



## **Resource Guide to Climate Change Issues in Tourism and Leisure**

### **INTRODUCTION**

Climate change will affect all aspects of the economy and the tourism and leisure industries are no exception. Tourism and leisure are both potentially climate sensitive sectors and are likely to be affected by changes to the climate in the future.

As climate change is now at the fore of both national and international government agendas it is imperative the tourism and leisure industries are aware of climate change issues and policy implications. There is growing awareness of these issues within the tourism industry where the greenhouse gas (GHG) emissions produced by flying and the impact of changing climate are a cause for concern. This has triggered a recent wave of research examining:

- Levels of GHG emissions associated with travel.
- Accommodation and activities.
- Industry and tourist understanding of the issues.
- Mitigation and adaptation strategies.

The leisure industry has been slower to respond as it has often been thought of as a 'green' industry with relatively low environmental impacts. While this might be the case when compared to the traditional manufacturing sector in the UK, it is now recognised that leisure might not be so benign.

Leisure travel is a key contributor to GHG emissions but there are also a variety of carbon intensive leisure activities that will come under the climate change spotlight together with climate sensitive activities and products. To date, cost has been a key driver for change within both the tourism and leisure industries. Cost is likely to continue to be a driver, however, regulation will play an increasing role.

Given the political weight now given to the topic, future graduates will be expected to have a solid understanding of climate change policy, mitigation

strategies and adaptation practices. The topic is currently covered in tourism and leisure degrees within current issues units and, increasingly, within units dedicated to climate change.

The intention of this resource guide is to direct tutors, students and researchers to key resources on climate change specifically focused on the tourism and leisure industries and their unique attributes. Given the emerging nature of climate change, much of the literature on this topic is based in research journals rather than text books. Therefore the content of some of the material listed in this resource guide may be more appropriate to final year undergraduate and postgraduate students rather than first and second year undergraduates. However, there are a growing number of reports and text books which provide a more accessible introduction. Key texts are listed in the following section and provide an accessible resource for undergraduate students.

## **OVERVIEW OF CLIMATE CHANGE AND THE IMPLICATIONS FOR LEISURE AND TOURISM**

Climate change can be defined in different ways but essentially refers to:

“any change in climate over time, whether due to natural variability or as a result of human activity” (Intergovernmental Panel on Climate Change (IPCC) 2007).

The IPCC now state “warming of the climate system is unequivocal” and there is very high confidence that this is due to the net effect of human activities. Globally, the average temperature has risen by 0.7°C over the last 100 years and mid-range estimates project a 2-3°C rise this century (Met Office 2008). The driver for this change is GHG production predominantly due to the burning of fossil fuel although this is not the only factor. CO<sub>2</sub> is the most important anthropogenic GHG (IPCC 2007).

Climate change impacts are many and varied but include the rising of sea levels and changes to wind, temperature and precipitation patterns. These changes are likely to have a differentiated effect with greater impact in some regions of the globe and on some activities.

Tourism is a sector particularly vulnerable to climate change due to its dependence on the environment and climatic conditions. Leisure, on the other hand, is less likely to be directly affected although there are activities with a similar dependence on resource conditions that may change. However, both sectors are likely to be affected indirectly as both tourism and leisure industries contribute GHG emissions which cause climate change. Thus they are part of the problem and climate change mitigation measures will therefore impact on both industries. So, to sum up, the issues for tourism and leisure are three fold and interrelated:

1. Climate change will directly affect the tourism and leisure resource base.

2. Tourism and leisure are part of the problem and a cause of climate change.
3. Climate change mitigation measures will impact tourism and leisure activities indirectly through regulatory processes and fiscal measures.

## **ANNOTATED BIBLIOGRAPHY**

Much of the material published on climate change is to be found outside of tourism and leisure journals. The following resources provide an excellent overview of the tourism issues for students. There are presently no similar texts focusing on leisure but students of leisure should also be able to gain relevant insight from the following:

### **Becken, S. and Hay, J.E., 2007 *Tourism and Climate Change: Risks and Opportunities*, Clevedon, Channel View Publications**

A comprehensive text book setting out the issues for tourism. Chapters cover:

- The Tourism-Climate System;
- Case-studies of the Tourism-Climate System;
- An Overview of Tourism; Global and Regional Climate Change;
- Methodologies for Greenhouse Gas Accounting;
- Climate Change Mitigation Measures;
- Climate Change-related Risks and Adaptation;
- Climate Change Policies and Practices for Tourism.

### **Gössling, S. and Hall, C.M., (eds) 2006. *Tourism and Global Environmental Change*, London, Routledge**

This edited book provides an excellent overview of the issues. The wide range of material covered and the range of contexts throughout the world makes it a good text for students and for lecturers developing teaching on tourism and climate change. The text is divided into three sections. The first examines key environments and global environmental change. Chapters cover:

- The impacts of global environmental change on tourism in the polar regions (Margaret E. Johnston);
- Global environmental change and mountain tourism (Daniel Scott);
- Lakes and streams (Brenda E. Jones, Daniel Scott and Stefan Gössling);
- Tourism and forest ecosystems (Stefan Gössling and Thomas Hickler);
- The coastal and marine environment (Stephen J. Craig-Smith, Richard Tapper and Xavier Font);
- Deserts and savannah regions (Robert Preston-Whyte, Shirley Brooks and William Ellery);
- Tourism urbanisation and global environmental change (C. Michael Hall).

The second section focuses on global issues with chapters covering:

- Tourism, disease and global environmental change: the fourth transistion? (C. Michael Hall);
- Tourism and water (Stefan Gossling);
- Extreme weather events (Chris R. Defreitas);
- Tourism, biodiversity and global environmental change (C. Michael Hall).

The third section addresses stakeholder adaptation and perceptions with chapters on:

- The role of climate information in tourist destination choice decision making (Jacqueline M. Hamilton and Maren A. Lau);
- Restructuring the tourist industry: new marketing perspectives for global environmental change (Szilvia Gyomthy);
- US ski industry adaptation to climate change: hard, soft and policy strategies (Daniel Scott);
- The example of the avalanche winter 1999 and the storm Lothar in the Swiss Alps (Christian J Nöthiger, Rolf Bürki and Hans Elsasser);
- Tourists and global environmental change: a possible scenario in relation to nature and authenticity (Erika Andersson Cederholm and Johan Hultman).

