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Tourist perceptions and attitudes regarding the impacts of climate change on Victoria Falls

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Abstract. Tourist perceptions are critical in shaping tourism development at a destination. Regardless of the centrality and vulnerability of the tourism industry, tourism geographers have been shying away from perception studies, and more so in Africa. Some of the destinations most vulnerable to climate change and related weather activities are water-based natural resorts. Recent droughts have ignited an intense debate that has brought the future viability of tourism in Victoria Falls into question. Using a mixed-method approach, the study sought to document tourist perceptions and attitudes regarding the impact and future of the Victoria Falls World Heritage Site. It emerged that Victoria Falls is categorised as a last-chance tourism destination. Going forward there is need for continuous resort monitoring, tourism product diversification, and transparency and proper communication, particularly during years of extreme droughts, in order to avoid tourism disruption. Climate change action is a must for all tourism stakeholders to save the resort.

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1. Introduction

There is increasing awareness and concern among global industry and citizenry about the danger of climate variability and change on human civilisation (Scott et al., 2012). Tourism is known to be one of the sectors that have a dual relationship with climate and weather (Ma and Kirilenko, 2019). Tourism affects and is affected by climate in various ways, including altering the facilities, activities and environment in which tourism occurs. For tourism to flourish, it requires ideal climate conditions that are adaptable to both activities and tourists. Tourists activities can be facilitated or disturbed by prevailing weather conditions such as droughts, or extremely high or cold temperatures. Changes in climate have therefore altered the tourism activities and the tourism infrastructure facilitating tourism development both in Africa and beyond. Initial climate and tourism studies emerged from the Global North, mainly focusing on explaining how polar ice-melting would affect tourists in the polar regions (Spandre et al., 2019), tourism in the Mediterranean region (Loizidou et al., 2016), winter Olympics (Scott et al., 2019) and beach tourism (Georgopoulou et al., 2019), amongst others. In the Global South, recent studies have revealed how climate change stands to affect ecotourism in coastal areas (Fitchett et al., 2016), waterfalls (Dube and Nhamo 2018 and 2019a, b), national parks (Kilungu et al., 2017; Dube and Nhamo, 2019c), world heritage sites (Dube et al., 2018) and tourism infrastructure, both inland and in coastal areas.

Climate change is, therefore, a significant concern and threat to environment-dependent industries, such as tourism, with indications that most iconic tourist destinations are in one or other way threatened by climate change (Kaján and Saarinen, 2013). Given the magnitude of this problem, there is a need for all tourism role players to work together in confronting this global challenge, which is set to most affect developing nations and fragile ecosystems. One of the challenges that the tourism industry has faced in achieving this is ignorance; a lack of knowledge and varying perceptions among the industry's vast array of role players (Pandy and Rogerson, 2018).

The realisation of vast knowledge gaps in tourism climate change perceptions led to the Intergovernmental Panel on Climate Change (IPCC) calling for climate change perception studies to be conducted amongst tourism stakeholders (IPCC, 2015). Perception is a construct of various factors such as beliefs, events, education, political background and religious affiliation. With this in mind, there remains very little understanding of how recent extreme weather events have shaped the perceptions and knowledge about climate change impacts on the tourism industry, especially on major global tourism attractions across Africa (Scott et al., 2019), including the Victoria Falls resort shared between Zambia and Zimbabwe. Negative perceptions may trigger last-chance tourism (LCT) as tourists flock to see destinations before they are permanently altered or disappear (Lemieux et al., 2018). Dube et al. (2018) found that most tourists were worried that iconic destinations in southern Africa, including the Victoria Falls, iSimangaliso (St Lucia) Wetland Park and the Okavango Delta, were victims of the ongoing climate change and extreme weather events. However, Pandy and Rogerson (2018) found that climate change was not considered as a pressing issue among tourism stakeholders. This is worrying, indeed. Although Africa is not really in the spotlight concerning mass tourism in the global discourse, it is imperative to understand how climate change and extreme weather events will affect tourist behaviour, attitude and tourist flow in Africa (Dube and Nhamo, 2019a). Such perception studies can act as a gauge as to the future flow pattern of tourists to some resorts, affecting business viability and sustainability going forward.

Inasmuch as nature-based tourism is vulnerable to climate change, there has been concern that tourism is threatening the environment through

the production of greenhouse gases (GHG) that are accused of driving climate change throughout its value chains such as travel, accommodation and activities (Dube and Nhamo, 2019b). The tourism industry is globally accused of lacking transparency and seriousness in dealing with the problem of climate change, even though the industry contributes about 5% to total GHG emissions (Cai, 2016). In the context of the tourism sector, tackling climate change is not only an ethical thing to do, but it is in the interest of the tourism industry, which is both a victim and a perpetrator of climate change (Mackay and Spencer, 2017).

Kaján and Saarinen (2013) argued that of the challenges in dealing with climate change in the tourism sector, adaptation in particular requires confidence and belief that the climate is changing. However, Turton et al. (2010) and Kaján and Saarinen (2013) observed that there were very few studies, and thus little knowledge within the tourism community – and this hampers climate change mitigation and adaptation efforts. Hoogendoorn and Rogerson (2016) and Scott et al. (2016) argued that there are still substantial knowledge gaps in the tourism industry that need to be closed to deal effectively with the climate change challenge.

Tourist behaviour and travel patterns in the tourism industry are functions of perceptions (Font and Hindley, 2017). Hindley and Font (2018) portrayed that perceptions of the impact that climate change has on a destination will affect choice of destinations and decisions to visit. The LCT, for example, is primarily driven by the perceptions that a particular tourist resort is under threat from climate change (Piggott-McKellar and McNamara, 2017) and could result in tourists flocking to see such a location before it disappears or degrades to the lowest levels. There is growing knowledge that suggests that water-based tourism is particularly vulnerable to the vagaries of climate change, mainly due to prolonged intense droughts and increasing temperatures (Dube and Nhamo, 2018; 2019a). In Southern Africa and the Zambezi basin, in particular, climate analysis models show a concerning picture of increased temperature way above the global average, declining rainfall and reduced water flow along the Zambezi River according to Nyamwanza (2018) and Zimba et al. (2018). The Victoria Falls are an ecotourist destination, and ecotourists are broadly profiled as responsible tourists who are knowledgeable and educated (Patterson, 2007). Understanding of this niche tourist group goes a long way in understanding how ecotourists to climate-change-sensitive areas perceive climate impact on tourism and how such perceptions shape behaviours and future travel patterns.

