

Article

“It Was Raining All the Time!”: *Ex Post* Tourist Weather Perceptions

Stefan Gössling^{1,2,*}, Bruno Abegg^{3,4,†} and Robert Steiger^{3,5,†}

Received: 19 November 2015; Accepted: 13 January 2016; Published: 15 January 2016

Academic Editor: Daniel Scott

¹ School of Business and Economics, Linnaeus University, 39182 Kalmar, Sweden

² Western Norway Research Institute, Box 163, 6851 Sogndal, Norway

³ Institute of Geography, University of Innsbruck, Innrain 52, 6020 Innsbruck, Austria; bruno.abegg@uibk.ac.at or abegg@alps-gmbh.com (B.A.); robert.steiger@uibk.ac.at (R.S.)

⁴ alpS GmbH, Grabenweg 68, 6020 Innsbruck, Austria

⁵ Institute of Public Finance, University of Innsbruck, Universitätsstraße 15, 6020 Innsbruck, Austria

* Correspondence: stefan.gossling@lnu.se; Tel.: +46-70-492-2634

† These authors contributed equally to this work.

Abstract: The importance of weather for tourism is now widely recognized. However, no research has so far addressed weather events from retrospective viewpoints, and, in particular, the role of “extreme” events in longer-term holiday memories. To better understand the character of *ex post* weather experiences and their importance in destination image perceptions and future travel planning behavior, this exploratory study addressed a sample of 50 tourists from three globally important source markets: Austria, Germany and Switzerland. Results indicate that weather events do not dominate long-term memories of tourist experiences. Yet, weather events are important in shaping destination image, with “rain” being the single most important weather variable negatively influencing perceptions. Results also suggest that weather events perceived as extreme can involve considerable emotions. The study of *ex post* traveler memories consequently makes a valuable contribution to the understanding of the complexity of “extreme weather” events for tourist demand responses.

Keywords: tourism; weather perceptions; demand responses; extreme events; climate change

1. Introduction

Relationships between weather, climate, and tourism have been studied since the 1960s, and it is now firmly established that climate is an important factor in tourism demand and holiday decision-making, including travel motivations, destination choice, and the timing of travel [1,2]. Studies of tourism and weather/climate interrelationships have essentially been based on three different methodological approaches: (i) climate indices illustrating the suitability of specific regions for tourism; (ii) econometric analyses of tourist flows; and (iii) assessments of tourists’ weather preferences and resulting behavior. With regard to climate indices, Mieczkowski [3] was the first to use a tourism climate index (TCI) on a global scale for evaluating the suitability of regions for tourism. The index consists of several weather variables (e.g., temperature, precipitation) with different weighting factors based on expert-judgment. This index was subsequently used as a tool to assess the potential impact of climate change on tourism destinations (e.g., [4–6]) and further adapted for beach tourism [7,8]. De Freitas *et al.* [9] also used the index approach to determine the climatic suitability of regions for highly climate-sensitive activities. For this purpose, they developed the Climate Index for Tourism (CTI), but, in contrast to preceding studies, the scoring of the weather variables was survey-based. Another related metric summarizing several weather components is the physiological equivalent

temperature (PET), which is also used for assessment of the climatic suitability of regions for tourism (e.g., [10,11]).

Econometric analyses of tourist flows have been conducted to identify relevant weather parameters for tourism demand and to quantify their importance compared to other factors. Furthermore, thresholds of weather parameters were identified that represented good/bad conditions for tourism. Such studies exist for summer tourism, mainly on a large spatial scale (e.g., countries) and with a temporal resolution of months to seasons (e.g., [12–15]). For snow-based winter tourism, studies exist with a higher spatial (from sub-national level to individual tourism businesses) and temporal resolution (daily visitation and weather data) (e.g., [16–20]).

The third approach, weather perception studies, investigates the relationship between weather and tourism on the basis of observed and stated weather preferences. This has included *in situ* observations of tourist behavior under different weather conditions [21–23], as well as stated weather preferences studied either *in situ* [24–30] or *ex situ* [31–34]. Dickinson [35] also engaged in focus group discussions of climate preferences. Two main findings emerged out of studies of weather preferences: First, weather conditions can be perceived as ideal, suitable, acceptable or unacceptable [36–39]. Second, thresholds between these valuation categories are highly individual and depend on many factors, such as traveler personality [40], or holiday type and role, age, culture, and traveler career [34,37,41,42]. If the weather experienced during a holiday is perceived as unacceptable or extreme, this can trigger various adaptive responses, and potentially have far-reaching consequences for destination image and future travel planning behavior [43,44].

Various studies have sought to understand how tourists perceive specific weather conditions or extreme weather events, revealing considerable complexity. Ruddy and Scott [37] found that beach tourists perceived thermal conditions above 34 °C as unacceptably hot, though older (>55 years) respondents showed a significantly lower heat tolerance than younger respondents, and heat tolerance also differed between climate regions of tourists' origin [37]. These results were further differentiated in two subsequent studies [38,39], showing that tourists have opportunities to adapt and that this increases the microclimatic range of thermal conditions that are perceived as acceptable. In consequence, beach tourists appear to be far more resilient to warmer thermal conditions than previously anticipated. In a study of prolonged, heavy rains in what is usually a dry season (April/May) in Martinique, Hübner and Gössling [45] found that weather perceptions were overwhelmingly negative but negotiated by tourists in relation to travel motives and belief systems, indicating a role of pre-determined understandings and rationalized weather experiences. However, 17% of respondents also stated to never visit the island again as a result of the rain.

