Tourism and Climate Change: An International Perspective

Geoffrey Wall
Department of Geography, University of Waterloo, Waterloo, Ontario N2L 5X4, Canada

Catherine Badke
Federal Environmental Assessment and Review Office, Environment Canada, 13th Floor, Fontaine Building, 200 Sacre-Coeur Boulevard, Hull, Quebec K1A 0H3, Canada

This paper addresses the implications of climate change for tourism through a survey of national tourism and meteorological organisations. While climate change may have far-reaching consequences for tourism, it is shown that while most respondents felt that climate is important to their country's tourism industry, very few were aware of climate change research specifically related to tourism. Almost half felt climate change is or could become a significant issue in their country but almost no climate change publications with direct bearing on tourism are available. It is concluded that climate is an important determinant of tourism, and that global climate change may create new challenges, and opportunities, for the tourism industry. However, more awareness, research, and policy analysis are necessary to reduce uncertainties, further understanding, assess implications and enable the tourism industry to adapt to changing circumstances.

Introduction

Increasing concentrations of carbon dioxide and other gases, commonly known as the greenhouse effect, are likely to have profound implications for world climate and, by extension, international and domestic tourism. A thorough presentation and assessment of knowledge concerning the processes of climate change can be found in the documents prepared by the Intergovernmental Panel on Climate Change (1990). Briefly, the major greenhouse gases are carbon dioxide, which is particularly associated with fossil fuel combustion and deforestation; methane, which is probably derived from agriculture, especially rice cultivation and animal husbandry; nitrous oxide from the use of fertilisers, land clearing, biomass burning and fossil fuel combustion; and halocarbons, particularly chlorofluorocarbons, which were introduced into the atmosphere for the first time this century. Concentrations of each of these gases continue to rise with far-reaching consequences for global climate.

Given existing trends, increases in greenhouse gases equivalent to a doubling of carbon dioxide since pre-industrial times are likely to occur by the middle of the next century. Such a doubling may induce average global surface temperature increases of between 1.5 and 4.5C. The magnitude of this warming is expected to be greatest in high latitudes, particularly in autumn and winter. Equatorial regions will experience a lesser but still substantial warming. Much less confidence can be placed in assessments of the implications for rainfall and the

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hydrological cycle. However, there may be reduced moisture availability, particularly in middle latitudes, because of increased evapotranspiration coupled with an increased demand for water. Sea-level is likely to rise chiefly because of the thermal expansion of ocean waters (and only secondarily because of glacial melting). These projections are based upon direct measurement of temperature and atmospheric concentrations of greenhouse gases, estimates of future energy use and technological change, and on elaborate modelling of both the economic and ocean-atmosphere systems.

The eminent climatologist Kenneth Hare (1989) suggests that this would be a revolutionary change in world climate on a scale which is unprecedented in the history of civilisation. He points out that not since the end of glacial climates a little over 10,000 years ago have temperatures changed so much or so rapidly. He concludes that 'I have no doubt that we are discussing the central environmental problem of our times.' Such changes in climate would have major consequences for tourism. However, while overviews of the literature on and relationships between climate, weather, tourism and recreation have been prepared (Wall, 1985), few authors have placed their studies in the context of climate change. There is a limited number of assessments of possible implications of climate change for specific activities in specific locations (for example, Lamothe & Periard, 1988; McBoyle & Wall, 1986, 1987; Wall *et al.*, 1986) and several, somewhat speculative, broader overviews concerning the topic are available (for example, Smith, 1990; Wall 1992, 1993), but it appears by the dearth of publications on the topic that little serious thought has been given to issues of climate change and tourism.

In order to assess the state of knowledge and concern with respect to this issue, an international survey was undertaken of governmental agencies responsible for either tourism or climate. This paper presents the results of this survey and examines variations in responses in relation to such factors as the economic significance of tourism and gross national product.

