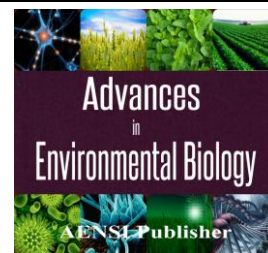




AENSI Journals

Advances in Environmental Biology

ISSN-1995-0756 EISSN-1998-1066

Journal home page: <http://www.aensiweb.com/AEB/>

Ecotourism and Climate Change: Challenges and Solutions

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ARTICLE INFO

Article history:

Received 4 September 2014

Received in revised form 24 November 2014

Accepted 8 December 2014

Available online 16 December 2014

Keywords:

Climate Change, Ecotourism, Global Warming, Tourism industry.

ABSTRACT

The main aim of this study is to review the consequences of climate change on ecotourism in terms of various aspects. Ecotourism as an important branch of the tourism industry is vulnerable to the consequences of global climate change. The potential consequence of global warming on ecotourism is a challenging issue that makes it possible to suggest certain policies which might help with future management of the ecotourism. The information for this purpose was gathered from the scientific resources. From the gathered information, it can be concluded that tourism and climate change have tow-way interactions. And for the future sustainability of the tourism industry, it is vital that all stakeholders continue to adopt measures to mitigate and adapt to the challenges of climate change

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To Cite This Article: Bahram Shakouri and Soheila Khoshnevis Yazdi, Ecotourism and Climate Change: Challenges and Solutions. *Adv. Environ. Biol.*, 8(21), 47-52, 2014

INTRODUCTION

Tourism as an industry is increasing in both volume and economic importance [1]. Tourism, similar to any market, is defined by supply and demand concepts and by push and pulls factors. While destinations compete for the most lucrative tourists, tourists also compete for the best deals [2].

As reported by the World Tourism Organization, travel and tourism involved 625 million people internationally and generated \$US 445 billion in receipts in 1998. Tourism is an important contributor to the economies of most countries and in some can represent up to one fifth of GDP. The global tourism industry is expected to grow significantly in the future as personal incomes and leisure time increase, and transportation networks improve [1].

Based on preliminary full year data included in this issue of the UNWTO World Tourism Barometer, it is estimated that international tourist arrivals grew by 5% in 2013, reaching a record 1087 million. Despite a global economy in "low gear", international tourism results were well above expectations, with an additional 52 million international tourists travelling the world in 2013. For 2014, UNWTO forecasts 4% to 4.5% growth again, above the long-term projections [3].

Tourism is obviously related to climate; therefore it is surprising that the tourism literature pays little attention to climate and climatic change. It is equally surprising that the climate change impact literature pays little attention to tourism [4].

Ecotourism as an important branch of the tourism industry is vulnerable to the consequences of global climate change. The main aim of this study is to review the consequences of climate change on ecotourism in terms of various aspects. Understanding the potential consequences of global warming on ecotourism is a challenging issue that makes it possible to suggest certain policies which might help with future management of the ecotourism.

The paper is built up as follows. Section 2 and section 3 present basic information about the ecotourism and climate change concepts, respectively. Section 4 outlines the interactions of ecotourism and climate. Section 5 presents the consequences of climate change on ecotourism. Section 6 discusses about the future threats and challenges. Section 7 reviews the required policies, implications and management suggestions and the Section 7 concludes.

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Ecotourism:

There are several definitions of ecotourism since the popularization of the concept in the late 1980s. Commonly cited elements include references to the need to conserve the physical attributes of the destination environment, the provision of economic opportunities for local communities, avoiding adverse socio-cultural impacts through visitor presence on host communities, ensuring an educational experience for the visitor, or some combination of the above; however, the inherent subjectivity of these definitions has made concern about prone to overuse, misuse or has limited practical relevance [5].

Ecotourism is a potential financial resource for implementation of environmental programs and the conservation of ecosystems for its beneficial impacts in the prevention of environmental destruction by indigenous people, and generating jobs and income opportunities for the community. Utility value of biodiversity makes an important motivation directly by tourism for conservation of biodiversity especially in developing countries. Over the past decades, ecotourism has become one of the fastest growing sectors of the tourism industry, growing three times faster than the industry as a whole [6].

Ecotourism is a tool having potential for contributing to sustainable livelihoods of local communities and conservation of natural environments which has been recognized internationally when the United Nation declared 2002 as the International Year of Ecotourism [7]. Ecotourism is defined in many ways in the tourism and environmental literatures. Two most appropriate definitions of ecotourism are given below:

- According to the definition of the International Ecotourism Society (TIES) ecotourism is "Responsible travel to natural areas that conserves the environment and improves the well-being of the local people" [6].

