

Tourists' reviews of weather in five Indian Ocean islands

Jennifer M. Fitchett,¹ ¹ Su-Marie Fortune² ¹ and Gijsbert Hoogendoorn² ¹

¹School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, South Africa ²Department of Geography, Environmental Management and Energy Studies, University of

Johannesburg, South Africa

Correspondence: Jennifer M. Fitchett (email: jennifer.fitchett@wits.ac.za)

Favourable climate forms a key resource in attracting tourists to tropical coastal destinations. Warm temperatures and clear skies are ideal conditions for tourists to spend long days on the beach and engage in outdoor activities. By contrast, rain, strong winds, high humidity and cloud cover serve as a deterrent. These factors influence tourists' choice of destination, timing and duration of stay, and enjoyment of their vacation, and are therefore imperative to the economic sustainability of a destination. This study explores tourists' self-reported sensitivity to and satisfaction of weather and climatic conditions during visits to five tropical Indian Ocean Islands through the analysis of 13 618 TripAdvisor reviews. An average of 12 per cent of reviews mentioned climatic factors, indicating a relatively high sensitivity to climate, with a highest proportion of 15.7 per cent of reviews for Maldives. Rain was mentioned most frequently (21 per cent of climate mentions), followed by sunshine and hot conditions. The majority of the reviews were authored in August and May, and more than 40 per cent were written in a neutral tone, with similar but lower proportions of overtly negative and positive reviews. Thematic analysis of reviews highlight the importance of preparedness amongst tourists, emphasizing the need for accurate information communicated.

Keywords: Tropics, islands, Indian Ocean, tourism, Tripadvisor

Accepted: 26 February 2020

Introduction

Long-term climate, and its experience as day-to-day weather, has been cited as one of the most significant factors in determining tourist's choice of destination, timing and duration of travel, and their satisfaction of their trip (Amelung et al., 2007; Gössling et al., 2012). This in turn will affect their likelihood to return to the destination or recommend it to friends and family (Hübner & Gössling, 2012). In the age of Web 2.0, such recommendations have a much wider reach than ever before (Munar & Jacobsen, 2013). Outdoor tourism is more sensitive to climate than other forms of tourism, as tourists are directly exposed to the elements, and adverse weather can therefore prohibit or impede certain activities (Craig & Feng, 2018). For beach tourism, weather and climate form one of the three key attractions, namely: sun, sea and sand (Ibarra, 2011). Clear skies, warm temperatures within human comfort levels, relatively low humidity and a slight breeze form ideal conditions for an enjoyable day on the beach, whether sunbathing or partaking in beach or water sports (Morgan et al., 2000). Coastal regions also face threats of sea level rise, which depending on the slope of the beach, may obliterate the beach extent, and pose flooding to seafront accommodation (Scott et al., 2012). These factors combine to heighten the vulnerability of the tourism sectors of island states, where beaches and outdoor activities are the primary attraction

to the country, and alternate attractions and potential for inland migration is limited in comparison (Bujosa *et al.*, 2015). For the small island states of the global South, this vulnerability is coupled with a low adaptive capacity, as nations struggle to address the contemporary fundamental human rights of their populations while planning for and mitigating the climate threats of the century to come (Hoogendoorn & Fitchett, 2018).

These Tropical Indian Ocean Islands, including of The Comoros, Mauritius, Reunion, Seychelles and Maldives, face the same climatic challenges as beach and outdoor destinations globally, with a reliance on sunshine, warm weather and minimal daytime precipitation. They also, however, face specific threats of flooding and severe winds associated with tropical cyclones, which in recent decades have increased in intensity and expanded polewards in their distribution (Fitchett, 2018; Pillay & Fitchett, 2019). Due to their location within the tropics, vector-borne diseases such as malaria and chikungunya¹ provide a further climate-related hazard and potential deterrent to tourists (Preston-Whyte & Watson, 2005).

As countries of the Global South, they have a significantly lower adaptive capacity than wealthier small island states, and necessarily prioritize contemporary needs of their population over development for future tourism (Roberts, 2010). Adaptation to climate threats in the region needs to be focused towards tangible changes, with maximum benefit to both the visiting tourists and the tourism industry. To achieve this, the weather- and climate-related concerns and dissatisfactions of tourists need to be integrated with the goals of tourism operators to align investment and adaptation measures with tangible improvements in tourists' experiences (Hoogendoorn et al., 2016). Achieving this requires an objective assessment of tourists' net sensitivity to climate during their vacations (Fitchett & Hoogendoorn, 2018; 2019). This is often difficult to ensure; asking tourists questions about climate can inadvertently cause them to consider climate even if it were not important during their trip (Denstadli & Jacobsen, 2014). For this reason, TripAdvisor provides a valuable platform, wherein tourists present their self-reported free-form accounts of their satisfaction of their trip (Mkono, 2012). Only in cases where the weather or climatic conditions were a significant feature in the vacation would tourists report on those (Stockigt et al., 2018; Fitchett & Hoogendoorn, 2019). The analysis of TripAdvisor reviews to assess climatic sensitivity of tourists has been applied successfully to 19 locations in South Africa (Fitchett & Hoogendoorn, 2018; 2019) and to a Ski Resort in Lesotho (Stockigt et al., 2018), providing information regarding whether climate is a significant factor in determining tourists' positive and negative experiences and determining the climatic factors tourists are most sensitive to. This allows for targeted adaptation plans that address the most significant concerns of tourists, and specifically those which would lead to negative 'word of mouth' advertisement for the destination (Bujisic et al., 2019).

This paper applies Fitchett and Hoogendoorn's (2018; 2019) approach to the use of TripAdvisor reviews in analysing tourist sensitivity to climate to five tropical Indian Ocean Islands: Mauritius, Reunion, Seychelles, Maldives and The Comoros. We explore the net climate sensitivity of tourists per island, the climatic factors that tourists to each island most frequently reflect on, and the proportion of negative to positive climate comments. We additionally explore the tone and sentiment of these comments, particularly regarding rainfall.

