

Research Notes & Reports

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Climate Change, Tourism and the IPCC

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The IPCC and Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organisation and the United Nations Environment Programme in 1988 to evaluate the scientific information on climate change, to assess the environmental and socio-economic impacts of climate change and to suggest response strategies. The first assessment was completed in 1990 and served as the basis for negotiating the UN Framework Convention on Climate Change. In spite of the international importance of tourism, its significance in world trade, and its potential vulnerability to climate change and variability, tourism was not mentioned in the first assessment report. Since it was based on a compilation and evaluation of existing knowledge, in large part this was a reflection of the paucity of attention given by tourism researchers to climate and, similarly, by climatologists to tourism.

The publication of a second assessment in 1996 provides the opportunity to examine if this situation has changed in the intervening years. The second assessment consists of three reports (Houghton *et al.*, 1996; Watson *et al.*, 1996; Bruce and Haites, 1996) which constitute an update of the first assessment, albeit with some reorganisation of topics as well as the inclusion of a new subject area concerning technical issues related to the socio-economic aspects of climate change. Together the three reports consist of almost 2,000 pages of text about climate change which have been based upon the published literature and reviewed by experts and governmental representatives. More than 2,000 experts world-wide participated in drafting and reviewing the documents. As such, like its predecessor, the volumes constitute a standard reference work which will be widely used by those with a serious interest in climate change and its implications.

Each volume contains summaries as well as heavily-referenced text with numerous graphs, tables and diagrams. The first volume discusses the science of climate

change. It is stated that "the balance of evidence suggests a discernible human influence on global climate". However, projections of future climate warming are less extreme than those in the first assessment. This is attributable to anthropogenic aerosols which tend to produce negative radiative forcings and thus work in an opposite direction to greenhouse gases with respect to climate warming. At the same time, it is acknowledged that there are many uncertainties which limit the ability to detect and project climate change, and make it difficult to quantify the human influence on global climate and to distinguish the signal of human-induced change from the "noise" of natural variability.

The second volume is concerned with analyses of the impacts of climate change and associated adaptations and mitigation strategies. It is pointed out that human-induced climate change exerts additional strain on many ecological and socio-economic systems which are already under stress from other causes. Most systems are sensitive to climate change but impacts are difficult to quantify. Successful adaptation depends upon technological advances, institutional arrangements, availability of financing and information exchange, and vulnerability to climate change increases as adaptive capacity decreases. Assessments of impacts, adaptation and mitigation options are made for a wide variety of terrestrial and aquatic ecosystems as well as for hydrology and water resources management, food, industrial production, human settlements and human health.

The third volume addresses economic and social dimensions of climate change. It is particularly concerned with the development of appropriate decision-making frameworks and mechanisms for addressing climate change, issues of equity, the contribution of economic analyses to informed policy and decision making, and the development of integrated assessments that will provide insights that would not normally be observed through traditional disciplinary research.

Space constraints mean that it is not possible here to give more than an intimation of the wealth of information which is to be found in these reports. They clearly represent the state of the art of climate change research and, as such, they constitute an indispensable source-book for anyone with a serious interest in climate change. However, the global orientation of the works means that their findings and suggestions cannot readily be transposed to specific places.

Purpose and Methods

The discussion in this communication concentrates on the contents of volume two of the IPCC assessment which, as indicated above, focuses upon impacts (Watson *et al.*, 1996). In particular, it examines the possible consequences of climate change for tourism as revealed in the IPCC documentation. It is based on a careful reading and abstraction of references to tourism and related topics such as recreation and parks. This discussion relies heavily on direct quotations and paraphrases of sections of the report so that the flavour of the presentation can be revealed accurately. As such, it indicates both the state of knowledge and the importance attached to climate change research related to tourism. However, no attempt is made here to substantiate the IPCC statements: the reader is referred to the original volume for citations to supporting documentation.

Scientific-Technical Analyses Pertaining to Tourism

The "Resources required for tourism are climate-dependent — that is, their availability may be affected in the short and long term by variability, extremes, and shifts in climatic means. These resources include the landscape of natural and anthropogenically influenced ecosystems and climatic conditions that are suitable for specific activities" (p. 205). Warm springs, falls and winters, the absence of a rainy season, and very hot, dry summers were found to have a favourable impact on tourism but typhoons, cool and rainy summers, extended periods of rain in the early summer, heavy snow, and cool springs were found to create unfavourable conditions for tourism and recreation.

Mountains and Skiing

The IPCC review begins with a discussion of the possible consequences of climate change for different environmental settings. It is stated that: "In relatively recent decades, tourism has emerged as a significant income source in mountain regions, as well as a major source of environmental stress" (p. 196). Land use pressures are increasing because of competition between parks and protected areas, mineral extraction and processing, recreation development, and market-oriented agriculture,

forestry, and livestock grazing (p. 196). It is suggested that "a warmer climate will reduce the extent and volume of glaciers and the extent of permafrost and seasonal snow cover" (p. 30). This will cause precipitation changes, affecting soil stability and a range of socio-economic activities (e.g. agriculture, tourism, hydropower generation and logging). "Recreational activities, which are increasingly important economically to many regions, also face likely disruptions" (p. 30).

