saharan Africa up to 40% of species in national parks are likely to become endangered by 2080 unless they are able to migrate. The question that arises – well before 2080 – would then be, how do tourism dependent economies in the Global South ensure that nature continues to be a sustainable resource to the tourism industry? This is a conundrum more so that response actions are dependent of the actors' perception of risk (see IPCC 2014c) as well as wider issues of environmental change that are interrelated to but distinct from climate change (Hall 2010a; 2010b).

Botswana is well endowed with natural capital including historical and cultural attractions that provide the impetus for nature-based tourism. The outstanding assets are wildlife and wilderness attractions. The most important attractions in terms of visitor numbers and economic revenue especially for leisure tourism are the Okavango Delta and the Chobe National Park (DoT 2000; DoT 2010) in Maun and Kasane areas, respectively. On the other hand there are some attractions that are still underdeveloped but have proven to have tremendous potential in the Kgakagadi District especially Tshabong area (Moswete *et al.* 2009; Saarinen *et al.* 2012). The area is also endowed with a wide array of wildlife and desert tourism landscapes. The vulnerability of nature-based tourism to climate change is substantial (Hopkins 2015; Viljoen 2013; Njoronge 2015). It goes without saying that currently Botswana's tourism industry is largely nature-based and any threats to the natural capital that sustains the industry (such as that posed by climate change) must be curbed without delay. However, response to climate change threats will depend on how key stakeholders such as tourism operators and policy makers perceive the 'problem'. The tourist operators and policy makers' perceptions of climate change are informed by the environmental changes that they may have observed; their level of awareness of climate change and whether they view it as a threat to their business operations. How the operators and policy makers perceive climate change will in turn determine their preparedness for the phenomenon and this will subsequently be reflected by the adaptation measures that they have instituted or for which they have planned. In some instances the fact that the perceived risks often differ from expert judgment poses

a challenge to public policy and business response due to a tendency to focus on short time horizons (Kunreuther 2014; IPCC 2014c).

There is a growing interest and awareness of the importance of climate change for tourism and related policy needs (Becken & Hay 2012). Although climate change policies are seen as increasingly urgent, many developing countries have not yet enacted national climate change policies while some like Botswana are still in the process of doing so. Careful thinking about what climate change policies should achieve is essential in assisting governments to make wise policy choices. That is, decision makers need to know and understand the problems and the response options available to them. Some of the policy instruments that some countries have instituted or are considering include: behavioural instruments such as GHG emission offset programmes; technological research and development instruments such as installation of pollution control technology; energy efficiency instruments; infrastructure development as well as design; and lastly adaptation and vulnerability reduction instruments (Hall & Higham 2005; Simpson *et al.* 2008; Kunreuther 2014). The former, which mainly constitute mitigation, are the most favourable in developed countries since they are faced with fewer political and technical constraints and hence more sensitive to uncertainties surrounding future damage costs from climate change (Kunreuther 2014). On the other hand adaptation policies are more favoured in developing countries (see Patterson *et al.* 2006; Omari 2010). Adaptation policies must fall within the socio-economic and environmental context of economic and political institutional arrangements, cultural differences in values and needs, beliefs about the existence and causes of climate change (Kunreuther 2014; Nagoda 2015; Sheaves *et al.* 2016).

All tourism businesses and destinations need to adapt to climate change so as to minimise associated risks (Gössling *et al.* 2009). Anticipatory adaptation came into policy focus with the advent of the UNCCC in the 1990s as the convention encouraged countries to conduct climate change vulnerability and impact assessments as well as capacity building initiatives (Agrawala & Crik 2009). In other words, the vulnerability and impact assessments revealed information that caused affected stakeholders to invest in proactive response measures because of what they anticipated with respect to the effects of climate change to their operations. The developed countries have since advanced at a faster rate than developing countries because of their adaptive capacity. Adaptation to climate change is now being increasingly recognised as a key to good development practice even though generally it does not feature within core development plans and activities (Agrawala & Crik 2009). They further assert that effective adaptation policies should target various levels of sectoral policies, sectoral budgeting allocation processes as well as regulatory processes.