The Climate Change–Tourism Survey

The sample

Since agencies individually responsible for climate and for tourism might be expected to have an interest in the juxtaposition between the two topics, the relevant national climate and tourism agencies were identified as potential contacts. The addresses of the tourism organisations were obtained from Annex 1 in Methodological Supplement to World Travel and Tourism Statistics, 1985 edition, published by the World Tourism Organisation. The addresses of the meteorological organisations were obtained from the World Meteorological Organisation's Handbook (1992) which lists all member organisations. Not all countries were covered by these two lists, the most notable exceptions being China, the USSR, and Canada. However, most countries were included on one or both lists, constituting a sampling of all geographical regions. In total, 192 addresses were obtained for national meteorological and tourism organisations around the world, 103 for tourism organisations and 89 for meteorological organisations. A list of these organisations is provided in Badke (1991).

The research instrument

In July 1989, a letter, in English, was sent to all government tourism and meteorological organisations. The purpose of this letter was to gather as much information as possible from these organisations concerning the climate–tourism interface.

Four specific questions were asked in the letter:

(1) Are climate and weather major determinants of tourism and recreation in your country at present?
(2) Has global climate change been the subject of any research or discussion in your country, particularly in the context of tourism and recreation?
(3) Are relationships between climate change and tourism likely to be significant issues in your country?
(4) Are publications or reports available concerning the relationships between climate–weather and tourism–recreation in your country?

The first question was intended to determine the current level of influence that climate and weather have on tourism, in order to place the effects of climate change in context. The second question was meant to establish the current level of research into the relationship between climate change and tourism. The third question attempted to determine the attitude of government agencies towards climate change, and whether climate change is likely to be a consideration when policy decisions are made. The last question was designed to bring to light relevant research throughout the world and to open new avenues of investigation by revealing new contacts.

Responses

The letter elicited 66 replies, constituting a 33% return rate. This was considered to be an excellent return rate for a 'cold call', particularly as the letters were sent to organisations rather than individuals and, in a large proportion of cases, were in a foreign language. Of the responses, six were referrals to other departments.

Each response was categorised based on the answers to the first three questions in the letter of enquiry. The three questions were open-ended and the classification of the answers was somewhat subjective since not all questions were answered in the same manner.

Since the importance of tourism to any particular country's economy reflects many factors, including tourist attractions and economic structure, the responses to the letter of enquiry were also categorised in a number of other different ways. First, they were sorted by answer without consideration of other factors. This provided a general overview of the attitudes of respondents towards climate change and tourism. Next, the responses were classified by type of organisation, for although it is likely that both tourism and climate organisations in a given country might be concerned with the potential impact of climate on tourism, either organisation might be in better position to carry out research and influence government policy. Finally, the responses were classified by factors that might influence responses to climate change and tourism, such as importance of tourism to the economy, number of tourist arrivals, and GNP and GNP per person.

It was hypothesised that countries that rely most heavily on tourism would be more inclined to believe climate change is, or will become, a significant issue in relation to tourism, while countries with higher GNP per person may be better able to conduct research on this topic.

Findings

Global responses

Figure 1 demonstrates that most respondents felt that climate is important to their country's tourism industry; very few were aware of climate change research specifically related to tourism; almost half felt climate change is or could become a significant issue in their country; and almost no climate change publications with direct bearing on tourism were available.

