Climate Change and Tourism – Advances in Knowledge and Practice

By Susanne Becken, Land Environment and People Research Centre, Lincoln University, New Zealand

Abstract

There is plenty of evidence that tourism stakeholders, as well as tourists, are increasingly becoming aware of the challenges that climate change is posing on the sector. This chapter presents a number of case studies that illustrate tangible progress both in terms of reducing greenhouse gas emissions and adapting to changes in climatic or environmental conditions. The examples discussed in this chapter highlight initiatives at the policy level, and practical implementations. Learning at both of these levels is seen as the major next step in making a difference for tourism to successfully address climate change. Key points extracted from the case studies include the need to avoid "unsustainable" tourism development, the importance to include carbon management as an integral part of business practice and the benefits of taking a risk-management approach to tourism (at various levels).

Introduction

Tourism stakeholders, as well as tourists, have become increasingly aware of the challenges that climate change will pose on the sector. There is plenty of evidence that tourists care and are, in principle, willing to contribute to climate-change initiatives, at least financially (Brouwer et al., 2008). Changes in tourist behavior toward more sustainable consumption patterns are less likely to happen at a large scale in the near future (Becken, 2007; Mair, 2011). However, despite some uncertainties around tourist demand and purchase behavior, the greater debate on climate-change action in the tourism sector has now moved on from mere discussions to exploring how to actually address climate change. The sector has focused on establishing frameworks and partnerships that facilitate policy making and implementation of measures that reduce tourism's greenhouse gas emissions (mitigation) as well as measures that help anticipate future climatic changes and increase tourism's resilience to these (adaptation). An example of this international effort is the "Climate Change – A Joint Approach to Addressing Climate Change" document prepared by the World Travel and Tourism Council (2010). This program details priorities for the tourism sector, commitments and suggestions for cooperation with government agencies in relation to climate-change mitigation. The report also acknowledges that the "recent model of carbon-intensive tourism growth, consumption and production is now under review" (2010: 3). It is also suggested that tourism can and should take a leadership role in climate-change mitigation, especially in those countries where tourism dominates the national economy.

The last few years saw a rapid increase in both academic and practically oriented enquiry into climate change and tourism. A number of books and reports have been published that draw together the collective knowledge in this field (e.g. Becken & Hay, 2007; Gössling

& Upham, 2009; Jones & Phillips, 2011; UNWTO, UNEP & WMO, 2008). Detailed research recently undertaken includes, for example:

• Tourists' behavior in relation to changing climatic conditions (e.g. Hein et al., 2009, Rossello-Nadal et al., 2011);
• Impacts on the ski industry around the world, for example in North America (Scott et al., 2006), New Zealand (Hendrikx & Hreinsson, 2010), Australia (Hennessy et al., 2008), and Austria (Wolfsegger et al., 2008);
• Opportunities to reduce carbon footprints and increase energy efficiency (e.g. Chan et al., 2008; Dalton et al., 2008);
• Carbon offsetting in tourism (Gössling et al., 2007);
• New forms of tourism (e.g. slow tourism, Dickinson & Lumsdon, 2010);
• Disaster-risk reduction and tourism (Becken et al., 2011; UNEP & CAST, 2008).

In addition to in-depth studies, there are also more and more toolkits and technical guides that are often produced by industry organizations and that typically have a very specific focus (e.g. improving environmental performance in the accommodation sector (The International Tourism Partnership, 2010)). These are very important for the day-to-day operational management of a business. Despite overall progress there still seems to be a gap between our increased understanding of the drivers and consequences of climate change on the one hand, and the technical advice on the other hand (Figure 1). This gap relates to specific climate-tourism policies (and institutional arrangements) that enable practical action at a larger scale. Thus, this chapter will provide an insight into progress made by policy makers and tourism businesses, drawing on case studies from around the world, including developing and developed countries. The importance of a sound conceptual understanding of climate change and tourism will be acknowledged, but the focus is on the roles of supportive policies and institutions in ensuring a strong "enabling environment" for practical responses, and on the practical responses themselves.
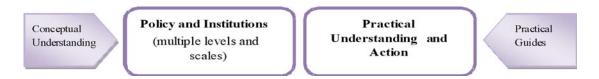

Figure 1. Filling the gap between our growing knowledge and understanding, and practical industry guides, by addressing policies, institutions and practical understanding (Becken & Hay, forthcoming).

• • •

The following discussion is structured into aspects and case studies related to mitigation policy and practice, followed by progress made in adaptation policy and practice.

