

TOURISM, RECREATION AND CLIMATE CHANGE: THE ROLE OF PROTECTED AREAS AND BIOSPHERE RESERVES

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ABSTRACT: Tourism, in its many forms, has been stated by the United Nations to be the world's largest industry. It is a world-wide activity, important in both developing and industrialized countries. It provides a significant part of the economy of many countries and is an important educational, physical and psychological element in the life of millions of people. A large portion of tourist activities is oriented toward experiencing nature, and the phenomena that are attractive to tourists are commonly sensitive to climate change. Many popular outdoor recreation activities depend upon environmental conditions remaining within a fairly narrow range of those prevalent at present. Any significant change of climate could have serious consequences for tourism and outdoor recreation. The large investments in facilities to support tourism or outdoor recreation may be at serious risk from small climate changes likely in store. Similarly, the values which justify protected natural areas in the long-term public interest and are attractive to tourists may be particularly sensitive to changes in climate, and raise difficult long-term policy questions. Adaptation of the tourist and recreation industry to climate change will require increased knowledge of climatic, hydrological, and ecosystem dynamics at appropriate scales to identify and appraise the sensitivity of tourist destinations and outdoor recreation sites. Ecotourism, and the programmes of Biosphere Reserves, will benefit and increase their usefulness, if they deliberately include climate change as a factor in their activities. Protected areas should include climatic information at appropriate scales in their data-gathering activities, should expand programmes of research on the sensitivities and responses of ecosystems, and should include the likelihood of changed conditions due to climate change in their forward planning.

Keywords: biosphere reserves, climate change, ecotourism, protected areas

1. Introduction

One aspect of the increasing prosperity of citizens in many countries, both those industrially developed and those undergoing development, is an increasing amount of free time and some disposable wealth which individuals can use for their personal satisfaction. This development has led to an enormous increase in tourist travel. Tourism is no longer the activity of relatively few well-to-do eccentrics or adventurers, but today involves persons from all walks of life and from many cultures. Similarly, there has been a growth and broad social acceptance of individual active "outdoor" recreation.

Tourism and outdoor recreation, and the investments in facilities and the provision of services that make these activities possible, have become important factors in the economies of many countries. They have provided some important psychological, educational, and spiritual factors that affect the sense of country, of belonging, and the values of citizens and societies.

A large proportion of tourist activities, both international and domestic, is directly or indirectly oriented toward “Nature” or natural phenomena. The desire to observe or visit natural features, to be where wild creatures are, to escape temporarily from modern stresses imposed by technology, commerce, and human conflicts into a setting not exclusively dominated by human actions is a strong instinct in many people. It is also a major incentive for at least half of the tourist activities in the last few decades.

These aspects of “Nature” that underlie much of modern tourism are the product of natural physiographic processes and biological/ecological evolution under the recent and current climate. Any important change in climate will have an effect on these natural features and thus on tourism. In a similar way, a great deal of the popular outdoor recreational activities – visits to beaches, sailing, canoeing and kayaking, wilderness hiking, mountain-climbing, skiing, recreational fishing and hunting, bird-watching – are dependent on climate-sensitive environmental conditions. Even small changes in regional or local climates can have profound effects on such activities.

This paper will review some aspects of tourism and outdoor recreation as they might be affected by climate changes that are likely to occur in the near future and the role played by protected areas and biosphere reserves. An awareness of the possible effects of climate change may help reduce some of the disadvantages and point ways for tourism and outdoor activities to benefit from changes to come.

These comments will touch briefly on:

- Some characteristics of protected natural areas and their relation to climate;
- Some of the different kinds of tourism and outdoor recreation and how they may be sensitive to changes in climate;

- Some effects that climate change may have on tourism, outdoor recreation, and protected areas;
- Biosphere reserves and the contribution they can make; and
- Conclude with some issues and needs for the adaptation of tourism to changes in climate.