Considering the above background, this study investigates the perceptions and attitudes of tourists regarding the impact of climate change on Victoria Falls. The research feeds into discourses around tourism, climate change and society. To this end, the research becomes more relevant as it feeds into the IPCC's call for perceptions and attitude studies focusing on climate change and tourism (IPCC, 2015). Drawing from the findings by Dube and Nhamo (2018) and Dube and Nhamo (2019a;b), the tourism industry in Victoria Falls is vulnerable to climate variability and change. Climate change was singled out as reducing the water flow at the waterfalls, hence disrupting the aesthetics and the experience of tourists at the waterfalls. The increasing temperature was reportedly increasing operating costs, which is passed on to the consumers. The increase in temperature is also cited as a challenge for the helicopter companies as, during certain months, they faced mechanical challenges associated with rising temperatures. Helicopters are a familiar attraction for an aerial view of the waterfalls (Dube 2018). Extremely high temperatures further caused challenges for tourists taking off and landing at the Victoria Falls International Airport (Dube and Nhamo, 2019b). Severe rainfall is also found to be problematic as it damages some roads in the national parks surrounding the waterfalls, thereby disrupting tourist activities such as game drives, photography and bush camping (Dube and Nhamo 2019a).

The next section deals with the methodological underpinnings. The results and discussion sections then follow, before the last section concludes the paper and provides some recommendations.

2. Research materials and methods

Victoria Falls is a World Heritage Site that is located in Southern Africa and shared between Zambia to the north and Zimbabwe to the south (Fig. 1). It

was inscribed as a World Heritage Site in 1989 under criteria vii, for being the largest curtain of falling water in the world, and under criteria viii, for its geological and hydrological features (United Nations Educational, Scientific and Cultural Organization UNESCO, 1989). The Victoria Falls National Park, which forms part of the asset, was designated a Ramsar site in 2013. It contains several animal species including some of the "Big 5". It is home to about 500 bird species; 10% of the world population of the black rhinoceros *Diceros bicornis*; and 400 vegetation species over a 1,750 ha area (Ramsar, 2013).

Victoria Falls received 544,104 tourists in 2015 (UNESCO, 2016). In 2017 air pollution, drought, housing, water abstraction and tourism-related activities were cited as some of the significant threats to the World Heritage Site property (Dube and Nhamo, 2018). The Victoria Falls are found along the Zambezi River, which is one of the four largest rivers in Africa, and is expected to witness reduced water flow because of climate change that will potentially affect economic activities along the river (Beck and Bernauer, 2011). Climate change is expected to disrupt some of the significant economic activities along this major river, including tourism. Hall and Higham (2005) predicted that, by 2050, climate change would result in a 2°C temperature increase in the Zambezi basin during the summer months.

A case study approach was used in this research with an online survey (n=370 out of the envisaged 1,200 potential respondents). In addition, content analysis of Google and Trip Advisor reviews (n=5,395 reviews) was done to gather perceptions, attitudes and knowledge of tourists that have visited the Victoria Falls. Additional data were obtained from field observations that took place on separate occasions between 2015 and 2017. An online survey was distributed to dedicated tourist Facebook Groups through postings. The questionnaire had 30 open and closed questions that interrogated tourists' observations, beliefs, knowledge, attitudes and opinions on the impact and the causes of climate change, among other such questions. Survey-based studies are standard in investigating behavioural responses by tourists to climate change globally (Damm et al., 2017). With permission from group administrators, a purposive random sampling technique was used to select the Facebook groups used to dis-

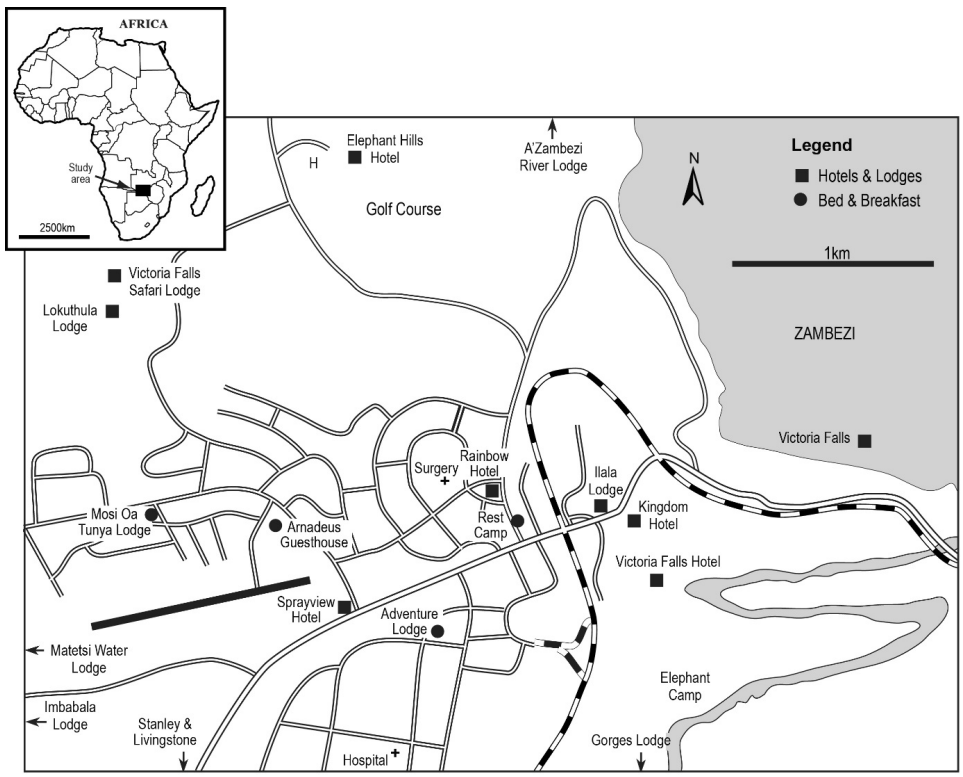

Fig. 1. Victoria Falls and environs
Source: Authors

tribute the questionnaires. The research sought the broader participation of tourists across the globe, in order to be as representative as possible of the Victoria Falls tourism market.

The use of social media or virtual communities in tourism research has seen growth in recent times due to the advantages that it offers, such as low cost, convenience and time efficiency in data collection (Illum et al., 2010). Given the above advantages, Facebook has been accepted as a scientific data collection platform by the medical fraternity with the recommendation that the use be expanded to other fields (Buzzi et al., 2017). However, online consumer reviews on social media and tourism blogs have also been used in various research tourism research studies as part of big data for business purposes (Xiang et al., 2017). Tourism is believed to be the best platform to make use of user-generated reviews contents, with over a hundred paper publications from research derived from online reviews (Lu and Stepchenkova, 2015).