Notwithstanding, adaptation has certain limitations that hamper effective climate policy pathways including; inadequate financial resources; cultural norms; lack of local knowledge and analytical skill as to what actions can be taken; lack of information, the uncertainty issues surrounding climate change discussions, lack of capacity to invest in response measures as well as the fact that developing countries have many development

issues that compete for limited funds (Lempert *et al.* 2000; Ojekunle *et al.* 2013; Kunreuther 2014). It must be pointed out however that, with regards to local knowledge, other scholars have emphasised its value in identifying suitable adaptation strategies (see Kolawole *et al.* 2014, 2016). With the prevailing uncertainty in climate change research and limited regional studies, most destination managers remain uninformed of possible implications of the plausible impacts of climate change in their destinations (Njoroge 2015a). Consequently, decision makers in developing countries often face challenges associated with implementing climate policies under risk and uncertainty (Easterling III *et al.* 2004; Kunreuther *et al.* 2014; van der Keur *et al.* 2016). For instance, when given information about measures to reduce climate change risks, they ask the following questions to inform their choices: how serious is the risk? Which options are ruled out because the costs seem prohibitive, and which ones offer the greatest net expected benefits (Kunreuther 2014)? Therefore, policies related to climate change and tourism depend on value driven decisions made in the context of uncertainty and complex socio economic, cultural and political relationships (Belle & Bramwell 2005). Risk is therefore defined as the potential for adverse effects on the economy, human wellbeing, cultural assets, services (including environmental) and infrastructure due to uncertain states of the world (Kunreuther 2014; van der Keur *et al.* 2016). Risk can be subjective in the sense that the likelihoods and outcomes are based on the knowledge or perception that a person has about a given situation (IPCC 2014c; Corner 2014).

In contrast, the concept of uncertainty is defined as a reasoning state of incomplete knowledge that results from a lack of information and in some instances disagreement about what is known and what is unknown leading to doubt (Kunreuther *et al.* 2014; van der Keur *et al.* 2016). The desirability of climate policies and instruments are affected by decision makers' responses to uncertainties. Corner (2014) argues that for as long as the climate discourse is marred with uncertainty transformation will less likely occur. Managing risk and uncertainty in the context of climate policy is of particular importance to developing countries that are resource constrained and face other pressing development goals. However, climate change research in the tourism sector has gained momentum in recent years after years of concentration in other sectors such as the agriculture, energy and water sectors. This increase in information among other factors as well as packaged in the right form (see Hall 2013, 2016) has the potential to raise awareness in affected parties causing them to be proactive with time. Effective and efficient tourism governance is, therefore, key to successful implementation of climate change response measures. Tourism governance include coordination of different stakeholders including government, community networks, markets, and businesses who perceive the risks and potential benefits of climate change differently given diverse values and goals (Bramwell & Lane 2012; IPCC 2014a).

It is clear that more research is needed in order to provide tools for innovation, awareness and adaptation strategy development in Botswana which would lead to practical action and also serve the interests of broader southern African tourism development.

Monitoring climatic suitability for tourism especially nature-based tourism cannot be neglected given the soaring temperatures and uncertain precipitation trends (see Fitchett *et al.* 2016a). The tourism-climate change nexus as it applies to Botswana is, however, still under-researched. There is limited understanding at present about the tourism's sector's vulnerability to climate change, even though the sector is highly impacted by the climate. A detailed climate change vulnerability assessment in the tourism sector needs to be undertaken in order to determine how the different ecosystems, and not only the internationally acclaimed Okavango Delta, will be affected by climate change and the likely impacts on tourism. For example, which of these would ultimately be counted among last chance tourism destinations (see Lemelin *et al.* 2012) due to climate change? In addition, questions addressing: how the impacts of climate change will evolve locally in the future; how different tourist attractions and activities will be affected; how visitor preferences and tastes will be affected, and consequently, how visitors' numbers will be affected; and how would Botswana's tourism sector have the required adaptive capacity to deal with climate change all remain unanswered. Another important aspect that is still under researched in tourism related studies is the concept of resilience which provides insights on how tourism stakeholders can adapt to short and long term impacts of climate change (Luthe & Wyss 2016). Of particular interest in the case of Botswana would be to determine the resilience of tourism dependent communities in the country in order to prepare the communities for the impending impacts of climate change. More often than not, the effect of climate change locally is mostly inferred from studies conducted elsewhere. Providing clarity to these issues would promote proactive adaptation that according to Eaterling III *et al.* (2004) can improve capacity to cope with climate change by targeting behavior change through removing indecisiveness and introducing incentives. As Kolawole *et al.* (2016:133) notes "for adaptation to occur there must be a stimulus that offsets the system resulting in a change that enables the affected system to endure and overcome the impact". The urgency to take action against climate change by decision makers and the tourism industry can no longer be regarded as a subject for debate.

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