**Hall, C.M. and Higham, J., (eds) 2005. *Tourism, Recreation and Climate Change*. Clevedon, Channel View Publications**

An edited book with chapters authored by many of the key people in the field.

Part 1 sets the context with chapters covering:

- The climate-tourism relationship and its relevance to climate change impact assessment (C.R. de Freitas);
- The evolution of the climate change issue in the tourism sector (Daniel Scott, Geoff Wall and Geoff McBoyle).

Part 2 considers the effects of climate change on tourist flows and recreation patterns with chapters on:

- Climate and policy changes: their implications for international tourism flows (Sue Mather, David Viner and Graham Todd);
- The Mediterranean: How can the world's most popular and successful tourist destination adapt to a changing climate? (Allen Perry);
- Greenhouse gas emissions from tourism under the light of equity issues (Ghislain Dubois and Jean-Paul Ceron);
- Climate change and tourism and recreation in North America: exploring regional risks and opportunities (Daniel Scott, Geoff Wall and Geoff McBoyle);
- Nature tourism and climate change in Southern Africa (R.A. Preston-Whyte and H.K. Watson);
- Changing snow cover and winter tourism and recreation in the Scottish Highlands (S.J. Harrison, S.J. Winterbottom and R.C. Johnson);

- Climate change and tourism in the Swiss Alps (Rolf Bürkis, Hans Elsasser, Bruno Abegg and Urs Koenig);
- Effects of climate change on tourism demand and benefits in Alpine areas (Robert B. Richardson and John B. Loomis);
- Implications of climate change on tourism in Oceania (Stephen Craig-Smith and Lisa Ruhanen);
- Tourism, fossil fuel consumption and the impact on the global climate (Susanne Becken and David G. Simmons).

Part 3 covers adaptation and response with chapters on:

- Tourism and climate change adaptation: the Norwegian Case (Carlo Aall and Karl G. Høyner);
- Tourism and the ozone hole: varying perceptions (L. Michael Trapasso);
- 'Everyone talks about the weather' (Keith Dewar);
- Climate change, leisure-related tourism and global transport (Paul Peeters); Sustainable mobility and sustainable tourism (Karl G. Høyner and Carlo Aall); Tourism as victim, problem or solution: story lines of a complex industry-environment relation (Lotta Frändberg);
- Tourism's contribution to global environmental change: space energy, disease, water (Stefan Gössling);
- Making tourism sustainable: the real challenge of climate change? (James Higham and C. Michael Hall).

**Peeters, P. (ed) (2007) *Tourism and Climate Change Mitigation: Methods, greenhouse gas reductions and policies*. Breda, NHTV Breda**

An edited book with sections focusing on appropriate methods and data to assess climate change impacts, approaches to reduce greenhouse gas emissions and mitigation policies.

Section I: Methods and data includes:

- Air transport greenhouse gas emissions (Paul Peeters, Victoria Williams and Stefan Gössling);
- The environmental impacts of tourism in Antarctica: A global perspective (Machiel Lamers, Bas Amelung);
- Sustainable tourism mobility: the social practices approach (Desiree Verbeek and Hans Mommaas).

Section II: Reducing greenhouse gas emissions includes:

- Compensation schemes for air transport (Bart Boon, Arno Schrotten and Bettina Kampman);
- Mitigation of climate impacts with innovative air transport management tools (Victoria Williams, Robert Noland, Arnab Majundar, Ralf Toumi and Washington Ochien);
- Long distance travel in Europe: the potential of the train (Cornelis Dirk van Goeverden);

- The role of scheduled buses in reducing car journeys in tourist areas (Jo Guiver, Les Lumsdon and Kate Morris);
- Mitigation opportunities in Portuguese hotels under a warming climatic trend (Ricardo Aguiar, Tiago Lourenço, Elsa Casimiro, Hélder Gonçalves and Filipe Santos);
- Greenhouse gas emissions reduction by target group tailored holiday offers (Ulrike Rheinberger, Martin Schmied and Konrad Götz).

Section III: Policies for mitigation includes: 'Not my main priority':

- Tourism entrepreneur attitudes and behaviours with respect to climate change adaptation and mitigation (Michael Hall);
- Can domestic tourism growth and reduced car dependency be achieved simultaneously in the UK? (Derek Robbins and Janet Dickinson);
- How heavy will the burden be? Using scenario analysis to assess future tourism greenhouse gas emissions (Ghislain Dubois and Jean-Paul Ceron).

**Simpson, M.C., Gössling, S., Scott, D., Hall, C.M. and Gladin, E. (2008) *Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices*. Paris, UNEP, University of Oxford, UNWTO, WMO. Available on-line at:**

**<http://www.geog.ox.ac.uk/news/events/ccamts/ccamts.pdf>**

A recent report for the United Nations Environment Programme. Chapters cover: Background to climate change and tourism; Key knowledge gaps related to developing countries and small island states; Adaptation; Mitigation; Plan for the way forward and challenges ahead.

Students can also be directed to two key reports on climate change both of which have non-technical summaries. Neither address tourism and leisure specifically but both provide relevant background to climate change issues:

**Intergovernmental Panel on Climate Change (IPCC), 2007. *IPCC Fourth Assessment Report***

**Available at: <http://www.ipcc.ch/>**

Very comprehensive but also very scientific material examining observed climate change, causes of change, projected impacts and adaptation and mitigation options. The summary document available at the same web URL would probably cover most student needs.

**Stern, N., 2006. *Stern Review: the economics of climate change*.**

**Available at: [http://www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/sternreview\\_index.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm)**

For general reading and viewing students will find Al Gore's book and film useful:

**Gore, A., 2006. *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*. Frome, Butler & Tanner Limited**

**An Inconvenient Truth, 2006. Film, directed by Guggenheim D. USA, Paramount Home Entertainment**

In recognition of the implications of climate change for tourism two international conferences have been organised by the World Tourism Organization (WTO).

1. The first took place in 2003 in Djerba, Tunisia and resulted in the Djerba Declaration on Tourism and Climate Change.
2. The second took place in 2007 in Davos, Switzerland and resulted in the Davos Declaration.