As such content analysis of the reaction of tourists and other stakeholders was conducted by tracking reactions on Facebook after pictures were circulated online that claimed that Victoria Falls had dried up sometime in October 2015. The researchers analysed all the content that could be found from the trending post "Victoria Falls dries up" on Facebook. This approach was used as Facebook offers people space to express their feelings and views more openly. The posts that were accessed ranged from company pages to newspaper pages and personal accounts, with the aim of analysing people's reactions and levels of concern.

Data analysis occurred simultaneously, using the QuestionPro analysis tool, and QuestionPro analytics was used to analyse text data. Content analysis was done following the approach prescribed by Bryman (2017). Further analysis was done using Microsoft Excel's Analysis Toolpak. Participation was anonymous and voluntary, with tourists consenting to participate in the interview before being allowed access to the main questionnaire.

3. Research results

3.1. Profile of respondents

The survey was completed by 370 tourists. Figure 2 shows the countries respondents were drawn from. From Fig. 2, it emerges that respondents were from about 43 different countries across all seven continents. As South Africa is the biggest market for Zimbabwe's tourism, most respondents came from this country (47% of all respondents) followed by the Zimbabwean market (13%), the United States of America (7%), the United Kingdom (6%) and Australia (4%).

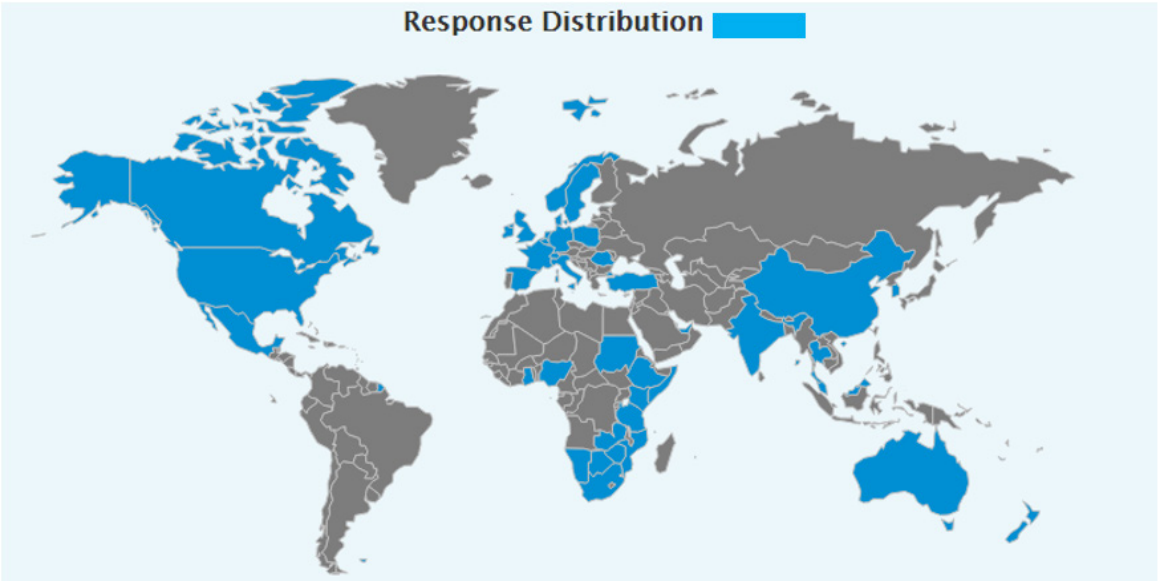

Fig. 2. Distribution of online survey response (n=370)

Source: Fieldwork

The survey had a high participation of educated people with the expectation that they would have some level of knowledge on climate change that would assist in the study. An estimated 87% of the respondents had attained tertiary qualifications, with 59% of that population being holders of first-degree qualifications and above. Further details are reflected in Fig. 3. The profile of respondents attests to the long-held view that by profile, eco-tourists are educated individuals who are informed, knowledgeable and well-travelled individuals with a deep understanding of tourism products. A similar profile was observed for ecotourists elsewhere in the world and regionally by Nheta et al. (2017). The broad participation of educated people was seen in a good light since it means that, to some extent, the participants have a level of understanding of the research focus.

From the survey, it emerged that 35% of the respondents were first-time visitors to Victoria Falls and the remaining 66% had visited the resort more than once. Out of the repeat visitors, 34% had visited Victoria Falls more than three times (Fig. 4). This shows how popular the attraction is with tourists. The tourists indicated that they visited the resort numerous times to view it in various seasons to experience and enjoy the various seasonal activities that the destination has to offer. White-water rafting and swimming at the devil's pool are conducted during the low-water season, whereas other activities such as rainwater walking and lunar rainbow views are best during the high-water flow season. Repeat visitors are central to the research, as some questions required the articulation of changes over time. At least 65% of the respondents can be said to be knowledgeable about the resort, given that they were repeat visitors. It is important to note that repeat visits tend to create an emotional bond with the attraction.

It is imperative to understand tourists' motivations for travelling, as climate modification of aspects of the resort can affect tourist flow either positively or negatively. The tourists were asked to rate the primary reasons for visiting Victoria Falls. In Fig. 5, adventure activities are ranked as the top reasons for visiting the resort. Most adventure activities are water-dependent, such as white-water rafting, swimming at the Devil's pool, gorge swings and bungee jumping. The study revealed that most tourists consider visiting the waterfalls as the most important reason for visiting the resort town of Victoria Falls. The second-most important reason for visiting the Victoria Falls resort town was for leisure and recreation purposes. Tourists also consider the destination to be a luxury destination where they go to relax close to nature. The third-most important reason for visiting is to participate in game viewing.

Field observation revealed that Victoria Falls is predominantly a wildlife area, with national parks and game reserves being the principal land use in the area. Adventure activities were also cited as an essential reason for visiting. Victoria Falls is fast gaining the status of an "adventure capital of Africa, since it offers several adventure activities that are popular with tourists, such as white-water rafting, bungee jumping, flying fox, elephant rides, zip line, gorge swing, crocodile cage diving and lion walks, to mention but a few.

