Climate Change and Global Tourism: A Research Compendium

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Heather Zeppel

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Climate Change and Global Tourism: A Research Compendium

CONTENTS

1. Climate Change and Global Tourism: Review of Key Events and Research
   Heather Zeppel ........................................................................................................ 1

2. CLIMATE CHANGE AND INTERNATIONAL TOURISM
   2.1 Climate Change and International Tourism .............................................. 7
   2.2 Tourism Organisations and Climate Change ........................................... 22
   2.3 Accommodation and Climate Change ....................................................... 25
   2.4 Aviation and Climate Change ................................................................... 27
   2.5 Carbon Footprint of International Tourism .............................................. 33
   2.6 Carbon Offsetting and International Tourism .......................................... 39
   2.7 Tourist Perceptions of Climate Change ..................................................... 46

3. CLIMATE CHANGE IMPACTS ON KEY TOURISM SECTORS
   3.1 Alpine Tourism and Climate Change ......................................................... 47
   3.2 Coral Reef Tourism and Climate Change ................................................. 54
   3.3 Events and Climate Change ..................................................................... 56
   3.4 Protected Areas and Climate Change ....................................................... 58
   3.5 Summer Recreation and Climate Change ................................................. 62
   3.6 Wildlife Tourism and Climate Change ..................................................... 63

4. CLIMATE CHANGE IMPACTS ON TOURISM DESTINATIONS
   4.1 Africa ........................................................................................................ 63
       4.1.1 Egypt ................................................................................................. 64
   4.2 Antarctic ................................................................................................... 64
   4.3 Australia ................................................................................................... 64
   4.4 Canada ..................................................................................................... 71
   4.5 Caribbean ................................................................................................ 75
   4.6 Central America ....................................................................................... 77
   4.7 China ........................................................................................................ 78
   4.8 Europe ...................................................................................................... 78
       4.8.1 Austria ............................................................................................... 81
       4.8.2 Finland .............................................................................................. 82
       4.8.3 France ................................................................................................. 82
       4.8.4 Germany ............................................................................................ 82
       4.8.5 Italy ..................................................................................................... 83
       4.8.6 Norway ............................................................................................... 84
       4.8.7 Spain .................................................................................................. 84
       4.8.8 Sweden ............................................................................................... 85
       4.8.9 Switzerland ......................................................................................... 85
       4.8.10 UK .................................................................................................... 86
   4.9 Mediterranean ......................................................................................... 89
   4.10 New Zealand ........................................................................................... 90
   4.11 South America ........................................................................................ 95
   4.12 South Asia & Indian Ocean ....................................................................... 95
   4.13 South East Asia ....................................................................................... 97
   4.14 South Pacific ........................................................................................... 97
       4.14.1 Fiji .................................................................................................... 98
       4.14.2 Tuvalu ............................................................................................... 98
   4.15 USA ........................................................................................................ 98
1. Climate Change and Global Tourism: Review of Key Events and Research  

    ‘Tourism is a significant contributor to climate change’ (Simpson et. al., 2008: 66)

This research compendium lists all current publications in English relevant to climate change and global tourism. It covers articles, books and reports published from 1985 through to July 2011. The articles were located through keyword searches (i.e. climate change; carbon emissions/footprint) of tourism journals; major tourism organisations (e.g. WTC, WTTC, PATA, ETC); academic publishers; key databases (i.e. Google Scholar, OAlster, Scopus); environmental agencies; and research centres. This comprehensive review of published research about tourism and climate change provides a wide range of global case studies about the impacts of climate change on key tourism sectors and regions. These cover both adaptation and mitigation responses to climate change by the tourism industry.

This research compendium follows the UNEP and World Tourism Organization definitions of climate change keywords relevant to global tourism (Table 1). This includes climate change itself (‘any change in climate over time’); adaptation (‘adjustment in natural or human systems’); mitigation (‘intervention to reduce greenhouse gases’); carbon neutrality and carbon offsetting. This research review of climate change and tourism also highlights ‘both adaptation and mitigation measures are essential to ensure the sustainable development of tourism’ (Simpson et. al., 2008: 110).