Reports are available detailing the main conclusions and agenda for action derived from these conferences:

**World Tourism Organisation, 2003. Climate Change and Tourism: Proceedings of the 1<sup>st</sup> International Conference on Climate Change and Tourism, Djerba, Tunisia, 9-11 April 2003**

**World Tourism Organisation, 2007. Climate Change and Tourism: Responding to Global Challenges. Available at:**  
[http://www.unwto.org/climate/support/en/pdf/summary\\_davos\\_e.pdf](http://www.unwto.org/climate/support/en/pdf/summary_davos_e.pdf)

## **INTERNATIONAL AND NATIONAL CLIMATE CHANGE POLICY DIRECTIONS WITH IMPLICATIONS FOR TOURISM AND LEISURE**

To date tourism and leisure industries have only been indirectly affected by policy decisions related to climate change. The **United Nations Framework Convention on Climate Change**, agreed at the Earth Summit in Rio de Janeiro in 1992, was the first international agreement on climate change. The aim was to stabilise greenhouse gases in the atmosphere to avoid dangerous climate change but the commitment to reduce greenhouse gas emissions was non-binding.

This was followed by the **Kyoto Protocol** in 1997 which was ratified by over 166 countries and became legally binding in 2005. The EU agreed to meet a joint target of an 8% reduction in greenhouse gas emissions below 1990 levels by 2012 with greater and lesser targets allocated to different member states to meet the overall reduction. Since the Kyoto Protocol was not ratified by a number of countries, most notably the United States, the Bali Climate Change Conference in December 2007 launched negotiations for a more

comprehensive global agreement to be concluded in 2009 at the UN Climate Change Conference in Copenhagen (Department for Environment Food and Rural Affairs 2008).

In the UK a Climate Change Bill was introduced in 2007 and is due to receive Royal Assent in 2008. The Bill sets a target to reduce the UK's CO<sub>2</sub> emissions by at least 60%, on 1990 levels, by 2050. This legislation will indirectly impact on the leisure and tourism industry through fiscal measures, technological adaptations and energy policy (Department for Environment Food and Rural Affairs 2008). The Department for Business Enterprise and Regulatory Reform (2008) has charted CO<sub>2</sub> emissions since 1990 by sector. Data for the service sector includes tourism and leisure.

UK and international legislation and regulation relating to climate change is gathering pace. The following are examples of relevance to the leisure and tourism industry at the current time (2008). Further regulation is likely to emerge in coming years.

1. **Emissions Trading Scheme (EU ETS)** - As part of the process of reducing emissions the EU introduced EU ETS in 2005. To date this has had no direct implications for tourism or leisure industries however, in December 2006 the EU Commission proposed the inclusion of aviation in the EU ETS. Within the proposal, emissions from all domestic and international flights between EU airports will be covered from 2011 with expansion to all international flights arriving or departing from an EU airport from 2012. This is proposed as a model for wider, global action (European Commission 2008). The inclusion of aviation within the EU ETS has implications for tourism travel although the impact will not be clear for some time.
2. **The EU Directive on Energy Performance of Buildings** has implications for energy conservation in hotels. This is being implemented over 2008 and 2009 and non-domestic buildings (such as hotels) will require energy performance certificates when sold or rented.
3. In 2007 the UK government established the **Carbon Reduction Commitment** which has implications for large hotels and attractions (Department for Food Environment and Rural affairs 2008). This requires energy users, above a specified level, to audit energy use and purchase emissions allowances each year.

The following resources provide background on climate change policy:

**Department for Business Enterprise and Regulatory Reform, 2008. Carbon dioxide emission estimates and fuel used in electricity generation 1990 to 2007. Available at: [http://www.berr-ec.com/CGIBIN/priamInk.cgi?MP=CATSER^GINT65&CNO=1&CAT='181'](http://www.berr.ec.com/CGIBIN/priamInk.cgi?MP=CATSER^GINT65&CNO=1&CAT='181')**



Department for Environment Food and Rural Affairs, 2008. Carbon Reduction Commitment. On-line material available at:  
<http://www.defra.gov.uk/Environment/climatechange/uk/business/crc/index.htm>

Department for Environment Food and Rural Affairs, 2008. Climate Change: What are we doing in the UK. Available at:  
<http://www.defra.gov.uk/environment/climatechange/uk/index.htm>

Department for Environment Food and Rural Affairs, 2008. International action – The UN and the Kyoto Protocol. Available at:  
<http://www.defra.gov.uk/environment/climatechange/international/un-kyoto.htm>

England's Regional Development Agencies, 2008. Tackling Climate Change in the Regions. Available at:  
[http://www.eeda.org.uk/files/tackling\\_Climate\\_Change.pdf](http://www.eeda.org.uk/files/tackling_Climate_Change.pdf)

European Commission, 2008. Aviation and Climate Change. Available at: [http://ec.europa.eu/environment/climat/aviation\\_en.htm](http://ec.europa.eu/environment/climat/aviation_en.htm)

Peeters, P., Gössling, S., Becken, S., 2006. Innovation Towards Tourism Sustainability: Climate Change and Aviation, *International Journal of Innovation and Sustainable Development*, 1, 3, 184-200.

Robbins, D.K. & Dickinson, J.E., 2007. Achieving Domestic Tourism Growth and Simultaneously Reducing Car Dependency: The Illusive Prize. In: Peeters, P. (ed.), *Tourism and Climate Change and Mitigation: Methods, greenhouse gas reductions and policies*. Breda, NHTV Breda, pp 169 – 187.

United Nations, 1998. Kyoto Protocol to the United Nations Framework Convention on Climate Change. Available at:  
<http://unfccc.int/resource/docs/convkp/kpeng.pdf>

## CLIMATE CHANGE AND TOURISM

Resources on climate change and tourism have been grouped under the following three headings although there is a certain amount of overlap:

- Climate change impact on the tourism resource
- Tourism impacts on climate change
- Mitigation and adaptation strategies

It should be noted that much of the research conducted on tourism and climate change is published outside of tourism journals in climate-meteorological journals and geography-environmental management journals (Scott et al 2005).

### **Climate change impact on tourism resource**

Most of the early studies on climate change and tourism focused on tourism as a climate sensitive sector. These studies examine potential and actual changes in tourism flows due to climatic conditions such as warmer summers and reduced snow cover. Many studies focus on specific regions and there are a number of destination specific reports available via the internet. Ecosystems will be, and are indeed already being, affected by climate change with resulting impacts on ecotourism destinations through biodiversity loss, however, there has been less work on this in the tourism area.