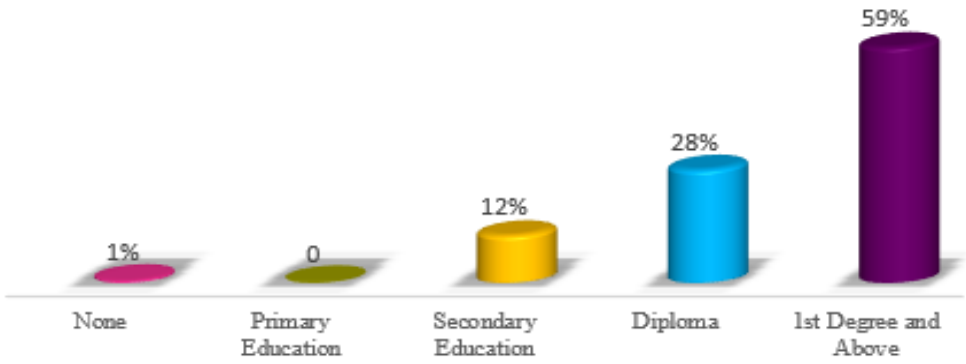

Fig. 3. Education profile of respondents (n=370)
Source: Fieldwork

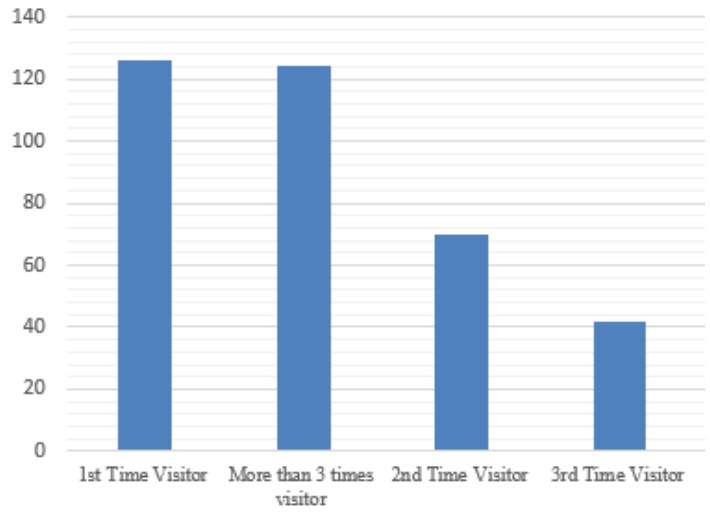

Fig. 4. Profile of respondent visits to tourist facilities
Source: Fieldwork

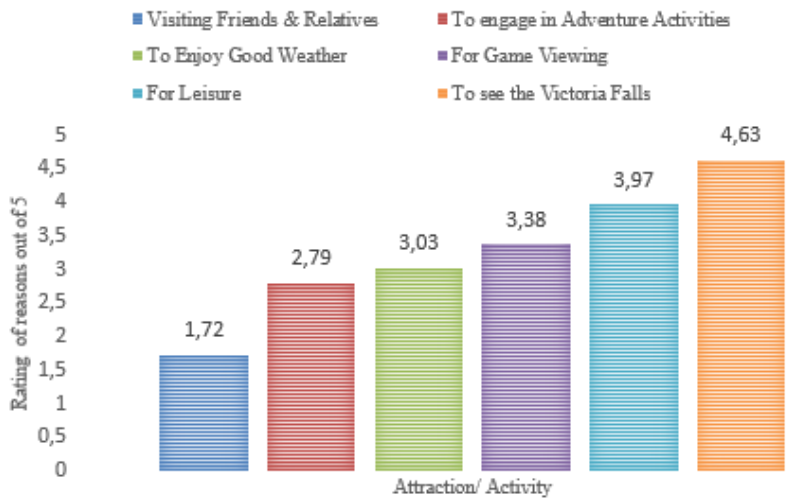

Fig. 5. Reasons for visiting Victoria Falls
Source: Fieldwork

3.2. Perceived impact of climate change on Victoria Falls

As indicated earlier, perceptions drive the tourism industry. In 2014 and 2015 there was a social and print media scare that the Victoria Falls was drying up. To this end, the survey asked tourists to give opinions on the likelihood of Victoria Falls waterfalls drying up. The tourists were primarily split in their responses, with no clear majority opinion on the matter. The results show that the dominant opinion was that Victoria Falls was unlikely to dry up (43%). At least about two in every five tourists (39%) were not sure as to how climate change will affect the water flow at the Victoria Falls waterfalls. This indecisiveness could be attributed to the highly unpredictable weather pattern in the valley, which has seen some arid years and some years being extremely wet, with the water flow pattern at the Victoria Falls resort following extreme climate fluctuations. Two studies conducted on both sides of the Victoria Falls attest to the high climate variability in terms of both rainfall and hydrological patterns as measured at the Victoria Falls Big Tree hydrological station (Dube, 2018; Dube and Nhamo, 2018; 2019a). General circulation models are widely known to fail to accurately predict future climate for Southern Africa. Available research had also been giving conflicting information, making it

difficult to understand and predict the future basin climate, for example (Kusangaya et al., 2014).

Several predictions have been made that the Zambezi River would decline by between 20 and 30% due to a decline in rainfall. However, studies carried out at various rainfall stations in the basin have not been able to detect a statistically significant rainfall change within the basin although high annual variability has been witnessed (Kusangaya et al., 2014). A small number of tourists believed that water flow was a factor in geological processes to an extent, as well as fearing that changes in precipitation patterns, and changes in geological dispositions too, could affect water flow in the basin. Some tourists who said they were not sure (39%) indicated that there was a lack of scientific data to provide a clear picture of what was going to happen shortly or in the long run. Only 18% of respondents believed that Victoria Falls would ultimately dry up because of climate change.

The tourists were also asked to give an account of their observations at the Victoria Falls regarding water flow at the waterfalls. There was no clear majority of opinion on this matter, with half the respondents noting that they were not sure if the Victoria Falls was drying up or not (Fig. 6). About every two in five tourists had observed a drop in water flow at the resort attributed to climate change. About one in ten ecotourists noted that they had not observed any changes in water flow at the waterfalls during the various visits they had made to the resort. About 3% of respondents reported that they had witnessed a water increase over the years at the waterfalls. About one in two tourists noted that they were not sure as to whether they had observed an increase or decrease in water flow. The high level of uncertainty could be attributed to the fact that tourists could have visited the waterfalls during various seasons, namely the high-water, low-water or mid-season. Most tourists indicated during the research that they make repeat visits to view the Victoria Falls resort during different seasons to enjoy the episodic activities each season has to offer. Most importantly, given the annual variation in water flow due to extreme years of drought and wetness, it is equally challenging for a tourist to tell the trend, as noted earlier.