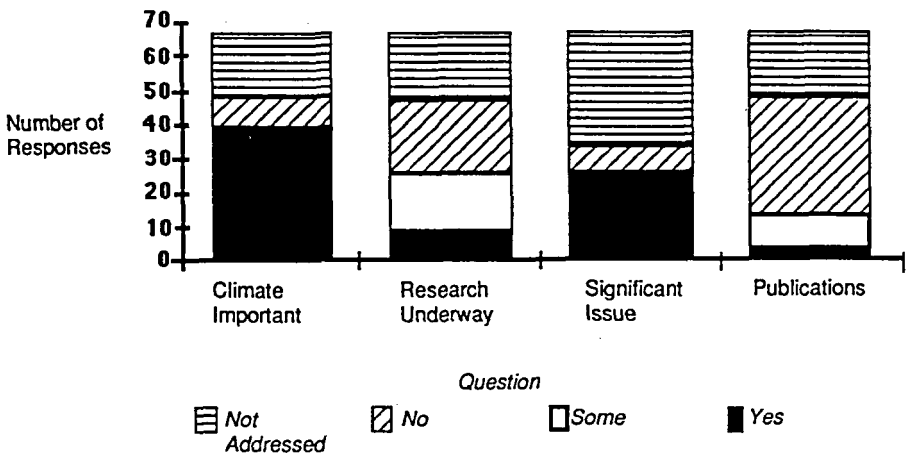

Figure 1 Responses to climate change enquiry questions

The majority (81%) of respondents that answered question one felt that climate and weather are major tourism determinants. This implies that any change in climate could have an impact on the tourism industry world-wide. This observation is further substantiated by the response to question three: more than 75% of respondents felt climate change could become a significant issue for their country. However, half (50%) of respondents did not answer the latter question, reducing the certainty with which one can state that climate change is likely to become a significant global tourism issue.

Even though many accept that climate change is a problem, research on tourism and recreation is lacking. Fewer than 20% of respondents that addressed question two reported that research into the possible effects of climate change on tourism and recreation was in progress.

The response from the meteorological Service in Jamaica is typical. Each question was answered with thoughtfulness and additional concerns were mentioned:

> Climate and weather are major determinants of tourism and recreation in our country at present. Further, ...research on this topic is limited and is confined mainly to work at the University of the West Indies in its Geology and Geography departments in relation to changes in ecosystems. Given the expected rise in sea level and the possible change in coastal ecosystems, we have no doubt that the relationships between climate change and tourism are likely to become significant issues in the near future. However, publications and reports are currently unavailable in our library. ...Along with tourism and recreation, other areas which could be of interest would be possible impacts on food production and implications for pests and diseases affecting animals and humans.

Many respondents provided information on present climate and its influences on their countries, although only a few included information on the possible effects of climate change on tourism and recreation, again reflecting the lack of research.

If responses to the first three questions are consolidated on one diagram (Figure 2), it is difficult to discern a clear trend. The response most often noted, in 9 out of 66 cases (14%), was that climate and weather are major tourism determinants, climate change is likely to become a significant issue, and no research linking the topics has been conducted. Another 21% (14 responses) indicated that climate and weather are major tourism determinants, that research is being conducted, and that climate change is likely to become a significant issue. Of these 14 responses, however, only 6 stated that climate change research was being conducted with specific reference to tourism and recreation.

Although it is interesting to view the responses in this way, the small sample size means that results are suggestive rather than conclusive. However, it is evident that climate is important to today's tourism industry, that the potential impacts of climate change on tourism are a cause for concern, but that very little research has been conducted on the relationship between climate change and tourism (although other aspects of climate change are being investigated, and tourism may be the subject of research in the future).

Organisational comparisons

It might be expected that, because of differing backgrounds and responsibilities, respondents from climate organisations might exhibit different responses to those from tourism organisations. Slightly more tourism organisations were consulted than meteorological organisations (103 to 89) but virtually equal numbers of each responded (32 and 31 respectively). The difference in response rate is not statistically significant.

Among those who responded, those from climate organisations consistently answered the questions more often than those from tourism organisations, although the proportions from tourism and climate organisations that answered each question positively or negatively are similar. For instance, more from both types of organisations answered positively than negatively that climate is a determinant of tourism. This may indicate that tourism organisations are preoccupied with the present tourism situation and rely on other agencies for information that could affect their industry in the future.