A key focus has been general temperature changes and the reduced competitiveness of key destinations. This has led to the development of tourism climate indexes. The most popular index to date is the Mieczkowski tourism climatic index (Amelung and Viner 2006) although it is criticised for lack of meaning attached to the quantitative climatic measures (de Freitas 2003). De Freitas (2003) provides a good overview of the attempts to create a tourism climatic index. The impact on ski reports is also well researched potentially driven by industry as early impacts have been apparent (Gössling and Hall 2006). The following texts examine the climate change impact on the tourism resource:

**Agnew, M. and Viner, D., 2001. Potential Impact of Climate Change on International Tourism. *Tourism and Hospitality Research*, 3, 37-60**

**Amelung, B. and Viner, D., 2006. Mediterranean Tourism: Exploring the future with the Tourism Climatic Index. *Journal of Sustainable Tourism*, 14, 4, 349-366**

**Amelung, B., Nicholls, S., and Viner, D., 2007. Implications of Global Climate Change for Tourism Flows and Seasonality. *Journal of Travel Research*, 45, 3, 285-296**

**Aspen Global Change Institute, 2006. Climate Change and Aspen: An Assessment of Potential Impacts and Responses. Available at: <http://www.agci.org/aspStudy.html>**

**Berritella, M., Bigano, A., Roson, R., Tol, R.S.J., 2006. A General Equilibrium Analysis of Climate Change Impacts on Tourism. *Tourism Management*, 27, 913-924**

**Brazier, C., 2008. To Fly or Not to Fly? *New Internationalist*, 409, 4-9**  
(An interesting discussion article from a non-academic perspective.)

**Breiling, á M., Charamza, P., 1999. The Impact of Global Warming on Winter Tourism and Skiing: A Regionalised Model for Austrian Snow Conditions. *Regional Environmental Change*, 1, 1, 4-14**

**Ceron, J.P., Dubois, G., 2005 The potential impacts of climate change on French tourism. *Current Issues in Tourism*, 8, 2/3, 125-139**

de Freitas, C.R., 2003. Tourism Climatology: Evaluating Environmental Information for Decision Making and Business Planning in the Recreation and Tourism Sector. *International Journal of Biometeorology*, 48, 1, 45-54

Fukushima, T., Kureha, M., Ozaki, N., Fujimori, Y. and Harasawa, H., 2002. Influences of Air Temperature Change on Leisure Industries: Case Study on Ski Activities. *Mitigation and Adaptation Strategies for Global Change*, 7, 2, 173-189

Gössling, S., Hall, C.M., 2006. Uncertainties in Predicting Tourist Flows Under Scenarios of Climate Change. *Climatic Change*, 79, 3-4, 163-173

Hamilton, J.M., Maddison, D.J., Tol, R.S.J., 2005. Climate Change and International Tourism: A Simulation Study. *Global Environmental Change*, 15, 3, 253-266

Hamilton, J.M. and Tol, R.S.J., 2007. The Impact of Climate Change on Tourism and Recreation. In: Schlesinger, M.E. (ed) *Human-Induced Climate Change: An Interdisciplinary Assessment*. Cambridge, Cambridge University Press, pp 147-155

Harrison, S.J., Winterbottom, S.J., Sheppard, C., 1999. The Potential Effects of Climate Change on the Scottish Tourist Industry. *Tourism Management*, 20, 203-211

Koenig, U. and Abegg, B., 1997. Impacts of Climate Change on Winter Tourism in the Swiss Alps. *Journal of Sustainable Tourism*, 5, 1, 46-57

Lise, W. and Tol, R.S.J., 2002. Impact of climate on tourist demand. *Climatic Change*, 55, 4, 429-449

Lohmann, M., 2001. Coastal Resorts and Climate Change. In: Lockwood, A. and Medlik, S. (eds) *Tourism and Hospitality in the 21<sup>st</sup> Century*. Oxford, Butterworth Heinemann, pp284-295

Maddison, D., 2001. In Search of Warmer Climates? The Impact of Climate Change on Flows of British Tourists. *Climatic Change*, 49, 193-208

McBoyle, G., Scott, D., Jones, B., 2007. Climate Change and the Future of Snowmobiling in Non-Mountainous Regions of Canada. *Managing Leisure*, 12, 4, 237-250

Mieczkowski, Z., 1985. The Tourism Climatic Index: A Method of Evaluating World Climates for Tourism. *Canadian Geographer*, 29, 220-233

Mintel, 2007. *Tourism and Climate Change*. London, Mintel

**Moen, J. and Fredman, P., 2007. Effects of Climate Change on Alpine Skiing in Sweden. *Journal of Sustainable Tourism*, 15, 4, 418-437**

**Patterson, T., Bastianoni, S., Simpson, M., 2006. Tourism and Climate Change: Two-Way Street, or Vicious/Virtuous Circle? *Journal of Sustainable Tourism*, 14, 4, 339-348**

**Perry, A., 2006 Will Predicted Climate Change Compromise the Sustainability of Mediterranean Tourism? *Journal of Sustainable Tourism*, 14, 4, 367-375**

**Richardson, R.B. and Loomis, J.B., 2004. Adaptive Recreation Planning and Climate Change: A Contingent Visitation Approach. *Ecological Economics*, 50, 1-2, 83-99**

**Scott, D., Jones, B., 2005. *Climate Change and Banff: implications for Tourism and Recreation*, University of Waterloo. Available at: [http://adaptation.nrcan.gc.ca/projdb/pdf/141\\_e.pdf](http://adaptation.nrcan.gc.ca/projdb/pdf/141_e.pdf)**

**Scott, D., Jones, B., 2006. The Impact of Climate Change on Golf Participation in the Greater Toronto Area (GTA): A Case Study. *Journal of Leisure Research*, 38, 3, 363-380**

**Scott, D., Jones, B., Lemieux, C., McBoyle, G., Mills, B., Svenson, S., Wall, G., 2002. The Vulnerability of Winter Recreation to Climate Change in Ontario's Lakelands Tourism Region, University of Waterloo. Available at: [http://www.fes.uwaterloo.ca/geography/faculty/danielscott/PDFFiles/Winterrecreation\\_Scott-good%20quality.pdf](http://www.fes.uwaterloo.ca/geography/faculty/danielscott/PDFFiles/Winterrecreation_Scott-good%20quality.pdf)**