Study region

The five Indian Ocean islands of The Comoros, Mauritius, Reunion, Seychelles and Maldives (see Figure 1) were chosen because of their small size therefore omitting large

islands such as Sri Lanka, Madagascar and Indonesia. The reliance on tourism for economic development (see Table 1) played an important role in selection of study sites, and also the islands were chosen as the most prominent tourist destinations in the tropical Indian ocean (McElroy, 2006).

The Indian Ocean Islands of this study rely to varying degrees on tourism for economic development (see Table 1). In particular, Maldives and Seychelles are heavily dependent on the tourism sector for economic development (Prayag, 2011). The Comoros, Reunion and Mauritius are also very reliant on the tourism sector for economic development (Table 1). Beaches form the primary attraction to these islands, often within resort style developments. These are supplemented by adventure tourism activities including scuba diving, snorkeling, surfing, paragliding, and smaller proportions of heritage and business tourism offerings (Ramkissoon & Nunkoo, 2008; Joynathsing & Ramkissoon, 2010)—the specific tourism products to vary between islands. Mauritius primarily comprises enclave beach resort developments (Nunkoo & Ramkissoon, 2016; Naidoo & Sharpley, 2016; Munhurrun *et al.*, 2015), and is being promoted as an exclusive destination for business and wedding tourism (Seebaluck *et al.*, 2015) The 'oneresort-one-island' concept has been implemented widely in Maldives where only one hotel or resort chain has the rights to develop the tourism products of an island (Domroes, 2001; Cowburn *et al.*, 2018).

Located in the warm Indian Ocean spanning the tropics to subtropics, the islands are characterized by oceanic, tropical and subtropical climate types (Table 2; Climatedata Organisation, 2018). Dominant proximal climate drivers include the monsoon season, the tropical cyclone season, and the modulation through the Indian Ocean Dipole, Madden-Julian Oscillation, the seasonal migration of the Inter-Tropical Convergence Zone (ITCZ); more distal factors include the El Niño Southern Oscillation, the Southern Annular Mode, and the effects of boundary currents (Schott et al., 2009). Tropical cyclones pose the most severe climate threats currently faced by these islands, and have increased in intensity and geographical range in the Indian Ocean over recent decades (Fitchett, 2018). Sea level rise is one of the greatest climate change threats to the islands, with the potential to make the islands uninhabitable by 2100 (Hirsch, 2015). Decreases in precipitation and prolonged droughts have led to water shortages, which is a particular concern for Comoros (CCKP, 2018). Due to its geographical position and geology, Seychelles is less exposed to major natural disaster than most of the neighbouring countries such as Mauritius, Reunion, Comoros and Madagascar (Division for Risk Management and Disaster Management, 2018). Coral bleaching events are likely to become more frequent due to climate change (Klint et al., 2012). However, coral in the southwestern Indian Ocean seems to be slightly more resilient than coral populations in the eastern Indian Ocean (CCKP, 2018; Cowburn et al., 2018).

Methods

There is a growing body of literature on the use of online reviews in research (see Bissell, 2012). The work of Mkono (2012) was among the first in applying this platform in the southern African context, exploring reviews on restaurants at Victoria Falls in assessing tourists' views on authenticity of experiences. This approach has later been applied in assessing tourists' experiences of climate (Fitchett and Hoogendoorn, 2018). For consistency in the analysis and comparison of results, this study adopts the approach described by Fitchett and Hoogendoorn (2018; 2019), and applied by Stockigt *et al.* (2018), without modification. TripAdvisor reviews were manually read and coded



Figure 1. *Map of study sites*. *Source*: Figure produced by authors.

for each of the five tropical Indian Ocean islands of interest for mentions of climate and weather events. A total tally of all reviews was recorded, and for each review that mentioned climatic conditions or the weather experienced, those comments were coded by weather type. Additional review information including the date of review, date of travel, and country of origin of reviewer were captured. Broader reviewer data including their total number of TripAdvisor reviews, and their TripAdvisor status were not captured, but may be a valuable avenue for future research. Reviews were considered for accommodation establishments as these have the longest and most continuous history of reviews on TripAdvisor. Five accommodation establishments were selected per island, spanning very low cost offerings such as backpackers and motels through to five star hotels (Fitchett & Hoogendoorn, 2018); all reviews for each of the accommodation establishments were considered up to the date of analysis, January 2017.

A total of 13 618 TripAdvisor reviews that were written in English were consulted from 25 accommodation establishments from Comoros, Reunion, Seychelles, Mauritius and Maldives that were written in the years 2012–2016. TripAdvisor reviews from five accommodation establishments on each island ranging from a five star to a BnB/Inn were consulted to prevent any biases that relate to the quality of the accommodation establishment, and the availability of climate control. The greatest number of reviews had been authored for Maldives, with 6191 reviews consulted for the five accommodation establishments over the five year period. For Mauritius, 5277 reviews were consulted, and Seychelles 1709. Far fewer reviews were available for Reunion (366) and

Island	Total tourist arrivals	Total contribution to employment	Travel and tourism export earnings (US\$)	Unemployment percentage	Tourism contribution to GDP
Comoros	23,600	9.10%	33.9 million	3.7%	10.5%
Reunion	458,261	11.30%	382.4 million	24%	10.9%
Seychelles	303,177	63.60%	516.7 million	3.5%	58.1%
Mauritius	1,275,227	24.30%	1,818.3 million	6.6%	25.60%
Maldives	1,286,000	43.60%	2,794.6 million	6.10%	79.4%

Table 1. Travel and tourism's economic impact during 2016.

Source: (World Tourism and Travel Council Country Reports, 2017; Trading Economics, 2019).

Table 2. Climate classification of the study area (after Climate-data Organization, 2018).

Island	GPS coordinates (mid-point)	Köppen-Geiger Classification
Comoros	11.6455° S, 43.3333° E	Tropical monsoon climate (Am)
		Tropical rainforest climate (Af)
Reunion	21.1151° S, 55.5364° E	Tropical savanna climate (Aw)
		Temperate Oceanic climate (Cfb)
		Humid subtropical climate (Cfa)
Seychelles	4.6796° S, 55.4920° E	Tropical rainforest climate (Af)
Mauritius	20.3484° S, 57.5522° E	Tropical monsoon climate (Am)
		Tropical rainforest climate (Af)
		Tropical savanna climate (Aw)
		Humid subtropical climate (Cfa)
Maldives	3.2028° N, 73.2207° E	Tropical monsoon climate (Am)

Source: Produced by authors based on (Climate-data Organization, 2018).

