



# Tourists' knowledge and perceptions on the impact of climate change on tourism in Okavango Delta, Botswana

K. Dube

Department of Ecotourism  
Vaal University of Technology, South Africa  
[dubekaitano@gmail.com](mailto:dubekaitano@gmail.com)

Prof K. Mearns\*

Department of Environmental Sciences  
University of South Africa, South Africa  
[mearnkf@unisa.ac.za](mailto:mearnkf@unisa.ac.za)

S.E. Mini

Department of Geography  
University of South Africa, South Africa  
[minise@unisa.ac.za](mailto:minise@unisa.ac.za)

L. Chapungu

Department of Geography  
Great Zimbabwe University, Zimbabwe  
[lchapungu@gzu.ac.zw](mailto:lchapungu@gzu.ac.zw)

Corresponding author\*

## Abstract

Tourism industry is one of the fastest growing industries globally, with an economic contribution that is unquestionable in both developed and developing countries. However, the growth in tourism is also associated with a growth in greenhouse gas (GHG) emissions from the tourism value chain, worsening the disaster of climate change. The tourism industry is dependent on the climate in many settings. To understand the current and future of the tourism industry, in the context of climate change, it is critical to understand the perceptions, knowledge and attitude of the tourism industry's main stakeholders, the tourists. This paper examines the stated aspects in the context of the Okavango Delta, Botswana. The study made use of an online survey, involving 155 tourists across the world, and secondary data. Analysis of data was done using QuestionPro analytics, Microsoft Excel ToolPak and Content Analysis. The results show that tourists are increasingly becoming more knowledgeable about climate change disaster. However, some practices and actions by tourists contribute towards the build-up of GHG emissions that drive climate change disaster. Tourists felt that climate change was worsened by ignorance, lack of education and poor global political leadership. Tourists believe that climate change is a threat to the water flow in the Okavango Delta, which has a negative effect on flora and fauna, as evidenced by the decline in bird-life species and other animal populations over the years. The study recommends increased environmental awareness interventions among tourism role players to foster greater climate resilience and more research to cover the knowledge gaps.

**Keywords:** Tourism, climate change impact, perceptions, knowledge, Okavango Delta, Botswana

## Introduction

Tourism is one of the fastest growing economic sectors, contributing significantly to the development and expansion of the global economy (Heryán, 2018). The tourism economy is critical, as it employs both skilled and semi-skilled workers (Dong, & Manning, 2017). The role



of tourism, however, is much more pronounced in the developing world than anywhere else, as it is a critical and sustainable tool that is used to address the challenges of poverty, unemployment and inequality (Snyman, 2012; Park et al., 2018). Tourism has been central to development in Southern Africa, which boasts a vast natural capital resource base. Top tourist destinations in Southern Africa includes Table Mountain in South Africa; the Victoria Falls in both Zambia and Zimbabwe, and the Okavango Delta in Botswana. Within Southern Africa, Botswana is particularly favoured by tourists for its pleasant climate and abundant wildlife populations (Winterbach et al., 2015).

In Botswana, tourism plays a pivotal role as it is the second largest economic activity after mining (Mmopelwa, & Blignaut, 2006). The sector contributed 11.6% towards Botswana's economy and employed 8% of the country's population in 2015 (WTTC, 2016). As such, tourism, like in many other parts of the world, is central to stimulating other sectors of the economy such as agriculture. In many respects, tourism is central to foreign currency generation (Harrison, & Maharaj, 2013). Tourism is equally important in the conservation of natural resources and, in Botswana particularly, this is a critical component of the tourism industry. Botswana was nominated by World Travel and Tourism Council (WTTC) as one of the 15 top global destinations in the world in 2017, which specifically made mention of its rich tourism product. Consequently, Botswana was nominated in the two prestigious categories, namely the Destination Award, which recognises destinations that champion sustainable tourism best practices, and the People Award, which gives recognition to the tourism industry's capacity building projects through education and training to build skilled tourism personnel for the future (WTTC, 2017).

Regardless of tourism's economic contribution, the world and Southern Africa have been confronted with the enormous challenge of climate change that threatens the existence of several economic sectors through triggering of climate extreme weather events such as extreme droughts, flooding and heatwaves. The Intergovernmental Panel on Climate Change (IPCC) warns of the catastrophic impact of climate change on the global socio-economic and environmental systems (IPCC, 2014). Southern Africa is reportedly extremely vulnerable to the impact of climate change, as indicated by various climate change models and scientists (Rogerson, 2016). Studies show that climate change will be detrimental to tourism in Southern Africa, and Botswana in particular, as the resources that tourism depends on are expected to be adversely affected by the impact of climate change (Hambira, 2011; Mearns, 2016). Tourism is one of the most climate-sensitive industries globally (Hernandez, & Ryan, 2011). The Okavango Delta, which is the central focus of the majority of Botswana's tourists, is particularly vulnerable to climate change. Climate change is expected to have severe impacts on the tourism industry (Andersson et al., 2006). It has to be noted, however, that tourism is both a victim and instigator of climate change, with a dual relationship existing between the two (tourism and climate change). Tourism has, of late, been cited as contributing around 5% to global carbon emissions (Hall et al., 2015). Thus, tourism both adds to climate change and will be impacted on by climate change as noted by Dube and Nhamo (2018).

There is, however, little understanding as to how tourism stakeholders understand and perceive climate change and its impact on tourism (Wyss et al., 2014). It has been established that the way tourists see climate change inform their actions, in either mitigation and/or adoption of adaptation strategies. The attitude, knowledge and perceptions of tourists also affect their travel behaviour, patterns and trends (Gössling et al., 2008; Dube, 2016). However, regarding the Okavango Delta, how tourism stakeholders perceive the impact of climate change on tourism and their knowledge about climate change remains obscure (Wyss et al., 2014). Fitchett et al. (2016) underscored the importance of such studies in sub-Saharan Africa, arguing that understanding is pivotal in addressing sustainability issues in the tourism industry.