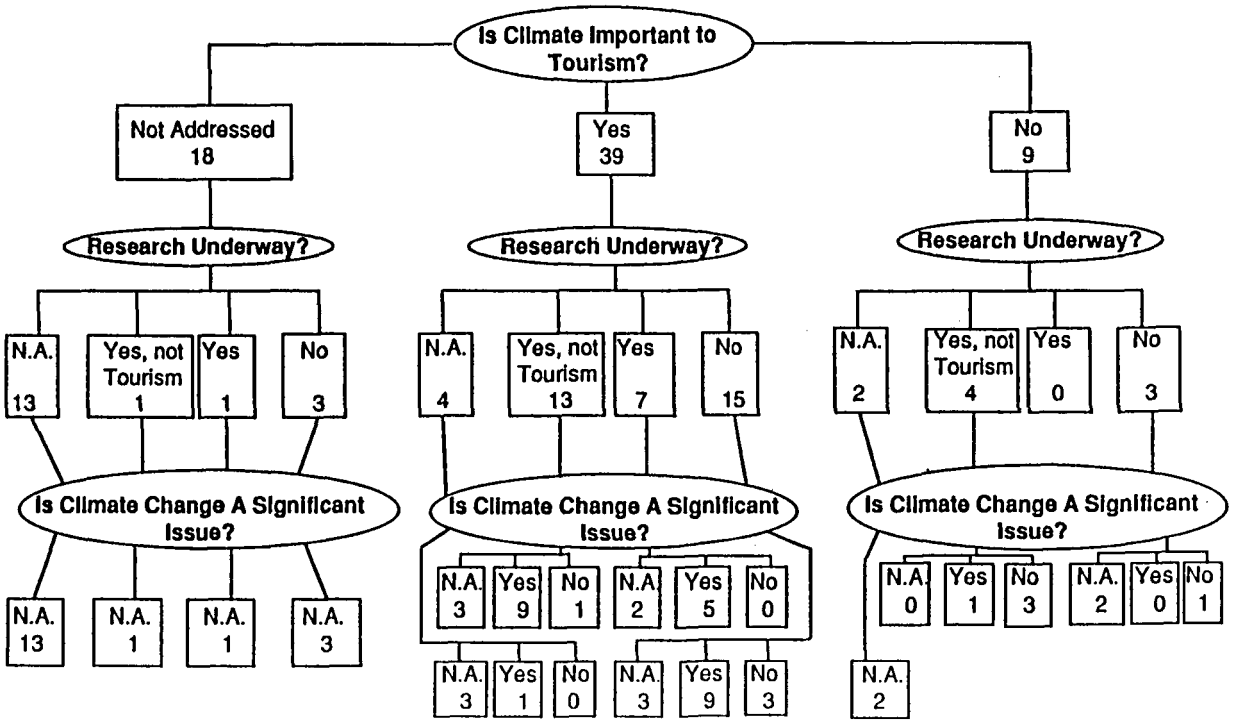

Figure 2 Breakdown of climate change enquiry response by question

Respondents from climate organisations were more likely to have opinions about the significance of climate change for tourism than those from tourism organisations: only 26% of the former did not answer question three while 70% of the latter chose not to comment on this question. The majority of the respondents that did answer this question, from both tourism organisations (80%) and climate organisations (74%), believed that climate change may be a significant issue for tourism in their country. Almost three times the proportion of respondents from climate organisations (16% to 6%) indicated that research was being conducted on climate change with specific reference to tourism. Thus, the climate respondents may have a stronger scientific basis for forming opinions about the significance of climate change since they are more likely to be aware of ongoing research than those from tourism organisations. However, even those from organisations that are conducting research, such as India's Meteorological Department, qualify their answers to the third question by reiterating the uncertainties associated with global climate change:

> No clear picture has yet emerged on the extent of climate change due to global warming...it is therefore still the subject of investigation as to how significant these issues are with respect to our country.

Thus, overall, climate organisations are currently conducting most of the research into climate change and the relationship between such change and tourism.

Economic aspects

Only 20% of the respondents considered tourism to be a significant contributor to their country's economy, and this could be a factor which might have influenced responses to the letter of enquiry. Responses to the letter of enquiry were received most often from countries where tourism is an important economic activity, and where tourist arrivals are between 1 and 10 million annually (60% response rate). Organisations that fall in the 100,000 to 1 million tourist arrival range were the least likely to respond (29% response rate) and had the lowest rate of answering the questions (6%). The lack of response from this group may be attributable to lack of funds, since the average GNP of countries in the 100,000 to 1 million arrivals category (US$ 13,617m) is almost 10 times lower than the average GNP of the countries in the 1 to 10 million arrivals category (US$ 116,139m).

Analyses of replies revealed that climate change research is more likely to be undertaken (26.2%) in countries with more than 10 million tourist arrivals annually, and is least (8.8%) in countries with fewer than 100,000 annual tourist arrivals. This suggests that countries with the highest volume of tourist traffic are the ones most interested in conducting research into climate change and tourism and, possibly, the most able to conduct such research.