**Scott, D., McBoyle, G., Mills, B., 2003. Climate Change and the Skiing Industry in Southern Ontario (Canada): Exploring the Importance of Snowmaking as a Technical Adaptation. *Climate Research* 23, 171-181**

**Sustainable Tourism Cooperative Research Centre, 2007. Climate Change and Australian Tourism. Available at: <http://www.crctourism.com.au/CRCBookshop/Documents/ClimateChange-AustnTourism-FINAL.pdf>**

**Unbehaun, W., Probstl, U. and Haider, W., 2008. Trends in Winter Sport Tourism: Challenges for the Future. *Tourism Review*, 63, 1, 36-47**

**Viner, D., Agnew, M., 1999. *Climate Change and its Impact on Tourism*. Norwich, Climatic Research Unit, University of East Anglia. Available at: [http://www.wwf.org.uk/filelibrary/pdf/tourism\\_and\\_cc\\_full.pdf](http://www.wwf.org.uk/filelibrary/pdf/tourism_and_cc_full.pdf)**

**Yeoman, I., 2005. Understanding the Impact of Climate Change on Scottish Tourism. Available at: [http://www.visitscotland.org/print/understanding\\_the\\_impact\\_of\\_climate\\_change-2.pdf](http://www.visitscotland.org/print/understanding_the_impact_of_climate_change-2.pdf)**

### **Tourism impacts on climate change**

Tourism contributes to climate change through GHG emissions from transport, accommodation and activities. Tourism was responsible for between 4% and 6% of global emissions in 2005 (World Tourism Organisation 2007), transport being responsible for the largest share (between 75-90%) (Gössling 2002a). Furthermore, it is air travel that causes the bulk of the problem (Peeters et al 2006). The following texts provide a solid background to tourism's impact on climate change:

**Becken, S., 2002. Analysing International Tourist Flows to Estimate Energy Use Associated with Air Travel. *Journal of Sustainable Tourism*, 10, 2, 114-131**

**Becken, S. and Simmons, D., 2002. Understanding Energy Consumption Patterns of Tourist Attractions and Activities in New Zealand. *Tourism Management*, 23, 4, 343-354**

**Dubois, G. and Ceron, J.P., 2006a. Tourism/Leisure Greenhouse Gas Emissions Forecasts for 2050: Factors for Change in France. *Journal of Sustainable Tourism*, 14(2), 172-191**

**Dubois, G. and Ceron, J.P., 2006b. Tourism and Climate Change: Proposals for a Research Agenda. *Journal of Sustainable Tourism*, 14(4), 399-415**

**Gössling, S., 2000. Sustainable Tourism Development in Developing Countries: Some Aspects of Energy Use. *Journal of Sustainable Tourism*, 8(5), 410-425**

**Gössling, S., 2002a. Global Environmental Consequences of Tourism. *Global Environmental Change*, 12, 4, 283-302**

**Gössling, S., 2002b. Human-Environmental Relations with Tourism. *Annals of Tourism Research*, 29(2), 539-556**

**Gössling, S., Hall, C.M., Lane, B., Weaver, D., 2008. The Helsingborg Statement on Sustainable Tourism. *Journal of Sustainable Tourism*, 16, 1, 122-124**

**Høyer, K.G., 2000. Sustainable Tourism or Sustainable Mobility? The Norwegian Case. *Journal of Sustainable Tourism*, 8, 2, 147-160**

**Intergovernmental Panel on Climate Change, 1999. Aviation and the Global Atmosphere. Available on-line at:  
<http://www.grida.no/climate/ipcc/aviation/index.htm>**

**Peeters, P., Szimba, E., Duijnsveld, M., 2007. Major Environmental Impacts of European Tourist Transport. *Journal of Transport Geography*, 15, 83-93**

**Theuns, H.L., 2001. Sustainable Long-Haul Tourism: Does it Really Exist? *Tourism Recreation Research*, 26, 2, 77-80**

### **Mitigation and adaptation strategies**

Mitigation and adaptation are different but related things. Mitigation refers to attempts to reduce the impact of tourism on climate change while adaptation refers to attempts to adapt tourism to climate changes. However, adaptation might also relate to adaptations made to achieve national mitigation strategies related to GHG emissions – hence the relationship. For instance, as a transport intensive industry mitigation policies related to GHG emissions will increase costs of transport and impact tourism mobility.

Mitigation strategies can be informed by ecological footprint analysis and eco-efficiency analysis. The following articles give insight into this approach:

**Gössling, S., Borgström, H., Hörstrmeier, O., Saggel, S., 2002. Ecological Footprint Analysis as a Tool to Assess Tourism Sustainability. *Ecological Economics*, 43, 199-211**

**Gössling, S., Peeters, P., Ceron, J.P., Dubois, G., Patterson, T., Richardson, R.B., 2005. The Eco-Efficiency of Tourism. *Ecological Economics*, 54, 417-434**

**Hunter, C. and Shaw, J., 2007. The Ecological Footprint as a Key Indicator of Sustainable Tourism. *Tourism Management*, 28, 46-57**

**Jackson, I., 2002. *Workshop Report and Plan of Action: Adaptation to Climate Change in the Caribbean Tourism Sector Workshop Grenada*. Organisation of American States. Available at:  
<http://www.oas.org/macc/Docs/TourismReport.doc>**

**Peeters, P. (ed) (2007) *Tourism and Climate Change Mitigation: Methods, Greenhouse Gas Reductions and Policies*. Breda, NHTV Breda**

**Peeters, P.M. and Schouten, F., 2006. 'Reducing the Ecological Footprint of Inbound Tourism and Transport to Amsterdam'. *Journal of Sustainable Tourism*, 14, 157–171**

**Simpson, M.C., Gössling, S., Scott, D., Hall, C.M. and Gladin, E. (2008) *Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices*. Paris, UNEP, University of Oxford, UNWTO, WMO. Available at:  
<http://www.geog.ox.ac.uk/news/events/ccamts/ccamts.pdf>**

Currently one of the main ways to mitigate GHG emissions is through carbon offsetting schemes. A number of tour operators and airlines now provide an offsetting option when booking a holiday and a variety of sites enable individuals to calculate the carbon footprint of their holiday and indeed other



elements of consumption. There is, however, some scepticism about the value of carbon offsetting and it is currently the focus of tourism research. The following shed some light on this issue:

**Becken, S., 2004. How Tourists and Tourism Experts Perceive Climate Change and Carbon-Offsetting Schemes. *Journal Of Sustainable Tourism*, 12, 4, 332-345.**

**Dodds, R., Leung, M., Smith, W., 2008. Assessing Awareness of Carbon Offsetting by Travellers and Travel Agents. *Anatolia*, 19, 1, 135-148.**

**Environmental Change Institute, 2008. Carbon Offsets.**

Available at: <http://www.eci.ox.ac.uk/research/climate/cop07/offsets.php>

**Environmental Change Institute, 2008. Voluntary Carbon Market.**

Available at: <http://www.eci.ox.ac.uk/publications/downloads/factsheet-offsets.pdf>

**Gössling, S., Broderick, J., Upham, P., Ceron, J.P., Dubois, G., Peeters, P., Strasdas, W., 2007. Voluntary Carbon Offsetting Schemes for Aviation: Efficiency, Credibility and Sustainable Tourism. *Journal Of Sustainable Tourism*, 15, 3, 223-248.**

**IATA, 2008. Aviation Carbon Offset Programmes: IATA Guidelines and Toolkit.**

Available at: [http://www.iata.org/NR/rdonlyres/22669B08-918C-4AB7-8D8F-8F9743BA8FE6/61823/Carbon\\_Offset\\_Guidelines\\_May2008.pdf](http://www.iata.org/NR/rdonlyres/22669B08-918C-4AB7-8D8F-8F9743BA8FE6/61823/Carbon_Offset_Guidelines_May2008.pdf)

**WWF, 2002. Holiday Footprinting: A Practical Tool for Responsible Tourism.** Available at:

<http://www.wwf.org.uk/filelibrary/pdf/holidayfootprintingfull.pdf>.

The following are examples of sites which provide carbon footprint calculators:

**Carbon Footprint, 2008. Welcome to Carbon Footprint.**

Available at: <http://www.carbonfootprint.com/index.html>

**Climatecare, 2008. Reducing Carbon Emissions.**

Available at: <http://www.climatecare.org/>

**Climate Trust, 2007. The Climate Trust - Your Path to a Stable Climate.**

Available at: [http://www.climatetrust.org/about\\_offsets.php](http://www.climatetrust.org/about_offsets.php)

With respect to adaptation, most work has been done in relation to the skiing industry which is already feeling the impact of rising temperatures. To date few studies have focused in detail on adaptation strategies but the following give an insight into this area:

**Becken. S., 2005. Harmonising Climate Change Adaptation and Mitigation: The Case of Tourist Resorts in Fiji. *Global Environmental Change Part A*, 15, 4, 381-393**

**Behringer, J., Buerki, R., Fuhrer, J., 2000. Participatory Integrated Assessment of Adaptation to Climate Change in Alpine Tourism and Mountain Agriculture. *Integrated Assessment*, 1, 4, 331-338**

**Ceron, J.P. And Dubois, G., 2007. Limits to Tourism? A Backcasting Scenario for Sustainable Tourism Mobility in 2050. *Tourism and Hospitality Planning & Development*, 4, 3, 191-209**

**Chan, W.W. & Lam, J.C., 2003. Energy-Saving Supporting Tourism: A Case Study of Hotel Swimming Pool Heat Pump. *Journal of Sustainable Tourism*, 11, 1, 74-83**

**Elsasser, H., Bürki, R., 2002. Climate Change as a Threat to Tourism in the Alps. *Climate Research*, 20, 3, 253-257**

**Scott, D. And Mcboyle, G., 2007. Climate Change Adaptation in the Ski Industry. *Mitigation and Adaptation Strategies For Global Change*, 12, 8, 1411-1431**

**South West Climate Change Impacts Partnership, 2008. Climate Change and Tourism in the South of England: What can Your Tourism Business Do to Adapt? Available At:**

**<http://www.oursouthwest.com/climate/registry/tourism-leaflet-2007.pdf>**

**UK Energy Research Centre, 2007. UK Tourism in a Low Carbon World. Available at:**

**<http://www.ukerc.ac.uk/TheMeetingPlace/Activities/Activities2007/071123UKTourisminalowcarbonworld.aspx>**

The tourism industry has been undertaking a variety of initiatives to tackle wider environmental impacts and sustainability issues including climate change. The following provide examples:

**Accor Hotels, 2006. Accor Hotels Environment Charter: Practical Guide. Available at:**

**[http://www.accor.com/gb/upload/pdf/guide\\_env/Accor\\_guide\\_GB.pdf](http://www.accor.com/gb/upload/pdf/guide_env/Accor_guide_GB.pdf)**

**Caribbean Hotel and Tourism Association, 2007. Position Paper on Global Climate Change and the Caribbean Tourism Industry. Available at: <http://www.caribbeanhotels.org/ClimateChangePosition0307.pdf>**



**Federation of Tour Operators, 2006. Supplier Sustainability Handbook.**

Available at:

<http://www.fto.co.uk/assets/documents/SSH%20Sept%2006.pdf>

**First Choice, 2008. Environment and People. On-line material available**

at: <http://bookings.firstchoice.co.uk/environment/index.html>

**Font, X. and Buckley, R.C. (eds), 2001. *Tourism Ecolabelling: Certification and Promotion of Sustainable Management*. Wallingford, Cabi Publishing.**

**Font, X. and Cochrane, J., 2005. *Integrating Sustainability into Business: a Management Guide for Responsible Tour Operations*. Stevenage, Earthscan**

**Institute of Hospitality, 2008. *Hospitable Climates*. On-line material available at: <http://www.hospitableclimates.org.uk/>**

**The Travel Foundation, 2006. *Insider guide: Climate Change and Tourism – A Guide for Managers*. Bristol, The Travel Foundation**

**UNEP, 2003. *Switched on: Renewable Energy Opportunities for the Tourism Industry*. Paris, UNEP**

## **CLIMATE CHANGE AND LEISURE**

Considerably less has been written on leisure and climate change beyond the literature on tourism. A few studies discuss outdoor leisure and/or recreation but these are essentially set in a tourism context. Leisure is, of course, much more than this and there are a whole raft of issues for the leisure industry related to the production of products and experiences and their consumption.

Day to day leisure travel is also a key issue, but much less researched, and climate change will also have an effect on the outdoor leisure resource. Beyond these aspects, the main issues for the leisure industry relate to carbon intensive products or experiences. Some of the climate change issues relate to manufacture and development; for instance, electronic equipment is changing its design to reduce energy consumption.