Table 1. Definitions of climate change keywords relevant to global tourism (UNEP & WTO)

| Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. (p. 123) |
| Carbon Neutrality: The entire set of policies that an institution or business uses when it estimates its known greenhouse gas emissions, takes measures to reduce them, and purchases carbon offsets to “neutralize” those emissions that remain. (p. 67) |
| Carbon Offsetting: The process by which an amount of greenhouse gas emissions equal to that caused by a certain activity, e.g. a flight, is reduced, or offset, elsewhere. (p. 124) |
| Climate Change: Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. (p. 124) |
| Mitigation: An anthropogenic [human] intervention to reduce the output or enhance the sinks of greenhouse gases. (p. 126) |

Source: Simpson et. al. 2008 Climate change adaptation and mitigation in the tourism sector: Frameworks, tools and practices. UNEP, WTO

This research compendium profiles 25 years of research about climate change and global tourism. Part 2 lists key studies about climate change in international tourism; responses by tourism organisations; climate change impacts and issues for accommodation and aviation, carbon footprints and carbon offsetting; and tourist perceptions. Part 3 lists research about climate change impacts on key tourism sectors such as alpine tourism, coral reef tourism, events, protected areas, summer recreation, and wildlife tourism. Part 4 lists climate change research for key tourism destinations by geographic region (i.e. Africa, Caribbean, Central America, Europe, Mediterranean, South America, South Asia, South East Asia, South Pacific); or country (i.e. Australia, Canada, China, NZ, USA etc).

Global awareness about the impacts of climate change has been growing since the early 1990s (Table 2). The Intergovernmental Panel on Climate Change (IPCC) has issued four global assessment reports (1990, 1995, 2001 & 2007). The United Nations Framework Convention on Climate Change (UNFCCC) was created in 1992 with the Kyoto Protocol for reducing emissions coming into force in 2005. Europe’s Emission Trading Scheme (ETS) also began in 2005, with aviation to/from/within Europe to be included from 2012. The World Tourism Organization (WTO) has also hosted two international conferences on climate change and tourism, leading to the Djerba Declaration (2003) and Davos Declaration (2007). Other WTO climate initiatives include an expert team on climate issues (2006), a Resolution (2007), minister’s summits (2007/08), and a Climate Commitment (2009).

ACSB Worki ng Paper No. 3 Climate Change and Global Tourism 1
Global tourism contributes 5%-14% of greenhouse gas emissions from air travel, ground transport, accommodation, and activities (Table 3), not including the energy used to construct tourist facilities. Transport accounts for 75% of tourism emissions, mainly from air travel, while accommodation is 20% of the tourism footprint. ‘By 2035, under a “business as usual” scenario, carbon dioxide emissions from global tourism are projected to increase by 130%’ (WTO, 2009: 2). Energy efficiency, renewable energy and cleaner fuels are key areas to reduce global and national tourism emissions.

Table 3. Key facts on global tourism emissions

- CO₂(Mt): Air Transport (517), Other Transport (468), Accommodation (274), Activities (45), TOTAL (1,307 MtCO₂-2005); Total World 26,400, Tourism Share of CO₂ is 4.95% (WTO, 2007)
- Air travel, adding a multiplier of 2.7 to 517Mt, yields tourism emissions of 8.2% in 2005
- Global tourism will double from 2005 to 2020, thus increasing tourism CO₂ emissions to 16%
- Excluding aviation, CO₂ emissions from global tourism will grow at 2.5% per year until 2035
- Tourism air travel accounts for 60-90% of a trip’s CO₂ emissions (Gossling et. al., 2005)
- Transport accounts for 75% of tourism emissions; Aviation is 40% of total tourism footprint
- Long-haul air travel is 2.7% of all tourism trips but contributes 17% of tourism CO₂ emissions
- Rail and coach travel is 34% of all tourism trips but 13% of all tourism emissions (WEF, 2009)
- Ocean cruising (34 MtCO₂), <5% global shipping emissions, 191% increase by2035
- Global accommodation (284 MtCO₂), 20% of tourism footprint, 156% increase by 2035
- By 2035, CO₂ emissions from global tourism are projected to increase by 130% (WTO, 2009)
- WTTC aspiration to reduce total tourism CO₂ emissions by 2035 by 50% from 2005 levels
- 40 CEOs committed to 25-30% reduction by 2020 on tourism emission of 2005 (WTTC, 2009)
- Four countries aiming for carbon neutral tourism: Costa Rica, Maldives, Norway, Sri Lanka

Sources: Gossling et. al., 2005; WEF, 2009; WTO, 2007 Climate change & tourism-responding to global challenges; WTO, 2009; WTTC, 2009
The WTO Davos Declaration supported mitigation of emissions and adaptation to climatic change by the tourism sector. Climate change mitigation includes technological, economic and social changes or substitutions to reduce greenhouse gas emissions from travel and tourism. This involves reducing energy, water and waste (i.e. eco-efficiency) along with low carbon travel products or activities. Mitigation measures mainly focus on transport, accommodation, tour operators and destinations. This compendium lists reports and articles about mitigation measures and carbon offsetting tourism. Adaptation to climate change includes additional actions or activities by tourism enterprises to deal with the operational risks from climate variability or extreme weather events. Table 4 lists key tourism adaptation strategies for coping with higher temperatures, sea level rises and varied rainfall.