This study is aimed at examining three aspects, namely; (i) to examine tourists' perceptions and attitudes on climate change and the implications thereof on the Okavango Delta; (ii) to examine tourists' knowledge and awareness of how tourism impacts on climate change and (iii) to examine how the perceived impact of climate change will potentially affect travel patterns to the Okavango Delta UNESCO World Heritage Site. The lessons learnt from this study can provide important recommendations for similar tourist attractions in Southern Africa. To tackle climate change in the tourism industry effectively, it is imperative to understand the perceptions and attitudes of tourists, so that appropriate intervention measures and strategies can be implemented.

## Research Methodology

The disciplines of tourism and environmental studies have been struggling to conform to one holistic research paradigm philosophy for ages. Academics recommend that these two research fields, given the complexity of the research they undertake, must adopt pragmatism as a theoretical framework for research (Pansiri, 2006). In light of the above recommendation, the pragmatism paradigm was chosen for this research design and informed the methodological underpinnings of this study. Pragmatism appreciates and encompasses an extensive methodological approach borrowing from the qualitative and quantitative research approach (Feilzer, 2010). The approach disentangles itself from the "wars" of paradigms that were characteristic of the qualitative and quantitative research.

In this research paper, a case study research approach was used, which allows for the use of various data gathering techniques. A case study allows for intensive research that leads to a deeper understanding of various factors that affect tourism and climate change in the Okavango Delta. The researchers made use of an original online questionnaire survey to gather data on the perceptions of 155 tourists out of an original 265 approached via email, from across the world. The survey sought to gather data on the views and perceptions of tourists about climate change in the Okavango Delta. The questionnaire tool was distributed through a promoted Facebook post. This allowed for a wider geographic representation of tourists' views, cost-effectively. Dedicated Facebook group administrators were used to distribute the link to the survey. In this way, the researchers were able to reach a wider geographic audience. A QuestionPro online survey was used in the design and distribution of the questionnaire, which contained mostly closed and a few open-ended questions. The questions were kept to a minimum, to reduce the time it would take to complete the survey and reduce unnecessary dropouts that result from long online questionnaires.

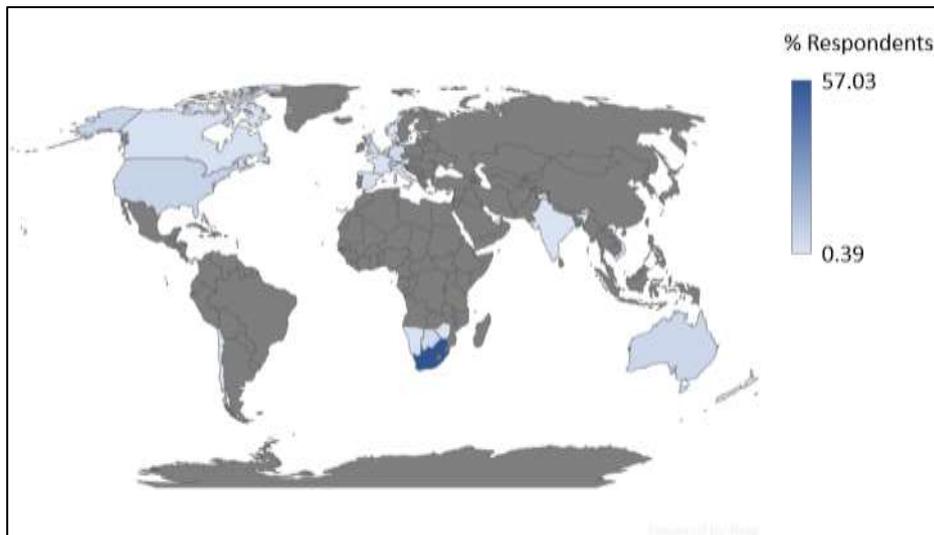
The research process was conducted in an ethical manner inline with researcher's institutional requirements. The distribution through emails and Facebook groups was conducted through informed consent of distribution partners after prior permission was sought. To respect and ensure confidentiality no personal information of participants was collected. Before participating in the research there was a landing page where participants had to consent to participate in research and rights were also spelt out including right to withdraw from research at any given time. The aims of the research was also spelt out and how findings were to be distributed in line with research and ethical best practice.

QuestionPro has integrated statistical analysis tools, which allows for quick processing, analysis and data interface. It also provides for geotagging, which provides a quick map of where respondents are located. This was necessary for easy reporting purposes (McPeake et al., 2014). Open-ended data were analysed, using QuestionPro text analysis, and additional

analysis of other data was done using Microsoft Excel Toolpak. Additional data were obtained from secondary data analysis, where content analysis was used to analyse data.

## Results and discussion

The online survey sought to collect views from 256 respondents. Out of those, 155 completed the survey, while the other 101 dropped out resulting in a completion rate of 60.55%. Figure 1 illustrates the geographical distribution of the 155 responses received. Responses were received from more than 26 countries, according to the report from the geotagging tool that was embedded in the survey. More than half of the respondents came from South Africa (57,3%). The sphere of influences of the Okavango Delta is vast and spreads across seven continents.



**Figure 1:** Okavango Delta sphere of influence and response distribution. (Source: authors)

The research had wider participation by women, who constituted 58% of the respondents. The destination is popular with female tourists. In keeping with the notion that ecotourist destinations attract educated people, the resort was seen to be popular with educated people. The results show that close to 9 out of 10 tourists, who have visited the Okavango Delta, have tertiary qualifications (87%). It also emerged from the results that only one per cent of the tourist visitors had received primary education only, with the remaining 13% having secondary education. The high levels of educated respondents were crucial in this research, as the issue of climate change is a complex matter that requires a certain level of education. The higher levels of education are in line with other studies undertaken regarding the educational levels of ecotourists such as Kruger et al. (2017) and Nheta et al. (2017). Ecotourists are often considered to be highly educated people (Ban & Ramsaran, 2017).