- As defined by IUCN (The World Conservation Union) Ecotourism is "environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features both past and present) that promotes conservation, has low negative visitor impacts, and provides for beneficially active socio-economic involvement of local people" [8], [9].

Climate change:

The subject of climate change and human influences on it is extremely complicated and has a seeming endless number of areas that are being studied. In addition, the small but well-focused objections to the mainstream consensus (that human influence is becoming a dominant climate driver) provide further confusion. Most of these objections and the additional research they have stimulated are what I would call "second order considerations"; that is, they are issues that are of secondary importance to whether or not human emissions of so-called greenhouse gases (GHGs) are causing substantial warming [10].

Global and regional temperatures are rising. 1998 was the hottest year of the millennium and the 1990s the warmest decade. The four warmest years globally – in decreasing order of magnitude – are 1998, 1997, 1995 and 1990. Climate models suggest a future warming of 0.2 - 0.3°C per decade and sea levels are expected to rise at a rate of 4 to 10cm per decade [1].

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change dispelled many uncertainties about climate change [11]. In other words warming of the climate system is now unequivocal. It is now clear that global warming is mostly due to anthropogenic emissions of greenhouse gases (mostly CO₂). Over the last century, concentrations of carbon dioxide in the atmosphere increased from a pre-industrial value of 278 parts per million (ppm) to 379 ppm in 2005, and the mean global temperature rose by 0.74°C. This is the largest and fastest warming trend that researchers have been able to discern in the history of the Earth. An increasing rate of warming has particularly taken place over the last 25 years, and 11 of the 12 warmest years on the basis of previous records have occurred in the past 12 years. The IPCC Report gives detailed projections for the 21st century and these represent that global warming will continue and accelerate. The best estimations indicate that the Earth could warm by 3°C by 2100. Even if countries reduce their greenhouse gas emissions, the Earth will continue to warm. Predictions by 2100 range from a minimum of 1.8°C to as much as 4°C rise in global average temperatures [12].

Climate change as a major environmental challenge for third millennium strongly influences tourism industry, especially ecotourism. Climate is the fundamental elements of ecotourism in a way that many tourism activities including different types of tourism such as coastal tourism, sports tourism, winter tourism and ecotourism are closely related to each area climatic conditions.

Interactions of ecotourism and climate:

Tourism is obviously related to climate on the one hand and ecotourism has various impacts on biodiversity on the other hands. The adverse effects of tourism stem from tourists themselves, as well as from infrastructure and accommodation facilities [6]. In other words, ecotourism is the subject of climate change consequences as an industry and from other point of view; it may be contributed in the climate change itself. Therefore, it should be studied the interaction of ecotourism and climate from both views.

Tourism has a strong impact on the environment, and a substantial impact on climate, not only through the emissions of CO₂ (particularly from air travel), but also through the direct impact of flying (e.g. contrails). One can approach the relationship between tourism and climate change in 2 different ways, by looking [2]:

- (1) At tourists, what they should prefer or how they behave;
- (2) At destinations and how their attractiveness changes with climate and management.

The link between climate change and tourism implies complex interactions and can be described as a two-way relationship. On the one hand, tourism activity contributes to climate change. The UNWTO [13] estimates that emissions from global tourism, including transport, accommodation and tourism activities subsectors make up 5% of total CO₂ emissions. The major contributor is the private automobile and air transport [14], followed some way off by other forms of transport and the accommodation subsector [15]. In 2005, CO₂ emissions originating from transport accounted for 75% of tourism-based emissions, with the most of this attributed to air transport. This means that air transport is responsible for between 2.5% and 3.5% of total anthropogenic emissions causing global warming [16].

On the other hand, climate change also considerably affects the tourism industry, mainly ecotourism. This is most importantly due to its effect on the attractiveness of tourism destinations and tourist flows. Tourism depends on natural resources, including water, coastlines, landscapes, biodiversity, etc. These natural resources influence the potential attraction of destinations. However, climate change threatens the loss of some of these relevant natural resources [17].

Consequences of Climate Change on Ecotourism:

Many researchers have been reported the consequences of climate change on ecotourism. Boesch and Ciari [1] studied the climate change influences on transport, tourism and energy. It was mentioned in their study that climate change is expected to affect those issues most in the form of increased weather variability and more extreme weather events, which pose a threat to infrastructure and operations. They also suggested that the adaptation and protection measures are needed and expected in all sectors.