In light of these findings, the objective of this paper is to better understand tourists' perceptions of weather events from *ex post* viewpoints, based on the assumption that the most important events will be memorized and dominate weather perceptions, and possibly destination images. In other words, *in situ* perceptions of an event are likely to differ from longer-term memories, which may be considered more relevant for destination choice. To better understand these interrelationships, an exploratory, qualitative research design was developed, focusing on narratives of "negative holiday experiences", and specifically the role of weather events in these experiences.

2. Methods

Semi-structured interviews were conducted with a total of 50 respondents, including residents from Austria (15), Germany (20) and Switzerland (15). The focus on these countries was primarily one of convenience, as each author is a citizen/resident of one of these countries. However, all countries also represent internationally important markets/destinations, making it important to understand the perspectives of tourists from these countries. Interviews were carried out in November and December 2013 as well as in January 2014, and lasted between 15 and 60 min. Respondents were identified on the basis of snowball sampling, *i.e.*, the first interviewee, in all three countries a personal contact, was asked to name three acquaintances that would be potentially willing to participate in this study.

For subsequent interviews, the researchers chose one of the three persons, who was asked to be brought in contact with another three people. This approach generated a broad sample in terms of age (22 to 73 years), educational background, family status (e.g., with/without children), and travel preferences. All interviews focused on “holidays” [German: “Urlaub”], a term clearly associated with leisure travel. Interviews took place in the respondents’ respective homes, in public locations, or, when the snowball sampling tracked respondents living in more distant locations, over the phone.

Interviews were opened with a general question addressing the respondent’s “worst holiday experience”, *i.e.*, avoiding any reference to weather/climate, in order to understand which memories dominated long-term perceptions. This also helped to assess the relative importance of weather-related experiences in comparison to other issues. Where non-weather related answers were provided, a follow-up question focused specifically on weather-related negative experiences. Subsequent questions addressed (i) adaptive responses to deal with the experienced weather situations; (ii) potentially negative impacts on the image of the visited destinations; and (iii) potential impacts on future travel planning behavior. Respondents were asked to report the year when events occurred, but, as memories were often blurred, this data was inconclusive. The oldest memories dated back to the 1980s. Gender, age and educational level of all respondents were noted.

To analyze the material, all interviews were transcribed and interpreted individually by each of the authors as a form of analyst triangulation. Comparative analysis was used to distinguish themes: that is, the empirical material was manually interpreted, and reduced into categories on the basis of inter-author comparison and discussion [46]. This also ensured coding reliability. As many respondents recalled several negative experiences, these were not treated hierarchically, as it is unclear how memories interrelate, or whether the experience recalled first is the most influential one in terms of, for example, future travel planning behavior. Negative holiday experiences were categorized to include accommodation, transport, weather, injury/illnesses, fraud and theft, and “other”, the latter summarizing singular experiences that could not be assigned to any of the previous categories. In a second step, weather-related experiences were structured into the three different facets of tourism climate according to de Freitas’ [21,36] conceptual framework that distinguishes physical (e.g., rain, wind, severe weather), thermal (integrated effects of air temperature, humidity, wind and radiation) and aesthetic (e.g., blue skies, visibility) conditions. Interview content was also evaluated with regard to the emotions expressed, distinguishing positive and negative emotions, the latter including irritation, annoyance, anger, and fear. Quotes from the interview material illustrate respondent perspectives. Note that respondents apparently used the terms “experiences” and “expectations” interchangeably, but differences in terminology use were not explored.

Given the exploratory character of this study, several limitations need to be outlined. As the objective was to identify negative travel experiences, as well as the role of weather events in destination perceptions, the overall sample size is small, and geographically located in the German-speaking part of Europe. Surveys in other regions or countries, focusing on specific tourist types or tourism segments may consequently yield different results. Moreover, all respondents, including the younger ones, are likely to be more experienced travelers. Given the exploratory character of this study, however, representativeness and sample size are less important than the breadth of travel experiences and memories reported.

3. Results

3.1. Negative Holiday Experiences

The opening question encouraged respondents to recall their “worst” holiday experiences. Given the importance of weather and climate for tourism, including the importance of satisfactory weather conditions, it was expected that unacceptable weather events would dominate negative holiday memories. However, this was not the case, as only 13 out of 50 survey participants mentioned weather-related events in response to this first, open question. In total, interviewees recalled a

total of 108 negative holiday memories (Table 1). The greatest share of memories (21) referred to accommodation, involving issues such as high prices, insufficient hygiene/cleanliness, or situations of overbooked accommodation, staff unfriendliness, or noise. This was followed by problems related to transport, such as delays, missed flights, or baggage loss (15 events). Weather events and injuries/illnesses were mentioned 13 times each. Weather-related events were dominated by rainfall and memories of very high or low temperatures; memories of injuries and illnesses included a broad range of health issues such as food poisoning, enteric fever, seasickness, and accidents (driving, diving, climbing). Fraud and theft were mentioned 11 times, including various forms of crime and dishonesty. In addition to the events related to these five main categories, a large number of incidents summarized in category six, “other”, referred to environmental degradation, mosquitos, bargaining, over-commercialization, tensions in the group, overcrowding, or unreliable tour operators. Findings thus indicate that a wide range of events can turn into long-term negative holiday memories, but these were not, in this survey, dominated by weather-related events.

Table 1. Categories of experiences dominating long-term memories.

