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# Tourist Perceptions of Climate Change: A Study of International Tourists in Zanzibar

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A study was conducted in Zanzibar, Tanzania, in order to understand tourist perceptions of climate change, the importance of climate for travel decisions, and the likely consequences of ongoing climate change for travel decisions. The results show that climatic characteristics of destinations are important, though not the only factor shaping travel decisions. Under a scenario of climate change, certain climate variables, such as more rain, storms, and higher humidity are also likely to negatively influence travel decisions, rather than higher temperatures alone, which are not necessarily perceived as negative. Regarding the contribution of travel to climate change, the study reveals that leisure tourists in Zanzibar are largely unaware of their impact on the natural environment, while the analysis of stated travel behaviour shows that they frequently travel by air. Overall, the results indicate that travel flows might change in more complex ways than currently assumed, and that a small share of high-intensity air travellers is responsible for a considerable environmental impact in terms of climate change.

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**Keywords:** air travel, biometeorological comfort, climate and weather perceptions, sustainable tourism, sustainable transport, travel decisions

## Introduction

It is widely recognised that tourism is subject to weather and climate, with travel decisions to a large extent being based on images of sun, sand and sea, or availability of snow, and thus on perceptions of climate variables such as temperature, rain and humidity (e.g. de Freitas, 2001; Smith, 1993). Accordingly, it is expected that climate change will affect travel behaviour, both as a result of altering conditions for holidaymaking at the destination level and climate variables being perceived as less or more comfortable by the tourists. However, most research has so far attempted to understand future travel patterns through modelling observed destination choices, that is, from top-down perspectives (e.g. Lise & Tol, 2002; Maddison, 2001). Only one study seems to exist that assesses comfort perceptions based on interviews with tourists in warm destinations (Mansfeld *et al.*, 2003). Given this situation, more substantiated insights into tourists' weather perceptions are needed in order to understand whether climate change will lead to changing tourist flows, particularly in already warm destinations. Furthermore, although temperature is usually assumed to be the most rele-

vant weather parameter, this paper also assesses the role of rain, humidity, weather extremes and tropical storms in tourist comfort perceptions.

Tourism and climate change need to be understood as a 'two-way relationship' (WTO, 2003b: 8), as tourism is itself an important contributor to climate change, a result of the large amounts of fossil fuels needed for transport, accommodation and activities (see studies by Becken *et al.*, 2003; Ceron, 2003; Gössling, 2000, 2002a; Gössling *et al.*, 2002; Høyer, 2000; Peeters, 2003). Air travel in particular deserves special consideration as its emissions are released at a height of 10–12 km in the upper troposphere and lower stratosphere, where they have a larger impact on ozone and cloudiness than they do at the earth's surface (IPCC, 1999; Schumann, 2004). In terms of radiative forcing, aircraft emissions might have 2–4 times the effect of surface-bound emissions (IPCC, 1999; Schumann, 2004). An analysis of tourist perceptions of climate change should thus also consider the tourists' understanding of their own role in this process. Hence, a second goal of this paper is to evaluate the knowledge of tourists of their own contribution to tourism-related environmental problems, particularly climate change. Travel patterns are analysed in order to understand the role of air travel, and distances flown are calculated.

## Tourism and Climate Change

The effects of climate change for tourism have been the focus of more research recently (e.g. Wall, 1998), and publications have sought to assess the consequences of climate change for the tourist industries of nations (e.g. Agnew & Viner, 2001; Hamilton *et al.*, 2004), destinations (e.g. König, 1999; Richardson & Loomis, 2003) or particular sectors of tourism such as ski tourism (e.g. Bürki *et al.*, 2003; König, 1999; Scott, 2003). Most researchers have warned that tourist destinations will lose attractiveness, as exemplified by snow loss in ski resorts, even though there might also be benefits in terms of less rain or extended summer seasons. Accordingly, there have been attempts to understand the effects of increasing temperatures and related parameters (such as rain) on tourist choices of a destination and time of departure. For example, Maddison (2001) analysed travel patterns of British tourists to identify optimal holiday temperatures and found that the maximum preferred daytime temperature was 30.7°C, with even small increases above this level leading to decreasing numbers of visits. Maddison also found that greater rainfall would deter tourists. In another study, Lise and Tol (2002) analysed a cross section of destinations of tourists from countries belonging to the Organisation of Economic Co-operation and Development (OECD). Using factor and regression analysis, they found that OECD tourists preferred an average temperature of 21°C at the hottest month of the year at their destinations. Both studies conclude that tourists may shift to other destinations or travel during other periods of the year under a scenario of climate change. Implications of such changes for the economies of nations and destinations might be severe: 'Although very responsive, tourists probably do not care much about climate change. They substitute one destination for another, or one travel date for another' (Lise & Tol, 2002: 447).