2. Protected Natural Areas

About one hundred and thirty years ago, some influential citizens realized that the natural resources and indeed the natural landscapes which produced products used by humans had values in themselves quite aside from their immediate products, and that these values were being progressively and irrevocably destroyed by human exploitation. They persuaded their governments to “set aside” tracts of land that had particular scenic or natural aesthetic or cultural value. They protected these lands by law, from private ownership or exploitation. A strong element in this development was the expectation that non-exploitive tourism on these public lands would preserve and enhance their value to the nation. Such increased value, in perpetuity, would more than offset the loss to the economy from the withdrawal of these lands and their products from private commerce. This was the beginning of “national parks”.

From its origins in North America, the concept of natural parks and protected areas has spread throughout the world. There is now a vast array of protected areas - national, sub-national and local parks, conservation areas, nature reserves of one kind or another - in more than 140 countries. Tourism is an important or dominant activity in most although a few are strictly wilderness areas where humans are excluded except through special permit. In almost all of the protected natural areas throughout the world, however, the central purpose is an appreciation of the value of natural features and natural processes, and recognition of the benefit to society of maintaining that value for the future. The natural World Heritage Sites recognized by UNESCO are demonstrations of the international importance of these intrinsic values.

The natural characteristics that have led to the selection of particular places as “protected areas” are of course characteristics that developed under the recent and present climate regime. A change in the climate regime will in some way affect the natural characteristics of the selected area and quite possibly change the values for which the area was protected. As tourism

plays a large part in the operation and valuation of many protected areas, it is of interest to consider some of the issues of tourism, protected areas, and climate change together.

3. Modern Tourism

In the last two decades, tourism has grown to such an extent that in the year 2000 it was stated by the United Nations to be the world's largest industry in terms of worldwide export earnings (WTO, 2000; di Castri and Balaji, 2002, p. 16; UNESCO, 2002, p. 67). It is also the industry most widespread throughout the world, from least-developed to highly industrialized countries, from small rural enterprises to activities of large multi-national tourist organizations. Tourism accounts for more than 50 per cent of the capital flow from industrialized to developing countries (WTO, 2000). The World Tourism Organization (WTO) reports that the number of Persons listed as "arrivals" at WTO member facilities has grown from 25 million in 1950 to 700 million in the year 2000. Expenditures by "international" tourists in the year 2000 is estimated at USD455 billion. It has been speculated that un-organized, unreported domestic or non-national tourism is, in aggregate, just as extensive as that reported by the WTO.

Clearly, tourism in the early 21st century is big business. As di Castri and Balaji (2002) point out, the natural and cultural environment is the main resource for tourism, everywhere in the world. And a large portion of that resource is very climate-sensitive.

Tourism related to nature takes many forms including organized mass tourism, adventure tourism, ecotourism and outdoor recreation.

Organized mass tourism, exemplified by sophisticated large tourist ship cruises or organized bus tours, takes large numbers of people on scheduled itineraries, advertised in advance and with facilities arranged beforehand, to pre-selected sites that are well known as "tourist" destinations. The most popular destinations are places of spectacular scenery, outstanding wild animal habitat, or places where the scenery and environment are distinctly different from the home environment of most of the tourists. The tourists themselves are for the most part passive observers, recipients of information. They are often enriched and educated by what they have observed, but remain detached from it.

Adventure tourism, in its purest form, involves the tourist directly into the characteristics and variations of the environment, including the climate, which may be seen as challenges and part of the attraction to the tourist. In such activities, as for example in advanced mountaineering or small boat transit of the Northwest Passage, the experience of being in competition with natural forces is an important goal in itself, as important as the attainment of any physical destination or quarry. There are many milder forms of adventure tourism, where knowledgeable people, preferably in small groups, deliberately seek out particular habitats or natural features, such as those who specialize in alpine flowers, scuba dive on coral reefs, or take part in extended hiking or trail riding holidays.

With increasing awareness in many societies of the need for conscious attention to the relationships of humans to the natural world, there has arisen in the last few years a new kind of tourism - *ecotourism*. Ecotourism seeks to use travel to selected places as a means of learning about nature and ecology, and to develop understandings that can change societal awareness and behaviour in ways that lessen the disruptive impact of human activities in natural systems. There is no single satisfactory definition of ecotourism, but it involves all tourism in which the main motivation of the individual tourists is conscious observation and appreciation of nature and its workings. In ecotourism, education and learning is an essential part of the experience. Ecotourism avoids negative impacts on the natural and socio-cultural environment, and thus fosters increasing understanding of the necessity for protecting and conserving natural values.