## Tourist attitude and behaviour

It emerged that the Okavango Delta attracts many repeat visitors, as most of the respondents had visited the resort more than once. The majority of repeat visitors came from South Africa which accounted for 52% of all the repeat visitors. Slightly less than two thirds (63%) of the respondents had visited the resort more than once, with the remainder being first-time visitors.



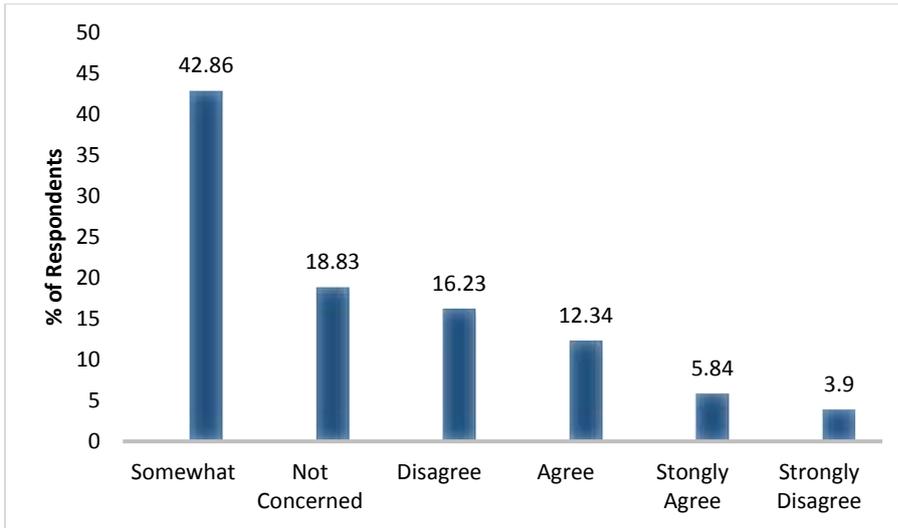
Out of the 63%, at least 16% had visited the resort twice, 11% visited three times, and the remaining 36% had visited the area four times or more. The number of visits tourists had made to the area was crucial in this research, as some questions required a recollection of previous encounters with the resort area. Lee and Moscardo (2005) had noted a relationship between repeat visits and tourists' environmental awareness, involvement in environmental management practices and participation in activities that expose them to nature.

Slightly more than half (56%) of the tourists, who had visited the Delta, had stayed there for between one and seven days, and about a third (32%) stayed for between one and two weeks, with the remainder staying between three weeks to more than a month. The longer a tourist stays at the resort, the more substantial the carbon footprint. The distance travelled is also a factor that affects the carbon footprint. The further the tourist is from the resort, the higher their carbon emissions. This view is supported by Filimonau et al. (2014), who found a strong relationship between tourist vacation period and the level of carbon emissions produced.

It emerged from the research that the most widely used mode of transport for tourists to the Okavango Delta is air transport, which was used by 65% of the respondents, with the remaining percentage making use of road transport. This means that the carbon footprint for the destination is quite substantial, given its sphere of influence and the mode of transport used by tourists. Air transport contributes a substantial amount of CO<sub>2</sub> emissions into the atmosphere (Staples et al., 2018). The contrail effect from the aircraft is a significant cause of concern, as it is feared to also contribute to global warming and disrupt weather conditions in some areas (Cox et al., 2018). Globally, there is a call for the transport industry and the public to be more climate conscious and to be transparent in the way they are dealing with climate change.

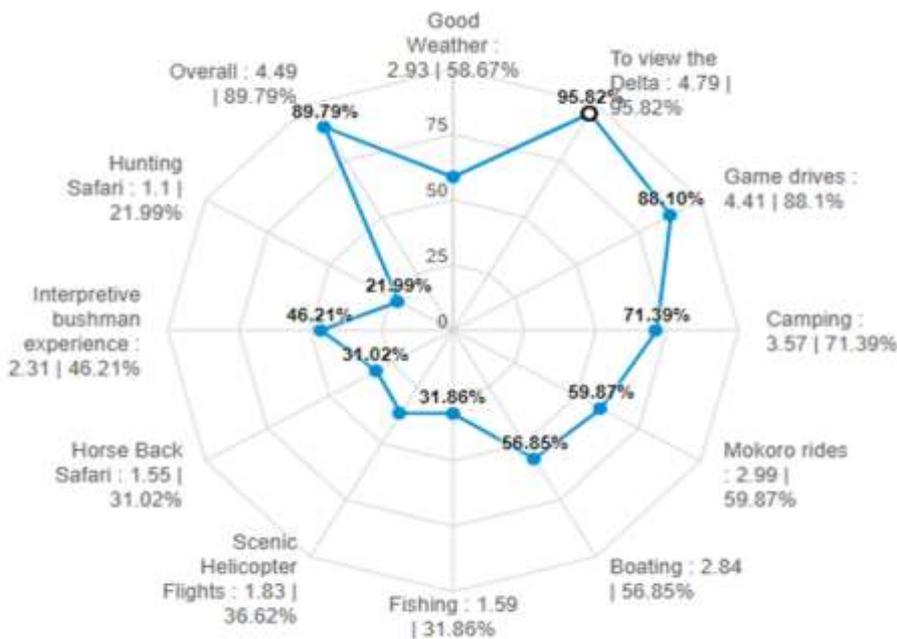
There was, however, also a high number of users of private transport (both air and road transport) to the resort, which is worrying. The wide use of private transport compounds the challenge of carbon emissions that drive climate change at a time the industry is trying to promote the use of public or shared transport, to reduce greenhouse gas emissions (GHG). More than two-thirds of the respondents (75%) made use of either private road or air transport to get to the resort, with only 25% making use of public transport to get to Okavango Delta. To effectively tackle the climate change challenge, there is a need for tourists to promote and embrace responsible tourism behaviour that would result in a reduction of carbon emissions, for instance, transport sharing, which involves the use of public transport and green transport.