The number of responses to the letter of enquiry was highest from countries whose GNP per person was under US$ 5,000 because there was a large number of countries in this situation. However, response rates were highest from the higher GNP per person countries. In fact, the response rate decreased as the GNP per person decreased, from 45.4% in the >$10,000 category down to 26.6% in the

<$1,000 category. One can speculate that the greater response rate was obtained from higher income locations because the infrastructure for disseminating information was more likely to have been present than in countries with a low GNP per person. However, this interpretation cannot be verified from the data available.

No significant differences were found between GNP per person and perceived significance of climate as a determinant of tourism, or in the perceived likelihood of climate change becoming a significant issue for tourism. In addition, no clear pattern emerged on the frequency of reporting of research on climate change in association with GNP per person. This suggests that the economic standing of a country need not be a major determinant of ability to conduct research into the implications of climate change.

Some examples

A number of respondents elaborated on the implications of climate change research for tourism and recreation. They can be grouped into three categories: those concerned with impacts on winter tourism, those concerned with impact on summer activities, and those concerned with both.

Not unexpectedly, respondents from countries that rely on sun–sand–sea tourism, such as Tonga and the Bahamas, expressed concern over possible rise in sea level, while those from mountainous countries, such as Chile, New Zealand, and Switzerland, showed more concern over temperature rise and shifting precipitation patterns, which could affect winter skiing. Other countries, like Turkey and Czechoslovakia, were concerned with the possible effects of climate change on both winter and summer tourism.

Impacts on summer tourism

The respondent from the Bahamas indicated the country's vulnerability to sea level rise since it consists of many low-lying islands. The potential effects include inundation of the islands, and contamination of freshwater aquifers, which could lead to water shortages. The implications of such effects reach far beyond tourism to encompass agriculture, health and other concerns which, in turn, have implications for tourism. It was suggested that possible loss of beaches is, perhaps, a less devastating effect since it could be compensated for by diversification and development of other tourist attractions, or by human intervention to preserve and maintain beaches. The loss of fresh water, however, could be debilitating to the tourism industry. A reduced supply of fresh water could result in the introduction of restrictions on types of tourism practised and limits on the number of tourists permitted on the islands.

The Tongan respondent was more concerned with the possibility of increased frequency and magnitude of storms and cyclones, as well as the increased frequency of droughts. Whereas an increase in the storm season could negatively affect the tourism industry, longer periods of rainless weather (or drought) could affect tourism positively, and could be promoted as one of the benefits of vacationing in Tonga. Unfortunately, drought conditions would have a negative effect on other aspects of life in Tonga, such as agriculture, which, in turn, could have an indirect negative effect on tourism.

Impacts on winter tourism

Chile's studies indicate that the ski industry will be affected because of the expected higher temperatures and shifting precipitation patterns. There is concern that, due to higher temperatures, precipitation might fall as rain in seasons and in areas where it had previously fallen as snow. This could push the snowline higher, increasing the risk of poor snow cover at lower elevation ski areas and decrease the length of the ski season in all areas. Hill operators at lower elevations may be forced to close, and even those areas operating at higher altitude may be in danger of losing their investments because of the shortened season.

The same concerns were expressed from New Zealand — that the snowline could recede by about 400 m, and that the ski season could be greatly shortened. This would make ski area operations at low altitude ski fields uneconomical. Nevertheless, there is a possibility that climate change may positively affect the ski industry in New Zealand because skiing in Australia, which takes place at lower elevations than in New Zealand, could be eliminated:

> We are looking at the snowline rising by about 400 m; this will significantly impact on some of the ski fields at lower elevations. What this might mean to the ski industry is that some ski fields may become uneconomic to operate and therefore commercial ventures may well have to look at relocation at higher altitudes... Evidence from Australia clearly indicates that any warming there may make all of their ski fields uneconomic; if we extend this further this may have a positive impact on the ski industry in New Zealand. (Survey response, 1989)

A respondent from Switzerland expressed less concern about the receding snowline than about a possible shift in weather patterns, which could preclude skiing during the most lucrative period for Northern Hemisphere ski hill operators: the Christmas Holiday period. Switzerland would be more adversely affected by changes in the timing of snowfall than New Zealand or Australia because Christmas falls at the beginning of its ski season, while in the Southern Hemisphere, Christmas falls during the summer. Research from Switzerland suggests that climate change may reduce the amount of water available during the winter months while, at the same time, more demands may be placed on the water supply for artificial snowmaking. Climate change may also alter the size and distribution of glaciers. If there is less snowfall, the glaciers could shrink, threatening the summer glacier-skiing industry. The Swiss respondent felt that the loss of ski tourism (both winter and summer skiing) could not be compensated for by other summer activities.