Mitigation Policy

The explicit consideration of climate change as part of tourism policy dates back to the first United Nations World Tourism Organization conference on tourism and climate change in 2003 in Djerba. The Djerba Declaration was the first substantial policy document on climate change by the tourism sector. From then on, tourism policies were enhanced by adding climate-change mitigation, or specific policies were developed by tourism stakeholders at different levels to address climate change (Becken & Clapcott, 2011). Prominent examples include the inclusion of aviation into Europe's Emissions Trading Scheme (ETS), (see for example Anger & Koehler, 2010) and IATA's efforts and ambitions to reduce aviation's greenhouse gas emissions. IATA's climate change response hinges on four pillars: 1) technology, 2) operations, 3) infrastructure, and 4) economic measures (IATA, 2009). The difference between the European ETS and IATA is their legal status. As for most industry initiatives, IATA's targets and goals are voluntary in nature and members are not obliged to comply. In contrast, the EU ETS comes with a clearly defined plan of emission reductions (caps), certificates and ways of auctioning. Imposing carbon-related costs or other taxes, such as the British Air Passenger Departure Duty, may act as economic disincentives and reduce tourist volumes. This might affect low-cost travel more than traditional carriers.

Mitigation policies and actions by local or national-level organizations often relate to transport management and infrastructure, renewable portfolio standards, energy-efficiency programs, emission registries and cap-and-trade mechanisms. Local policy making, in particular, has gained increased recognition in the last few years, because local government agencies are often at the core of decisions relating to both climate-change mitigation and adaptation. Tourist destinations (e.g. through Regional Tourism Organizations) often, but not always, collaborate with local governments to develop policies and implement climate-change mitigation

Passengers at Gatwick Airport, Great Britain. Photo by Susanne Becken.

measures. Tourist destinations often wish to differentiate themselves by acting as leaders of climate-change policies, even if the country as a whole may lag behind. Initiatives such as the National Geographic Center of Sustainable Destinations (and Destination Stewardship surveys) or destination-based Sustainability Charters are (e.g. in various regions in New Zealand) evidence of this.

A prominent example of local policy for climate-change mitigation is the Climate Change and Peak Oil Strategy developed by the Sunshine Coast Council in Australia. This

strategy contains an Energy Transition Plan, a Carbon Neutral Plan and the Community Emissions Reduction Plan. The implications of higher energy costs were assessed in detail for five sectors: transport, construction, food supply, regional energy production and tourism. The tourism-specific risk assessment concludes that, while the Sunshine Coast's reliance on tourism is high, at this point in time its vulnerability to higher energy costs is relatively low. This is due to the very small proportion of international tourists (only 9% of arrivals) who arrive on long-haul flights. However, it is recognized that many Australian tourists arrive by low-cost carriers. As a result, assessment of airline viability is one of the recommendations made for further studies. Other useful examples of climate-change mitigation policies in Australia (both at a national and regional levels) are summarized in Zeppel and Beaumont (2011).

Private-sector policy initiatives often include voluntary initiatives or emissions targets. Motivations for business mitigation actions include: i) influencing or pre-empting government action, ii) to creating financial benefits, and iii) to differentiating a company or its products (brands) from competitors. There are many good examples from the tourism industry that illustrate how environmental policies incorporate climate change, or how specific climate-change policies have been designed. Prominent case studies (amongst others) are:
• Accor with its Environmental Charters;
• Fairmont hotels with their Green Partnership program;
• Eurostar with a 10-point plan to minimize climate impacts;
• Auckland International Airport, being a member of the global Carbon Disclosure Project;
• Thomas Cook group, setting environmental targets for fuel efficiency and carbon reduction;
• Aspen, Colorado (USA), reductions in greenhouse gas emissions and supply chain management; and
• Virgin Atlantic, with climate change being the priority issue in their environmental policy.

Mitigation Practice
Reducing greenhouse gas emissions from tourism can happen at many levels, starting with the individual tourist, and ranging to businesses, supply chains, destinations, countries, regions and the global-tourism sector. Typical measures discussed in the literature and observed in practice include i) visiting destinations that are closer, ii) staying longer and having fewer trips, iii) choosing carbon-efficient transport modes, iv) driving efficiently, v) staying in environmentally friendly accommodation and minimizing energy use (e.g. switching off lights and air conditioning when leaving room), vi) avoiding energy-intensive recreational activities, and vii) supporting low-carbon products on the ground (e.g. those using locally grown food).