Recognising the importance of this development of a kind of tourism that has an orientation toward understanding and protecting the environment, the United Nations General Assembly proclaimed the year 2002 as the *International Year of Ecotourism* (UNGA/A/RES/53/200). Principal events to mark the year were the World Ecotourism Summit organized by World Tourism Organization and the United Nations Environment Programme, held in Quebec City, Canada, attended by more than 1200 participants from 130 countries; and an international workshop on Ecotourism and Sustainable Development in Biosphere Reserves, also held in Quebec City, organized by the UNESCO Man and the Biosphere Programme (MAB). These activities produced declarations and recommendations (UNESCO/MAB, 2002) that are intended to encourage tourism to learn from nature, and to facilitate the growth of responsibility to live in harmony with it. But they failed to recognize

the need for tourism to adapt to natural changes caused by changes in the climate or other environmental factors.

A very important but somewhat different kind of human activities, which are related to and often include tourism, can loosely be called *outdoor recreation*. In these activities, "Nature" is not the object of the travel or visitation, but natural conditions provide the setting or medium through which the participant achieves satisfaction through exercise, challenge, relaxation, or social enjoyment. Such activities have been characteristic of all civilizations throughout history. They range from simple family picnics in the woods to mass holidays at the beach; from week-end fly-fishing to round-the-world sailing races. The facilities and investments connected with them range from multi-million-dollar ski resorts and beach developments to exclusive spas at hot springs and to manufacturers of high-tech mountain bicycles, yachts, and kayaks. In all of these activities, the direct contact between humans and the natural environment is an essential part of the experience. Changes in climate, affecting natural environmental conditions, will have subtle or profound effects on outdoor recreation.

4. Response of Natural Systems to Climate Change

The effects on landscapes and natural systems due to changes in climate are common knowledge in a general way and for the most part well studied. The atmospheric drivers of these changes include:

- changes in mean temperatures and extreme temperatures, and in particular changes in the timing, throughout the year, and in the intensity of seasonal changes of temperature;
- changes in precipitation, in the variability and intensity of precipitation events and their timing throughout the year; and
- changes in the geographical patterns of temperature and precipitation regimes and in the stability or variability of such patterns on a range of space scales.

These basic changes in the dynamics of the atmospheric environment on local or regional scales lead to the familiar environmental changes that people associate with climate change such as changes in winds, storm patterns, in the duration, timing, and intensity of wet and dry periods; and changes in hydrology, run-off and soil moisture; floods, droughts; duration,

extent and thickness of snow cover; freeze-up and break-up of rivers and lakes, growth and decay of glaciers, and sea ice.

Such changes in the physical environment in turn lead to changes and adaptations in the natural biological world. The response of natural systems to climate change is rarely the result of a single environmental stress because of the complexity of biological systems and the inter-connectedness of ecological relationships. In most cases, the response reflects the influence of a combination of different but related changes. The adaptation responses of different components of an ecosystem typically differ widely in timing and scope. Small changes in climate may have considerable ecological consequences because the different components are interdependent, even though they respond differently to imposed stress.

There is reason for concern that climate changes in the near future, which individually may not be great in themselves, may lead to considerable disruption of ecosystems in many parts of the world. The changes will be manifest not only in changes in abundance of characteristic plants or animals but more profoundly and subtly in changes in the period or timing of recurring natural events – the phenology – like the flowering of plants, the appearance of insects, or the migration of birds. The changes will be seen ultimately in the species composition of plant and animal communities in the area. Such changes in environmental conditions and ecosystems could have profound effects on tourism, outdoor recreation, and the characteristics and value of protected areas.