When tourists were asked if they paid consideration to the carbon footprint during the planning phase of their trip, it emerged that only a small number of tourists paid attention to this and took into consideration their carbon footprint before deciding on the mode of transport. Only 18% indicated that they considered their carbon footprint when they were deciding on the mode of transport to and at the resort. A slightly more significant percentage, about 20%, said they did not consider their carbon footprint, while about 19% said that they were not concerned about climate change. At least two in every five of the respondents said they somewhat considered the carbon footprint before deciding on the mode of transport, as illustrated in figure 2. This finding indicates that there is a need to increase awareness and campaigning regarding climate change to change the behaviour among tourists towards reducing their carbon footprint. The current state of consciousness and attitude is concerning, as it will result in increased emissions for the sector at a time when there is a demand for the industry to cut its carbon emissions.



**Figure 2:** Choice of transport and carbon footprint considerations by tourists. (Source: authors)

Tourists were also asked to evaluate the primary reasons for visiting the Okavango Delta to understand their motives for visiting this site and activities that attracted them. Tourists indicated that the primary reason for visiting was to see and experience the delta. Tourists also considered game drives and camping to be the most critical reasons, besides viewing the Okavango Delta, which rated 4.41 and 3.57 out of five, respectively. Tourists rated the weather at the resort as mostly fair, 4.93 out of 5, while the mokoro rides (canoe-like boats) were rated 2.99 and was listed in fourth place as a pull factor, as illustrated in figure 3. However, it is critical to note that all the aspects that act as pull factors to this tourist site are vulnerable to climate change and climate variability and, as such, any anticipated and ongoing changes in the climate, due to climate change, could have a direct or indirect impact on this tourism product.



**Figure 3:** Rating of pull factors and reasons for visiting the Okavango Delta by tourists. (Source: authors)

## Climate change knowledge and awareness

The survey revealed that the majority (70%) of the tourists believed that climate change is a consequence of human activities. On the other hand, about 16% of the respondents felt that climate change is a product of natural processes. One in ten of the respondents believed that climate change is a result of a combination of factors, encompassing both natural and human factors, while the remainder said they were not sure what the exact causes of climate change were. The high number of respondents, who understands that climate change is the result of human activities and/or a combination of factors, is critical in advocating for climate change adaptation and mitigation activities in the tourism sector. Shi et al. (2016) pointed out that knowledge of climate change was a critical factor in shaping attitudes, concerns and behaviour towards climate change. The tourists, therefore, can be said to be aware of the general causes of climate change.

When tourists were asked to identify the top three challenges regarding dealing with climate change, it emerged that tourists considered the lack of political leadership as the number one stumbling block. Lack of knowledge and ignorance were identified as the second and third most problematic areas, respectively. International regulations were also recognised as a significant factor when dealing with climate change. These four challenges accounted for three quarters (75%) of the responses. The finding that a lack of political leadership in regard to climate change is a challenge, can be linked to observations of the behaviour of political leaders in recent years in the run-up to the Paris Agreement on Climate Change and, directly thereafter, with strong disagreement among global leaders and a failure to reach a progressive deal on climate change. It is worth noting that climate change talks, under the auspices of the Conference of Parties (COP), take close to a month every year, making it one of the most protracted global meetings held annually to deliberate on climate action.

The tourists pointed out that lack of knowledge and ignorance were problematic areas in their quest to address climate change. The Intergovernmental Panel on Climate Change (IPCC) acknowledges that there are knowledge gaps with regard to climate change, especially in Africa, where knowledge gaps are still huge, and state of confidence levels in many areas are still huge due to inadequate research capacity (IPCC, 2014; Hoogendoorn & Fitchett, 2016; McDowell, 2016).

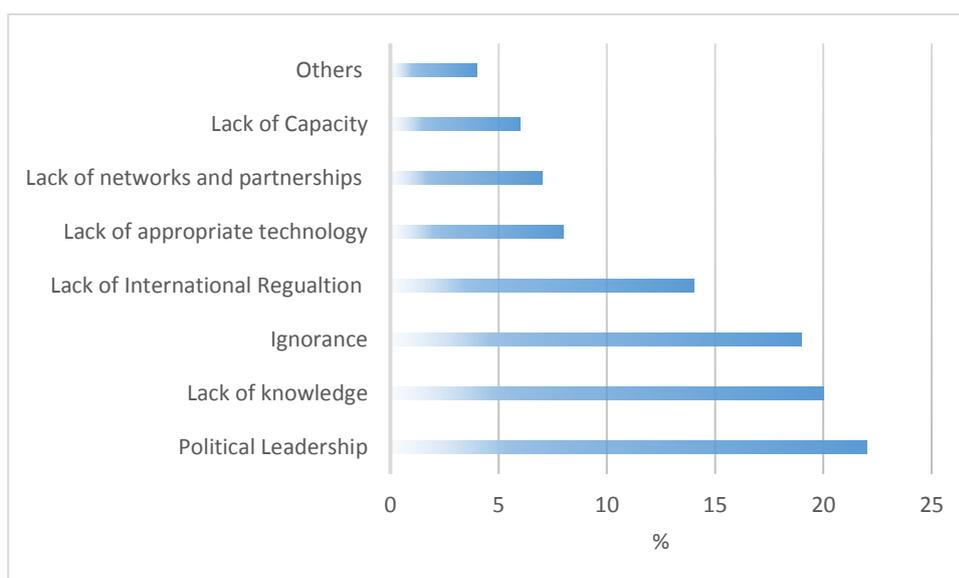
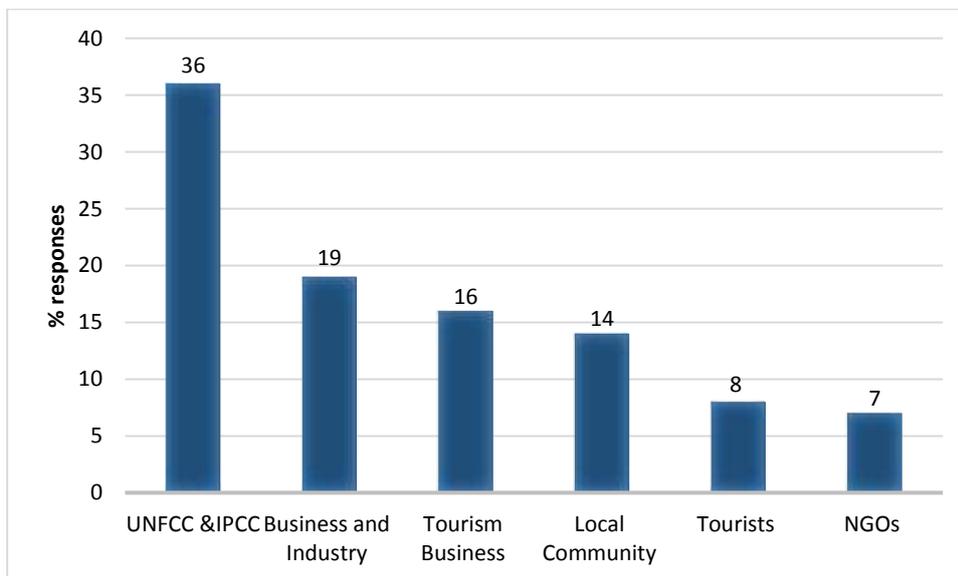