Table 4. Impacts of climate change and tourism adaptation strategies

<table>
<thead>
<tr>
<th>Impacts of climate change</th>
<th>Tourism adaptation strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced snow cover</td>
<td>Artificial snow making, Extend ski operations to higher altitudes, Re-design ski slopes, Cancel ski tourism, Promote non-snow winter activities, Build attractions (ice rink, spa), Develop all year tourism (i.e. summer activities), Insurance, Open higher-elevation ski runs, Levelling out ski slopes, Closures of lower altitude ski resorts, Subsidies for cableway operators to keep ski fields open</td>
</tr>
<tr>
<td>Increased coral bleaching</td>
<td>Extend operations to other reefs, Close affected reef areas, Use covers &amp; water jets over reefs, Assist reef propagation, Cancel dive tourism, Promote other reef tourism activities, Reduce impacts of ocean pollution, Ban fishing &amp; coral collection on reefs</td>
</tr>
<tr>
<td>Hotter days</td>
<td>Install air conditioners, Room fans, Hotel pools, Beach umbrellas, Develop artificial indoor beaches, Provide drinking water, Skin sun protection, Promote water-based or cool indoor activities, Plant more trees for shade &amp; cool buildings, Avoid summer travel</td>
</tr>
<tr>
<td>Increased cyclones/hurricanes</td>
<td>Heed cyclone warnings, Protect properties, Build to cyclone standards, Trim tree branches, Evacuate guests, Close damaged resorts, Disaster insurance, Visit alternative areas</td>
</tr>
<tr>
<td>Increased coastal erosion/inundation</td>
<td>Build coastal protection (sea/rock wall, groyne, dyke), Replenish beach sand (trucks, pumping), Close damaged beach areas, Closure of coastal resorts, Rebuild beach infrastructure, Revegetate/plant soil-binding vegetation in coastal areas, Protect &amp; maintain coastal native vegetation communities, Disaster insurance, Build coastal levees, Improve drainage &amp; pumping systems, Ban development in at-risk zones, Establish building set-back limits well above mean sea-level</td>
</tr>
<tr>
<td>Rainfall variability</td>
<td>Increased water storage, Recycle water, Desalination, Encourage minimal water use by guests, Purchase water, Limit or set quotas on water use, Use trickle irrigation, Repair leaks, Use timers on taps, Drought-tolerant plants</td>
</tr>
<tr>
<td>Drought</td>
<td>Reduce or cancel water activities, Relocate to other rivers, Build artificial watercourses, Release water from dams, Promote other outdoor activities, Closure of water sports</td>
</tr>
<tr>
<td>Reduced river flow</td>
<td>Reduce or cancel water activities, Relocate to other dams, Promote other outdoor activities, Closure of water sports</td>
</tr>
<tr>
<td>Reduced water in dams</td>
<td>Build on higher ground, Install levees, dykes &amp; drainage systems, Disaster insurance, Enhanced flood design &amp; site standards, Install pumping systems, Closure of flood-affected resorts, Close areas prone to flooding, Use alternative routes or areas</td>
</tr>
<tr>
<td>Floods</td>
<td>Source: Author &amp; based on Becken &amp; Hay, 2007</td>
</tr>
</tbody>
</table>
The WTO has produced eight major reports about climate change and tourism from 2003-2009 (Table 5). Other key reports by environmental, business or tourism groups also cover climate and tourism, low carbon travel, travel emissions, carbon offsetting, air transport and tourism operators. The organisations producing these reports about global tourism and climate change include the Centre for Sustainable Tourism (USA); World Economic Forum; The International Ecotourism Society; Deutsche Bank; Centre for Marine and Climate Research (Germany); Tufts University; Stockholm Environment Institute (Sweden); Ecumencial Coalition on Tourism (Thailand); The Icarus Foundation (Canada); Research and Markets; University of East Anglia (UK); UNESCO; World Travel and Tourism Council; WWF; and Naturefriends International. These reports highlight the global nature of the tourism industry and the impacts of travel emissions ranging from aviation to World Heritage sites.

Table 5. Key reports on global tourism and climate change

| Mathew, P. & McKeown, J. (2010). Disaster prevention in tourism: Perspectives on climate justice. ECOT. |
| Scott, D. et. al. (2007). Climate change and tourism: Responding to global challenges. WTO & UNEP. |
| Simpson et. al. (2008). Climate change adaptation and mitigation in the tourism sector. UNEP, WTO, WMO. |
| Todd, G. (2003). WTO background paper on climate change and tourism. WTO. |
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| WTO. (2007). Climate change and tourism: Responding to global challenges. |
| WTO. (2009). From Davos to Copenhagen & beyond: Advancing tourism’s response to climate change. WTO. |
| WWF. (2002). Holiday footprinting – a practical guide for responsible tourism. WWF. |