Statistical models express the behaviour of tourists as a function of weather, climate and other factors (such as travel costs), and thus need to be seen as top-down approaches to understanding the interaction of travel choices and

climate. Few studies have as yet analysed tourist perceptions of weather conditions from a bottom-up perspective. Using a combined strategy of climate variable measurements and stated weather perceptions based on structured interviews, Mansfeld *et al.* (2003) assessed the biometeorological comfort of beach tourists in Eilat, Israel. The results show that differences in wind velocity and cloudiness had a significant influence on the tourists' comfort perception, which in this case study with rather moderate temperatures (20–24°C) was negative. Temperature differences also had an influence on the tourists' comfort perception, but the importance of this variable was generally much smaller. Mansfeld *et al.* thus remark that perceptions might be very different under summer conditions, when both wind velocity and cloudiness might be perceived as rather positive. Furthermore, the study revealed that domestic tourists were more sensitive to weather conditions than tourists from overseas, hinting at the importance of other aspects, such as whether the tourists usually live in warm, temperate or cold climates. Mansfeld *et al.* conclude that weather conditions shape the tourists' comfort perception, even though the importance of single variables depends on the background conditions at the destination level, that is, relatively extreme (high or low) weather variables, and the conditions experienced before going on holiday. De Freitas (2001: 10, 2003: 51) thus summarises that a unitary indicator of climate needs to (1) rely on standard climate data, (2) minimise reliance on averaged climate data while maximising reliance on actual observations, (3) consider all attributes of the atmospheric environment, (4) use an integrated body/atmosphere energy balance assessment of the thermal component of climate, (5) include thermal (e.g. temperature), physical (e.g. rain) and aesthetic (e.g. blue skies) attributes of climate, and (6) recognise the notion of climate as a limiting factor with a focus on thresholds.

## Zanzibar

From what is known about biometeorological comfort (cf. de Freitas, 2003; Maddison, 2001; Mansfeld *et al.*, 2003), increasing temperatures will have different consequences for destinations. For example, countries with moderate climates such as those in Scandinavia might profit from increasing temperatures, while those with already very warm climates might see a decline in tourist arrivals. In this case study, focus was on Zanzibar, Tanzania. The island was chosen because it is a destination with a warm and humid climate, where average high temperatures reach 32°C (see Table 1), or what can be considered as the maximum comfortable temperature for tourists (cf. Maddison, 2001). Zanzibar comprises two islands, Unguja and Pemba, and is located about 40 km off the Tanzanian mainland in the Indian Ocean. The focus of the survey is on Unguja Island, which is also referred to as Zanzibar, because virtually all international tourists travel to Unguja, from where only a minority (an estimated 1–5%) may make follow-on trips to Pemba. The Government of Zanzibar has relatively recently focused on tourism as an expanding sector of its national economy. It was not before 1986 that the Government began to actively promote this economic activity, with international tourist arrivals increasing from fewer than 9000 in 1984 to more than 97,000 in 2000 (Commission for Tourism, 2000, 2002). Large resort hotels were built throughout the 1990s, mostly on the east coast.

**Table 1** Weather information provided by [www.zanzibar.net](http://www.zanzibar.net) (2004)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
Average temperature, °C	28	28	28	27	25	25	24	25	25	26	27	27
Average high temperature, °C	32	32	32	30	28	28	27	28	28	30	31	31
Average low temperature, °C	24	24	25	25	23	23	22	22	22	22	23	24
Highest recorded temperature, °C	36	38	38	36	32	31	31	31	35	36	37	36
Lowest recorded temperature, °C	21	22	22	22	21	20	19	19	19	20	21	21
Average rainfall, cm	5	6	14	32	28	5	2	3	4	6	17	13
Average number of rainy days	5	5	8	11	10	4	2	2	3	4	9	8
Average number of days above 32°C	15	15	17	10	8	nil	nil	nil	7	10	14	14

Source: [www.zanzibar.net](http://www.zanzibar.net), 2004

From an attraction point of view, the island can be seen as a typical sun, sand, and sea destination, even though there are sights of great cultural value. Most tourists coming to Zanzibar are on club-holiday package tours or combined safari-beach holidays, spending half of the time on the Tanzanian mainland before coming to the island for relaxation.

The importance of climate for tourists arriving in Zanzibar is reflected in websites advertising the island. For example, the travel-link [www.zanzibar.net](http://www.zanzibar.net) provides extensive information on weather and climate, including average temperatures, peak and low temperatures, highest recorded temperatures, rainfall, average number of rainy days and average number of days above 32°C (Table 1).

The website also provides a written description of Zanzibar's climate and weather conditions:

Zanzibar experiences ideal holiday weather for most of the year, with the exception of April and May which are seasonally subject to the long rains. Short rains can occur in November but are characterised by short showers which do not last long. The heat of summer is seasonally often cooled by windy conditions, resulting in pleasant sea breezes, particularly on the North and East coasts. Being near to the equator, the islands are warm all year round [ . . . ] Zanzibar is blessed with an average of 7–8 hours of sunshine daily.

It becomes clear that those factors believed to attract tourists (e.g. hours of sunshine) are rendered prominent and expressed with value statements ('ideal', 'pleasant', 'blessed'), while those aspects of weather presumably being perceived as negative (rain) are put in relative terms. For example, in November there can be 'short showers' which 'do not last long'. April and May, however, which are usually characterised by torrential rains, are pointed out as an unsuitable season to visit the island. Most of the large hotels close down during this period.

## Method

In order to understand tourist perceptions of increasing temperatures, an *in situ* study was carried out. An *in situ* study is more likely to yield relevant insights into weather perceptions, as tourist statements on the perception of increasing temperatures will be more reliable in locations where warm weather conditions prevail. Being on holiday in the tropics, tourists will also find it easier to imagine how changes in other variables (such as more rain) will affect their biometeorological comfort. In the context of this study, 'perception' is understood as a process of receiving and interpreting 'information' through all senses, which might include feedback processes leading to short- or long-term changes in the understanding and interpretation of the environment.

