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An analysis of factors affecting tourists' accounts of weather in South Africa

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Abstract

There is consensus within tourism research that tourists are sensitive to weather. The climate of a destination is believed to influence the selection of a destination, the timing of the visit and the enjoyment of the destination. The climatic suitability of locations for tourism is often evaluated using indices of climatic data, including the Tourism Climatic Index and the Climate Index for Tourism. The output of these indices is a measure of suitability based on the climatic conditions of the destination alone. This is valuable in facilitating baseline comparisons between destinations, but ignores the role of the country of origin of tourists, the anticipated climatic conditions and the infrastructure in tourist accommodation establishments and attractions. We explore the influence of these factors on the sensitivity of tourists to the climate of a destination, using commentary on climatic factors in TripAdvisor reviews for a selection of 19 locations in South Africa. An improved understanding of the climatic sensitivity of specific tourist groups and climatic challenges in tourist accommodation establishments, facilitates improved adaptation to climate change threats to the tourist sector.

Keywords Climate sensitivity · Climatic suitability · Accommodation · Tourism · TripAdvisor

Introduction

Climate is posited as a key determinant of the success of tourism in a given location—the relative suitability of the climate of one destination relative to another offering a similar primary attraction drives preference for visiting the former; the seasonality of ameliorable conditions influences the timing of peak visitation to a location; and poor climatic conditions, including extreme events, can detriment the net quality of a tourists' visit (Maddison 2001; Gössling et al. 2012; Hasan et al. 2017). The significance of both long-term climate in the destination image and marketing and the day-to-day weather in the planning and experiences of tourists as determinants of a successful tourism sector is heightened in regions which are marketed for their ideal climate and for destinations that rely on a large proportion of

Jennifer Fitchett jennifer.m.fitchett@gmail.com outdoor attractions (Agnew and Viner 2001; Sievänen et al. 2005; Moreno 2017). South Africa, marketed as 'sunny South Africa', and hosting a wide range of outdoor attractions, including beaches, nature reserves and adventure tourism activities, is particularly reliant on good weather and a favourable long-term climate for the economic success of tourism (Fitchett et al. 2017).

Mathematical indices, based on the imputation of climatic data, are frequently used to assess the climatic suitability of a destination for tourism (de Freitas et al. 2008). These indices most commonly include measures of the thermal comfort, proportion of rainy and sunny days and the wind speed (Perch-Nielsen et al. 2010). Indices developed to interrogate the climatic suitability of a destination for a particular activity. such as the beach climatic index, and adopt a greater focus on sun, cloud cover and rain (Becker 1998; Morgan et al. 2000). For South Africa, the Tourism Climatic Index has been applied broadly at a regional scale (Mieczkowski, 1985) and for specific destinations across the country (Fitchett et al. 2017), to quantify the climatic suitability relative to global benchmarks. The output scores are classified according to the Index as representing 'very good' to 'ideal' climatic conditions for tourism, which confirms the widely held perception of climatic suitability of the region for tourism (Fitchett et al. 2017).

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Two key factors are notably absent in these mathematical indices of climatic suitability for tourism. The first involves the infrastructure of tourism accommodation establishments and attractions and the degree to which this mitigates unsuitable climatic conditions (Verbos and Brownlee 2017). Where especially in the northern parts of Europe, for example, the majority of buildings have double-glazed windows for insulation, this is seldom found in South Africa (Ma Belén Gómez 2005; Hoogendoorn et al. 2015). Electrical adaptations, including air conditioning and underground heating, may be uncommon in countries where electricity availability or costs is prohibitive (Perry 2006; Hoogendoon et al. 2015). The absence of such infrastructural adaptations, which are assumed to be incorporated into climatic indices of climatic suitability of a destination, would heighten the sensitivity of a tourist to adverse climatic conditions. The second factor is the country of origin of the tourist, which drives variability in part through the climate they experience most often (Gössling and Hall 2006). For example, in general terms, tourists from very cold climates may be less sensitive to cold conditions when on holiday, but might suffer from heat stress in summer seasons of tropical to subtropical destinations. However, if those same tourists were anticipating a break from persistent cold conditions to a warm destination, a period of cooler than average temperatures may be unsatisfactory (Gössling and Hall 2006). The impact of precipitation is more specific to the activity that forms the primary tourism attraction. Tourists visiting beach destinations prefer clear days, particularly if they are avoiding the rainfall season in their home country (Moreno 2010), while experiences of snow in cold climates are often sought out by tourists from warmer countries (Tervo-Kankare et al. 2013). However, no tourist will enjoy having their choice of activities on a given day prohibited by prolonged or intense precipitation (Denstadli et al. 2011; Moreno 2017). The predictability of precipitation is therefore arguably more important (Maddison 2001; Denstadli et al. 2011; Moreno 2017). These nuances in tourists' expectations and baseline experiences of weather weaken the strength of indices that are based on objective climatic data alone in determining climatic suitability for tourism or the related tourist satisfaction of the climate of a destination (Gössling and Hall 2006).