Aspect	Issues	# of Responses *
1. Accommodation	Cleanliness, food, high price of accommodation, cost of food, noise, overbooked accommodation	21
2. Transport	Delays, missed flights, emergency landing, baggage loss, fear of flight, traffic jam	15
3. Weather	Rain, heat, cold, no wind for (windsurfing), high waves (boat transfer)	13
3. Injury/illness	Food poisoning, sea sickness, diving accident, car crash, heart attack, scorpion bite	13
5. Fraud & theft	Crime, dishonesty	11
6. Other	Mosquitoes, stony/concrete beach, bargaining, tensions in group, overcrowding	35
Total		108

* On average, 2.16 negative holiday experiences were mentioned. Note that the table does not distinguish the order in which they may have been discussed.

3.2. Weather Experiences

Asked specifically about weather-related experiences, 47 respondents recalled a total of 119 events, including the 13 events mentioned in response to the introductory question (Table 2). Weather memories referred to rain, heat, wind/storms, cold, snow, floods, fog and “other”, singular events. Rainfall events, and, in particular, continuous rain, clearly dominated weather-related holiday memories in absolute terms (mentioned 42 times, by 22 respondents). Several respondents recounted two or three separate holiday experiences overshadowed by rain, and talked about their frustrations in dealing with the weather situation: “The rain was horrible. We tried to come up with indoor activities, but that was difficult with the kids” (Gudrun, 33). Another respondent remembers: “We hired a car, wanted to go camping and hiking. But it was raining all the time. So we kept on driving, covered long distances but didn’t see anything. We were killing time in fancy B&Bs, as no cheaper options were available. It was expensive, wasn’t fun and a waste of time” (Anette, 41). This led, in some cases, to the shortening of holidays: “We put up our tent in the rain, and we took it down again in the rain. Then, driving all day through the rain, we decided to cut our holiday short, it just didn’t work out. [...] We were constantly wet” (Eva, 23). All respondents pointing out rain as a negative holiday experience indicated that there were very limited options to adapt, for instance by engaging in alternative activities, or to meaningfully spend time. Rain was thus, in this survey, the most frequently mentioned negative weather event, often relevant in multiple holiday recounts.

Strong winds and storm events were mentioned 23 times (by 19 respondents). Notably, wind-related events were perceived as highly negative, and several respondents recalled existential fears: “The storm destroyed the navigation system [during a sailing trip]. I feared for our lives, because I had to navigate by the stars—which I couldn’t” (Gerrit, 59). Interviews also indicate that specific forms of holidays are more vulnerable: “We were camping. In the middle of the night, a fierce storm built up, and we were nearly blown off the cliffs” (Christian, 43). “Heat”, referring to high temperatures, sunburns or heat strokes, was mentioned 21 times (by 19 respondents). In particular, weather situations combining high temperatures and humidity were perceived as problematic: “We did a small hiking tour. It was unbearably hot and humid, and I was suffering a lot, I felt like 90 years old” (Marcus, 46).

Unexpected “cold” was reported 17 times by 10 respondents, with cold spells, for instance in spring in the Mediterranean, dominating memories: “That was [...] the coldest night in my life” (Christian, 43, recalling a camping holiday in Tuscany). Unexpected cold temperatures had thus considerable importance for long-term weather-related memories, referring in all cases to unpleasant memories of freezing. Snow-related events were recalled nine times by eight respondents, and including events with too little (e.g., skiing not possible) or too much snow (e.g., being stuck in a mountain village). In one case, there was enough snow, but of insufficient quality, leading to very unpleasant experiences while ski touring. “It was very strenuous. I was mad when skiing downhill” (Sebastian, 34). In comparison, too little snow for skiing was reported to have caused dissatisfaction and spatial substitution: “We went on a skiing holiday with friends and there was no snow. That was before the widespread use of snowmaking—it was really annoying” (Rolf, 46); “We cancelled our ski holidays on the northern side of the Alps and went to Southern France instead” (Paul, 65). In contrast, too much snow was negatively perceived, or as dangerous when hiking or touring: “I am still grateful that nothing happened back then” (Christian, 43, recalling the danger of avalanches while ski touring). In another case, tourists suffered from heavy snowfall: “We got totally stuck. The mood [in the group] was bad” (Anja, 32).

Floods (mentioned nine times by seven respondents), as an event linked to heavy rainfall, had perhaps the most immediate consequences for tourist behavior, as adaptation was generally considered impossible. Floods forced holidaymakers to change accommodation, to leave the destination, or to stay longer than planned: “We barely managed to get out of the door of our accommodation. Then, we booked a room on the second floor of a luxury hotel” (Dagmar, 30). “There was that major flooding event with tens of thousands of deaths. We then fled to a touristic island [...] before we went back home” (Marc, 34). “The roads were flooded. We were trapped in the hotel for two days, and afterwards it was very difficult to get from ‘A’ to ‘B’” (Martina, 45).

Finally, fog (mentioned four times by four respondents) can severely affect aesthetic perceptions: “It was a pity, because we had seen photographs earlier on, beautiful landscapes, but when we were there, we couldn’t see a thing.” (Christoph, 29, recalling a hiking tour in Spain). Poor visibility can also be a risk factor, e.g., when skiing: “You don’t notice your surroundings, your only focus is on making it down the hill” (Anja, 31, talking about a ski holiday).

Table 2. Weather events mentioned.