Water flow at the waterfalls is crucial, as it shapes the activities that tourists can or cannot do. Depending on individual tourist preferences, the activities most enjoyed include the thundering, the water spray and water curtains produced by the water as it flows into the gorge. High water peak discharge and moderate discharge usually coincides with peak tourist volumes to the resort. Those who visit the waterfalls during peak discharge cannot enjoy activities such as white-water rafting, which is usually closed, and only re-opened once water flow has dropped to optimum flow levels associated with mid- and low water flow season. This season, however, is challenging for those who want to take photographs. The low water flow season normally coincides with low tourist arrivals. Nevertheless, there are numerous activities that tourists can experience during the low flow season, such as white-water rafting, swimming in the Devil's Pool and photography, amongst others; tourists view these as secondary to seeing a large curtain of plunging water producing a considerable spray that can be seen hundreds of kilometres away. Anything that alters the water flow and associated aesthetics are seen in a bad light by tourists.

One of the principal reasons for visiting the Victoria Falls town was noted to be game viewing. As such, tourists were asked to report any changes they had observed in national parks regarding wildlife. The results in Fig. 7 show that more than half (55%) believed that there had been a decline in the animal population. About one in ten (10%) believe that at least some of the animals had become extinct in the area. Almost one in four of the tourists reported that they had not witnessed any changes in the animal population in the area. A fair share of tourists that visit the Victoria Falls is interested in game drives, photography and hunting. Tourists fear that a drought induced by climate change would probably affect their game activities – an important secondary activity.

Victoria Falls is categorised as a wetland and a Ramsar site, which is home to some globally endangered birds. Victoria Falls is touted as one of the best birding destinations in Africa, given the fact that it is located along the Zambezi River (Gray, 2007). The field study revealed that it hosts more than 500 bird species, which is about 5% of global bird species. It is equally a critical migration corridor for birds, with the summer being the ideal time for avi-tourism for beginner and experienced birder

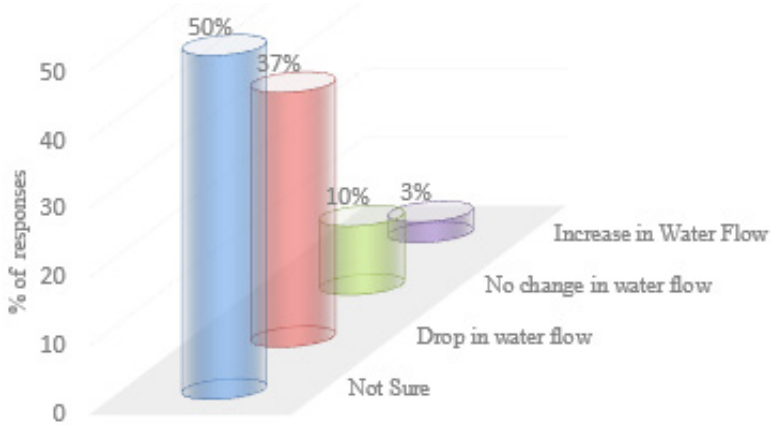

Fig. 6. Perception of waterfalls flow pattern at Victoria Falls (n=359)
Source: Fieldwork

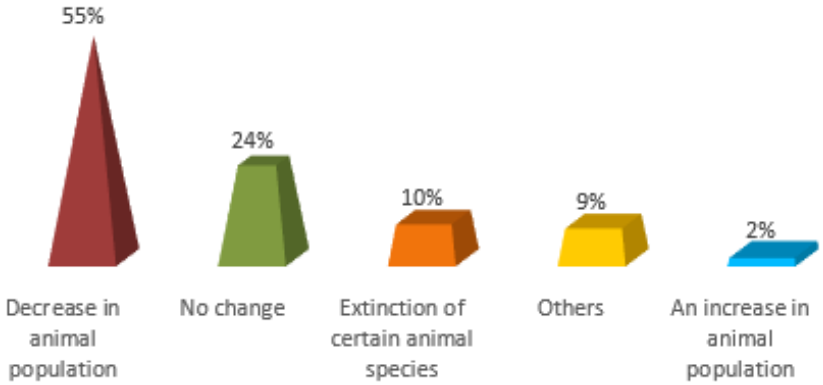

Fig. 7. Perceived impact of climate change on animal population (n=370)
Source: Field Work

viewers. Some endangered bird species use Victoria Falls as a nesting site. The survey revealed that more than half (51%) of the tourists had not observed any changes in the bird population in the area (Fig. 8).

More than a third of respondents reported that they had noticed a decrease in the population of birds, with one in ten tourists reporting that some bird species had vanished from the Victoria Falls area. The loss of bird population can be attributed to habitat or migration pattern changes in the area caused by climate change or increased human encroachment into former wildlife areas as result of urbanisation. A decline in bird population could negatively affect the experience of bird watchers who visit the area to conduct bird watching as either a primary or secondary activity. There are fears that climate extremes may drive some bird species to extinction.

In the industry, the weather is an essential parameter on which most activities and attractions depend. Numerous models have been developed in an attempt to assess tourists' level of comfort with the weather of a destination, although none of these models has been found useful in Africa due to data challenges and geographical inapplicability (Fitchett et al., 2016). Given the perceived changes in climate, tourists were asked to outline changes in weather and the climate that they had observed over the past few years. More than half the tourists indicated that they had observed an increase in temperature over the years. Slightly less than half the respondents indicated that they had not observed any changes in temperature over the years, as shown in Fig. 9. A small part of the population noted a decrease in temperature.