This study seeks to interrogate the role of the anticipated climate of a destination, the country of origin of the tourists and the quality of the accommodation establishment in influencing the climatic sensitivity of tourists in South Africa. We use the proportion of TripAdvisor reviews reflecting on climatic factors (often the weather conditions during the tourists' stay) as a representation of climatic suitability. Previous studies have highlighted that tourists' self-reported accounts of a destination provide the most reliable records of sensitivity to climatic factors (de Freitas et al. 2008; Denstadli et al. 2011). Social media represents an important source of self-reported accounts of tourists' experiences, due

to the open-brief nature of the platform (O'Connor 2010; Živković et al. 2014). Within this media, TripAdvisor remains the most popular platform for tourism reviews (Litvin and Dowling 2018). Therefore, a dataset of 5898 TripAdvisor reviews was consulted for 19 tourist destinations across South Africa. Climatic sensitivity was explored as a factor of the number of climate mentions and the climatic factors that were cited. The influence of the Tourism Grading Council of South Africa (TGCSA) rating of each accommodation establishment as a measure of the quality of infrastructure for leisure purposes, the country of origin of the reviewer and the primary tourist attraction of each destination are compared to the number of reviews containing climatic mentions and the distribution of climatic conditions mentioned.

Study region

South Africa is situated at the subtropical-temperate boundary, spanning coordinates of 22-35° S and 17-33° E. The climate is influenced most prominently by the warm Indian Ocean Agulhas current to the east and the cold Atlantic Ocean Benguela current to the west, with the latitude, varied topography and the effect of the urban heat island providing compounding influence. Temperatures are more moderate along the coastal boundary of the country, but in the interior, frequently exceed 30 °C in summer months and drop below 0 °C during winter nights. Winter rainfall conditions are experienced in the southwestern tip of the country, driven by the influence of the westerlies when the Inter-Tropical Convergence Zone shifts northwards; summer rainfall conditions are experienced north of this zone, encompassing the interior and east and west coasts; year-round rainfall is experienced along the south coast.

To capture the effect of this spatial heterogeneity in climate, a total of 19 locations were selected for analysis, providing representation of the nine provinces, each of these climatic zones and a range of tourist attractions (Fig. 1, Table 1). Tourism Climatic Index scores have previously been published for each of these locations (Fitchett et al. 2016a, 2017).

Data collection and methods

TripAdvisor reviews archived on www.tripadvisor.com formed the primary dataset for this study. Due to the relatively late uptake of the reviewing process for South Africa, reviews of accommodation establishments far outweigh those of activities, the latter of which are dominated by often unregistered microenterprises. Thus, despite the lower reliance of accommodation establishments on weather, reviews for this pilot study were restricted to accommodation establishments, due to the longer and more continuous record captured. For each