Event	# of Respondents Mentioning This	# Times Event Mentioned
Rain (including floods)	22	42
Wind/storms	19	23
Heat	19	21
Cold	10	17
Snow	8	9
Fog	4	4
Other	3	3
Total		119

In summary, findings suggest that all but three of the 50 people interviewed were able to recall weather situations that had negative repercussions for holiday experiences, including a wide range of different weather aspects, such as rain, heat, storms, or related situations such as floods. Notably, weather events may not necessarily have been “extreme” in a meteorological sense; yet, as unexpected and unacceptable events contradicting holiday weather expectations, and putting tourists in unpleasant or even life-threatening situations, they continued to dominate memories, in some cases even decades later (the oldest memories referred to the 1980s). Even though there were a few situations where unexpected weather events were also perceived as positive, this remained the exception. Interviews also revealed that in all cases, considerable emotions were involved in weather event experiences, covering a spectrum from positive (excitement) to negative (irritation, annoyance, anger and fear). In quantitative terms, respondents expressed positive emotions only once, while negative emotions were recounted 52 times, including irritation (23 times), annoyance (14 times), anger (seven times) and fear (eight times); in the case of 66 weather events, it was not possible to clearly associate these events with emotions. Note that the analysis of emotions is subjective, and difficult specifically with regard to the threshold between irritation and annoyance.

Answers were also categorized according to de Freitas’ [21,36] thermal, physical, and aesthetical facets of tourism climate (Table 3). The analysis suggests that most weather events are physical in character (77), *i.e.*, they refer to rain, snow, wind, or severe weather. Thermal aspects (38) were considerably less relevant, including heat and cold-related events. Aesthetic aspects were only mentioned four times, and all of them related to non-visibility in the event of heavy fog. Even though it is unclear if this distribution would also be found in quantitative studies, results suggest that, in particular, physical facets of climate are of relevance in the context of long-term holiday memories.

Table 3. Facets of tourism climate.

Event	# Times Event Mentioned
Physical	77
Thermal	38
Aesthetic	4
Total	119

3.3. Adaptive Responses, Destination Image and Future Travel Planning

Results suggest that tourists can react to adverse weather conditions in multiple ways, and that traveler personalities in negotiation of the character of the weather event determine adaptive behavior. Adaptive responses range from passive to active, from acceptance to a change of activities/locations, or an early termination of the holidays. In most situations, however, respondents appeared to simply endure adverse situations, trying to make the best of it, often by changing activities (e.g., indoor instead of outdoor, hiking instead of swimming). In a number of cases, the experienced weather conditions led to stronger reactions. One in four respondents recounted a situation where the destination was given up in favor of another (spatial substitution), and one in five respondents reported a situation in which the holiday had been ended early to return home. These ratios indicate that where weather events are perceived as unacceptable, they have considerable potential to affect adaptive behavior, with concomitant negative impacts for destinations. In this study, continuous rain and floods were the most relevant reasons to leave the destination.

It was also assumed that bad weather experiences would affect destination image negatively. Yet, in more than 80% of “bad weather” narratives, respondents stated that experienced weather conditions had no longer-term impact on destination image. This may be because respondents had relatively clear expectations of the destination’s weather, but when these expectations were not met, experiences were rationalized: “Well, I mean, it’s known” (Hans, 70, talking about rain in Scotland), “It’s my fault, I was ill prepared” (Sandra, 30, recalling a visit to Tokyo in summer), and “Last summer was perfect,

this summer was miserable—bad luck” (Pascal, 27, recalling his trips to England). “Weather” is thus seen by many respondents as a meteorological phenomenon that cannot be influenced [45]. However, as a somewhat contradictory finding, almost half of the respondents reported that negative weather experiences continued to affect their travel planning. This may include preparations, including the consideration of more suitable equipment, accommodation choices, or the timing of the holiday as well as bookings: “I study long-term forecasts and decide spontaneously” (Rolf, 46, in addressing his strategy to be informed about the weather situation up to two weeks in advance, and to then make a quick decision). The most relevant form of adaptation, however, is temporal substitution. One in four respondents stated that they would continue to visit the same destination but in a different time of the year.

4. Discussion

A number of key findings emerge from this qualitative research, partially confirming earlier insights but also adding complexity to the general understanding of tourist perceptions in the context of weather events. First of all, respondents indicated, contrary to expectations, that weather is not the dominating aspect of long-term negative holiday experiences. This insight is not necessarily at odds with the general view that weather is one of the most important aspects of destination choice and that negative experiences will affect travel choices [44]; however, it suggests that negative holiday experiences are not *per se* overshadowed by “bad” weather. Among respondents in this study, greater importance was assigned to long-term memories related to accommodation and transports, with injury and illness-related events also having considerable importance.

However, weather events are relevant. Prompted, respondents recalled a wide range of events with primarily negative consequences for holiday experiences and destination perceptions. Significantly, in order to be recalled as a negative experience, weather events do not necessarily have to be “extreme” in a meteorological sense: Events are negotiated individually, in the context of a specific situation and opportunities to adapt. Of specific relevance is also the family situation, as in particular travelers with children appeared to be challenged by adverse weather situations, because their adaptive capacities are more limited.