Impacts on winter and summer tourism

Czech research indicates that winters in Czechoslovakia will generally become more oceanic in nature, especially in the lowlands, with higher temperatures and greater precipitation. The higher temperatures will force the snowline to retreat to above 1200 m, and cause the snow conditions to deteriorate which, in turn, could shorten the winter recreation season. Summers will be longer, warmer, and sunnier. The water temperature is expected to rise between 1 and 3 C, but lake and sea levels are predicted to drop because of a diminished moisture-storage

capacity (as snow) in the mountains, and because of a higher evaporation rate. This will affect sailing routes, and could make forest fires more frequent and difficult to combat. The quality of summer recreational activities, such as hiking and camping, may decline because coniferous trees will gradually be replaced by less aromatic deciduous trees, and insects will likely become more numerous.

The outlook for Turkey, according to another respondent, is that losses in one area of the country will be offset by gains in other areas. Possible losses in coastal tourism on the Mediterranean and the southern Aegean could be counterbalanced by more favourable conditions for tourism in the northern Aegean and the Black Sea. Summer tourism would not be eliminated, but significant costs would be incurred in relocating tourism infrastructure from one area to the other. The loss may be partially compensated by habitat shifts which may make lakeside and nature tourism more feasible. Although the ski season in western Anatolia may be shortened, other ski areas in eastern Anatolia may benefit.

While each statement is specific to a particular country, together they reveal many of the effects climate change may have on tourism and recreation. These examples are drawn from a diversity of climatological situations, ranging from tropical to temperate, and each country will have its own climatic shifts and variations to which it must adapt. Tourism also is a broad phenomenon, encompassing a wide variety of activities, on which the examples have only touched. Great climatological diversity, coupled with the variety of types of tourism, as well as each country's ability to respond to changing conditions, make generalisation difficult. Each country will have to assess its own needs and opportunities based on changing supply and demand relationships, its present tourism infrastructure, the changes that may affect that infrastructure, and its goals for its tourism industry in the future.

While climate is only one among many factors with implications for tourism, sufficient evidence has been provided to indicate that climate change merits attention in such deliberations. However, the survey results indicate that, to date, the possibility of climate change and their consequences for tourism, have not received the consideration which they deserve.

Conclusion

Consequences of climate change could include the alteration of natural features, making tourism less attractive than previously in a region (e.g. the loss of beaches in sun–sand–sea destination areas); the shifting of the seasons making certain activities infeasible in peak periods (e.g. insufficient snowfall to allow skiing during the Christmas Holiday period in parts of the Northern Hemisphere); and the alteration of habitats, making some activities less enjoyable than previously (e.g. increase of obnoxious pests, such as mosquitoes, detracting from hiking and camping). It is likely that such conditions will affect the types and amounts of tourism practised in the future. This appears to be more widely-recognised among the climate fraternity than among members of tourism organisations, and awareness appears to be greater among those whose countries depend on tourism for economic stability and prosperity (i.e. countries with high numbers of tourist arrivals and countries with modest GNP per person).

Although a link seems to exist between high tourist arrivals, high GNP per

person, and survey response rates, economic standing alone does not appear to have much influence on a country's ability and willingness to conduct research on climate change and tourism.

Understanding of the relationship between climate change and tourism is still in its infancy. Little research has been undertaken on climate change and tourism, and that which exists is more likely to have been undertaken by climatologists than by tourism experts. There is general international awareness and agreement that climate change may have repercussions on the tourism industry. More awareness, research, and policy analysis are necessary, however, to reduce uncertainties, further understanding, assess implications and enable the tourism industry to adapt to changing circumstances.

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