Fig. 1 Map of South Africa highlighting the locations for which TripAdvisor reviews were consulted

location, TripAdvisor reviews of a minimum of three accommodation establishments were consulted; including a four-/ five-star hotel, a guesthouse or BnB and one-star accommodation. From these reviews, the date of review, date of travel (if different), duration of travel and country of origin of reviewer were captured. Any mention of weather or the climatic conditions of a region contained within a review were recorded, with both a direct quote and a one-word climatic indicator captured per review; where reviews did not contain any mention of climatic conditions, this was recorded. Reviews were consulted in chronological order, working back in time across the three accommodation types from December 2016 to January 2014, until at minimum, 100 reviews were counted per destination and a minimum of 20 mentions of climate captured. The sample size was determined in consultation with similar studies employing content analysis of TripAdvisor reviews (cf. O'Connor 2008, 2010). To standardise for the resultant variations in the total number of reviews consulted per destination, percentages of the sample rather than raw counts are used throughout.

TripAdvisor reviews were partitioned into those which did and did not mention climatic factors, through manual content analysis of both recurring and pre-identified themes of

weather and climate, including, but not limited to, the amount, duration or absence of rainfall; temperature (hot, warm, cool, cold); wind speed and direction and noise; the amount and duration of cloud cover or sunshine; experiences of high or low humidity and broader statements of good or bad weather conditions. Content identified as making mention of climatic conditions required a positive statement pertaining to the weather encountered. Reviews that have been written by persons employed by or associated directly with the accommodation establishment in question are removed by TripAdvisor via fraud detection software (Reiter 2007; O'Connor 2008). TripAdvisor reviews that were solicited by the accommodation establishment are flagged on TripAdvisor and have been excluded from this study to prevent any consequential biases (O'Connor 2008; Ayeh et al. 2013). Reviews that were written by visitors who did not stay in the accommodation establishment, but rather visited it for a meal or function, were also excluded from this study to prevent a skewing of results by local residents who did not have access to many of the facilities that mitigate poor climate within accommodation establishments, including air conditioning, fans and electric blankets. Moreover, day visitors generally have greater flexibility to change their restaurant booking at short notice, should

 Table 1
 Geographical and climatological details of the locations for which TripAdvisor reviews were consulted

Location	GPS coordinates	Annual mean temperature (°C)	Annual mean rainfall (mm)
Johannesburg	26.2044° S, 28.0456° E	16.0	543
Pretoria	25.7461° S, 28.1881° E	17.3	517
Pilanesberg National Park	25.2611° S, 27.1008° E	19.5	500
Cape Town	33.9253° S, 18.4239° E	16.9	853
Paarl	33.7274° S, 18.9558° E	17.6	770
Knysna	34.0356° S, 23.0489° E	17.0	779
Polokwane	23.9000° S, 29.4500° E	17.3	598
St. Lucia	28.3833° S, 32.4167° E	21.6	1129
Durban	29.8833° S, 31.0500° E	20.9	975
Ladysmith	29.5597° S, 29.7806 ° E	18.3	740
Kimberley	28.7419° S, 24.7719° E	18	283
Port Nolloth	29.2500° S, 16.8667° E	14.7	72
Port Elizabeth	33.9581° S, 25.6000° E	17.4	453
East London	32.9833° S, 27.8667° E	18.2	593
St. Francis Bay	34.1605° S, 24.8241° E	17.1	679
Bloemfontein	29.1167° S, 26.2167° E	16.1	407
Bethlehem	28.2333° S, 28.3000° E	14.4	693
Nelspruit	25.4658° S, 30.9853° E	19.8	796
Belfast	256,833° S, 30.0167° E	13.2	835

adverse weather be detrimental to their experience. However, reviews visitors who originate from the same province as the accommodation establishment but did stay in the establishment were captured, as any comments on weather likely reveal local variability in climatic conditions.