There are nine textbooks that focus specifically on climate change and tourism issues. These address tourism and recreation (Hall & Higham, 2005); risks and opportunities (Becken & Hay, 2007); assessment and coping strategies (Amelung et. al., 2007); winter tourism in the European Alps (Agrawala, 2007); climate change mitigation (Peeters, 2007); disaster prevention and climate justice (D’Mello, McKeown, & Minninger, 2009); climate change issues and actions (Schott, 2010); coastal tourism destinations (Jones & Phillips, 2010); and carbon management (Gossling, 2010). There have also been seven special issues of journals, five in tourism, that focus on climate change and tourism impacts. These special journal issues include: Asia Pacific Journal of Tourism Research (2012); Journal of Sustainable Tourism (2006 & 2010); Journal of Transport Geography (2010); Tourism Planning and Development (2009 & 2010); and World Climate News (2005). Climate change and tourism has been the focus of some 13 international or European/UK conferences since 2001 (Table 6). The global climate tourism conferences were hosted by the International Society of Biometeorology (2001); WTO (2003, 2007, 2009); OECD (2006); UNEP (2008); University of Brighton (2009); and the Carbon Neutral Destination Network (2011). Tourism conferences since 2007 focus on low carbon travel.
Selected travel, business, environmental, and research groups have further website resources about climate change impacts on tourism (Table 7). Information about climate change issues is included on the websites of key tourism organisations (i.e. European Travel Commission, PATA, WTO, WTTC). Other tourism NGOs focus on climate justice and tourism (i.e. ECOT, Equations, IIPT), or on how the travel industry and tourists can reduce their carbon emissions (i.e. Planeta, Icarus Foundation, Travel Foundation, TICOS). Some websites focus on specific mitigation initiatives for reducing energy use in tourism (i.e. Hotel Energy Solutions & Renewable Energy in Tourism Initiative). Research agencies that address climate change impacts on tourism include STCRC (Australia) and Landcare (NZ). In Europe, climate tourism reports are produced by Fondazione Eni Enrico Mattei (Italy), and the European Travel Commission & VisitSweden.

Other research examines climate change issuers for event tourism (n=46), but little on summer recreation or wildlife tourism. By geographic region, most climate tourism research is completed in Europe, North America, Australia and New Zealand.
This research compendium provides a worldwide list of publications on climate change and tourism. It provides a wide range of global case studies about climate change impacts and responses for key tourism sectors and regions. In doing so, it seeks to assist and advance tourism research on climate change. It also furthers the WTO goal in the 2003 Davos Declaration ‘for adaptation- and mitigation-related initiatives in all aspects of tourism practice’ (WTO, 2008: 110). In particular, it covers both global and locally-specific research and evaluation of adaptation and mitigation activities in tourism. Key areas of focus and also gaps in research about climate change impacts on tourism are identified.

The existing research focuses on regions (e.g. mountains, coast, islands) and destinations or activities (i.e. snow sports) that are vulnerable to the impacts of climate change on the tourism industry. It also covers climate change innovations through technology, low carbon products and green markets. This research review found only a few destinations has also covers climate change innovations through technology, low carbon products and green markets. This research review found only a few destinations has also covers climate change innovations through technology, low carbon products and green markets.

Global, national, regional, local and specific tourism industry responses to climate change were listed but collaboration between industry sectors, environmental and business agencies was also needed. Building the capacity of tourism to respond to climate change issues and impacts is a key challenge.

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ACSBD Working Paper No. 3 Climate Change and Global Tourism 91


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Author Biography

**Associate Professor Heather Zeppel**
heather.zeppel@usq.edu.au

Associate Professor Heather Zeppel is a Mid Career Research Fellow at the Australian Centre for Sustainable Business and Development (ACSBD) at the University of Southern Queensland, Springfield (Brisbane). She has a 20-year research and teaching career in environmental tourism, and was previously a senior lecturer in tourism at James Cook University, Cairns (2000-2010). Heather completed her PhD on Iban longhouse tourism in Sarawak, Borneo, followed by postdoctoral research on Indigenous tourism at Charles Sturt University and at The University of Newcastle (ARC Postdoctoral Fellow). Heather is the author of *Indigenous Ecotourism: Sustainable Development and Management* (CABI, 2006). Her research interests include Indigenous tourism, ecotourism, wildlife tourism, interpretation, environmental best practices, sustainability, and organisational responses to climate change. Heather is leading two ACSBD research projects: ‘Carbon offsetting and mitigation by Queensland tourism enterprises’ and ‘Climate change mitigation by Queensland councils.’ She is a member of the BEST Education Network and the Council for Australasian University Tourism and Hospitality Education (CAUTHE). Heather also has a Master of Education for Sustainability degree.
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