Comoros (105). Overall, the majority of the TripAdvisor reviews were for four star hotels (6682) and five star hotels (5195) and the least reviews were for BnB/Inns (209).

For each of the five islands, a small proportion of the reviews were written in languages other than English. This had not been the case for reviews of destinations in South Africa or Lesotho. Due to problems in translation, particularly relating to words such as 'warm' and 'cold' which could refer either to 'temperature' or 'friendliness' within the hospitality industry, and in instances of multiple words describing types of weather events such as wind, we elected not to include the non-English language reviews in this study.

Frequency distributions were analyzed 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 (Fitchett *et al.*, 2018). With multiple categories for each discriminator, comparison of means or medians through ANOVA was not possible (Fitchett & Hoogendoorn, 2019). We additionally performed qualitative analysis pertaining to the sentiment of the review, classifying these as positive, negative or neutral. Focusing explicitly on rainfall, the key hazard for beach tourism, we further analysed the data through thematic analysis and identifying key quotes.

Results

Demographics of the reviews

The majority of the 13 618 reviews were written by tourists travelling from the United Kingdom (UK; 42.1 per cent). Smaller, yet significant, proportions of reviews were authored by tourists travelling from India (5.5 per cent), the United Arab Emirates (UAE; 3.8 per cent), Mauritius (3.7 per cent), South Africa (3.3 per cent), the United States of America (USA) (2.5 per cent) and Australia (2.2 per cent), each with at least 300 reviews (Figure 2). A total of 2251 (16.5 per cent) reviewers did not indicate their country of origin on TripAdvisor. This demographic relating to the country of origin differed considerably by island. The majority of the reviews for the Comoros were written by tourists from the USA (17.1 per cent), Kenya (8.6 per cent) and Tanzania (6.7 per cent). For Reunion, the greatest number of reviews were authored by visitors from the UK (23.5 per cent), South Africa (11.3 per cent) and Australia (8.3 per cent). Reviews for Seychelles have a similar demographic, with the greatest proportion from the UK (26.3 per cent), UAE (11.6 per cent) and South Africa (6 per cent). For Mauritius the majority of the reviews were also from the UK (40.3 per cent) followed by local Mauritians (9.4 per cent) and tourists from India (7.2 per cent). The reviews for Maldives were predominantly authored by people from the UK (49.8 per cent), India (4.6 per cent) and the UAE (3.4 per cent).

The total number of TripAdvisor reviews for Indian Ocean Island accommodation establishments increased substantially between 2012 and 2016, from 1337 to 4178 reviews respectively (Figure 3). This trend is seen for each island except for Comoros, where TripAdvisor reviews decreased from 32 reviews in 2015 to 20 reviews in 2016 and Reunion, which had one less review in 2016 than in 2015. This is consistent with both the growth of the TripAdvisor platform over this time period (Amaral *et al.*, 2014), and the increase in tourism numbers to all islands except for the Comoros (Weaver, 2016).

From a seasonal perspective, there is a slight increase in the number of reviews between August and October, while the lowest number of reviews are authored for travel during January to March. The percentage of reviews per month vary between islands. The greatest percentage of reviews were in October for Comoros (14.3 per cent) and Maldives (9.7 per cent), while September had the greatest proportion of reviews for Mauritius (11.5 per cent) and Reunion (15.2 per cent) and the greatest proportion of reviews for Seychelles were in July (10.6 per cent; Figure 4). The months with the least proportion of reviews were June for Comoros (3.8), March for Reunion (4 per cent) and Maldives (6.9 per cent), and January for Seychelles (3.1 per cent) and Mauritius (5.6 per cent; Figure 4).

Mentions of weather in tourists' reviews

Of the 13 618 TripAdvisor reviews that were written in English, 1638 (12.4 per cent) contained mentions of the weather experienced by tourists (Table 3). Many of these reviews contained mentions of more than one weather phenomena, yielding a total number of weather mentions across all reviews of 2639. Experiences of weather were mentioned most frequently in reviews of Maldives (972 reviews, 15.7 per cent). This is followed by Reunion (31 reviews, 9.2 per cent), Seychelles (155 reviews, 9.1 per cent) and Mauritius (473 reviews, 8.9 per cent). Experiences of weather were cited least frequently in reviews from The Comoros (7 reviews, 6.7 per cent).



Figure 2. *Number of English TripAdvisor reviews for each country. Source*: Figure produced by authors.

The climatic conditions contained in these recounts of experiences of the weather included sun, clear skies, cloud cover, mist, rain, wind, storms, humidity, hot, cold, cool, comfortable temperature, uncomfortable temperature, temperature, unpredictable weather, good weather, and bad weather (Figure 5). Across all reviews, rain was most frequently mentioned by tourists (557 mentions, 21 per cent of all climate mentions), followed by sun (417 mentions) and hot temperatures (415). Rain was likewise the most frequently mentioned climatic factor for reviews from Seychelles, Mauritius and Maldives. For Reunion and The Comoros, wind and hot conditions respectively were cited most frequently, albeit with very small sample numbers in each instance (Table 2).

Only seven reviews from The Comoros contained mentions of the weather experienced, three of whom were from the USA; citing hot conditions (5 mentions) and one mention each for humid and unpredictable weather. It is notable that many reviewers visiting The Comoros commented on electricity outages, which may account for the heightened reviews on hot conditions as air conditioning would not be possible. For Reunion, a wider variety of climatic conditions were mentioned in reviews. Wind was mentioned most frequently (10 reviews), followed by hot (8 reviews) and cold (7 reviews) temperatures. Rain, sun and humid conditions were each mentioned twice, and mist and unpredictable weather once. Tourists visiting Reunion from the UK mentioned the weather most frequently (22.8 per cent), writing about wind (3 mentions) and cold temperatures (2 mentions).