The reviews that contained mentions of climatic conditions were further grouped according to the data collected from the reviews pertaining to month and year of visit, the country of origin of reviewers and the accommodation establishment visited. Accommodation establishments were further grouped according to their 2016 TGCSA rating, as a measure of the quality of the establishment which incorporates the availability of 'luxury' amenities within the rooms including electric blankets, fans and air conditioning, the presence of which would shelter tourists from thermal discomfort that may arise from adverse weather (Du Plessis & Saayman 2011a, b; Wessels et al. 2017). Frequency distributions were then calculated for all climate mentions and for mentions of each specific category of climatic conditions, facilitating the quantitative comparison of the total counts within each category and qualitative descriptions of inter-class variability. With multiple categories for each discriminator, comparison of means or medians through ANOVA are not possible. A parallel study considers variation in the distribution of climatic conditions mentioned by reviewers by destination across South Africa, and relating these to variations in TCI scores for each destination (Fitchett & Hoogendoorn, under review).

Results

Profile of reviews

A total of 5898 TripAdvisor reviews were reviewed spanning 19 tourist destinations in South Africa, comprising 168 tourist accommodation establishments. Of these accommodation establishments, the majority (113) had a three-, four- or five-star rating with the TGCSA, while a further 47 are not presently rated. Of the reviews, 2604 were written by South Africans revealing a large contingent of local residents visiting and reviewing tourist accommodation establishments in South Africa. Residential locations were not disclosed for 858 reviews consulted. The remaining reviews span 96 countries of origin (Fig. 2); with the greatest number of reviews authored by residents of the UK (579), the USA (209) and Australia (120).

From the total 5898 TripAdvisor reviews, a total of 464 reviews were recorded as containing climate mentions, yielding a mean sensitivity to weather or climate of 7.9% of the sample. As some reviews contained mentions of more than one climatic factor, a slightly larger total of 497 individual climate mentions in total were recorded. Most frequently mentioned were measures of the thermal comfort, including hot and cold conditions during the night or day, followed by mentions of experiencing rain and sunshine.

Country of origin of reviewers commenting on climate and weather

Reviewers travelling from a total of 34 countries mentioned their experiences of climate during their visit to a South African destination in their TripAdvisor review (Fig. 2). This represents just over a third of the total number of countries represented in all TripAdvisor reviews consulted in this study. Of the 464 climate mentions, 15.7% were submitted by reviewers who did not disclose their country of origin. This echoes the profile of the total set of reviews consulted, as does the proportion of reviews from South Africa mentioning climatic conditions (46.3%) and the reviews from the USA (4.1%) and Australia (2.4%). Notably, reviews authored by

Fig. 2 Map of destinations from which TripAdvisor reviews were authored and from which reviews mention climatic factors





Country of Origin of TripAdvisor Reviewers mentioning climatic factors



travellers from the UK accounted for 9% of the 5898 TripAdvisor reviews consulted, but a larger 14.2% of all climate mentions, indicating a higher than average proportion of climate mentions within this group. A considerably larger number of reviews from Europe made mention of climatic factors (92) than reviews from the Middle East (15), Africa (12), the Americas (24) or Australasia (14), again suggesting a heightened climatic sensitivity amongst reviewers from Europe. Notably, none of the reviews authored by tourists visiting South Africa from countries in South America contained mentions of climate, indicating a reduced sensitivity to climatic factors amongst this group. Examining the specific climatic factors mentioned within the reviews, regional patterns in the sensitivity of tourists to particular climatic conditions are apparent. Comparing all reviews authored by international tourists to those authored by South African local tourists, notable differences emerge (Fig. 3). For the South African subset of the database, cold conditions were cited most frequently at 44% of the climate mentions, followed by hot conditions in 25% of the reviews. This reveals a heightened sensitivity to thermal comfort factors amongst South African tourists. For international tourists, hot conditions are mentioned with a similar frequency to the South



African tourists at 28%: cold conditions, however, are cited considerably less frequently by international tourists and are equivalent to mentions of hot conditions (28%). International tourists cited sunshine far more often than South African tourists (15 and 8% of climate mentions, respectively). Mentions of rain are roughly equivalent between international and South African tourists, at 12 and 11%, respectively, while bad weather (4%) and humidity (2%) are mentioned more frequently by international tourists (Fig. 3).