Of all weather events mentioned, rain is the most dominant negative experience, confirming research by e.g., de Freitas *et al.* [9], Moreno [33]. Rain affects outdoor activities, which become less attractive or prohibitive, and as rainfall often affects relatively large areas, it is generally difficult for tourists to divert activities to other areas. Where rain is linked to floods, it may become even more difficult for tourists to adjust their activities. Rainfall also affects aesthetic perceptions. However, the outcome of rain events is difficult to assess: Hübner and Gössling [45] found that weather perceptions are negotiated by tourists in relation to travel motives and belief systems, *i.e.*, they will be rationalized depending on pre-determined understandings, as well as destination affiliation. In their study, they also found that returning guests sought to explain and rationalize torrential rains in Martinique as a “normal”, though rare event, while many first time visitors reacted more decisively negative, with 17% stating that they would never visit the island again because of their experiences. Two studies in the island of Madeira, Portugal, yielded similar results: Luna *et al.* [47] and Machado [48] reported that an intense rainfall event caused a 20% decline in room occupancy rates, a 12.5% loss in revenue, and a 7% decline in employment. Similar reactions have also been reported in the context of other events/weather-related situations, such as heat waves ([49,50]), storms [44], or snow conditions [40,51,52].

Hence, an important question is when perceptual thresholds will be exceeded and result in demand response changes [44]. This study supports findings that weather situations can be ideal, suitable, acceptable or unacceptable [36], and that a situation perceived as unacceptable will result in dissatisfaction. As has been outlined, thresholds are individual and subjective, depending on a wide range of factors, such as traveler personality or holiday type and role, age, culture, and traveler career, confirming earlier research [33,34,37,41,42]. However, interviews in this survey would add

that demand responses are also associated with emotional states, an aspect that has so far not been discussed in the literature. Interviews indicate that (extreme) weather events trigger emotions, which, generally speaking, may be positive (excitement) or negative. With regard to the latter, respondents reported feelings of irritation, annoyance, anger and fear, *i.e.*, emotions that reflect different intensities (see quotes in Results; see also Figure 1). Intense fear, reported in memories of two of the respondents, represents one of the deepest and most primal emotions. Importantly, emotions have subjective meaning and influence cognitive processes including causal attribution, memory, risk assessment, and expectation [53]. Future studies thus also need to focus on these interrelationships because emotions are linked to adaptive responses, *i.e.*, whether travelers will try to focus on different activities, move to another holiday location (spatial substitution), or cancel the holiday altogether (Figure 1). Emotions are an integral part of weather event perceptions, but the scope of this research did not allow linking specific emotions to specific adaptive responses.

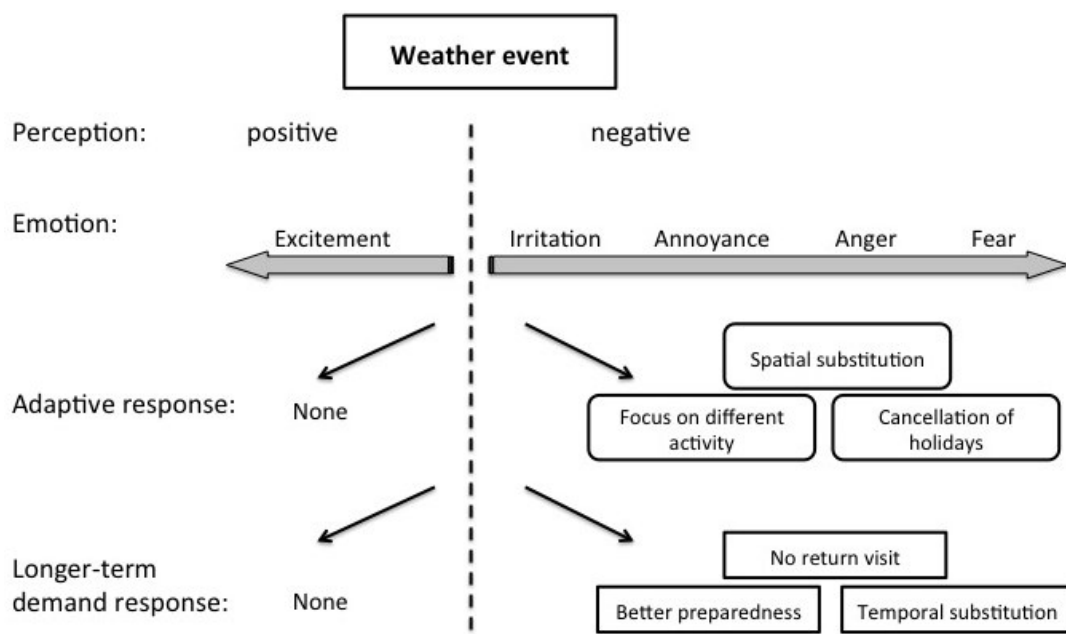


Figure 1. Weather events: emotions and demand responses.

Finally, results may be discussed in the context of climate change. There is clear evidence that the number of extreme weather events has been increasing in the last 30–40 years [54,55]. Munich Re [55] shows, for instance, that, since the 1980s, there have been increases in meteorological (storms, typhoons, tornadoes, extreme temperatures, drought, forest fires, hailstorms, heavy rainfall), and hydrological events (floods, mass movement). It is expected that weather patterns will continue to change [56,57]. Model runs suggest that high latitudes and the equatorial Pacific Ocean as well as mid-latitude wet regions will experience higher mean precipitation levels under high emission scenarios ([58]). Moreover, extreme precipitation events over “mid-latitude land masses and wet tropical regions will very likely become more intense and more frequent” [58]. Increasing unreliability in the seasonal timing of rainfall, together with changes in the intensity and frequency of such events may consequently constitute a considerable challenge to a wide range of destinations, given the importance of rain in negative holiday experiences. Notably, the IPCC [58] also indicates the likelihood of change in the frequency and duration of warm spells and heat waves, the frequency and intensity of heavy precipitation events, the intensity and/or duration of drought, and the magnitude of extreme high sea level events (see also [59]). Even though this research has shown that weather events do not necessarily have to be extreme to affect holiday experiences, an increase in the frequency and intensity of weather events is likely to have repercussion for weather perceptions, long-term memories, and

demand responses. The nature of these interrelationships is complex, however, and requires a better understanding of both perceptions and adaptive responses [43].