Figure 4: Top three challenges when dealing with climate change (Source: authors)

From the survey, it was also noted that most of the tourists felt that climate change was a threat to the Okavango Delta. About 87% of the respondents believed that climate change is a concern as it relates to the Okavango Delta, while approximately 7% of the respondents noted that climate change was not a concern, with the remaining indicating that they did not know whether it was a threat or not. A large number of tourists, who expressed concerns about the threat to the delta, might be an indication of the high level of understanding of the level of vulnerability of this world heritage site. This perception is backed by scientific studies, which have pointed to the vulnerability of the Okavango Delta to climate change (Kgomotso et al., 2018; Kgathi et al., 2016). Sundblad et al. (2009) noted that perceived risk is a significant facilitator of behaviour change. It is not yet clear whether this is true for the tourism industry in as much as shaping tourist behaviour is concerned.

When tourists were asked to specify whom they believe must be responsible for dealing with the causes and impacts of climate change in the Okavango Delta, a significant number of tourists indicated that they expected the IPCC and the United Nations Framework for Climate Change (UNFCCC) to play a leading role in this regard, as shown in figure 5. The second highest votes went to business and industry, followed by tourism businesses, in the third place, and the local community in fourth place. Less than 10% of the tourists believed that they have a role to play in addressing the causes and impacts of climate change. Tourists and tourism businesses are critical role players in the tourism industry and, as such, it is incumbent upon them to develop both mitigation and adaptation strategies that will address climate challenges in the sector. The results are therefore contrary to the assertions by Scott et al. (2016), who argued that tourists have the largest capacity to adapt to the impact of climate change; however, it is not clear how tourists will adapt if they do not fully appreciate their role and/or responsibility within the climate change impact and mitigation space. To some extent, this can be interpreted to mean that there is a significant lack of awareness and ownership among tourists of the role that they can play.

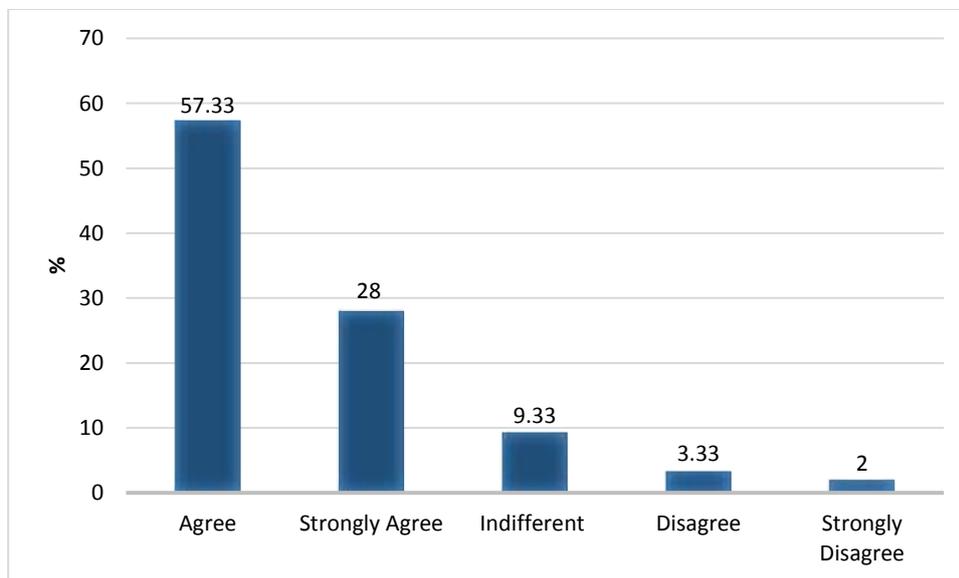


**Figure 5:** Who must be responsible for dealing with the causes and impacts of climate change? (Source: authors)

The recognition and expectation for the IPCC and UNFCCC to play a leading role in climate change are critical as these are leading organisations in the space of climate change. There

is, therefore, a need for the two bodies to consider the tourism sector, especially in their assessment reports. This must be aimed at catering for the knowledge gap regarding impact, mitigation and adaptation, which is quite pronounced in such areas as the impact on wildlife, freshwater resource-based tourism resorts and nature-based tourism, among other such areas, as noted by Scott et al. (2016). The low expectation for tourism business in dealing with climate change is equally worrying as it makes it challenging to hold tourism businesses to account by tourists if the expectation from them is low. The tourism industry, throughout the value chain, accounts for a significant carbon footprint, which is expected to exceed the previously mentioned (see, Introduction and background) figure of 5% (Paramati et al., 2016; Zhang et al., 2016). There is a need to increase pressure on the tourism industry to adopt a green tourism ethos and environmentally friendly principles so that the growth in the sector is sustainable.