Other issues relate to user practices, such as the impact of TVs and computers being on for many hours or the use of thrill rides at theme parks. There are also unexpected consequences, for example, Travers (1998) discusses the clothing retail implications of a changing climate, thus the topic is potentially very diverse. The following material provides reading more specifically on leisure:

**Ceron, J.P. and Dubois, G., 2007. Limits to Tourism? A Backcasting Scenario for Sustainable Tourism Mobility in 2050. *Tourism and Hospitality Planning & Development*, 4, 3, 191-209**

**Gutberlett, J., 2000. Sustainability: A New Paradigm for Industrial Production. *International Journal of Sustainability in Higher Education*, 1, 3, 225-236. (provides a product manufacture perspective)**

**Hurdle, D. and Tansley, R., 2001. Taking the Green Road, *Leisure Management*, May 2001 p54-56**

**Nicholls, S., 2006. Climate Change, Tourism and Outdoor Recreation in Europe, *Managing Leisure*, 11, 3, 151-163**

**Sayce S (2000) Building a Green Future. *Leisure Management*, June 2000**

**Travers, J., 1998. The Impact of Climate Change on Traditional Seasonal Ranges for High Street Women's Wear in England. *Journal of Fashion Marketing and Management*, 2, 4, 370-382**

**Vinod, S., Yarnal, C., Yarnal, B., Godbey, G., 2001. Climate Change: What Does it Mean for Parks and Recreation Management? *Parks & Recreation*, 36, 3, 54**

## **CONSUMER DECISION MAKING, BEHAVIOUR AND CLIMATE CHANGE**

People normally buy the best quality products they can afford, choosing the cheapest if it seems as good as slightly more expensive options. There are however, some people who apply additional criteria to the decision making. Choosing to take the train rather than flying may take longer and could cost more; it is an example of ethical purchasing behaviour in order to reduce the carbon footprint. A growing number of studies chart environmental awareness in general and specific to climate change. From an individual perspective, concern for the environment largely remains unrelated to holiday travel behaviour (Anable et al., 2006; Becken, 2007; Miller et al., 2007). Over 75% believe flying less would have an impact on the UK's contribution to climate change but few are willing to fly less (Defra 2007). The following material provides reading on consumer decision making with respect to climate change:

**Anable, J., Lane, B., and Kelay, T., 2006. An Evidence Base Review of Public Attitudes to Climate Change and Transport Behaviour. Department for Transport. Available at: <http://www.dft.gov.uk/pgr/sustainable/climatechange/areviewofpublicattitudestoc15730>**

**Becken, S., 2007. Tourists' Perception of International Air Travel's Impact on the Global Climate and Potential Climate Change Policies. *Journal of Sustainable Tourism*, 15, 4, 351-368**

**Becken, S., Simmons, D., and Frampton, C., 2003. Segmenting Tourists by Their Travel Pattern for Insights into Achieving Energy Efficiency. *Journal of Travel Research*, 42, 1, 48-56**

**Department for Environment, Food and Rural Affairs 2007 Survey of public attitudes and behaviours toward the environment. Available at: <http://www.defra.gov.uk/environment/statistics/pubatt/download/pubattsum2007.pdf>**

**Fairweather, J.R., Maslin, C., Simmons, D.G., 2005. Environmental Values and Response to Ecolabels among International Visitors to New Zealand. *Journal of Sustainable Tourism*, 13, 1, 82-98**

**Gössling, S., Bredberg, M., Randow, A., Sandström, E., Svensson, P., 2006. Tourist Perceptions of Climate Change: A Study of International Tourists in Zanzibar. *Current Issues in Tourism*, 9, 4&5, 419-435**

**Gössling, S. and Peeters, P., 2007. 'It Does Not Harm the Environment!' An Analysis of Industry Discourses on Tourism, Air Travel and the Environment. *Journal of Sustainable Tourism*, 15, 4, 402-417**

**Harrison, R., Newholm, T., Shaw, D., (eds) 2006. *The Ethical Consumer*. Sage, London**

**Jackson, T. (ed), 2006. *The Earthscan Reader on Sustainable Consumption*. London, Earthscan**

**Miller, G., Rathouse, K., Scarles, C., Holmes, K., and Tribe, J., 2007. *Public Understanding of Sustainable Leisure and Tourism: A Report to the Department for Environment, Food and Rural Affairs*. University of Surrey. DEFRA, London**

**Mintel, 2007. *Holiday Lifestyles – Responsible Tourism – UK*. London, Mintel**

**O'Connor, R.E., Bord, R.J. and Fisher, A., 1999. Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change. *Risk Analysis*, 19, 3, 461-471**

**Shaw, S. and Thomas, C., 2006. Social and Cultural Dimensions of Air Travel Demand: Hyper-mobility in the UK?. *Journal of Sustainable Tourism*, 14, 2, 209-215**

**Sustainable Consumption Roundtable, 2006. *I will if you will*. Available at: [http://www.sd-commission.org.uk/publications/downloads/I\\_Will\\_If\\_You\\_Will.pdf](http://www.sd-commission.org.uk/publications/downloads/I_Will_If_You_Will.pdf)**

## **ANNOTATED GUIDE TO INTERNET RESOURCES**

The following list has been developed from a list that appeared in Hall and Higham (2005):

### **Australian Government Department of Climate Change**

<http://www.greenhouse.gov.au/>

### **BBC**

[http://www.bbc.co.uk/topics/climate\\_change](http://www.bbc.co.uk/topics/climate_change)

### **Carbon Trust**

<http://www.carbontrust.co.uk/default.ct>

### **Cato Institute, global warming**

<http://www.cato.org/current/global-warming/index.html>

A private US policy research foundation focusing on 'limited government, individual liberty, free markets and peace'

### **Climate Action Network**

<http://www.climatenetwork.org/>

A network of NGOs focusing on climate change issues.

### **Cooler Heads Coalition**

<http://www.globalwarming.org>

The Cooler Heads Coalition is a sub-group of the National Consumer Coalition. It was formed on 6 May 1997 'to dispel the myths of global warming by exposing flawed economic, scientific, and risk analysis'

### **Department for Environment, Food and Rural Affairs, Climate Change and Energy**

<http://www.defra.gov.uk/environment/climatechange/index.htm>

### **Destinet**

<http://destinet.ew.eea.europa.eu/>

Information for tourist destinations and stakeholders aiming to disseminate best practice in sustainable tourism development.