The tourists had a chance to comment on their answer. It emerged from these comments that the weather in the resort was increasingly scorching and unbearably humid in November and October. This was found to be increasingly uncomfortable and, in a way, hampers the uptake of outdoor activities, especially in the afternoon. Dube and Nhamo (2019c)

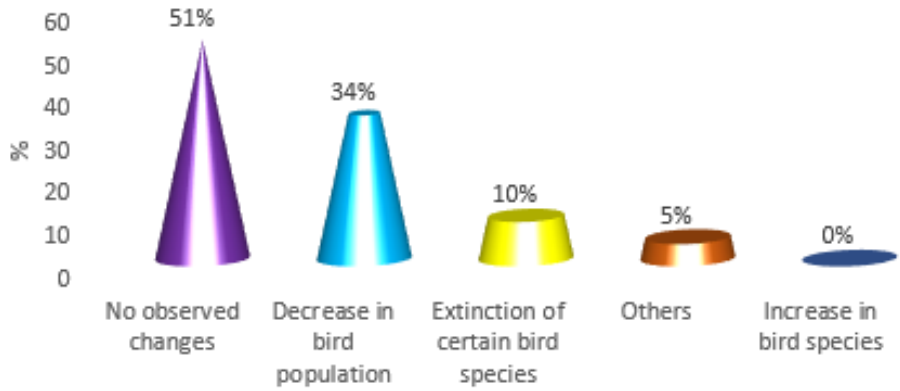

Fig. 8. Perceived impact of climate change on bird life in Victoria Falls (n=364)
Source: Fieldwork

reported that as a result of increased temperature in the Kruger National Park, tourists were averse to outdoor activities and demanded more water activities such as swimming. Some respondents pointed out that the winters were becoming warmer and drier, whereas the summers were sweltering; an indication of the climatic pattern of the resort town. The observation of a temperature increase might be valid, since Graham et al. (2011) projected a 2.9°C increase in the Zambezi basin as a result of climate change.

Climate change will likely affect the tourist pattern in the future, which, in turn, may affect revenue inflow for the tourism industry and the host community. The magnitude at which climate change will alter the destinations will affect its pull factor. The tourists were asked if they would consider visiting the Victoria Falls even if it dried up. As shown in Fig. 10, there was a split between those who would consider visiting it and those who would not (38% apiece).

Victoria Falls might lose 38% of its market as a result of climate change if it dries up. In "other" comments, most respondents noted that a "dry waterfalls mean no visits from them". Only a small fraction highlighted that they would visit the area to enjoy the natural and beautiful geology of the Victoria Falls and to reminisce the former of the seven wonders of the world. A small portion was adamant that the Victoria Falls would not dry up and, as such, they would continue coming to Victoria Falls to enjoy it.

3.3. Perceived Impact of extreme droughts and extreme temperatures

The content from social media revealed that the news of Victoria Falls drying up trended on social media for some days in 2015, and that this indicated the level of interest and the likely impact of such an occurrence for both companies and tourists. Most businesses operating in Victoria Falls were at pains to explain that the perceived drying of the waterfalls is a natural trend. Although thousands of pictures were circulated on social media showing the extent of water levels at the waterfalls, various explanations were given for the phenomenon by different tourism stakeholders.

Google reviews for 300 tourists from 2014 to 2016 were analysed for star-rating and content. Resort satisfaction is mostly a function of climatic conditions that prevail at a destination (Fitchett et al., 2016). The results indicated a general trend for lower star-rating during known extreme weather events. Secondary data analysis was also conducted by studying literature on the evidence of climate change.

Content analysis of 5,095 reviews from Trip Advisor was conducted. The general complaint that was picked up was that during the dry season in 2015 the falls virtually dried up – something never seen before, especially on the Zambian side. Most tourists discouraged others from visiting the resort during early summer or recommended others to visit the Zimbabwean side, which had some water flow during that time. This concern was more pronounced during the 2015 El Niño extreme drought that affected the whole of southern Africa.

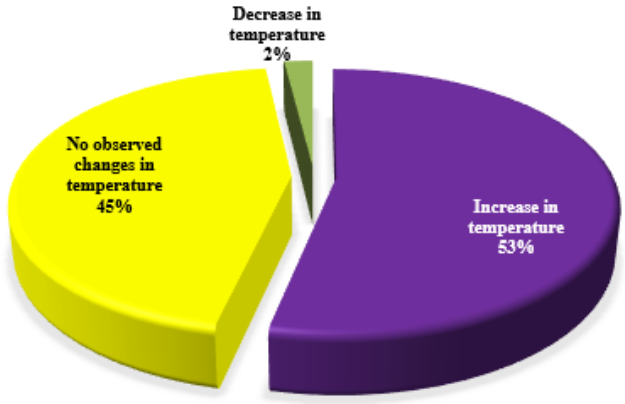

Fig. 9. Perceived temperature patterns at Victoria Falls (n=345)
Source: Fieldwork

What is worrying from the emerging trend is that there is a real chance that in the long run reduced water levels may result in a change from the Victoria Falls being a perennial attraction to a seasonal attraction. As the Victoria Falls tide turns into a Victoria gorge, there will be a severe negative impact on some tourist attractions. The severe water flow drop at the resort between September and February is a concern, since 26% of the total tourists gave the resort between an average and a poor review on Trip Advisor. Some experts reported that the water levels had hit the 30-year low mark, while the remainder say it was a typical fluctuation cycle of the Victoria Falls. Consequently, the water flow of the falls on the Zambian side had virtually dried up since it was at an all-time low. A severe decline in water levels can also affect the rainforest that is a popular attraction for tourists, most of whom go there to enjoy the rainforest walk and also to take the pictures, as the forest is watered by the water from the waterfalls.

The tourists were anxious about the report of the drying up of the Victoria Falls, with the majority taking to Facebook and Twitter to share pictures of the purported dried-up Victoria "gorge". These pictures received wide attention and circulation and were widely shared, liked and commented on by people who had either visited Victoria Falls or who intended to visit shortly. Most comments blamed climate change for the "disaster" at the waterfalls, with Zambians blaming the government and the local power supplier and drought for the water shortage at the waterfalls. To highlight the beauty and possibly potential negative impacts from reduced water flows into the Victoria Falls, an example of a photograph that was taken in the dry month of October 2015 is shown in Fig. 11.