In another question, tourists were asked if they feel they have a role to play in reducing harmful gases that cause climate change. In response to this question, the majority (85%) of respondents indicated that they believe that they have a role to play in reducing GHG emissions, while only a small fraction of respondents did not agree that they have a role to play, as shown in figure 6. The acknowledgement by respondents that they have a role to play in reducing GHG emissions is positive, as it is indicative of a receptiveness to change, which allows the tourism industry ample space for the adoption of mitigation measures. However, this finding was surprising, as, in an earlier question that directly dealt with the tourism industry, very few tourists indicated that they have a role to play. There doesn't seem to be a sense of responsibility in dealing with GHG in the tourism sector by the tourists, a scenario that has to change to effectively deal with emissions in that sector. This can be addressed through offering incentives for tourists who participate in green tourism initiatives and or through environmental education.



**Figure 6.** Perceptions of the role of tourists in reducing greenhouse gas emissions. (Source: authors)

When asked about initiatives tourists have taken to reduce their carbon footprint, it emerged that quite a number of tourists had made an effort to reduce their carbon footprint during their visit. Approximately one in every four tourists, who visited the area, had made use of solar energy technology for lighting and heating water. Some tourists indicated that their rooms were fitted with light-emitting diode (LED) and they made an effort to save energy by switching off lights and also conserve water by taking shorter showers. Other initiatives included drinking water that was locally supplied and purified, instead of using bottled water. About one in ten



respondents indicated that they did not take any initiative to reduce their carbon footprint during their visit.

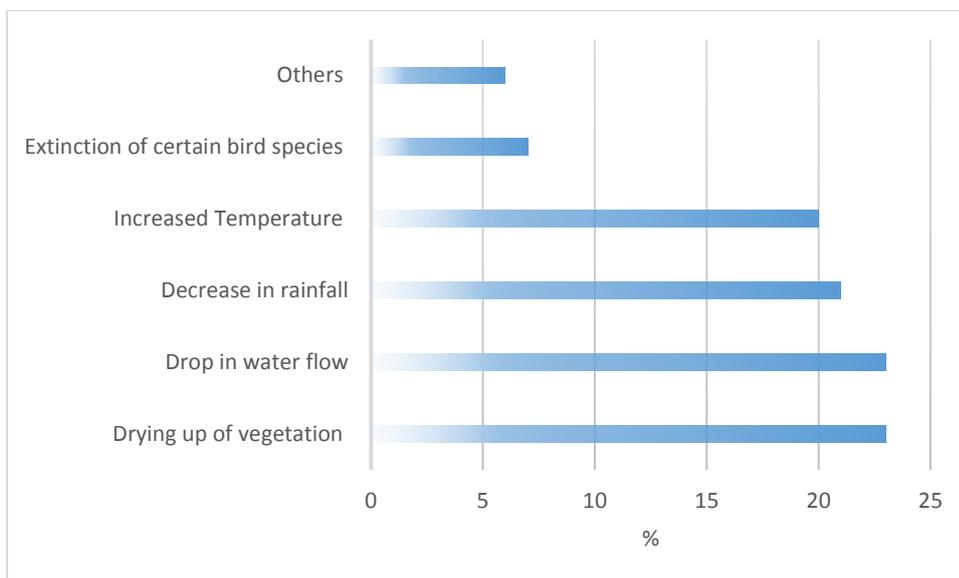
### **Perceived impact of climate change and influence on tourism**

Tourists were divided on whether the temperature in the Okavango Delta had changed. About 21% of the respondents reported that they had noted changes in the temperature during their visit to the delta. Of the 21%, 1% said temperatures had decreased, while about 20% (which is a fifth of the total population) said the temperature in the area had increased. However, about a fifth (22%) of the respondents indicated that they had not observed any changes in the temperature. The remaining 28% and 29% stated that they were not sure or that this was not applicable, respectively. An increase in temperature, in the Okavango Delta, is widely expected to affect tourist comfort and the Okavango Delta as a destination. The observation that the temperature in the Delta had increased is in line with the common narrative that temperatures within the Southern African region have increased over the years. Kolawole et al. (2016) noted that temperatures had soared within the Okavango Delta, with October being notably quite hot. Hughes et al. (2011) noted that an increase in temperature, attributed to global warming, would adversely affect the average water flow in the area due to the higher evaporation of water, which would, therefore, alter the woodland and savanna biomes in the delta and affect ecosystems and wildlife in the area. Various climate models have also shown deterioration of the Okavango Delta as a consequence of climate change impacts (Wolski, & Murray-Hudson, 2008).

There are fears that climate change is threatening some of the iconic world heritage sites globally, the tourists were asked to give their perception on the subject matter with regard to the Okavango Delta. The Okavango Delta is a water-fed (wetland) attraction, and projections are that, like other wetlands and estuaries, climate change will negatively affect this pristine wetland (Lamsal et al., 2017). Just below half (49%) of the respondents indicated that they expect that the Okavango Delta will dry up in the future as a consequence of climate change. This perception seems to confirm earlier findings by Folwell and Farquharson (2006), who observed a decline in water flow volumes in the Okavango Delta between 1961 and 1990. In a separate study by Wolski et al. (2012) and Darkoh and Mbaiwa (2014), the water flow changes within the delta, owing to several internal and external climatic factors, were also noted. About 27% of the respondents indicated that they were not sure, whereas about 17% noted that they do not believe that the Okavango Delta is under a threat of drying out. The remaining 8% argued that the future of the delta depends on some other factors, including tectonic movements, human activities upstream and the occurrence of other events such as El Niño. It would appear that quite a number of tourists believed that climate change is a real threat to this natural attraction.

