Adapting to climate change: the case of snow-based tourism in Afriski, Lesotho

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Abstract

Climate change poses significant challenges to the tourism sector, with snow-based tourism particularly threatened. Snow-based tourism is largely dependent on adaptation, including snowmaking practices and product diversification. In the global south, the limited snow-based tourism products face similar challenges to the global north, but with significantly higher vulnerability and lower adaptive capacity. By making use of a questionnaire survey and personal in-depth interviews this paper examines adaptation mechanisms and the perceptions held by tourists and managers at Afriski, Lesotho. While Afriski already implements adaptive mechanisms, considering the current global environmental change projections for southern Africa, greater adaptive action is necessary.

Keywords: snow-based tourism, climate change, Lesotho, adaptation, snowmaking
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Introduction

Climate and weather are amongst the most important resources of a tourist destination (Rutty and Scott, 2010; De Freitas, 2017) and tourism activities are particularly dependent on climate and, thus, sensitive and vulnerable to the impacts of climate change (Tervo-Kankare, Kaján and Saarinen, 2018). The reliance of snow on a narrow threshold of temperature, humidity, precipitation and environmental conditions, all of which are altered through climate change, make it an exceptionally vulnerable resource (Steiger, 2011). As a result, snow-based tourism has been facing challenges globally, with consequential investments into adaptation strategies that ensure reliable snow (Steiger et al., 2019). Snow-based tourism is a large-scale sector within the tourism industry that involves activities such as snowboarding, snowmobiling and, most commonly, downhill and cross-country skiing (Mulvey, 2018).

Previous research has demonstrated that snow-based tourism destinations have different levels of vulnerability to climate change, influenced by their location, altitude, and their capacity for adaptation (Dawson and Scott, 2013). Previous studies into tourism, climate change, adaptation and snow-based winter tourism activities have mainly focused on the experiences of the global north (Kaján and Saarinen, 2013). Climate change and related adaptation needs have recently become a major focus of tourism geography in southern Africa, where the tourism industry is largely dependent on natural attractions that are increasingly threatened (Hoogendoorn and Fitchett, 2016; Leung et al., 2018).

In Africa, the existing research on climate change and tourism has been focused on southern Africa (see Saarinen et al., 2012; Hoogendoorn and Fitchett, 2016; Tervo-Kankare et al., 2017). The southern African tourism geography-based literature is largely dominated by studies into activities reliant on the summer season or similar conditions (Fitchett and Hoogendoorn, 2018). While aspects of the tourism industry in Lesotho have been studied (see Mearns, 2012; Rogerson and Letsie, 2013), there are few investigations that consider the tourism industry’s adaptation towards climate change specifically. Consequently, a snow-based tourism study from Lesotho offers a unique opportunity to investigate an under-researched topic from a sub-Saharan location. This work aims to contribute to research in terms of the relation between tourism and climate change and specifically to snow-tourism adaptation in southern Africa. Arguably, the selected case study serves as an example of the conditions that will be faced
other snow-based resorts in the future due to its almost complete reliance on snowmaking. The primary aim of this study is to investigate the various adaptive strategies by the Afriski resort located in Lesotho. While the secondary aim is to provide insights into the perceptions held by managerial stakeholders and tourists concerning snowmaking and product diversification. Additionally, it suggests further adaptive mechanisms for the future.

Snow-based tourism is not a primary tourism attraction within the global south, especially not in southern Africa which is primarily known as a summer destination. However, there are zones classified as marginal alpine areas within the subcontinent that offer opportunities for this type of tourism (Hoogendoorn and Fitchett, 2018). The only ski resorts located in southern Africa are Tiffindell Ski Resort in South Africa and Afriski in Lesotho (Saner-Yiu et al., 2015). Projections of changes in rainfall patterns and increasing temperatures are expected for southern Africa (Engelbrecht et al., 2015; Pinto et al., 2015), which will have detrimental consequences to these ski resorts and other potential skiing areas in the region. Therefore, adaptation is critical in addressing these consequences (see Cristofaro et al., 2019).