Tourists were interviewed in the three major tourism areas in Zanzibar. These were (1) Stonetown, a World Heritage Site visited by most tourists to Zanzibar, (2) the North of Zanzibar, which consists predominantly of a mixture of small and medium-sized hotels, and (3) the East Coast, where large resort hotels are located. This mixture of locations was chosen to include all kinds of tourists, such as mass tourists staying in large resort-hotels, backpacker-type tourists staying in guesthouses, and special-interest tourists (diving, cultural sights) staying in all sorts of accommodation establishments (guesthouse to five-star hotel). Respondents were chosen based on a judgement sampling strategy, which included only leisure tourists. Tourists were approached randomly in hotels, restaurants, bars, and on the beach, and asked whether they would participate in the study. In total, 252 interviews were carried out in October 2003, during all times of the day, and throughout the week. The weather during the study period was characterised by periods of short and intense rains, high humidity, and sunshine with temperatures of up to 31°C. The average temperature in October is 26°C, which is typical of the local climate, given the annual average temperature of 26°C. While average temperatures are fairly stable throughout the year, Zanzibar experiences two major rainy periods. October falls into the dry season, with about 8% of all tourist arrivals taking place in this month (Commission for Tourism, 2002). There is no evidence that the composition of tourists is significantly different during this period of the year, even though this is difficult to confirm based on official statistics, which include both leisure and business tourists, and summarise groups of countries such as 'Scandinavia', 'Africa', etc. (cf. Commission for Tourism, 2002). Even though the choice of respondents is not representative, several measures were taken to reduce bias; for example, business travellers were excluded, and interviews were carried out in four different languages (English, French, German and Swedish) to overcome communication problems. The purpose of the interviews was always communicated in a general way ('scientific survey to understand tourism development') and anonymity was assured.

During interviews, a semi-structured questionnaire was employed to gather socio-demographic data (age, sex, nationality, education, and net income) and to understand reasons for choosing Zanzibar as a destination. Furthermore, tourists were asked which destinations they had visited in 2002 and 2003, how they perceived the characteristics of Zanzibar's climate, and the importance climate had for travel decisions. Interviews also included questions concerning tour-

ism's contribution to (global) environmental problems, the tourists' perception of the consequences of climate change for Zanzibar as a tourist destination, and personal assumed change in the choice of a destination given more rain, higher temperatures, increases in humidity and more storms. All questionnaires were filled in by the interviewers in direct communication with the tourists. Descriptive statistics were used to evaluate the quantitative data obtained; the qualitative part of the questionnaires was assessed through comparative analysis.

Distances flown by the tourists (for leisure purposes only) were assessed using the great circle distance calculator provided by chooseclimate (2004), a website dedicated to the assessment of the environmental impacts of flying. This procedure implies a certain degree of inaccuracy, as the exact city of departure was unknown. Instead, the geographical centre of the respective country was chosen for calculations. In a number of cases, the exact number of flights during a journey through several countries was unknown. In such cases, only confirmed flights were included in calculations. Given the great number of journeys undertaken by some tourists (with stays in up to 24 countries), it seems likely that not all journeys were recalled. In two cases it was impossible to make calculations for reasons of inaccuracy of the information provided. Furthermore, it should be noted that the present journey to Zanzibar is not included in the analysis, and that great circle distances underestimate true travel distances by about 5% (Peeters, 2004, personal communication). The results should thus be seen as conservative. Note that only air travel is included in the analysis because of the large environmental impact of aviation in comparison to other means of transport used during a journey (Gössling *et al.*, 2002). All data were evaluated through descriptive statistics.

## Results

### Demographics

Of the tourists interviewed ( $n = 252$ ), 56.7% were female and 43.3% male (Table 2). With respect to the country of origin, the survey includes Italian (16.7%), British (13.1%), German (10.3%), Dutch (8.7%), New Zealand (6.3%), French (6.0%), Australian (5.6%), South African (5.2%), Belgian (4.0%), Finnish (3.6%), US-American (3.2%), as well as tourists from 16 other countries (Table 2).

The age of the tourists interviewed was between 16 and 67, with about half of them falling in the age group 26–35 (49.2%), indicating the attractiveness of the island for young visitors. Almost 68% of the tourists reported having a university degree, reflecting a generally high educational status. Even the annual *net* income of the tourists is high, with 3.2% earning up to 10,000, 15.1% between 10,001–20,000, 20.2% between 20,001–30,000, 15.5% between 30,001–40,000, 8.3% between 40,001–50,000, 7.5% between 50,001–60,000, and 12.7% more than 60,000. Two percent of the tourists reported not to know the figure, 7.9% claimed not to have an income, and 7.5% refused to respond to this question. In summary, tourists in Zanzibar could thus be characterised as younger, well educated and wealthy.