Climate change has two major impact types at tourism destinations including direct climatic impacts and indirect environmental change impacts. These impacts are presented in Table 1.

Table 1: Climate change impacts on tourism destinations.

Direct climatic impacts	Indirect environmental change impacts
Warmer Summers	Biodiversity Loss (terrestrial and marine)
Warmer Winters	Sea Level Rise
Precipitation Changes (water supply)	Disease
Increased Extreme Events	

Resource: Scott *et al.*, 2008

Scott *et al.*, [15] have been addressed the global challenges of climate change on tourism. According to this report, there are implications of climate change for tourism demand in a way that changes in climatic elements of tourism alter geographic and seasonal distribution of tourism demand; for example proportionately more tourism spending in temperate nations. However, there is no impact on demand at global scale. Indirect environmental changes will result in impacted demand at destination-regional level; however there is no impact on demand at global scale.

Future threats and challenges:

Although, there are some cases of positive effects of climate change on improvement tourism industry; this is highly accepted that global climate change has resulted in many unexpected events in recent years. Critics have always pointed out the fickle nature of tourism, and indeed the industry's special vulnerability to bad news and events has been proven many times in recent years; just consider Hurricane Katrina that hit New Orleans in 2005 which caused immeasurable costs for the travel and tourism industry [18].

Worldwide local climate variability can affect peoples' decisions with consequences for their social, economic, political and personal conditions, and effects on their lives and livelihoods. Ecotourism clearly has social, economic, political considerations; therefore this type of tourism also is subjected to worldwide local climate variability. The effects of climate change imply that the local climate variability that people have previously experienced and have adapted to changing and this changing are occurring at relatively great speed [12].

The consequences of climate change on the environment will represent different threats and make problems in terms of many aspects. Increasing ocean temperatures cause thermal expansion of the oceans and in combination with melt water from land-based ice; this is causing sea level rise. The most serious impacts will result from the effects of sea level rise on small island states. The Maldives, which are an increasingly popular tourist destination, are particularly vulnerable to sea level rise [1].

As a result of global warming, the type, frequency and intensity of extreme events, such as tropical cyclones (including hurricanes and typhoons), floods, droughts and heavy precipitation events, are expected to rise even with relatively small average temperature increases. Changes in some types of extreme events have already been observed, for example, increases in the frequency and intensity of heat waves and heavy precipitation events [12].

Climate change also is expected to increase the risk of illness in several parts of the world and also to affect the environmental pollution conditions and consequently discourage tourism. Increasing sea temperatures are expected to result in increases in temperature-sensitive marine pathogens that are potentially damaging to human health [19].

Biodiversity as the most important element of ecotourism also is subjected to climate change impacts. Some examples of threats to ecological biodiversity which can be considered as environmental challenges of global warming are pointed as following examples.

Global warming trend is significance for reef-building corals and it has stated by many researchers that climate change is likely to increase the frequency and intensity of bleaching. Coral reefs are among the most biologically diverse and economically important ecosystems on the planet, providing ecosystem services that are vital to human societies and industries through fisheries, coastal protection, building materials, new biochemical compounds, and tourism. Rapid increases in the atmospheric carbon dioxide concentration ($[CO_2]_{atm}$), by driving global warming and ocean acidification, may be the final insult to these ecosystems. Under climate changing conditions expected in the 21st century, global warming and ocean acidification will compromise carbonate accretion, with corals becoming increasingly rare on coral reef ecosystems. The result will be less diverse reef communities and carbonate reef structures that fail to be maintained. Climate change also exacerbates local stresses from declining water quality and overexploitation of key species, driving reefs increasingly toward the tipping point for functional collapse [20].

The ecological niche of a species can be defined as the range of environmental and biotic conditions within which its populations can persist without immigration. In the face of environmental change, then (a) niche evolution or (b) movement to track niches spatially, become the only alternatives to extinction [21].

Climate change can impact the patterns of marine biodiversity through changes in species' distributions [22]. Given their global importance, coastal marine environments are a major focus of concern regarding the potential impacts of anthropogenic climate change. Marine ecosystems with high potential for ecotourism are encountered to global warming consequences [23].