Lesotho is highly reliant on the tourism industry as a source of economic revenue and employment with the tourism industry currently contributing three percent to the national GDP (Lesotho Review, 2018). In 2018, Lesotho hosted 1,2 million tourists (Mpaki, 2019) and from available statistics in 2016, these tourists were predominantly from South Africa (90.4%), Zimbabwe (1.7%), USA (0.8%) and Germany (0.7%) (Lesotho Tourism Development Corporation, 2017). Because the tourism industry of Lesotho is founded largely on nature-based tourism (Morgan-Jarvis, 2018), research into tourism, climate change and mechanisms of adaptation, can play a critical role in enhancing the adaptive capacity of the industry and the sustainability of tourism in Lesotho. While skiing in southern Africa is an unusual tourism product, it provides a laboratory setting to examine the impacts of climate change, within a context of environmental vulnerability, that could become the future reality for comparatively less-vulnerable resorts and regions in the global north (see IPCC, 2018a). For example, resorts in the Alps, and southern parts of the Nordic countries are facing increasing challenges of shorter skiing seasons and growing expenses due to artificial snow-making and the need to diversify products on offer (see Steiger, 2011; Demiroglu et al., 2020)
The State of Snow-based Tourism and a Changing Climate

Future and current climate change has negative impacts on the winter-based tourism industry (Scott et al., 2019b). For example, rising temperatures can lead to the shortening of snow-based tourism season and/or create unreliable snow conditions that have detrimental consequences for the ski-industry (Tervo-Kankare, et al., 2018). Snow-tourism faces an amplified risk of snowmelt, flooding and landslides when rainfall is increased (Beniston and Stoffel, 2016). This can negatively influence tourist perceptions of safety and cause damages to both tourism attractions and infrastructure (Gobiet et al., 2014). Snow-based resorts in Europe are vulnerable to climate change with moderate shifts in temperature and precipitation resulting in notable reductions in snow cover reliability (see Bonzanigo, Giupponi and Balbi, 2016). Additionally, the average length of skiing seasons in North America have diminished with delayed starting dates, earlier ending dates and forced closures intermittently due to poor weather conditions (Knowles, 2019).

Snow-based tourism is currently adapting to climate change in different ways that could in future lead to innovative practices (Steiger et al., 2019). However, the first adaptation response is to adjust the snow-based tourism season dates and the length of the season, allowing for seasonally determined weather conditions (Steiger, 2011). The second response is to manufacture artificial snow with automatic snow guns or snow factories (Hopkins, 2015). This response is dependent on quality of snow and availability. During conducive conditions, snow can be produced and stored over the summer for use in the winter seasons, which represents a more sustainable adaptation mechanism that can be used for ensuring a timely start to the skiing season (Lintzén and Knutsson, 2018). The third prevailing adaptation option is the introduction of non-snow-dependent activities (Landauer et al., 2012). Diversification of tourism products and activities reduces tourism industries’ dependence on snow, an increasingly unreliable natural resources due to climate change (see Bausch and Unseld, 2017).

Snow unreliability, and the subsequent introduction of snowmaking facilities has introduced a new dimension of competition between ski resorts (Scott et al., 2019a). The resources and infrastructure available for snowmaking at each resort determine the quantity and quality of snow, and as such ultimately determine the success of the resort (see Steiger et al., 2019). The artificial production of snow is useful for regions that have insufficient amounts of natural snow and is essential for snow quality management (Trawöger, 2014). This technique plays a key role in improving snow quality and reliability in many parts of Europe (Demiroglu et al., 2016).
Overall, the future of snowmaking at resorts is affected by numerous factors including the size and scale of the resort, relative humidity and financial resources (see Scott et al., 2019b). For example, research into several snow-based tourism resorts in Germany and Austria has found a decrease in the number of snowmaking days due to unfavorable conditions because of climate change (Hartl, Fischer and Olefs, 2018). Therefore, some resorts now additionally produce and store artificial snow during periods of favorable conditions (see Tervo-Kankare, et al., 2018).

In the case of southern Africa, temperature increases of between 3.4-4.2°C are projected for the end of the 21st century. This will result in heatwaves and changes in precipitation patterns which will act as deterrent for tourists (IPCC, 2018b; Rutty and Scott, 2010). Increasing temperatures will also affect the duration of snow in the Eastern Lesotho Highlands, including faster rates of snowmelt (Grab et al., 2017) which will negatively impact Afriski.

**Study Site: The Afriski Mountain Resort**

Lesotho is a landlocked country that is surrounded by South Africa. The eastern half of Lesotho is a mountainous environment that reaches a maximum elevation of 3,482 m.asl (Grab et al., 2017), with its lowest elevation at 1,400m.asl (Spooner, 2014). Lesotho generally experiences temperate weather with cold winters and cool summers; the majority of precipitation occurs as rainfall in the summer months, but 8-10 snowfalls occur per annum predominantly in winter (Grab and Nash, 2009). The quantity of snow during these periods can vary radically from 5cm to 120 cm (Grab and Linde, 2013). In general, the future climate projections for the Lesotho Highlands will include a decrease in the frequency of severe snowfalls and the number of frost days, while mean annual temperatures and precipitation levels are expected to increase (Morris, 2017).