With a significantly greater number of reviews reflecting on the weather experienced, Seychelles, Mauritius and Maldives each had a greater diversity in the climatic conditions mentioned. For Seychelles rain was mentioned 54 times followed by hot temperatures (42 mentions), and sun and wind (34 mentions each). Good weather, humidity, cloud and bad weather each received more than 10 mentions. Similar to Reunion, the majority of these reviews citing weather were authored by visitors from the UK (38.6 per cent), who mentioned rain most frequently (23 mentions) followed by hot temperatures (14 mentions) and humidity (10 mentions).

For Mauritius, rain was mentioned 145 times, followed by wind (123 mentions), sun (100 mentions), hot temperatures (90 mentions), and good weather (74 mentions). Bad weather, cloud cover, cool temperatures and unpredictable weather were each cited between 20–50 times, while cold conditions, storms, humidity, and comfortable temperatures were cited less often. Again, the vast majority of the reviews containing commentary on weather were authored by tourists from the UK (58.7 per cent), who mentioned rain (89 mentions), sun (64 mentions) and wind (59 mentions) most frequently.

For Maldives, a considerable variety in climatic factors were mentioned. Rain was mentioned 356 times, followed by sun (281 mentions) and hot temperatures (270 mentions). Good weather and wind were each mentioned in more than 100 reviews, while cloud cover, bad weather and storms were mentioned more than 50 times. Clear skies, humidity, comfortable temperatures and unpredictable weather were each mentioned more than 10 times, while fewer reviews cited cool, cold or uncomfortable temperatures. Once again the majority of the climate mentions were made by reviewers from the UK (73 per cent) followed by the USA (23 per cent). The reviewers from the UK mentioned hot temperatures (195 mentions) and rain (224 mentions) most frequently, while reviewers from the USA mentioned sun (10 mentions) and rain (9 mentions) most often.

The greatest proportion of reviews that reflected on the weather were authored for trips between May and September. The lowest proportion of reviews making mention of weather were for the month of December (8.7 per cent), marking the culmination of a downward trend from September (Figure 6). Larger proportions are recorded for January and February, revealing a roughly bimodal distribution in the interannual variability in mentions of weather in reviews.

Tourists' reported satisfaction with weather

The weather experienced during a vacation can contribute either positively or negatively to overall enjoyment of the vacation, the ability to take part in outdoor activities,



Figure 3. *Number of English TripAdvisor reviews per year. Source*: Figure produced by authors.



Figure 4. Percentage of English TripAdvisor reviews per month for each island. Source: Figure produced by authors.

Island	Number of reviews consulted	Number of reviews with mentions of weather	Percentage of reviews with mentions of weather	Number of mentions of weather	Most frequently mentioned climatic factor
The	105	7	6.7%	7	Hot
Reunion	336	31	9.2%	35	Wind
Seychelles	1709	155	9.1%	238	Rain
Mauritius	5277	473	8.9%	743	Rain
Maldives	6191	972	15.7%	1616	Rain
Total	13618	1638	12%	2639	Rain

Table 3. Reviews mentioning weather and climate.

Source: Table produced by authors.

and the likelihood to return to the destination or suggest it to others. The sentiment of these comments provides further evidence which is important in framing effective adaptation strategies.

The majority of comments were neutral (41.4 per cent), with little difference between negative (31.0 per cent) and positive (27.6 per cent) comments. Clear skies were only written about in a favourable or neutral manner, while cold conditions were only reported in negative or neutral terms (Table 4). A similar pattern was observed for sun, which was almost exclusively positive or neutral, and rain which was almost entirely negative or neutral. For the remaining climatic variables, a more even distribution in sentiment was recorded. For cloud, cool temperature and rain, the greatest percentage of reviews were neutral. For clear skies, hot temperatures, sun and wind the



Figure 5. Frequency of mentions of the various climatic conditions for the islands. Source: Figure produced by authors.

greatest percentage of reviews were positive (Table 4). Considering rain, the most frequently mentioned climatic factor, 60.7 per cent of citations were neutral while 33.2 per cent were negative. Neutral accounts of rain were often due to the short duration of rain, or the availability of alternate indoor activities. On the duration of the rain, a reviewer from the UK who visited Mauritius wrote on 2/24/2016:

The weather was fantastic even if it was the rainy season, it only rained once for 15 mins!!

A total of 44 reviews mentioned that the rain occurred at night and was therefore not an inconvenience. For example, a tourist from the UK who visited Maldives in June wrote on 7/13/2012:

It has been the most perfect weather when we went, the only rain we had was at night and only lasted around 20-30 mins.

On the availability of alternate activities, a reviewer from Singapore who visited Maldives wrote on 8/25/2014:

Our sunny holiday soon turn to 4 long days of nasty T-storm. We were so sad and worried what can we occupied ourselves with. To our surprised, the management and the staff were all gear up for the seasonal rain. Activities were well planned - indoor games competition were organized, free cocktails session, local cultural introduction, canvas painting, cooking demo classes, movie session, mixologist. Classes, mingle session among management and hotel guests. Well done !!! Overall, we all had good and fun experience in this lovely resort.

However, a few tourists were disappointed that they were not given advice on such alternatives. For example, a reviewer from the United Arab Emirates who visited Mauritius wrote on 9/2/2015:



Figure 6. *Proportion of reviews with climate mentions per month. Source*: Figure produced by authors.

If its raining the staff don't know what to recommend - so I advise you to do your research on what can be done before you travel. we learned the hard way!

For 39 reviewers, rain had a negative impact on their planned activities. This included various leisure activities such as sunbathing, swimming, eating at an outdoor restaurant, snorkelling or other watersports. A reviewer from India who visited Maldives wrote on 3/18/2015:

Due to rains we could not enjoy any of the sea sports (Parasailing, Funtubes. etc.).

A reviewer from the UK who visited Seychelles wrote on 3/8/2016 similarly reported:

The only downside was the unseasonably wet weather; which led to the abandonment of our planned trip to Praslin/La Digue on two separate occasions.