**Table 2** Overview of sample demographics

Country of origin	Number of tourists	Percentage of total	Sex		Age							Education		
			Male	Female	Under 18	18-25	26-35	36-45	46-55	56-65	Over 65	Secondary school	College	University
Italy	42	16.7	17	25	0	3	28	8	3	0	0	12	8	22
UK	33	13.1	17	16	1	3	14	9	4	2	0	3	8	22
Germany	26	10.3	7	19	0	2	7	7	6	3	1	6	3	17
Netherlands	22	8.7	9	13	0	2	11	2	4	2	1	2	8	12
New Zealand	16	6.3	4	12	0	6	10	0	0	0	0	0	1	15
France	15	6.0	8	7	0	0	7	6	2	0	0	3	1	11
Australia	14	5.6	6	8	0	3	9	1	1	1	0	2	0	12
South Africa	13	5.2	4	9	0	1	8	2	1	1	0	4	0	9
Belgium	10	4.0	5	5	0	0	2	3	5	0	0	1	3	6
Finland	9	3.6	7	2	0	4	3	1	1	0	0	0	3	6
USA	8	3.2	4	4	0	0	6	0	2	0	0	0	1	7
Norway	6	2.4	2	4	0	2	1	0	3	0	0	0	0	6
Denmark	6	2.4	3	3	0	0	2	3	1	0	0	1	4	1
Switzerland	6	2.4	3	3	0	0	3	2	1	0	0	1	1	4
Sweden	6	2.4	1	5	1	0	1	1	1	2	0	2	1	3
Spain	4	1.6	1	3	0	0	3	1	0	0	0	0	0	4
Austria	3	1.2	2	1	0	0	2	1	0	0	0	0	0	3
Ireland	2	0.8	1	1	0	0	1	1	0	0	0	0	0	2
Israel	2	0.8	2	0	0	0	2	0	0	0	0	0	0	2
Canada	2	0.8	2	0	0	0	1	0	1	0	0	0	1	1
Luxembourg	1	0.4	0	1	0	0	0	1	0	0	0	0	0	1
Zimbabwe	1	0.4	0	1	0	0	0	0	0	1	0	0	1	0
Argentina	1	0.4	1	0	0	0	1	0	0	0	0	0	0	1
Portugal	1	0.4	0	1	0	0	1	0	0	0	0	0	0	1
Mauritius	1	0.4	1	0	0	0	1	0	0	0	0	0	0	1
Poland	1	0.4	1	0	0	0	0	1	0	0	0	0	0	1
Japan	1	0.4	1	0	0	0	0	1	0	0	0	0	0	1
Total	252	100	109	143	2	26	124	51	36	11	2	37	44	171

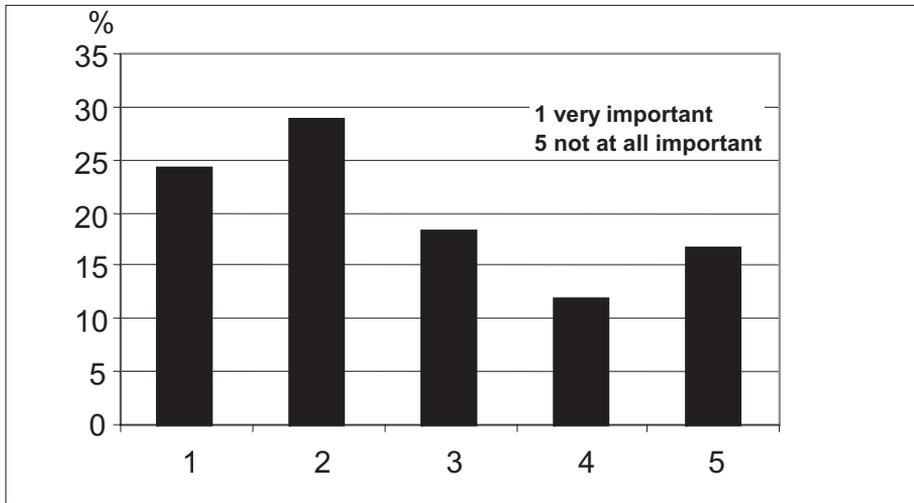
### Travel motives and weather perception

The first question posed to tourists addressed their reasons for choosing Zanzibar as a holiday destination: 'Why did you go on vacation in Zanzibar?' Most tourists gave proximate (e.g. honeymoon) rather than ultimate answers (e.g. unique cultural heritage, suitable climate), with only a few tourists mentioning aspects related to climate. However, comparative analysis of the statements indicates that relative warmth and sunshine are often implicitly understood as preconditions for visiting a particular destination ('I love sea and sun'). As many companies offer packages including a safari on the Tanzanian mainland and a beach holiday in Zanzibar, the weight of travel decisions might often lie in the possibility to see wild animals and/or to see or climb Mount Kilimanjaro, the most famous mountain in Africa (cf. Gössling, 2002b). Other tourists came to Zanzibar for its culture, diving opportunities, or even its very name. Travel decisions are thus a complex mixture of climate-related considerations (a fairly obvious precondition for tourists in Zanzibar) and other motives, which in the case of Zanzibar can include both 'incommensurable' (e.g. Stonetown as a unique World Heritage Site) and 'convenience' motives ('safe' place to relax after a safari).