The Afriski Mountain Resort (Figure 1) is located in the Drakensberg-Maluti Mountains near the northern border of Lesotho. This region experiences sufficiently low average temperatures for artificial snow production augmented by natural snowfall. Afriski’s primary attraction is a kilometre-long ski slope that begins at 3,222 m.asl (Afriski, 2020). The resort was first established in 2002 with artificial snowmaking starting in 2005. The resort includes amenities such as a restaurant, café and conference facility, and can host up to 1,000 daily visitors and 400 residential guests in the peak winter season, which generally extends from June to August. In 2018, Afriski attracted approximately 15,000 guests, of which 12,000 visited during the winter season. The nationalities of the Afriski guests involved in this research, similar to the
national findings, were primarily from South Africa, and to a lesser extent Germany, the UK and France (Table 1).

Figure 1: Study site map showing the location of the Afriski Mountain Resort

Methods

Two research techniques were employed in this project. The first were in-depth interviews with the management team of Afriski. In June 2018, four in-depth semi-structured interviews were conducted. The interviewees were questioned about perceived threats and concerns related to climate change and the resort. Members of the management team were interviewed which included the founder of the Afriski Mountain Resort (interviewee 4), the general manager, (interviewee 2), the operations manager and chief snowmaker (interviewee 1), the ski instructor, maintenance and infrastructure control manager (interviewee 3). The founder of the Afriski Mountain Resort and the general manager were interviewed first as key stakeholders to the management operations of the resort. Through the process of referral, the founder of the resort and general manager suggested that interviews should be conducted with the other managers specifically to gain technical knowledge of operations at the resort. The
interviewees were asked to explain the snowmaking process in detail, and their thoughts on expanding the alternative or activities not directly related to snow offered by Afriski. Each interview lasted on average for about 35 minutes.

The second technique was a quantitative and qualitative survey questionnaire with tourists visiting Afriski (see White, 2018). Respondents comprised both day visitors and overnight visitors, who were asked to complete the questionnaire. The fieldworker was housed on site by the Afriski Moutain Resort and was given 8 days to complete the fieldwork which allowed for a total of 170 complete questionnaires to be completed by respondents in June 2018. The questionnaires contained closed and open-ended questions including Likert rating scales and multiple-choice questions. The respondents were asked to complete the questionnaires throughout the day at the resting site located adjacent to the ski slope and in the evenings at the restaurant. This sample population is limited to the guests of Afriski and obtained via purposive and convenience sampling, it does not support generalisations beyond the sample itself.

The questions were aimed at gaining insights into respondents’ perceptions of climate change and concerns regarding the impacts on the southern African tourism industry and Afriski specifically. Additionally, questions were directed towards understanding respondents’ perceptions on artificially produced snow and the diversification of tourism products. The responses to the questionnaires were explored through content analysis and basic statistical analysis including the usage of counts and frequency distribution. Because of the exploratory nature of this study a descriptive level analysis was chosen. Key phrases were extracted from both the questionnaires and interviews and are quoted in the results section of this paper.

In terms of the specific timing of the field work, despite taking place at the resort within the peak of the snow season, no natural snowfall occurred during the period of data collection. Natural snowfall at Afriski is not sufficient to keep the resort operational. Arguably the lack of natural snowfall during the time of data collection displays typical climatic conditions, highlighting the necessity of artificial snowmaking. However, the lack of natural snow during the period of sampling could have altered some respondents’ perceptions of snow, weather and climate change, and their satisfaction with the vacation and interest in alternative activities (see Noome and Fitchett, 2019). Simultaneously, it could be argued that the typical conditions reflect respondents’ acceptance of artificial snow as the primary experience of snow at the resort during the data collection period. Lastly, the two research techniques were employed to gain a holistic perspective of the situation at Afriski in terms of the technical knowledge of
the managerial staff and the perceptions of the tourists, and how this will influence adaptive measures in future under climate change.

**Results**

The respondents had an almost even ratio of men to women with the dominant age group of the respondents between 18-25 years old, followed closely by the 36-45 and 46-55 age categories (Table 1).