Considerable debate has focused on the option of carbon offsetting one's emissions, with some arguing that investing into offsetting makes a real contribution to reducing global emissions, while others accusing it of being a form of "green wash" with high administrative costs, low transparency and limited accountability. Notwithstanding, a

large number of tourism businesses employ carbon-offsetting programs, including many airlines (e.g. British Airways, Qantas, Pacific Blue), Intercity Coachlines in New Zealand, Thompson and First Choice, World Expeditions, Bluewater Adventures (Canada) and Christchurch International Airport. The Tourism Industry Carbon Offset Service (TICOS) in the United Kingdom is an industry-wide program to facilitate collective action by those involved in the tourism industry. TICOS collects financial contributions from customers to finance projects that make both carbon savings and have wider sustainable-development benefits.

A key challenge for tourism relates to greenhouse gas emissions associated with transportation. Even though there continues to exist a real problem of scale (especially due to growing volumes) with aviation emissions, many airlines have made substantial improvements over the last decade. A number of airlines are investing into bio-fuel; for example, the Dutch carrier KLM has announced the formation of a new company to develop sustainable bio-fuels called SkyEnergy. British Airways and the US-based Solena Group announced an agreement to build Europe's first plant to produce jet fuel from organic waste. Subject to regulatory approval, the plant is expected to go online in 2014, and produce about 72,700 liters (16 million gallons) of fuel annually, all of which will be sold to British Airways. Air New Zealand is involved in research on bio-fuel production from algae and plans to use one million barrels of sustainable fuel annually by 2013. Virgin Airlines, Air New Zealand, Continental and Japan Airlines have completed flight trials with bio-fuel. The use of bio-fuels is subject to debate as there is a risk of unsustainable production (e.g. competing with land for food production) and there also remain questions around realistic scales of production. Other improvements in aircraft technology and plans to increase operational efficiency through integrated air-traffic management are detailed in a roadmap developed by the International Air Travel Association (2009).

There are a large number of other examples of tourism businesses mitigation actions. The Dutch Railways, for example, found that the optimization of their brake energy recuperation settings saves them about 1% of total electricity use. The Deutsche Bahn is involved in a number of "low-carbon" initiatives, including Fahrtziel Natur (train packages to 19 unique nature destinations) and attractive offers related to sports event (e.g. FIFA football events). Investments into electric vehicles have been made in Vietnam (in Hanoi), in Thailand (Green Island and Siaoliouciou), and hybrid cars are used in rental car fleets (e.g. Green Tomato, UK), and taxis (Green taxis, NZ). More examples of industry initiatives can be found in Becken and Hay (forthcoming) and also in Gössling (2011).

Deutsche Bahn was a sponsor of the Women's World Cup in 2011, also offering attractive "weltmeister bahncards" with a 25% discount on all train travel. Photo by Susanne Becken.

Tourist destinations are also increasingly interested in carbon management and branding. For countries, such as New Zealand, the brand of an environmentally clean and green ecotourism destination made it essential for decision makers to proactively engage in climate-change mitigation. A number of countries aspire to become the first carbon-neutral destinations in the world. Bonaire is one of them. Current activities in Bonaire include the auditing of GHG emissions and investments into renewable energy, energy efficiency and reforestation projects. In other cases, such as Växjö in Sweden, climate-change initiatives implemented by local communities for reasons other than tourism development have given a boost of visitor activity.

Adaptation Policy
The consequences of climate change are inevitable, and tourism, just like other sectors, needs to prepare for changes in climatic and environmental conditions to ensure its long-term viability. In some cases, this will entail the preparation of a policy and plan of action, and the establishment of new institutional arrangements. National and local governments in places where tourism makes a significant contribution to the economy and local livelihoods typically undertake such comprehensive responses. Large tourism corporations and industry organizations also develop policies, in order to reduce the risks that climate change represents to their profitability. In many cases these initiatives will also seek to exploit any benefits climate change might bring to the tourism industry. Smaller tourism operators, and tourists themselves, should benefit from these higher-level policies, plans and institutional arrangements. In some cases, smaller businesses also prepare adaptation policies as part of their wider business plan.