5. Conclusions

This study investigated long-term perceptions of negative holiday experiences based on qualitative interviews with Austrian, German and Swiss residents, concluding that weather and environmental events are not currently dominating long-term perceptions, and that not all of these negatively experienced events would be considered “extreme” in a meteorological sense. However, such events are of considerable importance in affecting memories, and likely to become more relevant in the future, when climate change progresses. In the context of tourist demand responses, two relevant new findings have emerged from this study: first, there exists a wide range of weather events that can influence holiday perceptions, though rain is the single most relevant aspect generating negative experiences. Findings also suggest, more generally, that physical facets of weather events appear to be more relevant in perceptions than thermal or aesthetic ones. Second, experiences of weather events perceived as “extreme” are related to emotions, which can be positive, but are more likely to be negative, including feelings of irritation, annoyance, anger, and fear. The emotional intensity of experiences may be of relevance in immediate (cancellation before holiday, spatial substitution, or quitting of holidays) and longer-term demand responses (higher degree of preparedness, temporal substitution, spatial substitution, no return visits), though no clear relationships were found in this research.

In conclusion, the paper shows that there is considerable scope for continued research on tourism and extreme weather event interrelationships. As this study’s exploratory findings are not necessarily exhaustive, future research may identify an even broader range of weather events affecting perceptions. Studies on weather perceptions and demand responses to extreme events also need to take into account the emotional states of tourists, which appear to be of great relevance for overall impressions and the long-term relevance of extreme holiday experiences. Temporal aspects of memories are another topic of future research, as it would be of relevance to better understand over which periods of time memories can overshadow or influence holiday perceptions. In this context, it is also important to better understand thresholds between “acceptable” and “unacceptable” weather/conditions for different traveler types (e.g., families, groups, couples, individual travelers). With climate change, tourists’ potential reactions to extreme weather events will remain an important research topic.

Author Contributions: Stefan Gössling, Bruno Abegg and Robert Steiger designed, conducted and transcribed the interviews in equal parts, Robert Steiger analyzed the data, Stefan Gössling wrote the paper draft, Bruno Abegg and Robert Steiger added sections to the paper.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Besancenot, J.-P. *Climat et Tourisme*; Masson: Paris, France, 1989.
2. Scott, D.; Lemieux, C. Weather and Climate Information for Tourism. *Procedia Environ. Sci.* **2010**, *1*, 146–183. [[CrossRef](#)]
3. Mieczkowski, Z. The tourism climatic index: A method of evaluating world climates for tourism. *Can. Geogr.* **1985**, *29*, 220–233. [[CrossRef](#)]
4. Amelung, B.; Viner, D. Mediterranean Tourism: Exploring the Future with the Tourism Climatic Index. *J. Sustain. Tour.* **2006**, *14*, 349–366. [[CrossRef](#)]
5. Kubokawa, H.; Inoue, T.; Satoh, M. Evaluation of the Tourism Climate Index over Japan in a Future Climate Using a Statistical Downscaling Method. *J. Meteorol. Soc. Jpn.* **2014**, *92*, 37–54. [[CrossRef](#)]
6. Scott, D.; McBoyle, G.; Schwartzentruber, M. Climate change and the distribution of climatic resources for tourism in North America. *Clim. Res.* **2004**, *27*, 105–117. [[CrossRef](#)]
7. Moreno, A.; Amelung, B. Climate Change and Tourist Comfort on Europe’s Beaches in Summer: A Reassessment. *Coast. Manag.* **2009**, *37*, 550–568. [[CrossRef](#)]