Table 1: Questionnaire respondent details

<table>
<thead>
<tr>
<th>Nationality</th>
<th>Age Category</th>
<th>%</th>
<th>Highest Level of Education</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=170)</td>
<td>(n=168)</td>
<td></td>
<td>(n=169)</td>
<td></td>
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<tr>
<td>RSA</td>
<td>137</td>
<td>18-25</td>
<td>46</td>
<td>28</td>
</tr>
<tr>
<td>British/English</td>
<td>6</td>
<td>26-35</td>
<td>29</td>
<td>17</td>
</tr>
<tr>
<td>French</td>
<td>5</td>
<td>36-45</td>
<td>45</td>
<td>27</td>
</tr>
<tr>
<td>German</td>
<td>4</td>
<td>46-55</td>
<td>39</td>
<td>23</td>
</tr>
<tr>
<td>Mosotho; African</td>
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</tr>
<tr>
<td>American; Portuguese; Swiss</td>
<td>2 each</td>
<td>66-75</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Serbian; UAE; Danish; Hungarian; Ecuadorian</td>
<td>1 each</td>
<td>75 and above</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
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Perceptions on Climate Change and Adaptation at Afriski

Tourists at Afriski have a general awareness of climate change as a clear majority of the respondents (81%, n=168) stated that they are of the view that climate change is being experienced in southern Africa. Only seven percent had an opinion that climate change is not a reality. Sixty four percent (n=166) of the respondents held the opinion that climate change will have an impact at Afriski in future, while 14 percent indicated that there will be no bearing for the resort, and 23 percent did not know (Figure 2).
Among the 11 respondents who do not believe the effects of climate change are being experienced in southern Africa, eight felt satisfied with their experience of snow. While out of the same 11 respondents nine felt that the weather had no impact on their skiing experience. Of the 138 respondents who were of the view that climate change is impacting southern Africa, 17 felt dissatisfied with their experience of snow, and an additional 25 expressed that they felt that climate change had an impact on their trip.

In addition to these responses, the varied weather conditions at Afriski, marked by unpredictable snowfalls, inconsistent rain patterns and temperature changes amongst other climatic factors, were specifically identified as challenges related to climate change by the managerial interviewees. According to interview responses of managers, over the past five years, these extremes have become more unpredictable and severe. In light of the various climatic concerns held by the operational management of Afriski, they have devised several strategies as a means of sustainably addressing these concerns which will be discussed in the following sections.

**Artificial snow**

In terms of adapting and providing ideal conditions for skiing, temporal substitution and artificial snowmaking are the two most prevalent choices at Afriski. Despite the fact that most
snow at Afriski is artificially produced, most respondents (87%, n=167) found the snow to be satisfactory and highlight the unique nature of being able to ski in southern Africa which is not a common tourism product in the region, with statements such as:

Considering Africa, Great!

[Respondent 72];

Considering its Africa and Because its Africa

[Respondent 80]

As the snow-based activities were only possible through artificially produced snow, respondents were asked to rate their experiences of various snow-based aspects (skiing, snowboarding, playing in the snow and weather) on a Likert scale from one to five, with one being the worst and five the best. For skiing, 52 respondents gave a rating of five (38%, n=138) followed by 50 who gave four (36%, n=138) and few respondents who gave lower ratings. This response pattern was generally repeated for all of the snow-based offerings. While a notably lower number of respondents answered the question regarding snowboarding (n=93), which received 63 ratings of either four or five (68%; Figure 3). Skiing and snowboarding were described by participants as on par with world standards. Overall, Figure 3 shows a clear trend of positive responses illustrating high tourist satisfaction levels regarding their experience of snow at Afriski.
Figure 3: Tourists’ preferences of four snow-based experiences

The interviewed managers agreed that the ability to artificially produce snow is critical in ensuring a timely snow season opening, despite adverse weather conditions.

Due to reliable snowmaking equipment, we can “guarantee” snow from the 1st June on all slopes. (Interviewee 1).

Operational managers additionally described plans to advance and improve their snowmaking quality and quantity in the future. This would entail reassessing their adaptive techniques, as is the case at other snow-based tourism destinations globally (see Tervo-Kankare, Hall and Saarinen, 2013). Moreover, to ensure success at the resort despite the negative climatic conditions predicted for this region (see IPCC, 2018b), interviewee 4 is of the view:

Better snowmaking equipment will be used in the future, just like at the skiing resorts all over the rest of the world.