The Australian "Tourism and Climate Change – A Framework for Action" (Department of Resources, Energy and Tourism, 2008) is a good example of a national policy that addresses the impacts of climate change on tourism. The rationale for the policy is that climate change will impose costs on the tourism industry, due to tourism's dependence on natural assets and the built environment and their vulnerability to the physical impacts of climate change. The framework recognizes that these impacts will also flow through in the form of financial risks with rising insurance premiums, changes to business financing and the need for business to incorporate climate change into their business model. The Framework aims to deliver five outcomes:
1. Improved understanding of the vulnerabilities of tourism to both the physical and economic impacts of climate change in order to build the resilience and adaptive capacity of the industry and provide certainty for the purpose of future investment;
2. A tourism industry that is prepared for a carbon-constrained future and continues to make a substantial contribution to the Australian economy;
3. A repositioning of tourism marketing strategies to meet head on the challenges and opportunities presented by climate change;
4. A fully informed tourism industry through consistent and effective industry outreach and communications; and
5. A nationally consistent, inclusive and cooperative approach to implementation.

There are also a number of examples of other regional or national adaptation strategies – for example, in the Caribbean, Germany (through the German Adaptation Strategy),

Samoa (various climate policies and tourism development plans), and Israel (in relation to reducing water consumption from tourism). The Great Barrier Reef Tourism Climate Change Action Strategy (2009-2012) is a good example of a destination-based approach to climate change adaptation by tourism. It is also a good illustration of how resilience and risk management are integrated with carbon management and environmental sustainability.

Caribbean small-island developing states have articulated National Climate Change Adaptation Policies and Implementation Plans and many regional programs are now linking these plans to their resource and risk-management policies (Pulwarty Et Al., 2010). The plans include:
1. Caribbean Environment Programme
2. International Coral Reef Action Network Project
3. Integrating Watershed and Coastal Area Management in Small Island Developing States
4. Caribbean Blue Flag Programme
5. Caribbean Global Water Partnership
6. Caribbean Regional Fisheries Mechanism
7. Caribbean Conservation Association

Figure 2. Examples of adaptation policies relevant to tourism in the Caribbean (Pulwarty et al., 2010).

Another important area of climate-change adaptation relates to disaster risk reduction. There is some evidence that climate change will increase the frequency and intensity of certain hydro-meteorological events (at least in some regions) and tourism destinations will have to prepare for crises and disasters resulting from such events. A number of good examples exist where tourism and disaster management have been integrated. Following the destructions of Hurricane Ivan, for example, Grenada has invested into a Policy and Operational Framework for Mainstreaming Disaster Risk Reduction into the Post-Hurricane Ivan

Beach protection (sea wall) in light colored rocks to reduce aesthetic disturbance (blending in with the white sand) at a beach resort in Antigua. Photo by R. Mahon.

Reconstruction Process. Important elements include: strengthening building codes and developing tools for integrating risk reduction into other planning. Phuket Province (in Thailand) has brought together tourism development planning with disaster prevention and management to create the Phuket Tourism Risk Management Strategy (UNEP & CAST, 2008).

Adaptation Practice

Adaptation to climate change and variability can take several forms: technical, managerial, behavioral and educational. Tourism adaptation measures often involve new product development, infrastructure management, environmental protection measures, marketing, and risk reduction. These can occur at all levels, from individual businesses to destinations and regions (examples are shown in Table 1). A good example of a business approach to climate-change adaptation is the International Civil Aviation Organization briefing paper for airports. The purpose is to prepare airports for changing operating environments, for example due to sea level rise (issues for runways, taxiways, terminal buildings and access routes), temperature rise (e.g. decreased aircraft lift), precipitation changes (e.g. flooding of runways) and storms (e.g. closure of airports in severe events) (Gittens, 2010).

Tourist restaurant in Cozumel (Mexico) destroyed by a hurricane. Photo by Susanne Becken.

Table 1. Examples of adaptation strategies for various climatic impacts (Becken & Hay, 2007; Zeppel, 2011).

Impact	Adaptation	Implementing Actor/Agency
Reduced snow cover /amount	Artificial snow making, Snowfencing, Extend ski operations to higher altitudes, Re-design ski slopes, Strategic partnerships, Increase sale of season passes, Weather derivatives	Ski resorts
	Promote non-snow winter activities, Build attractions (ice rink, spa), Develop all-year tourism (i.e. summer activities), Insurance, Open higher-elevation ski runs, Subsidies for cableway operators to keep ski fields open	Destination, local government
Increased coral bleaching	Extend operations to other reefs, Assist reef propagation, Cancel dive tourism, Promote other reef tourism activities,	Operators
	Reduce impacts of ocean pollution, Ban fishing and coral collection on reefs, Close affected reef areas, Educate tourists	Government and non-government organizations
Hotter days/ heat waves	Install air conditioners and fans, Hotel pools and umbrellas, Plant more trees for shade, Provide drinking water, Cool buildings	Operators
	Develop artificial indoor beaches, Promote	Destinations