In order to better understand the role of climate, tourists were asked to describe Zanzibar's climate. The broad majority of the tourists referred to the climate as 'warm/hot' and 'humid', often summarised as 'tropical'. Apart from these attributes, tourists mentioned 'breezes' or 'rains', which generally seemed to depend on the respective weather situation and interview location. Overall, there is broad consensus among tourists that Zanzibar's climate is very warm and humid, which is quite plausible, particularly given the climatic conditions most of the international tourists experienced at home before travelling to the island. It should also be noted that a high number of tourists chose to answer the question with value statements, such as 'great', 'fantastic', 'perfect', 'good' or 'nice'. There were a few rather negative comments, such as 'unpredictable', 'a bit windy' or 'a little warm'.

In an attempt to better understand the relative importance of climate, tourists were then asked to indicate the role of climate in travel decisions on a Likert scale from 1 (very important) to 5 (not at all important). More than half of the tourists rated climate 1 or 2, corresponding to 'very important'/'important' for travel decisions (Figure 1). However, a substantial share of the tourists (16.7%) also claimed that climate was 'not at all important' for travel decisions. While these results could be explained by the fact that other factors such as the visitation of a unique site such as Stonetown are 'off-setting' climate as a factor in travel decisions, the general, that is, not location-specific, character of the question nevertheless also points at a certain disinterest in weather and climate among these tourists.

Tourists were also asked whether changing weather patterns (temperature increase, more storms) would have an influence on tourist arrivals in Zanzibar. The answers indicate a high degree of variation, reflecting heterogeneous understandings and perceptions of different weather parameters. Two of these (temperature, storms) were mentioned to clarify the question, as a pre-survey feasibility study found that the term 'weather patterns' was not always under-



**Figure 1** Importance of climate for travel decisions

stood to include several weather parameters. In consequence, these served automatically as an anchor for the respondents and we thus expected these to be mentioned more often. Despite this, most tourists referred immediately to rain, which in this study was the most important weather variable influencing tourist comfort. However, as mentioned earlier, the survey period was characterised by frequent and intense periods of rainfall, including permanent cloudiness in Stonetown, one of the interview locations. Clearly, weather conditions thus had an influence on the statements of tourists, as they made a vacation scenario with permanent rain more plausible and 'urgent'. Note that even with respect to increasing and changing rainfall patterns, some tourists claimed to regard them as being of little importance for tourist arrivals.

Second to rain, tourists discussed the effects of storms. Even with respect to this variable, tourist perceptions are not homogeneous. While some tourists claimed that storms would not have consequences for tourist arrivals, a majority perceived these as problematic, and incidences of great storms (hurricanes and the like) were perceived by virtually all respondents as a threat to tourist arrivals. Several tourists also mentioned secondary effects of storms, such as disturbances of the water body leading to decreasing visibility and thus less favourable diving conditions. 'Temperature' was mentioned by only about one third of the tourists. On one hand it was suggested that higher temperatures might not have any effect at all ('certainly not for the British!', 'tourists want it hot!', 'the warmer the better!'), on the other hand that they would cause decreasing visitor numbers, even though this would depend on the relative increase in temperature ('if it gets very humid and hot there will be less tourists'). A number of tourists even claimed that higher temperatures would attract more tourists. Overall, the majority of the tourists discussing temperatures made it clear that temperatures would have to increase substantially before the effect on tourist arrivals could be felt. In this context it should also be mentioned that many tourists pointed out

that climate change is a natural process one has to accept ('the climate is going to change everywhere'). Increasing temperatures were often mentioned in the context of increasing humidity, the latter being perceived as negative. Finally, a number of tourists pointed out that there are weather-independent travel motives. Stonetown as a World Heritage Site, for instance, might, irrespective of weather conditions, attract a substantial number of tourists primarily coming to Zanzibar for cultural reasons. Obviously, such comments might explain and confirm the reported importance of climate in travel decisions reflected in the Likert-scale analysis (Figure 1). Overall, roughly half of the tourists seem to believe that climate change in general (including different climate variables) will have consequences for tourist arrivals in Zanzibar, while about one third tend to think that arrivals will not be affected, the remainder being undecided.

In a follow-up question, tourists were asked whether their own travel behaviour would be affected by changing weather conditions (more rain, higher temperatures, higher humidity, more storms), based on a Likert scale from 1 (huge influence) to 5 (no influence). The responses show that the tourists see rain and storms as the most important parameters influencing travel decisions, with about 62% of the tourists ranking these 1 or 2 ('huge influence' / 'major influence', Figure 2). These two variables also show a clear downward trend towards 'no influence'. In contrast, temperature and humidity polygons are rather parabolic-shaped, with the majority of the tourists understanding these as having a moderate influence, while comparably small groups of tourists ascribe a 'huge' versus 'no influence' to these parameters. Overall, temperature is the least relevant factor for travel decisions, ranked as having no major influence (4 and 5 on the Likert scale) by almost half of the tourists (46%). These findings confirm the results of the open question as presented above.