In some instances the impact of rain was even more significant. For Maldives five reviewers mentioned that their seaplane was cancelled due to rain or storms; two were only able to fly the following day and thus had to spend a night in Malé. Unseasonal rain is also more problematic than rain which tourists anticipate. For example, a reviewer from Switzerland who visited Seychelles in June 2014 wrote on 7/5/2014:

After four days of nearly continuous wind and rain (in June, which is supposedly the driest month) we left the place which we had booked for a fortnight. The hotel management refused to refund the remaining 8 days half-board (and apparently we were not the only customers in a similar situation). We moved to a more sunny place on another island, well what a difference!

More broadly described, unpredictable weather can also have a negative influence on tourists resulting in them curtailing their trip. For example, a reviewer who visited Mauritius in August wrote on 9/4/2016:

the only let down for our stay was the unpredictable weather - we decided to leave 2 days earlier (7 nights instead of 9) was unfortunate that the resort could not offer us some sort of refund for these nights as we had given 4 day notice.

Some reviews were very detailed in their account of the weather experienced throughout the trip, and evoked more visceral reaction than could be captured by 'positive', 'negative' or 'neutral'. For example, a reviewer from the UK who visited Maldives in January wrote on 1/8/2012:

Our first week we had absolute glorious sunshine, few clouds, little bit of the odd rain cloud passed and the odd storm at night, but the second week was very mixed, still baking hot and humid but we got some frightening storms night and day, amazing to watch the lightening over the sea especially being in our water villa but so scary when the storms/winds hit, the villa shuck and I really was scared. I thought the villa was going to collapse and crash into the sea below but we were fine.

These heightened responses often arise from tourists being exposed more directly to the weather by being out on the water. Similar to the previous quote, a reviewer from Qatar who visited Maldives in August wrote 9/8/2012:

An evening to remember was the sun set and dolphin watching cruise, organized by the resort. It was a very joyful evening but unfortunately the weather conditions changed without any warnings. Dramatically the sky turns dark and the sea became rough in few minutes due to the strong wind and the waves started spattering in to the boat and on the passengers. Even though everybody became panic and some almost in tears, the three crew members on board put all their good efforts and experience to calm down the guests and assuring them the safety until we reach the island after 30 minutes of struggling of the captain to cut through the high waves. This is of course beyond human control but the efficiency of the staffs to handle the situation deserves a great applause.

Neutral comments often arise where one climatic variable counteracts the impact of another. For example, cloud cover, light winds and evening rain are welcomed when temperatures are excessively hot; likewise warm temperatures circumvent the effects of rainfall. Cool temperatures are considered acceptable when tourists experience clear skies, but when cool temperatures are associated with wind they are considered less preferable.

As for the total number of mentions of weather in reviews and distributions of climatic variables across reviews, the country of origin is significant in determining the experience of a particular climatic condition, as they will inherently be comparing this to the climate they are most used to. For example, a reviewer from the UK who visited Maldives wrote on 11/13/2012:

Climate factor mentioned	Positive (%)	Negative (%)	Neutral (%)
Clear sky	79.7	0	20.3
Cloud	8.5	34.9	56.6
Cold	0	57.7	42.3
Cool	14.8	29.6	55.6
Hot	50.1	28.4	21.4
Humid	5.6	47.2	47.2
Rain	6.1	33.2	60.7
Storm	12.5	44.9	42.3
Sun	62.6	2.4	35
Wind	36.2	31.4	32.4
TOTAL	27.6	31.0	41.4

Table 4. Classification of the tone of climate comments in TripAdvisor Reviews.

The best weather, with wall-to-wall sunshine, is from November to June. It can be rainy in the other months - but nothing like Britain! The temperature rarely drops beneath 80 degrees - even at night.

Such comparisons may be considering more regional climates that tourists are accustomed to. For example, a reviewer from Belgium who visited Maldives wrote on 4/8/2013:

On arriving in Malé, we were hit with a wall of heat and humidity (a constant 34 degrees) - we had left snow behind in the UK and it was a bit of a shock to the system. Having read reviews, we packed shorts, t-shirt, flipflops and suncream in hand luggage as we knew that our main luggage would follow us later that day. Not all new-arrivals appeared to have this knowledge and being stuck in winter clothing when it is 34 degrees and uber humid is not a relaxing start to the holiday.

Tourists' concerns of climate change

The comments from the tourists which describe the unpredictability of weather, very hot conditions, and the experience of tropical cyclone conditions could, arguably, be connected to climate change. However, when writing about the weather that they experienced, none of the tourists specifically mentioned climate change in their reviews. Climate change has, however, been mentioned by reviewers with regard to coral bleaching and sea level rise.

Five of the reviewers mention that the coral bleaching is due to the effects of climate change and, in one instance, El Niño. For example, a reviewer from the UK who visited Maldives in October wrote on 10/26/2016:

The house reef is lovely, but with the effects from climate change and potentially El Nino it means a lot of the reef in the shallows has died - this is the same throughout the Maldives.

Three reviewers mentioned explicitly that they were able to see a change in the amount of visible beach from the previous time that they visited the island. For example, a reviewer from the UK wrote on 1/22/2016:

The sea has made inroads on the south side of the island opposite Villivaru (one of the neighbouring islands). A couple of years ago we were able to put our sunbeds there - now there is basically no beach on that side at all. However, this might well be a temporary thing to do with seasonal currents and there are enough sandy areas around the island for everyone.

These reviewers, however, were less certain that this was due to climate change. The difference in ascribing weather events or landscape and biotic changes to climate change is significant when considering adaptation, as the target market opinion is critical to any success.