The same interviewee further stated that:

In the future I would like to open a second ski slope so that we could double our guest numbers and skiing opportunities. This may take several years to accomplish though.
This plan was echoed in the following statement:

Further into the future it could become necessary to invest €2,000,000 to purchase more advanced snowmaking technology and machinery that could ultimately lengthen the snow season and keep to guests happy. (Interviewee 1).

Presently, automated snow guns are used to maintain sufficient snow at the resort. It is accepted that wet bulb and other conditions are adequate for snowmaking at Afriski to be reliable and effective in ensuring enough snow for successful snow seasons, despite climatic changes. However, one of the interviewees acknowledged that in the future more sophisticated systems such as snow factories may have to be established to address the challenges of a changing climate.

There is also an issue related to general availability of water in the region, as noted by interviewee 1, which impacts snow production. Due to changing environmental conditions there have been issues with drought and water stress in the region. As a result, the melted snow is collected at the end of the snow season in dams, built in the resort. This water is then pumped and re-used for snowmaking the following season, which underscore the potential sustainability of artificial snowmaking as an adaptive technique.

Adaptation through diversification of offerings

A third viable adaptative mechanism, in response to climate change, is the diversification of tourist offerings and products by destinations (Landauer et al., 2012). Depending on its nature and how it is managed, product diversification can lead towards more sustainable adaptation towards climate change. In this respect, Afriski has created a selection of tourist activities that are less climatically dependent and also less energy consuming than snow-based activities. The alternative activities offered by the resort range from abseiling, fly-fishing and bird watching (Hoogendoorn, 2014; Figure 4). Respondents also showed interest in reading, relaxation and hiking. These kinds of activities do not require any additional infrastructure, and they were considered as easy to take part in, both from the perspective of the respondents and the interviewees.
Figure 4: Demand for Activities offered by Afriski Resort

In the questionnaire, respondents were asked to indicate which alternative activities they had or would like to take part in during their stay. Both respondents and management intimated that while most of the offered alternative activities are available yearlong, some activities such as the mountain biking trails and quads for kids may be more appealing in warmer seasons. This may contribute to the low levels of tourist interest and participation during the winter season, amongst the sample group. Due to the timing of this research, most guests primarily interested in snow-based activities, notably skiing. However, in other times of the year, there is notable interest in other activities offered by the Afriski resort (Stockigt et al., 2018).

Beyond the tourist responses, interviewee 4 highlighted that:

> Not many businesses can run on only three functional months a year. So yes, the general good weather and unique features of the resort attract tourists throughout the year. Every little bit helps. (Interviewee 4).

Management is placing considerable focus on the future of this resort, with various plans to introduce various new tourist activities and attractions to encourage yearlong visitation. Interviewee 2 stated that:

> A zip line, monorail, suspension bridge […] are a few ideas for the future. But [that] we need to build on and strengthen what we already have first.

Furthermore, Interviewee 4 shared hopes for the future development of the resort:
Our high altitude creates attractions that are unique and appealing and can extend beyond just snow. In particular cycling, adventure running, and high-altitude training are very big attractions for the resort. (Interviewee 3).

The interviewees and respondents showed that despite interest in alternative activities the prevailing attraction for this resort remains snow. Without snow, Afriski would lose its regionally unique tourism product. This would result in negative economic consequences for the resort and negative economic outcomes for local Basotho employed by Afriski.

Discussion

Adaptation is a critical process to address the challenges presented by climate change (Pandy and Rogerson, 2018). Africa and particularly southern Africa is not popularly associated with snow-based tourism because of its location and general weather patterns, despite this, as with many other snow-based tourism destinations, Afriski has implemented artificial snowmaking to take on this challenge. The stakeholders expressed that the artificial production of snow has been implemented at Afriski for many years, and is necessary to ensure successful quantity and quality of snow for skiing. This sentiment was echoed by the tourists on site who had expressed great satisfaction with their snow experience during their stay. However, this may not be the case in the future as climatic conditions deteriorate because of climate change (see Scott et al., 2019a). Beyond the resort’s snowmaking capacities, they have also introduced a variety of alternative non-snow-dependent activities in an attempt to diversify their tourism product. These activities potentially represent more sustainable adaptation mechanisms for the future, as well as adjustment of the ski season (Cocolas, Walters and Ruhanen, 2015).