5. Examples of the Effects of Climate Change on Tourism Values, Recreational Activities, and Protected Areas

The variety of nature-sensitive tourist activities is so great that an attempt to group those features that are likely to be particularly affected by rapid change of climate would be cumbersome and have little meaning. Some examples may serve to show the need to give thought to climate-sensitive factors important to tourism.

In general, nature-seeking tourists tend to go to places that are unusual, which are outstanding examples of "Nature" at its most dramatic, or pleasing to modern conventions of beauty or spiritual satisfaction. On a world basis, the most popular tourist destinations are in mountains, on seacoasts or small

islands. These are also areas where the physiography and the biological systems are particularly sensitive to climate change. Mountain scenery with glaciers or snow and lakes, waterfalls, remnants of once-mighty forests, sand beaches not conspicuously altered by humans, coral atolls are among the world's most sought-after tourist destinations. All of these owe their attractiveness to a dynamic balance between physical and chemical processes each of which is sensitive to changes in climate.

Organized mass tourism must develop destinations where large numbers of people can observe and enjoy nature, and in a passive way briefly experience it as a whole before moving on to the next destination, without impairing its value for the next group of tourists. To provide satisfaction to each individual within large numbers of tourists in a dependable manner, the locations chosen and the activities conducted there must be such that the experience is positive regardless of the normal variations in weather, water levels, or biological activity. Small changes in climate may influence the delicate environmental/ecological balances that provide tourist satisfaction and support the tourism enterprises. The changes in natural conditions as a result of changes in climate will have an effect on the length of the "tourist season" which is important to tour operators, and be a factor in the relative attractiveness of one tourist destination compared to another in a different region. For example, Canada has an international tourist trade deficit that was estimated to be \$2.1 billion in the year 2000 (Canadian Tourism Commission, 2001), due largely to Canadian tourists going to warmer lower latitudes during the winter; Scott and McBoyle (2001) concluded that this deficit could diminish considerably under conditions of climate change to warmer Canadian winters.

Adventure tourism, which involves smaller numbers of people but is an activity where the participants directly experience the natural world, is often climate-sensitive in a different way. The effect of climate change may be positive or negative. In its more strenuous forms, such as advanced mountaineering or long-distance sea-kayaking, the different physical conditions resulting from climate changes may add to the challenges and, ultimately, to the satisfaction to the tourist. The increasingly broken state of alpine glaciers due to recent climatic warming, or the increasing incidence of violent storms in waters tempting to amateur rough-weather sailors are examples. In the milder and more popular forms of adventure tourism, such as canoeing, hiking, ski touring or wilderness camping, the changes in climate

that seem plausible in the near future may have an important influence through changes in water levels in streams and lakes, changes in the timing and severity of summer or winter seasonal conditions, in snowfall or the proportion of clear and stormy days. An important aspect may be changes in the richness of the wilderness experience because natural habitats and wildlife are stressed or impoverished by changes in forage richness, in insect infestations, etc. Such changes may persuade the tourist to simply not come, or to go elsewhere (Lise and Tol, 2002).

Some forms of popular outdoor recreation are likely to be significantly affected by climate change in the near future. Perhaps the most dramatic example is that of ski resorts. Recreational skiing, centred mainly in sophisticated modern resorts, has grown in the last forty years to a multi-billion-dollar business in Europe, North America, Japan, Australia, and New Zealand. Switzerland alone has 230 fully developed ski resorts, and Japan has 61. Many of these resorts are a principal source of income for the mountain communities in which they are located. A recent study (UNEP, 2003) concluded that more than half the established ski resorts throughout the world are in a seriously vulnerable position for survival in face of likely weather and climate trends (Toepfer, 2003; Radford and Wilson, 2003). These conclusions have been supported by studies or estimates of skiing areas in many parts of the world, which show contraction or elimination of recreational skiing as a consequence of projected climate change (e.g. Lamothe and Periard, 1988). Clearly, if there is not enough snow and it does not stay long enough during the winter sport season, skiing as a popular activity in areas where it is presently practiced will decline or disappear. Clearly, other popular outdoor activities that depend on cold winter conditions, such as ice-fishing and motorized snowmobiling, which have hundreds of thousands of devotees and are major factors in the economy of some areas, will be impacted severely by even minor changes in winter climate (Scott et al., 2002).