About three-quarters of the tourists believed that droughts, attributed to climate change, were likely to affect the attractiveness of the Okavango Delta. Tourists feared that an increase in droughts would result in the future result in a reduction of the size of the delta, a reduction in birdlife, reduced aquatic life and biodiversity and death of plant life, which forms the bedrock and is central to the ecological functioning of the delta. A few respondents pointed out that they feared there would be floods after the droughts, which might affect tourism infrastructure. If the droughts are to continue, with the related disruption in the ecosystem, it will have a negative impact on tourist arrivals and, consequently, affect the livelihoods of those who depend on tourism in that particular area.

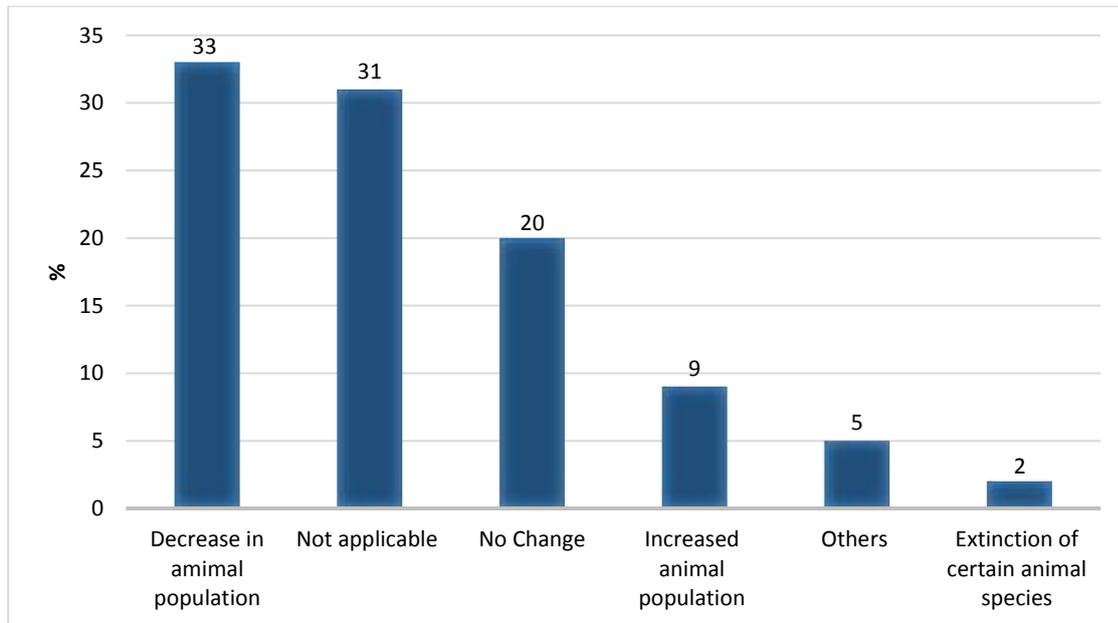
A few tourists noted that an increase in droughts in the area might have a negative impact on the host community, which might lead to increased poaching activities and human-wildlife conflict in the area. Tourists, who had made several visits, argued that they have started to see some evidence of this and they held the view that this could be attributed to climate change. Most of the tourists noted that there were about four indicators which could be attributed to climate change, as shown in figure 7. About one in five (23%) of the tourists reported that they had witnessed a drop in water flow and reduction in the vegetation in the Okavango Delta due climate change over the years. About one in four of the tourists also reported that they had witnessed indications that point to a decrease in rainfall in the area, with the increase being only noted in the area's temperature. Kolawole et al. (2016) had observed a decrease in the number of heavy rainfall showers and an increase in incidences of drought in the area, confirming tourists' perceptions.



**Figure 7:** Perceptions of evidence of climate change in the Okavango Delta. (Source: authors)

The results indicate and point to changes in environmental factors that sustain wildlife in the delta. It is not surprising, therefore, that some tourists reported that they had witnessed an extinction of certain birdlife species in the area. A study by Mainwaring et al. (2017) established that climate change was affecting nesting species through a reduction of nesting material and causing suboptimal sex ratios for bird species that are known to be temperature-dependent sex determinant. This had an overall impact on suppressing bird population growth. The Okavango Delta boasts an estimated 400 to 500 bird species, and tourist on walking trails and doing mokoro rides can experience birds in this vast wetland. The bird populations seem to be very high in areas that are permanently under water, compared to seasonal wet areas. This could be because of changes in habitat conditions in the area. UNESCO (2014) acknowledges, in its awarding of the Okavango Delta a World Heritage Site status, that the delta was an important bird area. The delta is home to 24 globally threatened bird species. It equally has thirty-three waterbird species, which exceeds 0.5% of the regional and global population. A drop in the number of bird species or extinction of certain bird species could result in reduced satisfaction levels for the tourists who love bird-watching in the area.

A third of the survey respondents reported that they had observed a decrease in the animal population that could be directly and indirectly attributed to the impact of climate change in the area. At least one in five of the repeat tourists visitors said they had not witnessed any changes in the population of animals in that area, as can be seen in figure 8. These observations and perceptions might be valid, as studies conducted elsewhere have proved that, in most global regions, the altering of habitat conditions led to a decline in animal populations as animals struggle to adapt.



**Figure 8:** Perceptions of the impact of climate change on animal populations. (Source: authors)

Tourists were asked to give their views on how climate change has affected the water flow in the Okavango Delta. About one in four (24%) tourists indicated that they had witnessed an unprecedented drop in water flow in the delta over the years, which can be attributed to climate change. A reduction in the water flow could, directly or indirectly, be attributed to reduced rainfall activity and water abstraction upstream, as a consequence of climate change. The tourists observed that increased occurrences of droughts could be attributed to climate variability and climate change and is compounded by increased evapotranspiration. This perception confirms observations by Konecky et al. (2016), who noted that climate change was causing water supply challenges in parts of the delta. Increased water demand in the region could also be responsible. It is important to note that, since the Okavango Delta is a wetland, a reduction in water supply would disrupt the ecosystem, which might have a detrimental effect on flora and fauna, if the nutrient cycle is disturbed.