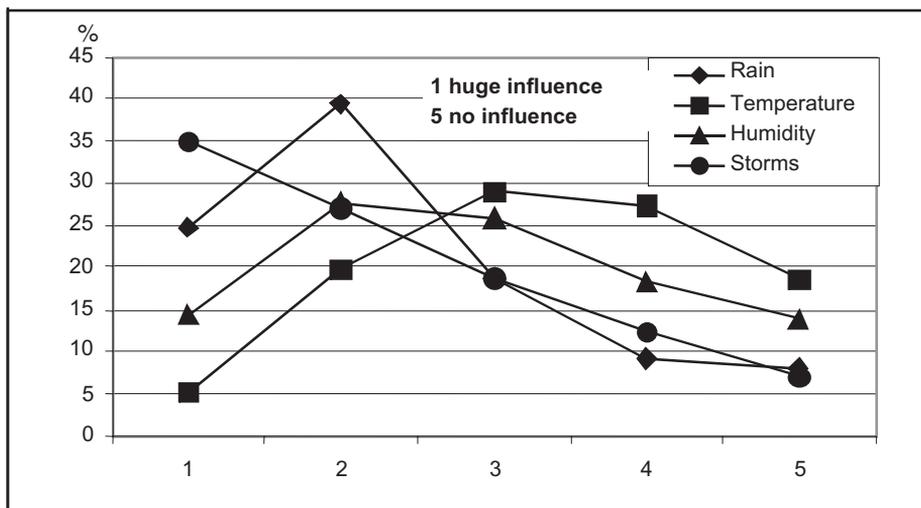
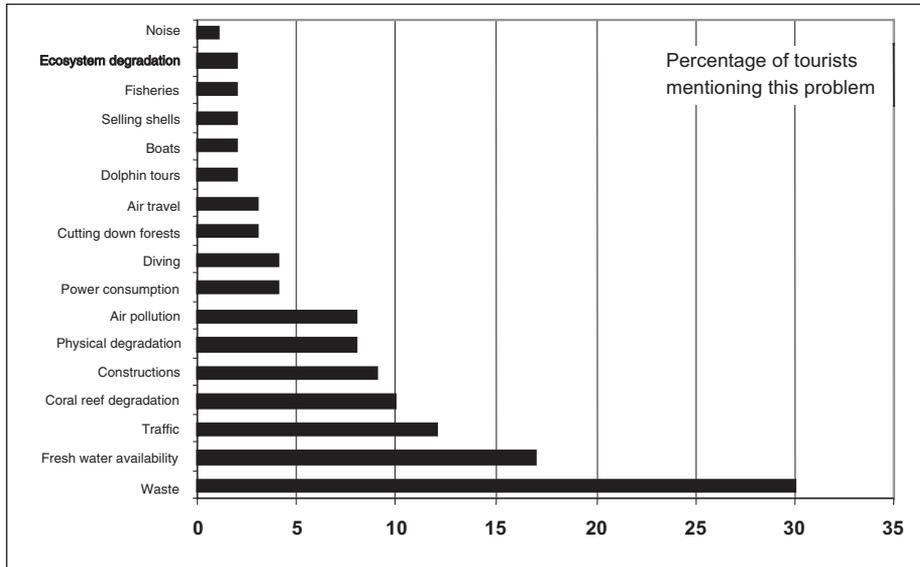


Figure 2 Importance of changes in selected weather parameters for travel decisions

## Environment

The first question addressed the tourists' travel behaviour. The results show that the vast majority of the tourists interviewed are frequent travellers. Of the 252 respondents, more than 89% had visited at least one and up to 24 countries in 2002 and / or 2003, excluding the present journey to Zanzibar. Of those who had visited other countries, 7.7% had visited one, 15.7% two, 20.6% three, 10.9% four, 15.3% five, and 29.8% more than five countries over the last two years. In total, their journeys involved more than 8.6 million passenger kilometres (pkm) travelled by air, or an average of 34,250 pkm per respondent, which is equivalent to approximately three return flights from London to New York. Among the tourists, a fraction of 'high-intensity' travellers was identified. The 10 most frequent travellers, constituting 4% of the tourists interviewed, had covered almost 1.8 million pkm in 2002/2003, which corresponds to about one fifth (20.5%) of the total kilometres flown. All high-intensity travellers come from just three countries, South Africa, New Zealand and Australia, even though some of them live in the UK. A closer look at those tourists coming from South Africa, New Zealand and Australia ( $n = 40$ ) reveals that these had flown more than 3.3 million pkm in the last two years. Comprising less than 16% of the sample, they accounted for almost 39% of the kilometres flown. This hints at the existence of a small group of high-intensity travellers from a few, rather peripheral countries. While the results of this survey cannot be generalised, the existence of high-intensity travellers from South Africa, New Zealand and Australia seems nevertheless plausible. All countries have strong economies, which makes it possible for part of the population to participate in frequent journeys that will usually be long distance given the remote location of these countries. However, while there is evidence that there is a group of high-intensity travellers within the sample, it is worth noting that the sample itself is also composed of high-intensity travellers. Based on data provided by Gössling (2002a), it can be calculated that the global average distance flown for leisure-related purposes was about 200 pkm per world citizen in 2001. Each respondent in the sample had thus on average flown about 85 times the distance of the world average citizen in both 2002 and 2003 (calculated per year).