Amongst the regionally distinguished groups of TripAdvisor review authors, those from Europe made mention of the widest range of climatic conditions (11), while those from the Americas (South and North America), cited the smallest range of conditions (5). Hot conditions were cited most frequently only amongst European tourists, accounting for 30% of all climate mentions within their TripAdvisor reviews. Amongst reviews authored by tourists from the Middle East. Americas and Australasia, cold conditions were mentioned most frequently (Fig. 3). For reviewers from the Middle East, hot conditions were amongst the least mentioned climatic factors at 6% of all reviews. Mentions of sunshine exceeded mentions of rain for tourists from Europe, the Middle East and Australasia, while mentions of rain were considerably more dominant in reviews authored by tourists from the Americas (Fig. 3).

The final regional category represents authors of unknown country of origin. Climate mentions amongst these reviewers are most similar to those from South Africa (Fig. 3), with cold conditions cited most frequently (38%), followed by hot conditions (27%) and equal mentions of rain and sunshine (10%).

Significance of the grading of the accommodation establishment reviewed

Grouping reviews according to the TGCSA grading of each accommodation establishment, a representation of the quality of establishment and thus the likelihood for successful mitigation of adverse climatic conditions, revealed differences in the degree of climatic sensitivity and the climatic factors most commonly mentioned within the TripAdvisor reviews. The variation in climatic factors between reviews of accommodation establishments demonstrates notable variability, particularly between the unrated and one-star establishments compared to those with four- and five-star ratings. Reviews capturing experiences at five-star accommodation establishments contained the greatest proportion of mentions of rain, drought and wind and amongst the lowest proportions of mentions of cold and hot conditions and of sunshine (Fig. 4). Cold conditions most frequently mentioned by tourists staying in accommodation establishments that were not yet rated by the TGCSA, while hot conditions and sun were mentioned most often by tourists staying in establishments with a one star rating (Fig. 4). In both instances, these represent higher proportions of mentions of the climatic factor in question. For most climatic variables, a moderate proportion of climate mentions were recorded for three and four star rated establishments (Fig. 4).

Seasonality

The third division of the data has been made on the basis of the seasonality of the timing of the review author's visit to South Africa. Climate mentions within TripAdvisor reviews were grouped according to the month of visit (Fig. 5). There are







Fig. 5 The number of mentions of each climatic factor in TripAdvisor reviews of South African accommodation establishments per month of visit

distinct qualitative differences in the frequency distributions for each variable throughout the year reflecting a notable seasonal pattern. Cold conditions were cited most often in reviews for visits in July, the peak of the South African winter, followed by the winter months of August and June (Fig. 5). Cold conditions are cited least frequently in reviews for the summer months of November to March. Although hot conditions are cited with the lowest incidence for reviews spanning the South African winter months and most frequently for the summer months, a noticeable peak is obvious for April and September, while markedly low counts are observed for March and November (Fig. 5). The seasonal distribution of climate mentions breaks down for rain and sun. Rain is mentioned within reviews most frequently for the months of September and July and least often for the months of May and June. Sunshine was mentioned most frequently for visits during the summer months of December to March, but with distinct winter season peaks in August and May (Fig. 5). Broader comments in reviews of 'bad weather' and 'good

weather' are very sparse, prohibiting conclusive patterns from being discerned. However, reviews citing bad weather are distributed relatively evenly throughout the months of the year, while mentions of good weather are noticeably absent for the early summer months of October to December. Further analysis of a larger database would be required to determine if this is by chance alone. (Fig. 5).

Discussion

Factors influencing a tourists' sensitivity to climate

An underlying assumption in many indices of climatic suitability for tourism is that 'good climate' is a factor of the measured meteorological variables of the destination alone (de Freitas et al. 2008). While this is necessary for the development of standardised indices comparing the climatic suitability of more than one destination, it reduces the model strength (de Freitas et al. 2008). Gössling and Hall (2006) point to a number of concerns with such indices and argue for the significance of the perceptions of expected weather and the home country weather conditions; we argue further that the mean climate of the home country, the type of accommodation establishment and the timing of the visit will influence the likelihood of a tourist enjoying the weather during their vacation. This list is of course not exhaustive, as the climatic sensitivity of a tourist is likely also to be influenced by the amount of time spent outdoors, climatic conditions which may facilitate or hinder particular activities (Scott et al. 2008) and competing detriments to a destination such as crime, excessive noise, political unrest and poor infrastructure at a city to regional level (Sönmez 1998; Thompson and Schofield 2007; Lorde and Jackman 2013).