8. Perch-Nielsen, S. The vulnerability of beach tourism to climate change—An index approach. *Clim. Chang.* **2010**, *100*, 579–606. [[CrossRef](#)]
9. De Freitas, C.R.; Scott, D.; McBoyle, G. A second generation climate index for tourism (CIT): Specification and verification. *Int. J. Climatol.* **2008**, *52*, 399–407. [[CrossRef](#)] [[PubMed](#)]
10. Matzarakis, A.; Mayer, H.; Iziomon, M.G. Applications of a universal thermal index: Physiological equivalent temperature. *Int. J. Climatol.* **1999**, *43*, 76–84. [[CrossRef](#)]
11. Matzarakis, A.; Zygmontowski, M.; Koch, E.; Rudel, E. Mapping the Thermal Bioclimate of Austria for Health and Recreation Tourism. In *Advances in Tourism Climatology*; Matzarakis, A., de Freitas, C.R., Scott, D., Eds.; Eigenverlag des Meteorologischen Instituts der Albert-Ludwigs-Universität Freiburg: Freiburg, Germany, 2004; pp. 10–18.
12. Hamilton, J.; Maddison, D.; Tol, R. Climate change and international tourism. A simulation study. *Glob. Environ. Chang.* **2005**, *15*, 253–266. [[CrossRef](#)]
13. Köberl, J.; Prettenthaler, F.; Bird, D.N. Modelling climate change impacts on tourism demand: A comparative study from Sardinia (Italy) and Cap Bon (Tunisia). *Sci. Total Environ.* **2016**, *543*, 1039–1053. [[CrossRef](#)] [[PubMed](#)]
14. Lise, W.; Tol, R. Impact of climate on tourist demand. *Clim. Chang.* **2002**, *55*, 429–449. [[CrossRef](#)]
15. Maddison, D. In search of warmer climates? The impact of climate change on flows of British tourists. *Clim. Chang.* **2001**, *49*, 193–208. [[CrossRef](#)]
16. Damm, A.; Köberl, J.; Prettenthaler, F. Does artificial snow production pay under future climate conditions?—A case study for a vulnerable ski area in Austria. *Tour. Manag.* **2014**, *43*, 8–21. [[CrossRef](#)]
17. Falk, M. A dynamic panel data analysis of snow depth and winter tourism. *Tour. Manag.* **2010**, *31*, 912–924. [[CrossRef](#)]
18. Hamilton, L.C.; Brown, C.; Keim, B.D. Ski areas, weather and climate: Time series models for New England case studies. *Int. J. Climatol.* **2007**, *27*, 2113–2124. [[CrossRef](#)]
19. Shih, C.; Nicholls, S.; Holecek, D.F. Impact of Weather on Downhill Ski Lift Ticket Sales. *J. Travel Res.* **2009**, *47*, 359–372. [[CrossRef](#)]
20. Töglhofer, C.; Eigner, F.; Prettenthaler, F. Climatic and Economic Impacts on Tourism Demand in Austrian Ski Areas. *Clim. Res.* **2011**, *46*, 1–14. [[CrossRef](#)]
21. De Freitas, C.R. Recreation climate assessment. *Int. J. Climatol.* **1990**, *10*, 89–103. [[CrossRef](#)]
22. De Freitas, C.R. Weather and place-based human behaviour: Recreational preferences and sensitivity. *Int. J. Climatol.* **2015**, *59*, 55–63.
23. Mansfeld, Y.; Freundlich, A.; Kutiel, H. The relationship between weather conditions and tourists' perception of comfort: The case of the winter sun resort of Eilat. In Proceedings of the NATO Advanced Research Workshop on Climate Change and Tourism, Warsaw, Poland, 6–8 November 2003.
24. Buzinde, C.N.; Manuel-Navarrete, D.; Yoo, E.; Morais, D. "Tourists" perceptions in a climate of change: Eroding destinations. *Ann. Tour. Res.* **2010**, *37*, 333–354. [[CrossRef](#)]
25. Denstadli, J.; Jacobsen, J.; Lohmann, M. Tourist perceptions of summer weather in Scandinavia. *Ann. Tour. Res.* **2011**, *38*, 920–940. [[CrossRef](#)]
26. Dubois, G.; Ceron, J.-P.; van de Walle, I.; Martin, O.; Picard, R. *Météorologie, Climat et Déplacements Touristiques: Comportements et Stratégies des Touristes*; TEC: Marseille, France, 2010; p. 17.
27. Lohmann, M.; Kaim, E. Weather and holiday preference, image, attitude and experience. *Rev. Tour.* **1999**, *54*, 54–64. [[CrossRef](#)]
28. Gomez-Martin, B. Climate potential and tourist demand in Catalonia (Spain) during the summer season. *Clim. Res.* **2006**, *32*, 75–87. [[CrossRef](#)]
29. Gössling, S.; Bredberg, M.; Randow, A.; Svensson, P.; Swedlin, E. Tourist perceptions of climate change: A study of international tourists in Zanzibar. *Curr. Issues Tour.* **2006**, *9*, 419–435. [[CrossRef](#)]
30. Scott, D.; Jones, B.; Konopek, J. Implications of climate and environmental change for nature-based tourism in the Canadian Rocky Mountains: A case study of Waterton Lakes National Park. *Tour. Manag.* **2007**, *28*, 570–579. [[CrossRef](#)]
31. Førland, E.J.; Steen Jacobsen, J.K.; Denstadli, J.M.; Lohmann, M.; Hanssen-Bauer, M.I.; Hygen, H.O.; Tømmervik, H. Cool weather tourism under global warming: Comparing Arctic summer tourists' weather preferences with regional climate statistics and projections. *Tour. Manag.* **2013**, *36*, 567–579. [[CrossRef](#)]