### **EDF Energy, The Big Green Switch: Recreation and Leisure**

[http://www.biggreenswitch.co.uk/recreation\\_and\\_leisure](http://www.biggreenswitch.co.uk/recreation_and_leisure)

### **Energy Saving Trust**

<http://www.energysavingtrust.org.uk/>

### **European Environment Agency**

<http://www.eea.europa.eu/themes/climate>

### **European Commission**

[http://ec.europa.eu/environment/climat/home\\_en.htm](http://ec.europa.eu/environment/climat/home_en.htm)

**Experts in Climate Change and Tourism (eCLAT)**

<http://www.icis.unimaas.nl/eclat/>

**Gateway to the United Nations System's work on Climate Change**

<http://www.un.org/climatechange/>

**Greenpeace, Stop Climate Change**

<http://www.greenpeace.org/international/campaigns/climate-change>

**IATA**

[http://www.iata.org/whatwedo/environment/climate\\_change.htm](http://www.iata.org/whatwedo/environment/climate_change.htm)

**Indicators of Climate Change in the UK**

<http://www.ecn.ac.uk/iccuk/>

**Intergovernmental Panel of Climate Change**

<http://www.ipcc.ch/>

**International Civil Aviation Organisation – Environmental Unit**

<http://www.icao.int/env/>

**The International Ecotourism Society**

<http://www.ecotourism.org/>

**International Energy Agency, Greenhouse Gas R&D Programme**

<http://www.ieagreen.org.uk/>

**The International Tourism Partnership**

<http://www.tourismpartnership.org/index.html>

**The Met Office**

<http://www.metoffice.gov.uk/research/hadleycentre/>

**The online learning portal from the Open University and the BBC**

<http://www.open2.net/climatechange/index.html>

**New Zealand Government's climate change solutions**

<http://www.climatechange.govt.nz/>

**Pew Centre**

<http://www.pewclimate.org/>

**Tour Operators' Initiative for Sustainable Tourism Development**

<http://www.toinitiative.org/>

**Tyndall Centre for Climate Change Research**

<http://www.tyndall.ac.uk/>

**UK Government Office of Climate Change**

<http://www.occ.gov.uk/>

**United Nations Environment Programme**

<http://www.grida.no/>

**United Nations Environment Programme: Tourism**

<http://www.uneptie.org/pc/tourism/>

**United Nations Environment Programme: Climate Change**

<http://www.unep.org/themes/climatechange/index.asp>

**United Nations Framework Convention on Climate Change**

<http://unfccc.int/2860.php>

**United Nations Framework Convention on Climate Change (Kyoto Protocol)**

<http://unfccc.int/resource/docs/convkp/kpeng.html>

**United States Climate Change Science Program**

<http://www.climatechange.gov/>

**United States Department of State**

<http://www.state.gov/g/oes/climate/>

**United States Environmental Protection Agency**

<http://www.epa.gov/climatechange/index.html>

**United States Global Change Research Program**

<http://www.usgcrp.gov/usgcrp/default.php>

**World Bank: Climate Change**

<http://www.worldbank.org/climatechange>

**World Health Organization, global change and health**

<http://www.euro.who.int/globalchange>

**World Meteorological Organization**

[http://www.wmo.int/pages/themes/climate/index\\_en.html](http://www.wmo.int/pages/themes/climate/index_en.html)

**World Tourism Organization, climate change and tourism**

<http://www.unwto.org/climate/index.php>

**WWF**

[http://www.panda.org/about\\_wwf/what\\_we\\_do/climate\\_change/index.cfm](http://www.panda.org/about_wwf/what_we_do/climate_change/index.cfm)

## **INTEGRATING CLIMATE CHANGE INTO THE TOURISM AND LEISURE CURRICULUM**

The increasing significance of climate change merits its inclusion in both tourism and leisure undergraduate programs. It could be a component of first

or a second year current issues module or an optional final year module in its own right. There is currently much more scope for the latter on tourism courses. The teaching of climate change might be structured around the topic areas outlined here such as:

- International and national climate change policy directions.
- Impacts of climate change on tourism/leisure.
- Leisure/tourism impacts on climate change.
- Mitigation and adaptation.

The following topic areas provide opportunities for more analytical argument and would therefore be suitable for seminar discussion:

- Tourism industry implications (eg destinations, tour operators, small island states).
- Leisure industry implications (eg manufacturers, providers).
- Ethical decision making in leisure and tourism.
- Viability of alternatives to car and air travel.
- The eco tourism dilemma (eco tourism while attempting to develop sustainable tourism is often located in remote places and hence travel to destinations can result in a large carbon footprint).
- The carbon footprint of leisure – who is responsible - government, manufacturers, providers, consumers?
- Climate change impacts on specific leisure/tourism settings.

The following areas are relatively under developed in the literature and would provide good topics for student projects:

- Ethical purchase behaviour in tourism or leisure.
- Ecological footprint of leisure activities.
- Carbon offsetting and leisure or tourism.
- The rebound effect (where energy efficiency savings are offset by greater use – eg choosing a smaller more fuel efficient car and then traveling further for leisure).
- The climate change impact of home entertainment equipment.

Several areas have attracted more than their fair share of attention from researchers interested in climate change and could form a focus for delivery:

### **Winter Sports**

The climate change impact on the skiing industry has received much attention. This topic provides opportunities to focus on the climate change impacts on the leisure/tourism resource and adaptation strategies. A number of authors address the impacts (Breiling and Charamza 1999; Fukushima et al 2002; Koenig and Abegg 1997; Moen and Fredman 2007; Unbehaun et al 2008) and Scott et al (2003) focus more on adaptation strategies. This is likely to be a popular topic for students as they can easily relate to the issues and often have direct experience.

### **Tourism Flows**

Tourism flows have also been analysed outside the skiing context largely focusing on warmer summer tourism conditions in destinations (e.g. the Mediterranean) and tourism market origin areas (e.g. Northern Europe). Again this provides an opportunity to look at the climate change impacts on resources and issues for destination areas.

### **Transport Impacts**

Transport impacts provide a focus on the tourism and leisure impact on climate change. The literature focuses on tourism but can easily be applied to leisure travel.

### **ABOUT THE AUTHOR**

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