The results of this study confirm that the location of origin of tourists plays a role in the distribution of climatic factors most frequently mentioned in TripAdvisor reviews (Figs. 2, 3), supporting the findings of Scott et al. (2008) who report significant variation in the perceptions of ideal climatic conditions and of the ranking of different climatic variables by tourists from Canada, New Zealand and Sweden. Gössling and Hall (2006) argue that the climatic conditions of a country that a tourist resides in most often create a baseline relative to which the climatic conditions in the destination location are experienced. Residents of countries with cooler climates may be more sensitive to extreme heat, whereas residents of countries with warmer climates may find cooler temperatures uncomfortable (Gössling and Hall 2006; Giddy et al. 2017), yet Scott et al. (2008) found that tourists from southern Sweden had a preference for warmer temperatures at their vacation destination, which was argued to be due to the relatively low summer temperatures experienced in Sweden. A heightened sensitivity to cold temperatures is found amongst reviews from the Middle East, South Africa, Australasia and the Americas and a heightened sensitivity to hot temperatures in reviews from Europe (Fig. 3). This would support the argument that the climate of the region of origin sets a baseline against which temperatures at a vacation destination are experienced (Gössling and Hall 2006; Rutty and Scott 2015). The use of broad regions in this study is necessitated by the large distribution of countries of origin of the individual reviewers, yielding an insufficiently small number of reviews per individual country for finer-scale analysis. This represents a key limitation, as there is tremendous climatic heterogeneity within each of these regions. However, against this backdrop, the variance between these regions in the climatic factors mentioned is notable. This may represent more than a comparison to home climate alone and also reflect a greater awareness of weather and climate amongst residents of some regions, greater adaptability in terms of clothing options, or the access to information regarding the anticipated climate framing their perceptions. These factors should be explored in greater detail in future research, as should analyses of tourist reports of climate at finer spatial scales.

The presence of sunshine was mentioned frequently by international tourists visiting South Africa (Fig. 3). This is not surprising, as South Africa is deliberately marketed as a sunny destination and, when compared to countries in Europe, a considerably higher number of sunshine hours (Fitchett et al. 2017). However, tourists from the Americas mentioned observations of sunshine very seldom, with a higher proportion of mentions of rain instead (Fig. 3). This potentially speaks to the role of the perceived or advertised climate of a destination and the risk perceptions in shaping a tourists' reaction to the weather that they experience during their vacation (Maddison 2001; Gössling and Hall 2006; Hasan et al. 2017). In practical terms, the anticipated climate of a destination influences decisions surrounding the selection of clothing to pack, the itinerary of activities during the vacation and the selection of accommodation type (Hyde and Olesen 2011). Furthermore, if tourists perceive that they have been misled through false advertising, they are arguably more likely to include this in a review of the destination (Burns and Bibbings 2009; Cox et al. 2009; Banerjee and Chua 2016). In validation of the findings in this survey of TripAdvisor reviews, research conducted by questionnaire on American tourists' experiences of weather in South Africa similarly found rain to be the third ranked factor (Giddy et al. 2017), yet further research to determine the representivity of TripAdvisor comments in the broader tourist community is necessary.