While there are several adaptation mechanisms available, snowmaking is the most common option of ensuring snow reliability both internationally and at Afriski (Demiroglu et al., 2016). Despite the projected deteriorating environmental conditions that result from climate change, artificial snowmaking has served as a medium to long-term solution thus far (Hartl, Fischer and Olefs, 2018), but it does have negative implications for the sustainability of snow-based tourism where tourists show a strong preference for natural snow over artificially produced snow (see Demiroglu et al., 2016). These kinds of findings are also reflected at Afriski, with a limited number of tourists’ comments expressing a preference for ‘real’ snow (Stockigt et al., 2018). In this study, however, the majority of tourist perceptions on the quality and quantity of artificially produced snow at Afriski were positive.
The difference between managerial perceptions at Afriski in this study and research by Trawöger (2014) in Austria, as an example, is that stakeholders at Afriski perceive climate change to be a substantial concern and challenge for the future of both the resort and globally. Conversely, Trawöger’s (2014) research shows that climate change is seen as a manageable concern which has, to an extent, prevented adaptive action from being taken during the time of the research. Internationally, automated snow guns are most frequently used, while snowfactory systems are increasingly implemented (see Donnelly, Ernst and Arheimer, 2018). A predominant adaptation technique both internationally and at Afriski is the diversification of tourism products. Through the diversification of tourism products, there can be important advantages, especially for Alpine destinations “to enlarge their portfolio for the non-skier market.” (Bausch and Unseld, 2017:215). Diversification was visible through the variety of alternative activities offered by Afriski and the varying levels of tourist interaction with these activities, notably their interest to take part in activities in the future. For example, tourism climate indices scores for the Lesotho Highlands and Afriski specifically, show that summer and spring months are the most climatically suitable for outdoor tourism in this region which would encourage tourism in the off-season for skiing and snow-based activities (Noome and Fitchett, 2019).

Despite challenges faced by Afriski, management showed interest in expanding the resort infrastructure. This appears contradictory to the perceived and known climatic challenges. Yet, this is a noteworthy finding that underlines the persistent growth-oriented thinking of the tourism industry.

The relationship between snow tourism and climate change globally underpins the necessity for adaptation, that meets socio-economic and environmental needs (see Eriksen et al., 2011). Bicknell and McManus (2006) highlight the relevance of longitudinal examining of both perceptions and responses towards climate change, challenging the pervasive ‘business as usual’ model in tourism. Therefore, continual examining of perceptions and responses, from tourists and stakeholders with a view towards adapting to climate change is critical for ensuring the future of certain tourism products (see Odimegwu and Francis, 2018; Knowles, 2019).

We would argue that it is critical that Afriski continually re-examines its adaptive techniques to guarantee the most effective strategies to ensure the longevity and future success of the resort. One way of doing this is to keep abreast with the newest mechanisms implemented internationally which could inform future practices at Afriski. Skiable and snow-covered areas
have been acquired by some snow-based tourism destinations internationally to increase the likelihood of natural snowfalls, and to establish reliable snowmaking conditions (Trawöger, 2014). This could be a consideration for Afriski, where higher elevations are sought to attain more suitable temperatures for natural snowfalls and snowmaking. However, Afriski is located at a high altitude (3222m) already, and the moving or expansion of this resort would require new infrastructure, water sources and additional resources which would be very costly. A further option that could potentially be viable to the future success of Afriski is the introduction of nocturnal skiing (see Campos Rodrigues et al. 2018). The colder conditions at night would be more suited to ensure snow reliability, but could have disadvantages in terms of constructing additional infrastructure, putting in place safety measures and the increase in energy consumption especially to light slopes sufficiently.

Conclusions

Globally, an increasing amount of research has been conducted on tourism and climate change. Based on international evidence, snow-based tourism is facing challenges, which call for the implementation of various adaptive strategies, such as artificial snowmaking, product diversification and relocating tourist activities. This study presents an investigation into the snow-based tourism industry of Lesotho with special focus on the implementation of adaptive measures. In addition, concerns, awareness and perceptions regarding the threat climate change by Afriski tourists and managerial stakeholders’ perspectives were investigated. Overall, the Afriski resort is a good example of maximizing unique tourism products and displays the benefits of adapting to climate change, despite being highly dependent on natural conditions that are increasingly threatened by global climate change.

Future adaptive measures will define whether skiing at the resort remains a distinctive and unique tourism product in the southern African region that has a potential to contribute to local and national development. In the latter case, additional research into tourism and its adaptative capacity are needed in Lesotho that would encourage the sustainable use of natural and cultural heritage resources, which could not only maintain, but further stimulate local employment creation leading to improvement of living conditions in local communities in future.

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