It is recognised that tourism is an increasingly important component of mountain economies, but it is not an easily defined economic sector although it will be highly influenced by the impacts of climate change, as well as other factors (p. 205). At the same time, it is indicated that tourism tends to be popular in tropical and semi-arid climates because mountain areas are usually wet, cool, and inhospitable for human dwelling and commercial cultivation.

Impacts of climate change on tourism in mountain areas are divided into two types: direct and indirect. Direct impacts result from changes in the atmospheric resources necessary for specific activities (e.g. clean air, snow). Indirect impacts result from direct impacts and from wider-scale socio-economic changes (e.g. fuel prices and patterns of demand for specific activities or destinations.) "Various indirect impacts may also derive from changes in mountain landscape — the 'capital' of tourism — which might lead potential tourists to perceive them as less attractive, and consequently to seek out new locations" (p. 205). As climates change, new competition may result from other tourism locations.

The implications of climate change for skiing receive considerable discussion (p. 205). A prerequisite for such commercially important activities as skiing is an extended snow cover of sufficient depth. Despite increases in precipitation, warming will decrease the cover, depth and quality of snow, and impair winter tourism in most alpine countries. It is suggested that skiing is sensitive to small climatic changes through changes in the length of the operating season and that winters with little snow can be economically devastating to mountain communities that rely on tourism (p. 206). For this reason, socio-economic disruption could result in communities that have invested heavily in the ski industry. It is estimated that ski industry losses from projected warming could be \$1.7 billion annually in the US (p. 259). An effective CO₂ doubling could eliminate the downhill ski season with an annual loss of \$36.55 million in the South Georgian Bay Region, Ontario, Canada. With a 4-5°C temperature rise throughout the downhill skiing season in Quebec, a 50-70% decrease in

the number of ski days is projected in Southern Quebec. A 40-50% reduction in the number of ski days is projected for ski resorts equipped with snow-making devices.

Although some countries will retain snow despite climate change because they are sufficiently high in elevation, less snow and fewer glaciers on mountains will diminish the quality of many alpine vistas because scenic appeal depends upon their presence in the landscape. On the other hand, if climatic conditions remain within appropriate bounds, negative economic impacts could be offset by greater opportunities in the summer season and also by investment in new technologies, i.e., snow-making equipment.

Oceans and Coasts

With respect to oceans, climate change may alter sea level, ocean circulation, vertical mixing, wave climate and reduce sea ice cover and, as a result, nutrient availability, biological productivity, structure and functions of marine ecosystems, the oceans' heat and carbon storage capacity, and important feedbacks to climate systems will change as well. These all have implications for tourism and recreation although the nature of these implications is not stated clearly in the IPCC documentation (p. 31). However, it is suggested that reduced sea ice will provide safer approaches for tourist ships and new opportunities for sightseeing around Antarctica and the Arctic.

Sea-level rise may be of concern to recreational and tourist industries because many recreational activities and related facilities are associated with coasts and beaches. Erosion of beaches backed by sea walls could lead to lowering of beach level and also affect recreational habitats, i.e., sand dunes, shingle banks, marshlands, soft banks, soft earth cliffs, and coral reefs (p. 385). The cost of sand required to protect major US recreational beaches from a 50 cm sea-level rise would be \$14-21 billion. Fixed waterfront facilities, i.e., marinas and piers, could be affected by sea-level rise. At the same time, higher temperatures will likely stimulate an overall increase in tourism in the UK and this would put increased pressures on beaches at the same time as erosion along these beaches may reduce beach area.

Small Islands

Small islands, many of whose economies are dependent on tourism, are singled out as being particularly vulnerable to climate change (p. 310). With a sea-level rise of 50 cm to 1 m, many small island countries could lose a significant part of usable land oriented towards coastal activities. "Even the less-vulnerable small islands would suffer significant economic effects from the loss of beach tourism and recreation areas because of sea-level rise and,

possibly, more storms leading to increased beach and reef erosion" (p. 310). It is stated that in 1988, income from tourism as a percentage of GNP was 69% for Antigua and Barbuda, 53% for the Bahamas, and for a dozen other Caribbean islands tourism revenues make up more than 10% of the GNP. In 1991, total receipts from tourism generated foreign exchange earnings of \$94 million in the Maldives. Tourism to developing countries and small island developing states has experienced a particularly rapid increase (e.g., tourist numbers to Mauritius have increased from 1,800 visitors in 1968 to 180,000 in 1988). Given accelerated sea-level rise, first-order estimates suggest that substantial investment would be required in some developing countries in order to protect urban areas and maintain related activities such as beach tourism. The benefits resulting from a longer season in some coastal areas, i.e., low-lying and vulnerable tropical islands, may be offset by the loss of economically important beaches and coastal recreational resources (p. 384). Therefore, more comprehensive assessment of the available adaptation options in these vulnerable settings is urgently required. Integrated Coastal Zone Management, including programmes for sectors such as food production and tourism, is advocated as a desirable response (p. 315).