It emerged from the survey that tourists feared that increased incidences of drought in the area would lead to the reduced attractiveness of the delta, which might affect their decision to visit the area. This finding confirms observations by Brice et al. (2017) and Jedd et al. (2017), who argued that tourist arrivals were adversely affected by extreme weather, as it undermined tourist comfort and activities as well as the quality and standard of tourist attractions. About one in four (84%) of the respondents were adamant that increased droughts, triggered by climate change, will reduce the natural beauty of the area. Increased incidences of drought could result in loss of vegetation and force the migration of birds and animals in certain parts of the delta, which might affect the livelihood security of the area, as tourists might not visit the



dry areas. About 11% of the respondents said that they do not agree with the fact that drought will affect the Okavango Delta, while the remaining percentage said they were not sure.

When tourists were asked to identify some of the tourist attractions that they felt are under threat of climate change, they noted that they believed that most national parks were under threat of climate change and notably singled out the Kruger National Park in South Africa, Hwange National Park in Zimbabwe, Serengeti National Parks in Tanzania and Etosha National Park in Namibia, among others. They also noted that all water-based tourist attractions were threatened by climate change. The Victoria Falls in Zambia/Zimbabwe received the highest number of mentions, as a possible threatened tourist resort, followed by the Great Barrier Reef in Australia and the Maldives in the Indian Ocean. The respondents also pointed out that most beaches in South Africa and elsewhere were threatened by erosion. Other attractions that were mentioned include the St Lucia Wetland Park in South Africa and the polar areas.

The results showed that tourists are conscious of the tourist climate hotspots, as all the attractions mentioned had been cited, in previous studies, as being vulnerable to climate change. In this regard, Kilungu et al. (2017) noted that climate change was threatening major tourist attractions in the Serengeti National Park, while Manatsa et al. (2018) and Chanza (2018) also raised concerns over the increased incidence of drought attributable to climate variability and change, and the impact this has on wildlife in Hwange National Park. On the other hand, Hoogendoorn and Fitchett (2016) argued that climate change impacts were altering animal migration patterns with implications for the tourism industry. Bunting et al. (2016) warned that climate change was resulting in habitat loss and changes in the Kruger National Park, which might affect animal populations - a drawcard for tourists.

Climate change was found to have implications for water-based tourism resorts and ecosystems (Folkersen, 2018). Dube (2016), noted that climate change was one of the major threats for the Victoria Falls resort in Zimbabwe. On the other hand, Piggott-McKellar and McNamara (2017) argued that the Great Barrier Reef is labelled as a last chance tourism destination, due to a decline in the health of the reefs as a consequence of climate change. The polar areas, in particular, the Arctic, which is under threat of vanishing, have been classified as last chance tourism destinations (Lemelin et al. 2010).

To ascertain the sustainability of tourism industry, post-climate change impact, tourists were asked to state if they would visit the Okavango Delta if it happens to dry up. It seems that the Okavango Delta would lose about 59% of its tourist market share, as only about 41% of the respondents indicated that they would visit the Okavango Delta, even if it were to dry up. Nearly one in five (19%) of the respondents said that they would not come to the attraction, if it were to dry up. This is a significant figure, since it will have a knock-on effect on tourism revenues and given that the Okavango Delta receives an estimated 120,000 tourists annually (Darkoh & Mbaiwa, 2014). The Okavango Delta accounts for the largest share of the 3.9% GDP contribution by the tourism sector in 2016 (WTTC, 2017).

## **Conclusion and recommendations**

This study assessed tourists' attitudes, knowledge and perceptions on the impact of climate change in the Okavango Delta, in Botswana. The results show that the Okavango Delta is a tourist location that attracts tourists from across the world. These tourists are primarily aware of climate change and the implications of their actions on climate change. The awareness and understanding of climate change have, by and large, not transformed into meaningful actions that ensure a reduction in greenhouse gas emissions in some instances, as tourists are not



yet at a stage where they consider their carbon footprint in their travel plans. Most tourists could identify some of the global challenges that affect mitigating action regarding climate change, such as poor political leadership, lack of knowledge and ignorance. There is a broader expectation by tourists for global bodies such as the Intergovernmental Panel on Climate Change (IPCC), under the auspices of United Nations Framework for Climate Change (UNFCCC), governments and business to do more to tackle climate change, which they believe is a serious threat.

Tourists believed that climate change is occurring and that has altered the Okavango Delta in a manner that has affected the water flow as well as flora and fauna. Tourists noted that the Okavango Delta had seen an increase in droughts, a decline in rainfall and, in turn, water flow and, as a consequence, bird and animal populations had declined in the area. If the Okavango Delta were to dry up, it might lose a large market of the tourist population, something that will negatively affect the Botswana economy. Besides the Okavango Delta, tourists also felt that most water-based tourism attractions are under threat of climate change, with specific examples being given as the Victoria Falls, St Lucia Wetlands Park, beaches along coastal areas in Southern Africa, the Great Barrier Reef and the Maldives. The tourists also felt that most national parks were under threat of climate change, citing the Hwange National Park, Kruger National Park, Serengeti National Park and Etosha National Park as the most perceived threatened national parks.

Regardless of the findings, tourists were eager to make use of green technology, if provided at the destination such as the example of making use of renewable energy technology and the purchase of local products and participating in water saving initiatives. The research, therefore, recommends continuous monitoring of tourist resorts to providing up to date information on the impact of climate change. We also recommend support for further research on the topic of climate change impacts to ascertain the extent of the impact on the tourism industry and to make the industry greener, in line with the Paris Agreement on Climate Change. There is also a need to provide educational support by both civil society and government to sensitise and improve the understanding of the tourism sector on climate change adaptation and its mitigation.

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