Discussion

Outdoor tourism is known to be highly sensitive to the long-term climate, and tourists' enjoyment thereof dependent on the quality of the weather during their stay (Agnew & Viner, 2001; Moreno & Amelung, 2009). This is heightened for tourism subsectors for which climate serves as one of the prime attractions and forms part of the destination image (Prayag, 2009; Noome & Fitchett, 2019). This is the case for beach

tourism, and for the marketing of many tropical small island states, which form an escape to warm and sunny weather to many Europeans in mid-winter (Joynathsing & Ramkissoon, 2010). It is thus not surprising that an average of 12.4 per cent of the reviews consulted across the five islands make mention of the weather experienced and/or the mean climatic conditions, with a peak of 15.7 per cent for Maldives and a sensitivity to climate of 8.9-9.2 for Mauritius, Seychelles and Reunion. This is higher than the mean 7.9 per cent for TripAdvisor reviews from 19 destinations across South Africa (Fitchett & Hoogendoorn, 2018; 2019), but quite significantly lower than the 25.5 per cent of reviews from Afriski Mountain Resort in the eastern Lesotho highlands (Stockigt et al., 2018). This speaks to the diversity of tourism offerings provided by these tropical Indian Ocean islands, making them less solely reliant on the climate than a ski lodge. For Afriski, climate is critical to the ability to take part in the primary attraction of the resort, as temperatures too warm or constant rainfall would prohibit skiing (Stockigt et al., 2018; Noome & Fitchett, 2019). While climate is important to beach tourists, alternate tourism offerings on the islands including cultural and heritage tourism (Boswell, 2005; Soper, 2007) would entertain tourists during unfavourable weather. The weather and climate are, however, more poignant in trips to these islands than visits to South Africa, where only a small proportion of destinations covered, offered predominantly outdoor attractions (Fitchett & Hoogendoorn, 2018; 2019).

Of interest in comparing these results to those from South Africa, is the much lower proportion of reviews mentioning climate for the South African southern coast towns where scores ranged from 4.7-5.4 per cent (Fitchett & Hoogendoorn, 2019), both in relation to other destinations in South Africa, and more notably in relation to reviews for the tropical Indian Ocean Islands. The highest proportion of reviews mentioning climatic factors in South Africa were for small inland towns, none of which have significant outdoor tourism offerings. Tourists visiting these small inland towns were reflecting in most instances on the very cold temperatures that had taken them by surprise during a vacation in South Africa (Fitchett & Hoogendoorn, 2019). This speaks to the importance of tourists' preparedness for the weather that they will experience during their vacation. For Afriski in Lesotho, many tourists had commented on the novelty of snow in Africa, and similarly of the unexpectedly cold temperatures given the geographical context on the African continent (Stockigt et al., 2018). Tourists choosing to allocate their time, resources and energy in reviewing a destination often do so where they have a notable event or experience to report (Fitchett & Hoogendoorn, 2019), and thus the occurrence of expected warm and sunny conditions in the South African southern coast towns and in the tropical Indian Ocean islands would necessarily attract less attention than the unanticipated splendor of snow in Africa. For the tropical Indian Ocean islands, the greatest proportion of comments on weather related to rain and storm events. These events were notable for tourists who were hoping for continuous sunshine and suitable conditions for the beach, and a few tourists mentioned explicitly that the storms and rain were unexpected. Given that the tropical Indian Ocean islands are situated within the region of tropical cyclone activity (Fitchett, 2018; Pillay & Fitchett, 2019), it is, however, surprising that very few reviews made mention of tropical cyclones or weather typologies associated with these storms, such as very strong winds and torrential rainfall (Fitchett et al., 2020).

Gössling and Hall (2006) reflect on the significance of home country conditions and the anticipated weather in framing tourists' experiences of weather during their vacation. The country of origin of tourists is therefore of interest in reflecting on their commentary on climate. For the tropical Indian Ocean islands, the majority of reviewers were authored by tourists from the UK, many of whom were responsible for the reviews relating to rain and storms. This highlights that tourists often seek weather different to what they experience at home, particularly in the case of rain. For temperature, tourists may hope for warm weather as an escape from their cold winter (Scott et al., 2012), but struggle to regulate thermodynamically in temperatures significantly higher than what they have adapted to in their home country (Fitchett & Hoogendoorn, 2018). In this study, the comments from tourists that made explicit comparisons to conditions in their country of primary residence strengthen this hypothesis. The anticipated climate of a destination is controlled by the information communicated to tourists prior to their vacations. For Mauritius, both first time and repeat visitors have been found to rely on the internet in sourcing information prior to their vacation, while first-time visitors additionally utilized travel agencies and wordof-mouth from friends and family (Ramkissoon & Nunkoo, 2008). The quality of information thus varies considerably, and a notable iterative effect of climate mentions on TripAdvisor informing future tourists must be considered. Finally, tourists may expect a baseline of infrastructural adaptation at their chosen accommodation establishment, which in its absence may cause discomfort from the climate. In the case of South Africa, this often related to the absence of air conditioning in more basic budget accommodation (Fitchett & Hoogendoorn, 2019), while at Afriski this related to insufficient heating in some of the lower-cost rooms (Stockigt et al., 2018). A parallel is seen for reviews of the Comoros, where 'hot' conditions rather than 'rain' was mentioned most often, against a backdrop of numerous reviews speaking to the frequent electricity outages which would have prohibited the use of fans or air conditioning.

This study adopted the approach of Stockigt *et al.* (2018) in considering the sentiment of reviews. It is notable that for the tropical Indian Ocean islands, the climate comments in the majority of the reviews were neutral, with relatively small proportions of positive or negative comments. This indicates that while unexpected, the weather did not impinge on the overall enjoyment of the vacation. The dominance of neutral weather comments reveals the value of TripAdvisor reviews in highlighting climatic sensitivity amongst tourists, rather than a focus only on weather that resulted in the cancellation of events (Fitchett & Hoogendoorn, 2018). Quantitative assessment of the climatic sensitivity of tourists, and the climate and weather conditions that are considered to be suitable and unsuitable, are important in understanding the importance of weather and climate in the destination image of the region (Prayag, 2009) and as pull factors for tourists (Joynathsing & Ramkissoon, 2010). Notably, in factor analysis of variables affecting destination image in Mauritius, weather and climate were removed due to low levels of variance (Prayag, 2009).