	water-based or cool indoor activities, Expand shoulder seasons	Government
	Adjust building codes	
Increased cyclones/ hurricanes	Build to cyclone standards, Trim tree branches, Develop evacuation plans, Disaster insurance, Protect and maintain coastal native vegetation, Improve drainage (clear gutters)	Operators
		Government/destinations
	Provide cyclone warnings, Close damaged beach areas	
Coastal erosion	Build coastal protection (sea/rock wall, groyne, dyke), Replenish beach sand (trucks, pumping), Revegetate/plant soil-binding vegetation in coastal areas, Ban development in at-risk zones, Establish building set-back limits well above mean sea-level	Government and destinations
Reduced water availability	Increased water storage, Recycle water, Desalination	Operators
	Encourage minimal water use by guests, Limit or set quotas on water use, Use trickle irrigation, Repair leaks, Use timers on taps, Plant drought-tolerant plants	Government
	Develop water savings policies (e.g. charging for usage), Provide incentives for water-efficient equipment	
Flooding	Build on higher ground, Disaster insurance, Pumping systems	Operators
	Install levees, dykes and drainage systems, Enhanced flood design and site standards, Close areas prone to flooding, Use alternative routes or areas	Local and Central Government

Conclusion
This chapter highlights that not only has our conceptual understanding of tourism and climate change increased rapidly, so have the practical responses by those involved in the tourism sector (Becken & Hay, forthcoming). A wide range of examples have been introduced to highlight progress in both mitigation policy and practice. There are also many good examples where mitigation and adaptation are addressed in an integrated way (e.g. the business guide for climate change developed by the Australian Department of Resources, Energy and Tourism, 2009).

Three points stand out as key "lessons learned." One is that successfully addressing climate change begins with avoiding unsustainable practices. The more efficient use of resources (both energy and water, for example), the minimizing of impacts on the bio-physical environment (e.g. coral reefs or beach systems), the appropriate design of

buildings (especially designed for local, climatic conditions) and the involvement of the local population are only a few examples of how climate-change responses become an integral part of sustainable development. Further, it is evident that reducing greenhouse gas emissions is no longer merely an ethical issue that defies business logics. The contrary is the case. Carbon management has now become part of good business practice that is essential to the economic bottom line. This is not only due to the cost savings associated with reducing energy demand and the favorable market feedback, but also because of a long-term strategic view of increasing energy costs and reducing dependency on fossil fuels (Becken, 2011).

Finally, it becomes clear that adapting to climate change is very closely linked to "future proofing," "risk management," and "disaster-risk reduction." All of these are highly relevant for tourism businesses, destinations and the tourism sector at a global level.

REFERENCES

Anger, A. & Koehler, J. (2010). Including aviation emissions in the EU ETS: Much ado about nothing? A review. Transport Policy, 17, 38-46.

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. (2011). A Critical Review of Tourism and Oil. Annals of Tourism Research, 38(2), 359-379.

Becken, S. and Hay, J. (2007). Tourism and Climate Change: Risks and Opportunities. Clevedon: Channel View Publications.

Becken, S. & Clapcott, R. (2010). Developing public policy for climate change in the tourism sector. Journal of Policy Research in Tourism, Leisure and Events, 3 (1), 1-17.

Becken, S., Wilson, J. & Hughey, K. (2011). Planning for Climate, Weather and Other Natural Disasters – Tourism in Northland. LEaP Research Paper 1. Available at www.lincoln.ac.nz/leap.

Becken, S. and Hay, J. (2012). Tourism and Climate Change Mitigation and Adaptation: From Policy to Practice. London: Earthscan.

Brouwer, R., Brander, L. & Beukering, P. Van (2008). A convenient truth": air travel passengers' willingness to pay to offset their CO2 emissions. Climatic Change, 90, 299–313.

Chan, W.W., Mak, L.M., Chen, Y.M., Wang, Y.H., Xie, H.R., Hou, G.Q. & Li, D. (2008). Energy saving and tourism sustainability: solar control window film in hotel rooms. Journal of Sustainable Tourism, 16(5), 563-574.

Dalton, G.J., Lockington, D.A. & Baldock, T.E. (2008). Feasibility analysis of stand-alone renewable energy supply options for a large hotel. Renewable Energy, 33, 1475-1490.