Ecotourism, by its nature, should be able to observe the environmental and ecological effects of changes in climate and be enriched by them. The changes and their consequences should serve as examples or models through which the ecotourist can learn, and to increase understanding of the dynamic aspects of the natural world in which we live. This kind of tourism, to be successful, requires a good degree of knowledge about environmental characteristics and processes, and adequate advance preparation by both tour leaders and tourists. It should be undertaken by small groups, with time

for adequate detailed observation or study by each participant (UNESCO/MAB, 2002). Ideally, the information from each ecotourism event should be placed into the context of wider environmental and ecological information and changes. In this way, ecotourism itself can broaden understanding of the importance and consequences of climate change in the area visited. This is a more difficult, but more rewarding, form of tourism.

6. Biosphere Reserves

An international mechanism that could be useful for obtaining and sharing information on climate change and its effects on tourism is the World Network of Biospheres of the Man and the Biosphere Programme (MAB) of the United Nations Educational, Scientific, and Cultural Organization UNESCO.

UNESCO/MAB Biosphere Reserves are selected areas of terrestrial and coastal landscapes and ecosystems that are recognized by UNESCO as places where the relationship of the natural biosphere to on-going human activities can be particularly well studied, where there is good scientific information and continuing research, where there is a strong incentive or determination by the local citizens to maintain natural values, and cooperation or support from businesses and all levels of government.. Biosphere Reserves should not only be justified in themselves, but can be models or demonstrations of how progress toward sustainable life styles and use of natural resources can be achieved without diminishing environmental quality or productivity (UNESCO, 2002).

At the beginning of 2004, there were 425 UNESCO Biosphere Reserves, in 95 countries, constituting a World Network that includes examples of all major terrestrial and coastal ecosystems except those of Antarctica. China has 23 Biosphere Reserves; Canada has 12. An important feature of the World Network system is the opportunity for direct cooperation and sharing of information or research programmes between Biosphere Reserves in different countries but who have similar issues. There is good opportunity for such sharing and cooperation between Chinese and Canadian Biosphere Reserves. In 1996 a delegation of representatives from Biosphere Reserves and the MAB programme in China visited three Biosphere Reserves in Canada and other protected areas, and much useful information was exchanged (Birtch, 1997). This has been followed by visits of Canadian

National Parks officers to Yunnan, China (Welch, 2004). An important area for future cooperation and sharing of information could be the issues related to climate change, as manifested in different Biosphere Reserves in the two countries.

An introductory research study to assemble data and evidence of climate changes in each of Canada's Biosphere Reserves was undertaken by the Canadian Biosphere Reserves Association, supported by Environment Canada, in 1998-99 (Hamilton et al, 2001). This project, which was aimed at providing information and incentives from Biosphere Reserves to help communities in the area understand and deal with the implications of climate change, could be a start for international cooperative activity in this subject. Tourism is an important activity in many Biosphere Reserves (UNESCO/MAB, 2002; Di Castri and Balaji, 2002), and in some areas is a major contributor to the regional economy. In the Juizhaigou Biosphere Reserve in Sichuan province, China, for example, where the number of tourists increased from 181,000 in 1997 to 580,000 in 2000, the revenue from tourism has increased the per capita income for the whole province five-fold from that in 1995 to "six times the average income of farmers in Sichuan province" (Han, 2001). The taxes from the Biosphere Reserve constituted 80 percent of the taxes collected by the county government (UNESCO, 2002). In its contribution to the United Nations World Summit on Sustainable Development in Johannesburg in 2002, Canadian Biosphere Reserves developed a series of "cooperation plans" describing the multi-faceted contribution of each Biosphere Reserve to sustainable development, and in each example noted tourism and the investment in recreational facilities as an important factor in both the economy and the environment (CBRA, 2002).

7. Conclusions

Adaptation of tourism to the changed conditions as a result of climate change will raise many problems. Some of the responses will be automatic and inevitable - tourists just won't go any more to places that don't satisfy them. The results for the tourist industry could be devastating in some instances, and result in "overloading" with decline in tourist appeal in others. Very careful consideration must be given by the industry to planning, investment, and allowance for variations because the changes in environmental conditions are outside the immediate control of the tourist business.