Looking forward, the content of TripAdvisor reviews provides a positive outlook for continued tourism to these tropical Indian Ocean islands in future. The relatively low proportion of comments relating to hot temperatures is promising under climate change, indicating that the thresholds for human comfort are not yet being severely exceeded. The significance of comments regarding rain and storms, and particularly severe storm events, by contrast, should be treated with caution given the intensification of tropical cyclones in the region over the past three decades (Fitchett, 2018), and their poleward expansion in regions of occurrence (Pillay & Fitchett, 2019). The greatest risk of climate change to these islands, however, has not been considered in this study: sea level rise (Fitchet *et al.* 2016). Although a few reviews did speak to the reduction in beach extent, sea level rise was not a key consideration. This is likely because it is not yet visible and thus not a tangible concern of tourists who are visiting

for a short period. Adaptation plans would therefore need to consider the impacts of climate change to ensure the continued sustainability of these islands as beach tourist destinations.

Conclusion

This study presents the first detailed report of tourists' experiences of weather and climatic conditions during vacations to the tropical Indian Ocean islands of The Comoros, Mauritius, Reunion, Seychelles and Maldives, through the analysis of 13 618 TripAdvisor Reviews. Across the islands, an average of 12.4 per cent of reviews made mention of the weather/climate, most frequently citing the occurrence of rain. The majority of reviewers who made mention of the weather or climate were visiting from the UK or the USA. While there was a degree of variation between the islands in terms of the climatic conditions mentioned, the greatest variance related to the infrastructural ability to mitigate poor weather, and to offer alternate activities.

Given the importance of weather as a pull-factor for tourism, and in framing the destination image, accounts of poor weather serve a dual function. First, if treated with the gravitas that we believe they should, these reviews alert the tourism authorities of the respective island states to tourists' levels of satisfaction with and sensitivity to the climate experienced on those islands, allowing for well-informed and therefore more likely effective adaptation. Second, they inform future visitors about the weather experienced by recent visitors to the islands, including those from the same region of origin, thus ensuring greater preparedness among prospective visitors and thus a lower chance of disappointment. Given the vulnerability of small island states to climate change, and the importance of tourism for their economic growth and employment, such adaptation is essential in developing a robust and sustainable tourism sector that is able to withstand these future challenges.

Detailed monitoring and analysis of TripAdvisor reviews, particularly pertaining to the weather, afford novel and proactive opportunities to both tourism operators and policy makers who can react promptly and effectively to tourist discomfort. In particular, an assessment of the relative dissatisfaction of a variety of climatic factors would allow for more effective advertising of peak tourism seasons to specific audiences, the tailoring of tourism offerings, and the adaptation of indoor environments. This is particularly valuable in developing regions, where networks of and access to climatic and tourism data is often limited.

Acknowledgements

JF receives funding from the DST-NRF Centre of Excellence for Palaeosciences.

Endnote

1 Chikungunya fever is a viral vector-borne disease spread by infected mosquitoes, prevalent in Asia, Africa and India.

References

Agnew MD, Viner D (2001) Potential impacts of climate change on international tourism. *Tourism € Hospitality Research* **3** (1), 37–60.

- Amaral F, Tiago T, Tiago F (2014) User-generated content: tourists' profiles on Tripadvisor. International Journal on Strategic Marketing 1, 137–47.
- Amelung B, Nicholls S, Viner D (2007) Implications of global climate change for tourism flows and seasonality. *Journal of Travel Research* **45** (3), 285–96.
- Bissell D (2012) Mobile testimony in the information age: The powers of travel reviews. *International Journal of Cultural Studies* **15** (2), 149–64.
- Boswell R (2005) Heritage tourism and identity in the Mauritian villages of Chamarel and Le Morne. *Journal of Southern African Studies* **31** (2), 283–95.
- Bujisic M, Bogicevic V, Parsa HG, Jovanovic V, Sukhu A (2019) It's raining complaints! How weather factors drive consumers comments and word-of-mouth. *Journal of Hospitality & Tourism Research* **43** (5), 656–81.
- Bujosa A, Riera A, Pons PJ (2015) Sun-and-beach tourism and the importance of intra-destination movements in mature destinations. *Tourism Geographies* **17** (5), 780–94.
- Climate Change Knowledge Portal (CCKP) (2018) Country Historical Climate. Available at: http:// sdwebx.worldbank.org/climateportal (accessed 21 February 2018).
- Climate Data Organisation (2018) Climate Data Country. Available at: http://en.climate-data.org/ region (accessed 19 July 2018).
- Cowburn B, Moritz C, Birrell C, Grimsditch G, Abdulla A (2018) Can luxury and environmental sustainability co-exist? Assessing the environmental impact of resort tourism on coral reefs in the Maldives. *Ocean e*² *Coastal Management* **158**, 120–7.
- Craig CA, Feng S (2018) A temporal and spatial analysis of climate change, weather events, and tourism businesses. *Tourism Management* **67**, 351–61.
- Denstadli JM, Jacobsen JKRS (2014) More clouds on the horizon? Polar tourists' weather tolerances in the context of climate change. *Scandinavian Journal of Hospitality and Tourism* **14** (1), 80–99.
- Division for Risk Management and Disaster Management (2018) Climate change threats. Available at: http://www.drdm.gov.sc/articles/ (accessed 19 February 2018).
- Domroes M (2001) Conceptualising state-controlled *Resort Islands* for an environment-friendly development of tourism: the Maldivian experience. *Singapore Journal of Tropical Geography* **22** (2), 122–37.
- Fitchett JM (2018) Recent emergence of CAT5 tropical cyclones in the South Indian Ocean. *South African Journal of Science* **114** (11-12), 1–6.
- Fitchett JM, Grant B, Hoogendoorn G (2016) Climate change threats to two low-lying South African coastal towns: risks vs. perceptions. *South African Journal of Science* **112** (5-6), 1–9.
- Fitchett JM, Hoogendoorn G (2018) An analysis of factors affecting tourists accounts of weather in South Africa. *International Journal of Biometeorology* **62** (12), 2161–72.
- Fitchett JM, Hoogendoorn G (2019) Exploring the climate sensitivity of tourists to South Africa through Tripadvisor reviews. *South African Geographical Journal* **101** (1), 91–109.
- Fitchett JM, Hoogendoorn G, van Tonder SM (2020) Tropical cyclones and tourism: the case of the South West Indian Ocean. In Hall CM, Prayag G (eds) *Aspects of Tourism: Tourism, Cyclones/Hurricanes*. Channel View, United Kingdom (under review).
- Gössling S, Hall CM (2006) Uncertainties in predicting tourist flows under scenarios of climate change. *Climatic Change* **79** (3-4), 163–73.
- Gössling S, Scott D, Hall CM, Ceron JP, Dubois G (2012) Consumer behaviour and demand response of tourists to climate change. *Annals of Tourism Research* **39** (1), 36–58.
- Hirsch E (2015) "It wont be any good to have democracy if we don't have a country": Climate change and the politics of synecdoche in the Maldives. *Global Environmental Change* **35**, 190–8.
- Hoogendoorn G, Fitchett JM (2018) Tourism and climate change: a review of threats and adaptation strategies for Africa. *Current Issues in Tourism* **21** (7), 752–9.
- Hoogendoorn G, Grant B, Fitchett JM (2016) Disjunct perceptions? Climate change threats to two low-lying South African coastal towns. *Bulletin of Geography: Socio-Economic Series* 31, 59–71.