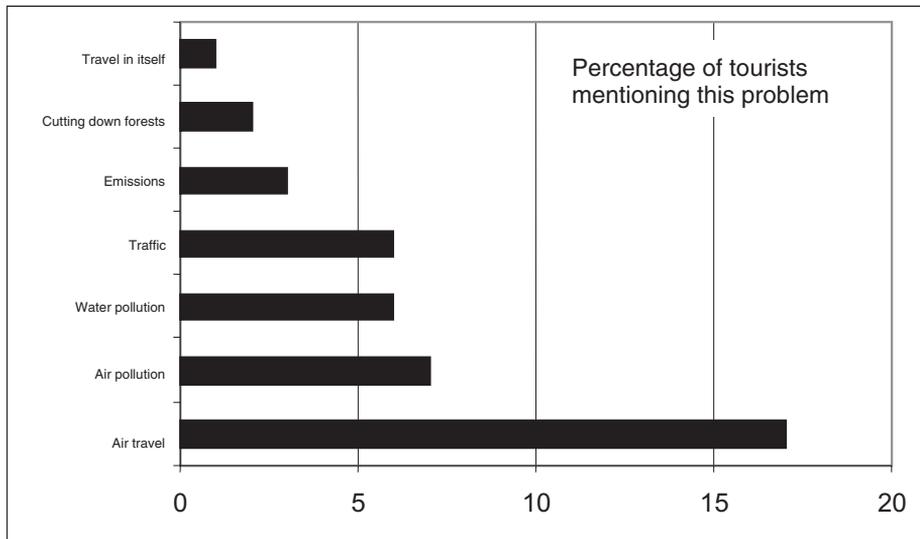
In order to understand the tourists' perception of their contribution to environmental problems, a general question was posed to the interviewees: 'Does tourism contribute to environmental problems?' Almost three quarters (73%,  $n = 184$ ) answered this question with 'yes', and 21% with 'no', the remainder being undecided (6%). However, while three quarters claimed that tourism causes environmental problems, only 52% ( $n = 131$ ) were able to give an example. Problems mentioned include a wide range of aspects (Figure 3), such as 'waste' – for example, plastic bags disposed of along roads – (mentioned by 30% of the tourists,  $n = 75$ ), fresh water availability (17%,  $n = 43$ ), traffic (12%,  $n = 31$ ) coral reef degradation and destruction (10%,  $n = 25$ ), problems related to construction (e.g. sand mining, conversion of lands, etc.) (9%,  $n = 23$ ), physical degradation, such as overuse of natural resources, damage of the natural environment, etc. (8%,  $n = 20$ ), air pollution (8%,  $n = 19$ ), power consumption (4%,  $n = 10$ ), diving (4%,  $n = 10$ ), cutting down forests (3%,  $n = 8$ ), air travel (3%,  $n = 7$ ), dolphin watching, such as inappropriate behaviour of boat owners and guides



**Figure 3** Environmental problems mentioned by tourists

(2%,  $n = 5$ ), boat-related problems (2%,  $n = 6$ ), selling of ornamental shells (2%,  $n = 4$ ), fisheries (2%,  $n = 4$ ), damage to ecosystems (2%,  $n = 4$ ) and noise (1%,  $n = 2$ ). Overall, the study thus found that virtually all problems mentioned are local ones, with only 4% ( $n = 10$ ) of the sample explicitly mentioning 'global' ones, such as 'air travel'. The result is an interesting paradox, as many tourists seem aware of environmental problems; however, in their perception the problems that matter are, from a scientific point of view, rather secondary. For example, waste disposed of along a road is of greater importance in the tourists' perception than the large amounts of greenhouse gas emissions caused during the flight to Zanzibar.

In a second question, the tourists were asked explicitly if there were *global* environmental problems associated with tourism. Of the 252 respondents, 66% ( $n = 166$ ) answered 'yes', 23% 'no', the remainder being undecided (11%). The 166 tourists believing that tourism contributes to global environmental problems were then asked to give an example (Figure 4). However, only 66 (26% of the sample) were able to answer this follow-up question, revealing a rather diffuse notion that global environmental problems exist. Global environmental problems include air travel, mentioned by 17% of the tourists in the sample ( $n = 43$ ), air pollution (7%,  $n = 17$ ), water pollution (6%,  $n = 16$ ), traffic (6%,  $n = 14$ ), emissions (3%,  $n = 7$ ), cutting down forests (2%,  $n = 4$ ), and 'travel itself' (1%,  $n = 2$ ). Of the problems mentioned, some are not directly related to tourism, indicating that the respondents had no idea of what to answer or that the question was not properly understood. Several of the problems mentioned are also interconnected, such as 'air travel', 'air pollution', 'traffic', and 'emissions'.



**Figure 4** Global environmental problems associated with tourism

## Discussion

### Perception of weather and climate

Earlier studies on the role of climate/weather and tourism have shown that temperature and other climate variables are of great importance for travel decisions of leisure tourists (e.g. Lise & Tol, 2002; Maddison, 2001), concluding that climate change would have a major impact on travel decisions and tourist flows. However, the situation might be more complicated in Zanzibar, because a considerable share of travel decisions of tourists visiting the island is made irrespective of climate. For example, travel motives including visiting relatives and friends, or the wish to see a World Heritage Site, may be independent of climate-related considerations. These motives are important in Zanzibar, where a great number of foreigners work (development aid workers, employees of an international school, and foreign students), who are visited by friends or family members making use of the opportunity to visit them. In addition, Stonetown is a famous World Heritage Site, which can be assumed to attract many cultural tourists. For these tourists, climate may have little influence on travel decisions. Furthermore, tourist perceptions of weather and climate vary widely, and perceptions of 'unbearable' weather conditions might depend on climate conditions in the tourists' country of residence and individual biometeorological comfort and weather perceptions (cf. Mansfeld *et al.*, 2003). In this study, tourists report that higher temperatures will be negative, of no importance, or positive, confirming the existence of such varying climate perceptions and comfort factors.