The most important first need is more thorough and focussed information on environmental, hydrological, and climate information at the sub-regional or local level in areas important to the tourist industry. This is needed together with information about how the ecosystems are sensitive to climate and hydrology, particularly those vegetative ecosystems and the fauna that together form the basis of much of the "Nature" appeal to tourists. This will require specific data-gathering and in some cases dedicated research, in different areas important to tourism (Scott, 2003). The task is enormous, but without this information, attempts to adapt to the changes likely in store will be largely speculative. Techniques such as the "tourism climate index" as developed by Scott, McBoyle and others (Scott and McBoyle 2001) can be very pertinent. There is no recent or historical precedent or experience for the environmental changes that may happen in the near future, nor for the way those changes could affect the discretionary spending of the people who today are tourists.

A second important need is to increase the awareness and knowledge of climate change and its consequences as it relates to tourism and outdoor recreation. Businesses related to tourism must factor climate change into planning and investment, not as an "unknown" or 'contingency", but as an integral element based on continually improving knowledge. This awareness and knowledge also includes an opportunity to identify areas and situations that could become more attractive tourist or recreational destinations with changes in climate potentially, such as higher-altitude ski areas or new routes for recreational boating. And those sectors of the public who are interested in nature and tourism, those who are the potential tourists and customers, or who invest in private recreational cottages, need to receive more balanced information about climate changes and the implications of such changes on the environment and thus on the landscape and the vegetation, the animals, birds and insects, and other things.

Climate change and its consequences are subjects that easily become overdramatized in popular literature, leading to exaggerated predictions, usually dire, of the future effects; and this tendency inevitably leads to loss of credibility or trivializing of the subject. Partial or incorrect information harms tourism and distorts public understanding of a very important topic. It is a responsibility of the tourism industry and all connected with it to become well-informed about issues of climate change and to help the public cultivate a balanced perspective about it.

Protected areas, themselves needing to cope with many issues posed by changes in climate with regard to the ecosystems and natural features can play a very significant role in helping tourism adapt to climate change. The long-term responsibilities of national parks and other protected areas to assess natural values and monitor changes in them, to disseminate information to the public about the importance of the role of Nature and natural process to the life of every citizen and to the health and well-being of the nation, as well as the fact that tourism itself is an important activity in nearly all of them, make these places key players in the sensible adaptation of tourism to changed conditions brought about by climate change.

The National Parks Service in Canada is developing an integrated source of climatic and environmental data, some of which goes back one hundred years. Biological inventories, while still incomplete, are being compiled and organized; and research is underway to identify and fill gaps in knowledge about the sensitivities of species and ecosystems to environmental disturbance (Welch, 2004). Many other protected areas in Canada are taking steps toward the same objectives.

Information is being exchanged with other protected areas around the world, and international bodies, such as the International Federation of Parks and Protected Areas (IFPPA) and the World Conservation Union (IUCN), and the Conferences of Parties (COP) of the United Nations Convention on Biological Diversity are also beginning to focus on issues related to climate change. These developments will help provide the scientific and communication basis essential if tourism policies, investments, and the general public awareness is to adjust successfully to new conditions caused by changes in climate.

Biosphere Reserves can play a key role. All Biosphere Reserves have protected lands – parks or their equivalent – as core areas, and in most, tourism is an important activity. Biosphere Reserves are in a unique position to study and monitor the effects of climate change on human activities as well as on natural systems, and to translate the environmental and ecological information from changes in the core protected areas to the wider world of ordinary human affairs. Not least of these opportunities is that provided by tourism, and especially ecotourism. A very large proportion of the tourists in protected areas has a “base” in, or is serviced by, activities and investments in the outer zones of Biosphere Reserves. Thus, information and understandings from the Biosphere Reserves as a whole can be important, and

indeed lead the way, to successful adaptation of tourist activities and outdoor recreation to forthcoming changes in climate.

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