The overall rating for Victoria Falls was 4.6 out of 5 on Google Reviews, whereas the overall rating

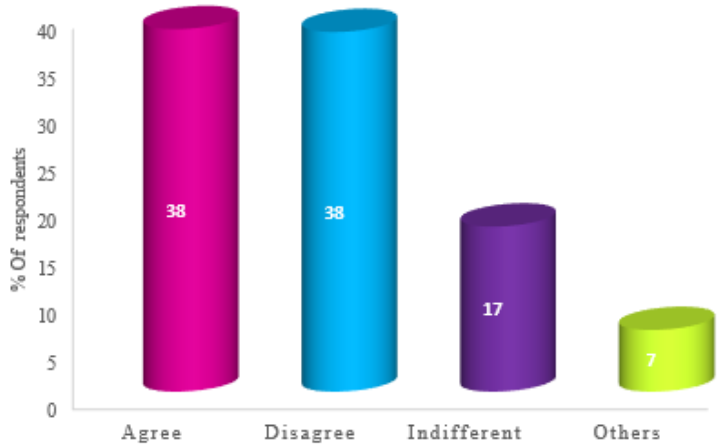

Fig. 10. Tourist visit to dried-up Victoria Falls? (n=370)
Source: Fieldwork

Fig. 11. Unusual levels of dry parts of the main falls (not witnessed before)
Source: Fieldwork 2015

on Trip Advisor is 5. The researchers noted an interesting trend. Out of the 300 reviews that were made, the lowest ratings for Victoria Falls were recorded in 2015 with only a single negative review of the 3-star rating given in 2014 (Fig. 12). The 3-star rating tourist cited that they had received bad service in Victoria Falls, naming one family food outlet as the culprit of poor service. What emerges from the Google Reviews ratings is that Victoria Falls remains an attractive tourist destination, and therefore, the threat of climate change is likely to impact these perceptions.

The findings further revealed that even though there is a potential for adverse impacts of climate change on the Victoria Falls, the resort offers all-year-round activities that cater for different segments of tourists during different seasons of the year. For example, a significant reduction in water flow attributed directly and indirectly to climate change as a result of extreme droughts and

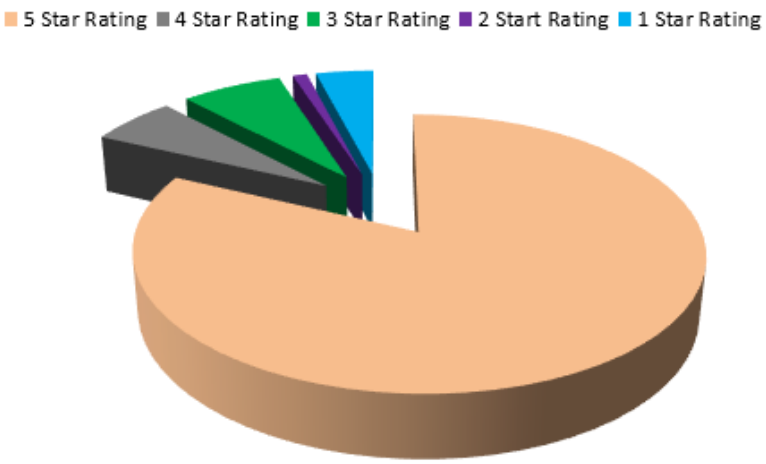

Fig. 12. Victoria Falls: Google Reviews ratings 2014–2016
Source: Fieldwork

high temperatures and increased water demand on the upper Zambezi might not necessarily be a bad thing. Some other activities, like white-water rafting and swimming at the famous Devil's Pool, are only feasible when water levels are low. These two adventure activities are popular among tourists. The above activities are shut down entirely during the peak periods in summer, which is usually between February and June depending on the rain season north of the Zambezi basin.

However, it emerged that most travel agents discourage tourists from visiting Victoria Falls between October and November as they consider it a period of highly uncomfortable temperatures. They also flag visiting the falls during summer between January and May as they deem it a very uncomfortable period to visit due to a combination of high temperatures and humidity, which can be very discomforting for tourists. Even though the falls are at their peak due to river flooding during this period, travel agents indicated that it is tough to conduct photography at the falls during this time because of the dense sprays, which are like a constant downpour of rain; something that was also confirmed by some tourists. Most travel advisors noted that the best period to visit is between June and September because the water levels are low enough to allow for multiple activities and photography. The climate during this time is perfect and comfortable for tourists. There was clear agreement that during this period a tourist could get the best experience of the sub-region, ranging from game viewing to participating in activities at the Victoria Falls. The above pattern is set to be distorted by extreme weather events disturbing the natural rhythm and tourism season at Victoria Falls.

3.4. Last-chance tourism prospects for Victoria Falls

As noted earlier, the advent of climate change has created a stampede in specific tourist destinations worldwide as tourists rush to experience the resorts before they "disappear" or are transformed by climate change (Lemelin et al., 2010). This phenomenon has created a boom in affected regions, sometimes to the detriment of the already vulnerable resort. Last-chance tourism is expected to shape the tourism trends in threatened regions and attractions such as Antarctica, Mt Kilimanjaro and the Great Barrier Reef to mention but a few. If there is substantiated evidence that Victoria Falls is seriously threatened with drying up, the resort town will experience an influx of tourists who would wish to see the waterfalls before they dry up. About 75% of the respondents indicated that they would visit Victoria Falls before it dried up. Only a small fraction of the respondents stated that they would not come to Victoria Falls as part of last-chance tourism (11%) as shown in Fig. 13.

Given the findings, Victoria Falls is likely to see more pronounced tourist arrivals, which will see certain seasons having a higher number of tourists

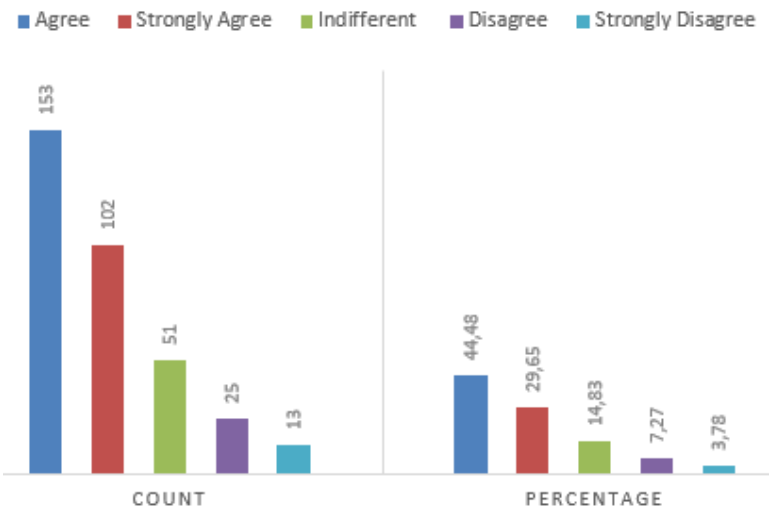

Fig. 13. Last-chance tourism prospects for Victoria Falls
Source: Fieldwork

and others a small number of arrivals. This is possible if the resort does not take a proactive approach in highlighting the advantages and activities that are offered in each water flow season, particularly the low water flow season. It might also be crucial for the resort to diversify and make use of flexible pricing to ensure continued business viability during low and high flow seasons, including years of severe drought, which undermine the normal flow patterns at the waterfalls.