Aquatic Ecosystems

For aquatic ecosystems it is pointed out that lakes, streams, non-tidal wetlands, coastal environs and oceans are all sensitive to changes in temperature, precipitation, and sea level and that these provide a range of socio-economic values and benefits for recreation. For many lakes and streams, the most severe effect of climate change may be the exacerbation of current stresses resulting from human activities (p. 30). Additional adverse impacts on coastal ecosystems will result from sea-level rise, altered rainfall patterns, and changes in ocean temperature. This is of concern where human activities already affect environmental conditions. Ecosystems on coral atolls and in river deltas are sensitive to climate and sea-level change. "Changes in these ecosystems almost certainly would have major negative effects on tourism" (p. 31).

The sensitivity of recreation to changes in the hydrological characteristics of water bodies (i.e., reservoir storage volume, water quality, etc.) is not well known (p. 480). Thus, the effects of possible changes are difficult to quantify. For the Great Lakes, "there are clear relationships between beach area, length of recreation season and recreational benefits: Both beach area and recreation season length would increase under climate warming, resulting in an estimated doubling of recreational benefits" (p. 480). However, global warming would cause a decline in desirable fish populations, particularly salmon, thus

affecting demand for recreational fishing, resulting in an annual loss of recreational benefit of \$35 million (1993 values). There is no significant difference in the impacts of climate change on recreational species as opposed to commercial or subsistence species (p. 528). However, a decrease in sport fishing may be due to cold-water fisheries being replaced by warm-water fisheries. Cold-water species are generally preferred by anglers and they can be expected to shift towards higher latitudes. Increased storminess or changes in weather patterns will affect the desirability and effort involved in recreational fishing more than other types of fishing. Changes might include shorter ice-fishing seasons and longer seasons for higher-latitude fisheries. In New Zealand, decline in the distribution and abundance of a popular shellfish species, sought by recreational fishermen, may result if there are decreases in westerly winds, higher temperatures and sea-level rise.

Summary

Maintaining a balance between developing tourism and protecting sensitive environments is regarded as an important issue for both mountains (p. 206) and aquatic environment and, in the latter situation, adverse human impacts on the coastal zone are likely to be amplified by the coastal effects of climate change with adverse economic effects on tourism and other aspects of the coastal economy.

"Countries with economies that are highly dependent upon tourism may face great challenges because the resources upon which tourism rests are regionally, nationally, and globally climate-dependent... Tourism and recreation are sensitive to climate change because part of the industry is closely associated with nature" (p. 384). Parts of the tourism and recreation industry may migrate as a result of climate change. However, it is difficult to determine whether dislocations or relocations caused by climate change will produce costs over and above those that would have otherwise been incurred.

Two of the most obvious tourism and recreation facilities exhibiting climate sensitivity are skiing and beach resorts. Global warming might reduce the length of the skiing season and affect the viability of some ski facilities

but, due to global warming, the summer recreation season may be extended in many areas. Some of the likely major consequences are summarised as follows (p. 374) : temperature and precipitation changes resulting in shorter skiing seasons (modest impacts requiring adaptive responses); changes in the frequency of extreme events impacting the attraction of mountainous and coastal regions (minor impacts); sea-level rise impacting beach resorts and marinas (significant impacts requiring adaptive responses at a strategic level); and numerous small impacts affecting the demand for and location of facilities (minor impacts).

Transportation, which is a key element of tourism, received little tourism-specific discussion. It is stated that no quantitative assessments of the impacts of climate on demand for transportation in areas such as tourism and recreation have been made because necessary economic scenarios do not exist. It is acknowledged that climate change affects the geography of specific climate-sensitive sectors, i.e., agriculture and tourism, and that changes in the location of these activities affect demands for flows of passengers, which influence development of transportation infrastructure and transportation movements. This transportation infrastructure and activity, in turn, influences patterns of regional growth (p. 380).

Conclusions

The second IPCC reports give much greater attention to tourism than their predecessors. Global climate change is unlikely to be an homogeneous force and its consequences are likely to be different in different locations depending upon the magnitude and speed of change, and the characteristics of existing biological and human systems. While, as a global phenomenon, it is necessary that negotiations and strategies concerning climate change be conducted at an international level, the consequences will be felt at more localised scales. Unfortunately, the current state of knowledge is not generally conducive to the undertaking of detailed regional studies. While it is encouraging that tourism is receiving greater attention in IPCC reports, it is also apparent that the likely consequences of climate change for tourism and recreation are not well understood.

References

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