Any increase in coastal flooding, erosion and extreme events would be expected to increase damage to coastal communities, tourist accommodation and transport links, whilst also posing an increased safety risk to marine recreation activities. Climate change is increasing the frequency of months when conditions are more comfortable for tourists in north-west Europe than in the Mediterranean. As a result, the tourism industry is expected to grow in the UK and especially along the coast. However, the changing climate is already having negative impacts on the tourism industry. Rising in relative sea level is resulting in increased coastal flooding, the loss of beaches and changes to other natural habitats. There has been a northward movement of important recreational angling fish species and changes in the populations of species important for wildlife watching such as harbor seals and seabirds [19]. These potential consequences influence the tourism industry, especially coastal tourism.

The issues provided here and many others mainly are the essential elements of ecotourism. In general, the mentioned challenges are related with together, therefore it can be claimed that climate change likely will provides several challenges in which ecotourism and other types of tourism are subjected to various impacts directly and indirectly.

Policies, Implications and Management Suggestions:

These are just a few of the effects of climate change. These effects are already noticeable and will be felt ever stronger in the future. Governments, industry and science are required to adapt to a changing world. They are required to prepare and to take action. The question is, how to best prepare and what the optimal actions are. The IPCC statement shows that climate change is already happening and that substantial adaptation is needed. But even if the world would substantially reduce greenhouse gas emissions today, climate change is already transforming the world. Rising sea levels are reshaping coast lines. Extreme weather events create havoc in formerly spared areas. Floods and droughts threaten (natural) infrastructure formerly considered reliable. The melting of the arctic ice accelerates climate change, but also starts a race to formerly unavailable resources and territories. Shorter winter and longer summer reshape tourism [1].

To ensure sustainable development of the sector, it is essential that policy makers understand the direct and indirect impacts of climate change on both tourism infrastructure and tourists' perception. Changes in the marine climate have already affected the coastal environment which may affect the attractiveness to some tourists [19].

The scientific evidence is clear; climate change must be considered the greatest challenge to sustainable development and tourism in the 21st century. Tourism can play a significant role in addressing climate change. It must show leadership as an agent of change for both adaptation and mitigation [15].

There are two scenarios of tourism mitigation for 2035 as following [15]:

(i) High Tech-Efficiency Scenario (changes versus BAS):

- Reduction in aviation energy consumption per pkm of 50% (vs 32% in BAS);
- Additional 2%/year reduction in car emissions per pkm;
- Additional 2%/year reduction in other transport emissions per pkm;
- Additional 2%/year reduction in accommodation emissions per guest-night;
- Additional 2%/year reduction in activities emissions per trip;

(ii) Modal Shift-Longer Stay Scenario (changes versus BAS):

- No further growth in aviation number of trips and pkm;
- Growth in rail/coach of 2.4% to 5% per year to keep total number of trips growth constant with BAS;
- 0.5%/year increase in average LOS vs 0.5% reduction/year in BAS;

Conclusions:

Climate as an essential element of ecotourism considerably affects the potential of destination sites. The direct effects of global warming on ecotourism are appearing in the formation and occurrence of climatic phenomena; while indirect effects are also occurring as the ecological disorders.

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change dispelled many uncertainties about climate change. Warming of the climate system is now unequivocal. It is now clear that global warming is mostly due to man-made emissions of greenhouse gases (mostly CO₂). Ecotourism clearly has social, economic, political considerations; therefore this type of tourism also is subjected to worldwide local climate variability with respect to the different aspects of ecotourism.

As discussed in the previous sections biodiversity also is an essential element of ecotourism and it is obvious that any alterations in the climatic patterns can be potentially impacted the ecological diversity which in turn can influence the ecotourism from different aspects. Therefore, it can be concluded that the biodiversity of destination sites is required to be concerned about the potential impacts of climate change.

Understanding the carrying capacity of the tourist sites is also essential to manage the new flow of visitors and minimize the negative effect on the environment and the socioeconomic. For the future sustainability of the tourism industry, it is vital that all stakeholders continue to adopt measures to mitigate and adapt to the challenges of climate change.

It should be noted that tourism and climate change have tow-way interactions. Ecotourism not only is subjected to changing climate from different ways, but also the rate of climate change itself is under environmental effects of tourism via increasing consumption of fossil fuels and rising the emissions of greenhouse gases. Therefore, it should be considered in the tourism management that safer methods and devices should be used for sustainable ecotourism to reduce the environmental destructions when the tourist destinations are natural ecosystems.