3.5. Other tourist concerns

When asked to give closing remarks, some tourists took the time to highlight some issues raised in the research or emphasise their feelings. Some tourists indicated that participating in the survey was an eye-opener since it afforded them a chance to seriously think and take stock of their actions at a tourist resort. They highlighted the need for tourists to behave more responsibly and to act as change agents in dealing with climate change. They also raised concerns about emissions from the transport sector, particularly aviation carbon emissions. At least two tourists indicated that there is a need to put a fuel tax in place aimed at dealing with climate change. They indicated that if the falls were to dry up it would prove dire to the economies of Zimbabwe and Zambia. As such, the proponents called for action to ensure that such a thing does not happen. The tourists also feared that climate change might lead to the construction of dams upstream; something that would seriously affect the flow at the falls.

4. Discussion

A survey was conducted to examine the perceptions and attitudes of tourists regarding the impact of climate change on the Victoria Falls resort. It emerged that drought in the area was the single most significant problem and threat as it negatively affects water flow, biodiversity and some tourist activities and infrastructure. An increase in temperature was cited as a challenge as it affects tourists' comfort and their participation in outdoor activities and their negative impact on facets of the aviation industry in the area. Extreme droughts that lead to below-average water flow at the waterfalls causing the outrage portrayed in social media is indicative of how tourists are emotionally attached to the waterfalls. It also shows the desire to have its status undisturbed by climate change and other sorts of environmental degradation. The high number of those that pay attention to the various environmental aspects of the waterfalls is a testament to the level of attachment and care tourists have for the natural preservation of the waterfalls. The majority of tourists view climate change as a potential threat to the water flow although they are not sure if this will lead to total drying up of the waterfalls or not. This could be explained by the lack of conclusive scientific projections from General Circulation Models on the impact of climate change on water flow in the Zambezi River.

At the time of the study, no study had been instituted to ascertain the impact of climate change on the resort, with only three climate-change-focused studies now having been conducted by Dube and Nhamo (2018) and Dube and Nhamo (2019a; 2019b) which looked at the past and current trends and impact of climate change on various aspects of the tourism and aviation industry. The lack of certainty about the impact of climate change on the resort is not unique to Victoria Falls but applies to other tourist resorts in the southern African region, as pointed out by Hoogendoorn and Rogerson (2016). There is, therefore, a need to conduct more empirical impact studies on tourism resorts to capacitate tourist knowledge of resort vulnerability. This can assist in fostering climate change action amongst tourism stakeholders, as various reports point to the devastating impact of climate change on Africa's biodiversity (IPCC, 2018; IPBES, 2019) and other natural attractions that are the bedrock of nature tourism in the region and Africa as a whole.

The research further noted that there was increasing concern over some observed changes that tourists attributed to climate change. These included a further decline in animal and bird populations and increased temperatures, which was also disturbing. Mapira (2018) and Kupika and Nhamo (2016) seem to confirm some tourists' observations by pointing out that climate variability and change attributed to droughts in the basin led to vegetation and habitat loss, which, in turn, resulted in animal

population reductions in many Zimbabwe National parks including the Zambezi and Victoria Falls National Park on the Zimbabwean side, which have the potential to scuttle game safari activities in the area.

The concerns over increased temperatures, which hamper tourism activities, confirm the findings by Dube and Nhamo (2018; 2019a;b) who reported a temperature increase in the Victoria Falls resort. The authors further reported the potential for such changes to alter tourist comfort and tourist activities, potentially undermining the seasonal flow of tourists and profitability in the business. Amelung et al. (2007) noted that the Tourism Climate Index (TCI) for destinations would be altered for many destinations, with implications on tourists flow across the world. Therefore, it will be imperative for weather stations in Africa, particularly southern Africa, to collect all the necessary weather parameters required to calculate the TCI for tourist resorts, such as the Victoria Falls. Wilkins et al. (2018) suggest that warming temperatures in tourist resorts alter spending patterns. An increase in temperature has severe implications for river basin evapotranspiration rates, which could further reduce annual water flow at the waterfalls, with a far-reaching impact on water activities. The length of some activities can be prolonged, while others can be shortened, affecting seasonal employment. In addition, the aesthetics of the waterfalls and national parks surrounding then will most likely be adversely affected by such changes.

It emerged that, given concrete scientific evidence of the waterfalls drying up as a result of climate change, tourists will rush into the area before the waterfalls dry up. The Victoria Falls, therefore, falls into the same category as other World Heritage sites, such as the Great Barrier Reef, which is at risk of over-tourism because last-chance tourism is driven by the threat of climate change. However, the total drying of the falls would result in a decline in tourist arrivals into the Victoria Falls. Such a scenario would threaten tourism business viability in the area and undermine livelihood security for the Victoria Falls community, which is mainly reliant on tourism for livelihood security. Academics have warned that climate change poses a severe threat to tourism sustainability across the world.

5. Conclusion

The paper focused on highlighting the perceptions and attitudes of tourists regarding the impact of climate change on the Victoria Falls resort. The survey reveals that there is growing awareness and concern over the implications of climate change on the tourism product and activities in Victoria Falls, which might result in an adverse impact on the waterfalls, birds, animals and vegetation in the resort town. A reduction in biodiversity could have implications for safari tours and related activities. Changes to the water flow at the waterfalls due to increased drought were flagged as a significant threat to the beauty of the waterfalls and also the rainforest. Changes in the water at the waterfalls also posed a threat to animals that use the waterfalls as a habitat, some of which species are endangered. If the waterfalls dry up, Victoria Falls stands to lose more than 38% of its market share, which might affect tourism-dependent communities in Victoria Falls, with a knock-on effect for the economies of many southern African countries that benefit directly and indirectly from the Victoria Falls tourism value chain. Tourists see Victoria Falls as a potential last-chance tourism destination, which might lead to over-tourism if it is ascertained that the waterfalls are at risk of drying up. Research shows that increased severe weather events harm tourism products in the Victoria Falls resort. The paper recommends further constant monitoring and reporting of water flow at the waterfalls and other climate variables in the basin to accurately inform tourists on developments that are unfolding there, as the resort seem to be undergoing some significant changes. The study further recommends that Victoria Falls be transformed into an ecotourism destination that will allow and promote green living for tourists. This will result in tourists to the resort learning about and participating in various green tourism initiatives and other sustainable development initiatives that can assist in fostering climate change action. Policy initiatives in this regard could include having the tourism industry set carbon reduction targets.

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