Department of Resources, Energy and Tourism (2008). Tourism and Climate Change – A Framework for Action. Available at (12/12/2010) http://www.ret.gov.au/tourism/policy/Tourism%20and%20Climate%20Change/frameworkforaction/Pages/default.aspx.

Department of Resources, Energy and Tourism (2009). Climate Change Guide. Mitigation and Adaptation Measures for Australian Tourism Operators. Canberra: Commonwealth of Australia. Available at (12/07/2011) http://www.ret.gov.au/tourism/Documents/Tourism%20and%20Climate%20Change/2141259A_TOURISM_CLIMATE_CHANGE_Workshop%20guide_v12.pdf.

Dickinson, J & Lumsdon, L (2010). Slow Travel and Tourism. London, Washington: Earthscan.

Gittens, A. (2010). Airports and Climate Change Adaptation. ICAO Council Briefing, Montreal, 16 April 2010.

Gössling, S. & Upham, P. (2009). Climate Change and Aviation. London: Earthscan.

Gössling, S. (2010). Carbon Management in Tourism: Mitigating the Impacts on Climate Change. Oxford: Routledge.

Gössling, S., Broderick, J., Upham, P., Ceron, J.P., Peeters, P. & Strasdas, W. (2007). Volunatry carbon offsetting schemes for aviation: Efficiency, credibility and sustainable tourism. Journal of Sustainable Tourism, 15(3), 223-248.

Hein, L., Metzger, M. & Moreno, A. (2009). Potential impacts of climate change on tourism; a case study for Spain. Current Opinion in Environmental Sustainability, 1, 170-178.

Hendrikx, J., and Hreinsson, E. Ö. (2010). The potential impact of climate change on seasonal snow conditions in New Zealand. NIWA Client Report: CHC2010-153, November 2010.

Hennessy, K., Whetton, P.H., Walsh, K., Smith, I.N., Bathols, J.M., Hutchinson, M. & Sharples, J. (2008). Climate change effects on snow conditions in mainland Australia and adaptation at ski resorts through snowmaking. Climate Research 35, 255-270.

IATA (2009). The Technology Roadmap Report. Available at (02/01/2011) www.iata.org/SiteCollectionDocuments/Documents/Technology_Roadmap_May2009.pdf.

Jones, A. & Phillips, M. (2011). Disappearing Destinations: Climate Change and the Future Challenges for Coastal Tourism. Wallingford: CABI.

Mair, J. (2011). Exploring air travellers' voluntary carbon offsetting. Journal of Sustainable Tourism, 19(2), 215-230.

Pulwarty, R.S., Nurse, L.A. & Trotz, U. (2010). Caribbean Islands. Environment, November/December 2010. Available at (12/05/2011) http://www.environmentmagazine.org/Archives/Back%20Issues/November-December%202010/caribbean-islands-full.html.

Rossello-Nadal, J., Riera-Font, A. & Cardenas, V. (2011). The impact of weather variability on British outbound flows. Climatic Change, 105, 281-292.

Scott, D., McBoyle, G., Mills, B. & Minogue, A. (2006). Climate change and the sustainability of ski-based tourism in eastern North America. Journal of Sustainable Tourism, 14(4), 376-398.

The International Tourism Partnership (2010). Environmental Management for Hotels. Available for purchase at http://www.tourismpartnership.org/Publications/EMH.html.

UNEP & CAST (2008). Disaster Risk Management for Coastal Tourism Destinations. Responding to Climate Change. A Practical Guide for Decision Makers. UNEP DTIE: Paris. Available at www.unep.fr/scp.

UNWTO, UNEP & WMO (2008) Climate Change and Tourism: Responding to Global Challenges. Madrid: United Nations World Tourism Organization; Paris: United Nations Environment Program; Geneva: World Meteorological Organization.

Wolfsegger, C., Gössling, S. & Scott, D. (2008). Climate Change Risk Appraisal in the Austrian Ski Industry, 12, 13-23.

World Travel & Tourism Council (2010). Climate Change. A Joint Approach to Addressing the Challenge. London. Available at (20/11/2010) www.wttc.org.

Zeppel, H. & Beaumont, N. (2011). Green Tourism Futures: Climate Change Responses by Australian Government Tourism Agencies. In: 21st Annual Council for Australian University Tourism and Hospitality Education Conference (CAUTHE 2011): Tourism: Creating a Brilliant Blend, 8-11 Feb 2011, Adelaide, Australia. Available (19/04/2011) http://eprints.usq.edu.au/18695/.