When exploring the seasonality of the TripAdvisor mentions of individual climatic factors, issues of the perceived climate of a destination and the degree to which tourists have adequately prepared for the conditions of the environment that they will be visiting and their perceptions of an advertised climate (Maddison 2001; Gössling and Hall 2006; Hasan et al. 2017), can similarly be identified. The monthly distribution of mentions of cold conditions mirrors the seasonal temperature fluctuations for South Africa: the greatest number of mentions is in the winter months, and the fewest mentions are for the summer months (Fig. 5). Although this is consistent with climate data (Fitchett et al. 2017), it would suggest that tourists are not sufficiently prepared for cold winters in South Africa, perhaps anticipating warm subtropical conditions year round. Reviews citing hot conditions follow a similar pattern, with the greatest number recorded for the summer months, and the fewest for winter (Fig. 5). However, of interest are the peaks in reviews citing hot conditions in April and September. This arguably speaks even closer to issues of incorrect perceptions and poor planning, whereby tourists are likely anticipating cooler weather than is typical for the spring and autumn months in South Africa and are therefore surprised by the warm weather and hence have cause to include this in their review. This is accentuated for mentions of rain and sun, which due to their erratic seasonal distribution and poor conformity to annual rainfall distribution, would indicate that these reports are predominantly made in instances in which the tourist was pleasantly/unpleasantly surprised by the occurrence of sunshine/rain.

The seasonal patterns in the reporting of climatic conditions within TripAdvisor reviews likely also speaks to the ability of the accommodation establishment under review to mitigate the poor climatic conditions (Verbos and Brownlee 2017). This is particularly the case when tourists are accustomed to indoor environments that are moderated by air conditioners to ensure that they remain within comfort levels at all times while indoors and are thus sensitive to even slight deviations from the human comfort range when indoors. As many of the budget accommodation offerings in South Africa do not have air conditioning within individual rooms, if at all, the high incidence of mentions of temperature amongst tourists visiting one-star and unrated establishments relative to those visiting three- to five-star establishments (Fig. 5) would support this hypothesis. This may speaks to the relatively low effectiveness of low-cost adaptations to the climate, including fans, blankets and hot water bottles (Hoogendoorn et al. 2015). Difficult to explain, however, is the proportional representation within the mentions relating to temperature for the one-star and unrated establishments. While hot conditions are mentioned, the most frequently for one-star establishments, it is the least frequently mentioned climatic factor for unrated establishments; this is reversed for mentions of cold conditions. Although the counts of both hot and cold conditions are higher for one star and unrated establishments than any of the higher rating categories, it is difficult to explain why one might experience colder or warmer conditions in a one-star establishment than in one that is not rated. By contrast, reviews of five-star rated accommodation establishments had the lowest combined total of mentions related to temperature, but the highest number of mentions of rain, wind and drought (Fig. 5). Rain and wind are relevant to outdoor activities and thus cannot be mitigated by the accommodation establishment, whereas these highly acclaimed lodgings would have the greatest success in mitigating adverse temperatures through high-cost indoor climate controls, a feature of their rating; these factors are thus a comment on the destination as a whole rather than the accommodation infrastructure. With reference to drought, it could tentatively be argued that tourists in five-star accommodations are made more aware of regional drought conditions through the advertising of water saving protocols (Kasim et al. 2014). Moreover, many five-star-rated accommodation establishments in South Africa are located within environmental settings that would more markedly be affected by and heighten a tourist's awareness of drought, such as golf courses and game reserves. On balance, the more moderate mentions of climatic factors from reviewers who visited three and four star accommodation establishments may provide a more objective view of the regional climatic suitability for tourists.

Importance for tourism marketing and management in South Africa

Tourism climatic indices have potential to determine competition between two otherwise similar tourist destinations through evaluating the suitability of the climate of each destination to tourism through a multivariate approach (Perch-Nielsen et al. 2010). These indices do incorporate the seasonality of the destination, as best evidenced by the seasonal classification of climatic suitability proposed by Scott and McBoyle (2001). The findings presented here would suggest that the degree of preparedness of tourists, as a function of their perception of the climate prior to their trip, can accentuate the seasonal fluctuations in climatic suitability. This may be due to the relatively aggressive marketing of South Africa as a sunny destination with moderate temperatures (Saayman and Saayman 2008). Moreover, we would argue that the seasonal fluctuations in the mentions of each of the climatic variables would highlight the role of extra-climatic factors, of which infrastructure is most important.