Climate change has many consequences in local and global scales; therefore, further studies are needed to obtain accurate information on interactions of tourism and climate change in both

REFERENCES

- [1] Viner, D., M. Agnew, 1999. *Climate change and its impacts on tourism*. (p. 49). Climatic Research Unit, University of East Anglia.
- [2] Hamilton, J.M., D.J. Maddison, R.S. Tol, 2005b. *Effects of climate change on international tourism*. Climate Research, 29: 245-254.
- [3] UNWTO, 2014. World Tourism Barometer. *World Tourism Organization*, Madrid, Spain, 12: 1728-9246, available online at www.unwto.org/pub.
- [4] Hamilton, J.M., D.J. Maddison, R.S. Tol, 2005a. *Climate change and international tourism: a simulation study*. Global environmental change, 15(3): 253-266.
- [5] Clifton, J., A. Benson, 2006. *Planning for sustainable ecotourism: The case for research ecotourism in developing country destinations*. Journal of Sustainable Tourism, 14(3): 238-254.
- [6] Blangy, S., H. Mehta, 2006. *Ecotourism and ecological restoration*. Journal for Nature Conservation, 14(3): 233-236.
- [7] Sayyed, M.R.G., M.S. Mansoori, R.G. Jaybhaye, 2013. *SWOT analysis of Tandooreh National Park (NE Iran) for sustainable ecotourism*. Proceedings of the International Academy of Ecology and Environmental Sciences, 3(4): 296-305.

- [8] Ross, S., G. Wall, 1999. *Ecotourism: towards congruence between theory and practice*. Tourism management, 20(1): 123-132.
- [9] Stem, C.J., J.P. Lassoie, D.R. Lee, D.D. Deshler, J.W. Schelhas, 2003 *Community participation in ecotourism benefits: The link to conservation practices and perspectives*. *Society & Natural Resources*, 16(5): 387-413.
- [10] Keller, C.F., 2007. *Global warming 2007. An update to global warming: the balance of evidence and its policy implications*. *The Scientific World Journal*, 7: 381-399.
- [11] IPCC., 2007.
- [12] UNFCCC, 2007. *Change change: Impacts, Vulnerabilities and Adaptation in Developing Countries*. Information Services of the UNFCCC secretariat.
- [13] UNITO, 2011
- [14] Chapman, L., 2007. *Transport and climate change: a review*. *Journal of transport geography*, 15(5): 354-367.
- [15] Scott, D., B. Amelung, S. Becken, J.P. Ceron, G. Dubois, S. Gössling, M. Simpson, 2008. *Climate change and tourism: Responding to global challenges*. World Tourism Organization, Madrid, pp: 230.
- [16] Hernandez, A.B., G. Ryan, 2011. *Coping with climate change in the tourism industry: a review and agenda for future research*. *Tourism and Hospitality Management*, 17(1): 79-90
- [17] Lise, W., R.S. Tol, 2002. *Impact of climate on tourist demand*. *Climatic change*, 55(4): 429-449.
- [18] Pleumarom, A., 2008. *Tourism Feels the Heat of Global Warming*. Tourism Investigation and Monitoring Team. Available online at: <http://www.tourism-review.com/fm408/tourism-feels-the-heat-of-global-warming.pdf>
- [19] Simpson, M., 2013. *Impacts of climate change on tourism (and marine recreation)*. MCCIP Science Review. doi:10.14465/2013.arc29. 271-283.
- [20] Hoegh-Guldberg, O., P.J. Mumby, A.J. Hooten, R.S. Steneck, P. Greenfield, E. Gomez, 2007. *Coral reefs under rapid climate change and ocean acidification*. *Science*, 318: 1737-1742.
- [21] Martínez-Meyer, E., A. Townsend Peterson, W.W. Hargrove, 2004. *Ecological niches as stable distributional constraints on mammal species, with implications for Pleistocene extinctions and climate change projections for biodiversity*. *Global Ecology and Biogeography*, 13(4): 305-314.
- [22] Cheung, W.W., V.W. Lam, J.L. Sarmiento, K. Kearney, R. Watson, D. Pauly, 2009. *Projecting global marine biodiversity impacts under climate change scenarios*. *Fish and Fisheries*, 10(3): 235-251.
- [23] Harley, C.D., A. Randall, K.M. Hughes, B.G. Hultgren, C.J. Sorte, C.S. Thornber, L.F. Rodriguez, L. Tomanek, S.L. Williams, 2006. *The impacts of climate change in coastal marine systems*. *Ecology letters*, 9(2): 228-241.