- Hübner A, Gössling S (2012) Tourist perceptions of extreme weather events in Martinique. *Journal of Destination Management & Marketing* **1** (1-2), 47–55.
- Ibarra EM (2011) The use of webcam images to determine tourist-climate aptitude: favourable weather for sun and beach tourism on the Alicante coast (Spain). *International Journal of Biometeorology* **55** (3), 373–85.
- Joynathsing C, Ramkissoon H (2010) Understanding the behavioral intention of European tourists. Paper presented at International Research Symposium in Service Management, Le Meridien Hotel, Mauritius, 24-27, August.
- Klint LM, Jiang M, Law A *et al.* (2012) Dive tourism in Luganville, Vanuatu: shocks, stressors and vulnerability to climate change. *Tourism in Marine Environments* **8** (1/2), 91–109.
- McElroy JL (2006) Small island tourist economies across the life cycle. *Asia Pacific Viewpoint* **47** (1), 61–77.
- Mkono M (2012) A netnographic examination of constructive authenticity in Victoria Falls tourist (restaurant) experiences. *International Journal of Hospitality Management* **31**, 387–94.
- Moreno A, Amelung B (2009) Climate change and tourist comfort on Europe's beaches in summer: a reassessment. *Coastal Management* **37** (6), 550–69.
- Morgan R, Gatell E, Junyent R, Micallef A, Özhan E, Williams AT (2000) An improved user-based beach climate index. *Journal of Coastal Conservation* **6** (1), 41–50.
- Munhurrun P, Seebaluck VN, Naidoo P (2015) Examining the structural relationships of destination image, perceived value, tourist satisfaction and loyalty: the case of Mauritius. *Procedia— Social and Behavioural Sciences* 175 (12), 252–9.
- Munar AM, Jacobsen JKS (2013) Trust and involvement in tourism social media and web-based travel information sources. *Journal of Sustainable Tourism* **13** (1), 1–19.
- Naidoo P, Sharpley R (2016) Local perceptions of the relative contributions of enclave tourism and agritourism to community well-being: the case of Mauritius. *Journal of Destination Marketing* \mathcal{C} *Management* **5** (1), 16–25.
- Noome K, Fitchett JM (2019) An assessment of the climate suitability of Afriski Mountain Resort for outdoor tourism using the Tourism Climate Index (TCI). *Journal of Mountain Science* 16 (11), 2453–69.
- Nunkoo R, Ramkissoon H (2016) Stakeholders' views on enclave tourism: a grounded theory approach. Journal of Hospitality & Tourism Research 40 (5), 557–8.
- Pillay M, Fitchett JM (2019) Tropical cyclone landfalls south of the Tropic of Capricorn, southwest Indian Ocean. *Climate Research* **79** (1), 23–37.
- Prayag G (2009) Tourists' evaluations of destination image, satisfaction, and future behavioral intentions— the case of Mauritius. *Journal of Travel & Tourism Marketing* **26** (8), 836–53.
- Prayag G (2011) A research agenda for understanding tourism development in Indian-Ocean Islands. *e-Review of Tourism Research* **9** (5), 221–42.
- Preston-Whyte RA, Watson HK (2005) Nature tourism and climatic change in Southern Africa. In Hall CM & Higham J (eds) *Tourism, Recreation and Climate Change*, 130–42. Channelview Publications, Bristol.
- Ramkissoon H, Nunkoo R (2008) Information search behavior of European tourists visiting Mauritius. *Turizam: međunarodni znanstveno-stručni časopis* 56 (1), 7–21.
- Roberts D (2010) Prioritizing climate change adaptation and local level resilience in Durban, South Africa. *Environment and Urbanization* **22** (2), 397–413.
- Schott FA, Xie SP, McCreary Jr JP (2009) Indian Ocean circulation and climate variability. *Reviews* of *Geophysics* **47** (1). Available at: https://doi.org/10.1029/2007RG000245.
- Scott D, Simpson MC, Sim R (2012) The vulnerability of Caribbean coastal tourism to scenarios of climate change related sea level rise. *Journal of Sustainable Tourism* **20** (6), 883–98.
- Seebaluck NV, Munhurrun PR, Rughoonauth P (2015) An analysis of the push and pull motives for choosing Mauritius as 'the' wedding destination. *Procedia—Social and Behavioural Sciences* 175 (12), 201–9.
- Soper AK (2007) Developing Mauritianness: national identity, cultural heritage values and tourism. *Journal of Heritage Tourism* **2** (2), 94–109.

- Stockigt L, Hoogendoorn G, Fitchett JM, Saarinen J (2018) Climate sensitivity and snow-based tourism in Africa: an investigation of Tripadvisor review on Afriski, Lesotho. Proceedings of the Biennial Conference of the Society of South African Geographers Bloemfonten, 1–5 October, 207–224.
- Trading Economics (2019) Unemployment Rate. Available at: https://tradingeconomics.com/ mauritius/unemployment-rate (accessed 7 November 2019).
- Weaver DB (2016) Core-periphery relationships and the sustainability paradox of small-island. *Tourism Recreation Research* **42** (1), 11–21.