These findings require proactive engagement from South African tourism, travel agencies and individual accommodation establishments to ensure that tourists are correctly prepared for the most probable climatic conditions during their visit through more accurate communication of the climate of South Africa in advertising (Hoogendoorn et al. 2016). Arguably, TripAdvisor and other social networking sites provide a greater chance of tourists being adequately prepared for their visit due to the up-to-date, unbiased nature of reviews (O'Connor 2010). The ability to determine the country of residence of the reviewer on TripAdvisor allows tourists to incorporate a degree of location-dependant climatic sensitivity into their decision-making; this, however, relies on the tourist to be proactive in their decision-making. The findings regarding the variation in climatic factors mentioned most frequently both internationally and within South Africa further allows for such advertising to be tailored at a higher resolution to the target audience. This could include advertising specific destinations in South Africa to the audience most receptive to the particular climatic conditions of that location, advertising locations with more seasonally appropriate climatic conditions during those periods, or promoting five-star-rated accommodation establishments to more thermally sensitive tourists.

Future prospects under climate change

The four climatic factors most frequently mentioned by the reviewers are cold and hot temperatures, rain and sunshine. The slightly greater proportion of mentions of cold conditions amongst international tourists bodes well for the future of South African tourism under climate change, with projections of above international average increasing temperatures year round. However, for many regions, the mention of cold conditions are equivalent to those of hot conditions, which would occur more frequently and severely in forthcoming decades under climate change (SAWS 2017). Thus, the slight gains incurred in the reduction of cold mentions, would likely be outweighed by an increase in heat stress amongst tourists. Changes in precipitation amount are less evenly distributed across the country and thus while some regions are projected to experience an increase in rain days, others will receive a decrease in rain frequency (SAWS 2017). This, although positive in the short term to tourists in facilitating a greater number of days of outdoor activity, will be detrimental to the sector when the reduction in rainfall inevitably results in an increased incidence of drought.

Finally, this study reveals a low prevalence of mentions of extreme climatic events in TripAdvisor reviews. Although extreme hot and cold events could constitute extreme climatic events, South Africa has not experienced these events at the scale or severity of, for example, the European heat waves of 2003 and 2006 (Fouillet et al. 2008). Thus, extreme climatic events would be predominantly represented in this study by mentions of drought, wind and potentially bad weather. Interestingly, wind was not mentioned by any of the reviewers from the Americas, yet was the most frequently mentioned factor when American tourists to South Africa were deliberately questioned regarding experiences of weather (Giddy et al. 2017). This not only highlights the change in focus when tourists are speaking objectively about their visit, rather than being questioned about the weather, but more notably highlights that excessive wind seldom leaves an overall poor impression of a destination as a whole. Drought was mentioned more frequently than wind, perhaps due to the greater temporal and spatial scale, the visibility in the natural landscape and the often associated water restrictions within accommodation establishments. Of concern is the increasing severity of extreme events such as flooding, drought, fire and tropical cyclones under climate change (Mirza 2003). Extreme events of this nature have a greater potential to detriment the tourist experience of climate as these can isolate a tourist and prevent them from taking part in planned activities (Gössling and Hall 2006; Fitchett et al. 2016b).

Conclusion

The results presented here provide evidence to support that the sensitivity of tourists to climatic factors varies according to the country, or indeed province, of origin of tourists, the quality of the accommodation establishment that they are staying in and the seasonality of their visit. These findings are of critical importance to the planning for a sustainable tourism sector, in identifying the climatic factors, both good and bad, which tourists report on, and the mitigating factors. They are also important in improving quantitative metrics such as the

Tourism Climatic Index and as the production of the destination image through travel brochures. We would argue that greater attention should be placed on marketing efforts both in terms of accurately portraying seasonal climatic fluctuations and in advertising the most suitable destination to the target audience, and at a smaller scale, indoor climatic improvements to accommodation establishments. The climatic suitability of a destination is clearly not only a function of the climate of the destination but also the baseline climate of the tourist, the climatic conditions anticipated by the tourist and the factors which would mitigate or accentuate experiences of poor weather while on vacation. Further research should seek to determine the extent to which these sensitivity analyses hold true for other developing nations which rely on tourism and their good weather to bolster their gross domestic product.

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