This study confirms earlier findings (Mansfeld *et al.*, 2003) that local weather experiences shape the tourists' perceptions of what constitutes a region's or

country's 'climate'. This suggests that tourists' understandings of a destination are based on the conditions experienced during a rather short stay, which might be very different from the 'average' conditions. Moreover, 'extreme' situations are likely to dominate this perception. For example, a tourist being exposed to intense showers when planning to sunbathe might return home with the dominating image of frequent rains. A single incidence such as this might then shape this tourist's understanding of the climate of Zanzibar. Weather conditions experienced during a holiday might also have substantial consequences for word-of-mouth recommendations, even though the role of information in climate-related holiday decision making is as yet insufficiently understood. Nevertheless, the role of weather extremes deserves attention, as their amplitude and frequency can be expected to increase, which will not be reflected in those climate statistics which are confined to averages. For example, heat waves as experienced during summer 2003 in Europe might have a substantial influence on the 'climate in Europe during summer' perception of international tourists, as temperatures exceeding 40°C may generally lead to hyperthermia and thus dominate the weather perception. In the tropics in particular, it seems clear that global warming will be less pronounced (IPCC, 2001), while tourists might expect these regions to be 'hot' anyway. On the other hand, weather extremes such as El Niño Southern Oscillation phenomena might become more frequent in the tropics, and are, according to the results of this study, more likely to affect tourist perceptions. Overall, the study indicates a high degree of complexity in the prediction of travel flows under a scenario of climate change.

### **Perception of environmental problems caused by tourism**

Regarding the perception of the tourists' own contribution to climate change, the study suggests that most visitors are unaware of the consequences of travel. When asked about environmental problems associated with tourism, responses focus on local, visible, immediate and comprehensible problems. For example, plastic bags along roads are mentioned by 75 of the 252 tourists interviewed, while only 10 mention the effects of flying. When asked explicitly about *global* problems, 66% report that such exist; however, only 26% can also give examples, indicating a rather diffuse notion of 'global problems' rather than more explicit knowledge. Of the examples given, several seem not related to tourism ('cutting down forests'), and should thus rather be seen as examples related to environmental destruction more widely reported in the media. Other global problems mentioned mostly relate to emissions of greenhouse gases, with air travel being explicitly mentioned by 17% of the tourists. Note that of those mentioning the emission of greenhouse gases as a problem, only few seem to have a more profound understanding of the problem, while the causal relationship of greenhouse gas emissions and global warming was in one case even denied. This is even more remarkable given the high percentage of respondents with university degrees (67.9%). There seems no relationship between education and knowledge of global environmental change. Of those respondents claiming that tourism contributes to global environmental change, 10% had been to secondary school, 17% college, and 73% university, which compares to the sample's educational distribution of 14.7% (secondary school), 17.5% (college) and 67.9% (university). A university degree is thus not necessarily a measure of awareness, at least not in

this sample. Among the tourists, clear differences in the perception of environmental problems seem to exist, even though the sample is too small to test these differences statistically. For example, out of 42 Italian tourists, none mentioned flying as being environmentally harmful, while this was reported by 8 of 26 Germans, 5 of 22 Dutch, and 4 of 6 Norwegians.

### **New Insights into Tourism and Climate Change: A Summary**

The case study confirms that climate is an important aspect of travel decisions, which is as de Freitas (2003: 45) points out, 'assumed to be self-evident'. However, the case study also indicates that 'climate' consists of a *set* of parameters (temperature, rainfall, humidity, storms) affecting comfort perceptions, rather than one single parameter (temperature). There is some evidence that many tourists might implicitly consider 'temperature' in their travel choices (i.e. at home), while rain and weather extremes might have a greater effect on comfort perceptions at the destination level. As most research so far assumes that tourists *consciously* consider climate in their travel decisions (cf. de Freitas, 2003), more research concerning the role of weather and climate information for decision making is needed to understand this interaction. Finally, it needs to be acknowledged that a substantial number of people travel for reasons independent of climate, including, for example, visiting friends or World Heritage Sites. These insights, even though Zanzibar-specific, might be of broader relevance, as global analyses of travel flows (e.g. Lise & Tol, 2002) currently focus on temperature as the key climate parameter.

The study also yielded new insights into tourists' travel behaviour and their perceptions of their contribution to climate change. The study seems to consist of what might be called high-frequency leisure travellers, who, on average, have travelled 85 times as much by air in 2002/2003 than the average human being. Within this sample of frequent travellers, a smaller group of even more intense air travellers was identified, who, on average, had flown some 82,500 pkm in 2002/2003 for leisure-related purposes (per year, this is more than 200 times the distance annually flown by the average human being). Demographic characteristics of the entire sample suggest that frequent travellers are young, well educated and wealthy, while their awareness of environmental problems caused by energy-intensive lifestyles is low. Virtually no tourist seems to realise the relationship between tourism's contribution to climate change and tourism as being affected by climate change. Overall, and even though results cannot be generalised, the study confirms that tourism and climate are a complex research field, where further research is needed to better understand the interactions of social, economic and environmental changes.

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