32. Lohmann, M.; Hübner, A.C. Tourist behavior and weather. Understanding the role of preferences, expectations and in-situ adaptation. *Mondes du tourisme* **2013**, *8*, 44–59.
33. Moreno, A. Mediterranean tourism and climate (change): A survey based study. *Tour. Hosp. Plan. Dev.* **2010**, *7*, 253–265. [[CrossRef](#)]
34. Scott, D.; Gössling, S.; de Freitas, C. Preferred climates for tourism: Case studies from Canada, New Zealand and Sweden. *Clim. Res.* **2008**, *38*, 61–73. [[CrossRef](#)]
35. Dickinson, J. Climate change and the air travel decisions of UK tourists. *J. Transp. Geogr.* **2010**, *18*, 466–473. [[CrossRef](#)]
36. De Freitas, C.R. Tourism climatology: Evaluating environmental information for decision making and business planning in the recreation and tourism sector. *Int. J. Climatol.* **2003**, *48*, 45–54. [[CrossRef](#)] [[PubMed](#)]
37. Ruddy, M.; Scott, D. Differential climate preferences of international beach tourists. *Clim. Res.* **2013**, *57*, 259–269. [[CrossRef](#)]
38. Ruddy, M.; Scott, D. Examining the Thermal Range of Coastal Tourism Microclimates. *Tour. Geogr.* **2014**, *16*, 346–363. [[CrossRef](#)]
39. Ruddy, M.; Scott, D. Bioclimatic Comfort and the Thermal Perceptions and Preferences of Beach Tourists. *Int. J. Climatol.* **2014**, *59*, 37–45. [[CrossRef](#)] [[PubMed](#)]
40. Dawson, J.; Havitz, M.; Scott, D. Behavioral Adaptation of Alpine Skiers to Climate Change: Examining Activity Involvement and Place Loyalty. *J. Travel Tour. Mark.* **2011**, *28*, 388–404. [[CrossRef](#)]
41. Hewar, M.; Scott, D. Tourism Climatology for Camping: A Case Study of Ontario Parks (Canada). *Theor. Appl. Climatol.* **2014**, *121*, 401–411. [[CrossRef](#)]
42. Ruddy, M.; Scott, D. Will the Mediterranean become “too hot” for tourism? A reassessment. *Tour. Hosp. Plan. Dev.* **2010**, *7*, 267–281. [[CrossRef](#)]
43. Gössling, S.; Scott, D.; Hall, C.M.; Ceron, J.-P.; Dubois, G. Consumer behaviour and demand response of tourists to climate change. *Ann. Tour. Res.* **2012**, *39*, 36–58. [[CrossRef](#)]
44. Scott, D.; Hall, C.M.; Gössling, S. *Tourism and Climate Change*; Routledge: London, UK, 2012.
45. Hübner, A.; Gössling, S. Tourist perceptions of extreme weather events in Martinique. *J. Destin. Mark. Manag.* **2012**, *1*, 47–55. [[CrossRef](#)]
46. Meuser, M.; Nagel, U. Experteninterviews—Vielfach erprobt, wenig bedacht: Ein Beitrag zur Methodendiskussion. In *Qualitativ-empirische Sozialforschung: Konzepte, Methoden, Analysen*; Garz, D., Kraimer, K., Eds.; Westdeutscher Verlag: Opladen, Germany, 1991; pp. 441–471.
47. Luna, T.; Rocha, A.; Carvalho, A.C.; Ferreira, J.A.; Sousa, J. Modeling the extreme precipitation event over Madeira Island on 20 February 2010. *Nat. Hazards Earth Syst. Sci.* **2011**, *11*, 2437–2452. [[CrossRef](#)]
48. Machado, L.P. The consequences of natural disasters in touristic destinations: The case of Madeira Island—Portugal. *Tour. Hosp. Res.* **2012**, *12*, 50–56. [[CrossRef](#)]
49. Lagadec, P. Understanding the French 2003 heat wave experience: Beyond the heat, a multi-layered challenge. *J. Conting. Crisis Manag.* **2004**, *12*, 160–169. [[CrossRef](#)]
50. Létard, V.; Flandre, H.; Lepeltier, S. *Rapport d'Information Fait au Nom de la Mission: La France et les Français Face à la Canicule: les Leçons d'une Crise*; Report No. 195 (2003–2004) to the Parliament. Government of France: Paris, France, 2004.
51. Behringer, J.; Bürki, R.; Fuhrer, J. Participatory integrated assessment of adaptation to climate change in Alpine tourism and mountain agriculture. *Integr. Assess. Stud.* **2000**, *1*, 331–338. [[CrossRef](#)]
52. Unbehaun, W.; Pröbstl, U.; Haider, W. Trends in winter sport tourism: Challenges for the future. *Tour. Rev.* **2008**, *63*, 36–47. [[CrossRef](#)]
53. Keltner, D.; Lerner, J.S. Emotion. In *Handbook of Social Psychology*; Fiske, S.T., Gilbert, D.T., Lindzey, G., Eds.; John Wiley & Sons: Hoboken, NJ, USA, 2011; pp. 317–352.
54. World Meteorological Organization (WMO). *The Global Climate 2001–2010: A Decade of Climate Extremes*; Summary Report, WMO Report 1119; World Meteorological Organization: Geneva, Switzerland, 2013.
55. Munich Re (Muenchner Rueckversicherungs-Gesellschaft). Overall Picture of Natural Catastrophes in 2013 Dominated by Weather Extremes in Europe and Supertyphoon Haiyan. Available online: http://www.munichre.com/en/media_relations/press_releases/2014/2014_01_07_press_release.aspx (accessed on 8 January 2015).
56. Fischer, E.M.; Knutti, R. Anthropogenic contribution to global occurrence of heavy-precipitation and high-temperature extremes. *Nat. Clim. Chang.* **2015**, *5*, 560–564. [[CrossRef](#)]

57. Lehmann, J.; Coumou, D.; Frieler, K. Increased record-breaking precipitation events under global warming. *Clim. Chang.* **2015**, *132*, 501–515. [[CrossRef](#)]
58. Intergovernmental Panel on Climate Change (IPCC). Summary for Policymakers. In *Climate Change 2013: The Physical Science Basis; Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*; Stocker, T.F., Qin, D., Plattner, G.-K., Tignor, M., Allen, S.K., Boschung, J., Nauels, A., Xia, Y., Bex, V., Midgley, P.M., Eds.; Cambridge University Press: Cambridge, UK, 2013.
59. Coumou, D.; Robinson, A. Historic and future increase in the global land area affected by monthly heat extremes. *Environ. Res. Lett.* **2013**, *8*, 034018. [[CrossRef](#)]



© 2016 by the authors; licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons by Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).