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Developing a framework for regional destination adaptation to climate change

Ryan Jopp*, Terry DeLacy and Judith Maira

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The tourism sector is particularly vulnerable to changes in climate, as it is often the weather that sets the parameters for various forms of tourism. Despite this, little research has been done to assist tourism destinations in adapting to climate change. Adaptation aims to moderate, cope with, and benefit from the consequences of climate change in order to manage risk and reduce vulnerability. Most adaptation models focus on the risks of climate change, missing the potential opportunities that may emerge due to climate change. Furthermore, the role of the tourist is largely neglected. This paper provides an analysis of existing adaptation models for tourism before proposing a conceptual framework for regional adaptation to climate change which takes into account both supply- and demand-side perspectives. Consequently, the proposed model provides a holistic approach to adaptation that aims to increase resilience and resistance to climate change by implementing appropriate adaptation strategies that reduce vulnerability, while increasing readiness to capitalise on opportunities presented by climate change.

Keywords: climate change; adaptation framework; regional tourism destinations; vulnerability; resilience

Introduction

Tourism is a climate-dependent industry. Many tourists travel to particular destinations to enjoy pleasant or suitable weather as they participate in outdoor activities. A suitable climate can be a major factor influencing holiday choice (Hamilton, Maddison, & Tol, 2005; Lise & Tol, 2002; Ritchie & Crouch, 2003) However, the world’s climate is changing. The fourth report released by the Intergovernmental Panel on Climate Change (IPCC, 2007a) predicts severe consequences for planet Earth unless effective action is implemented over the next 50 years, starting immediately.

This presents substantial challenges to destinations that may become less attractive or competitive due to the impacts of climate change. Moreover, this may have major social and/or economic ramifications for regions reliant on tourism as a source of income and employment (COAG, 2007). In the Australian context, for example, DeLacy (2007, p. 1) states that a 2–3°C rise in global temperature could see 97% of the Great Barrier Reef...
bleached and 80% of Kakadu's wetlands gone. If such a situation were to prevail, Australia's regional economies would likely suffer a serious decline in tourist demand, which would lead to a significant reduction in tourism revenue.

The two broad options available to manage risks from climate change are mitigation and adaptation. Mitigation aims to reduce greenhouse gas (GHG) emissions, with the goal of slowing or preventing climate change, whereas adaptation is the act of reducing vulnerability to the impacts of climate change (Sanderson & Islam, 2007).

Adaptation is seen as necessary and complementary to mitigation efforts (IPCC, 2007a; Preston, Suppiah, Macadam, & Bathols, 2006; Simpson, Gössling, Scott, Hall, & Gladin, 2008). It is the principal way to deal with the unavoidable consequences of climate change in the short term. Adaptation is a mechanism to manage risks, adjust economic activity to reduce vulnerability, and to improve business certainty (COAG, 2007).

According to Simpson et al. (2008), the tourism sector has often been overlooked by governments and policy-makers when examining adaptation options, with sectors such as agriculture and water garnering more attention. This is further supported in the report by Scott, de Freitas, and Matzarakis (2006, p. 19) who state that ‘climate adaptation research in the tourism-recreation sector is 5–7 years behind that of sectors that have been actively engaged in adaptation research’. Furthermore, models suitable for regional tourism destinations to use in order to adapt to climate change have not been reported in the literature.

The aim of this paper is to review the limited literature on climate change adaptation in the tourism sector and to propose a framework for regional destination adaptation to climate change. The proposed framework outlines the process of adaptation and the steps involved in decreasing vulnerability to climate change, while identifying any possible adaptation opportunities.

The framework represents a significant contribution to the literature in several ways. First, it focuses on adaptation at the local or regional destination level, something which is currently lacking in the literature. Secondly, it proposes not only a risk management approach to adaptation, but also recognises that climate change may also present opportunities for future development. Finally, it puts emphasis on the role of the consumer, which is vital given the comparatively high adaptive capacity of tourists.

Background
Climate change adaptation is a process whereby governments, business, and civil society aim to moderate, cope with, and benefit from the consequences of climate change in order to manage risk and reduce vulnerability (Becken & Hay, 2007; COAG, 2007; DeLacy, 2007; Scott et al., 2006; Simpson et al., 2008) The ability or potential of a tourism system to respond successfully to climate variability and change is termed adaptive capacity; this includes adjustment to both behaviour, and resource and technology use (Simpson et al., 2008).

Adaptive capacity can refer to multiple tourism stakeholders, including tourists, tourism businesses, attractions or destinations (Becken & Hay, 2007). Destinations are somewhat limited in their ability to adapt, as unlike businesses or tourists, they do not have the ability to relocate. While individual adaptation will be dependent on personal knowledge and values, a destinational adaptation approach is more complex due to the large number of the stakeholders involved. Consequently, a destination’s ability to be proactive and make well-informed, long-term decisions is essential in the development and implementation of appropriate adaptation strategies that reduce a destination’s vulnerability. While
various definitions of vulnerability exist, for the purposes of this paper vulnerability is defined as a function of exposure to climate factors, sensitivity to change, and capacity to adapt to that change (Adger & Vincent, 2005; Australian Government, 2005; IPCC, 2001).

The adaptive capacity of a destination can influence its ability to reduce overall vulnerability to climate change impacts; however, this will be dependent on weather’s relative importance at the destination, and the potential for alternative forms of tourism (Simpson et al., 2008). For example, destinations that rely heavily on certain climatic conditions, such as the Victorian ski fields, are likely to be more vulnerable to changes in climate than a city destination, such as Melbourne, which offers a more diversified tourism product. Consequently, ski destinations’ ability to adapt to warmer temperatures and reducing snowfalls will be dependent on, among other things, their level of innovation and the financial resources available.

Tourism as a whole has shown great propensity for adaptation to shocks and hazards. This has been evident by its ability to cope with a variety of recent pressures such as terrorism, SARS, tsunamis, etc. (DeLacy, 2009). However, the capacity to adapt to climate change varies substantially between sub-sectors, destinations, and individual businesses within the tourism industry (Scott et al., 2008). Consequently, there is a need to further incorporate adaptation planning into decision-making throughout the tourism industry, and a real need for effective communication between the climate change science community and tourism operators at the regional and local scale (Scott et al., 2008).

Tourism, both domestic and international, contributes markedly to regional development. For example, approximately 30% of international tourist expenditure in Australia occurs in regional areas, contributing significantly to economies and employment (Tourism Australia, 2008; Victorian Government, 2008). Victorians travelling within that Australian state contributed A$5.1 billion to gross state product. Interstate visitors accounted for A$2.8 billion, whereas international visitors generated A$3.1 billion (Victorian Government, 2008). Although the focus is often on the economic benefits of regional tourism development, tourism also has the ability to contribute to regional sustainability by increasing community involvement and generating civic pride, improving infrastructure and facilities, and preserving fragile environments (Kelly, 2002).

As climatic conditions are such a critical factor for tourism, a wide range of climate-induced environmental changes will have profound effects on tourism at the regional destination level (Simpson et al., 2008). However, knowledge of regional impacts and vulnerability to climate change is inadequate, particularly in coastal communities, as was reported by an independent working group for the Australian Prime Minister’s Science, Engineering and Innovation Council (PMSEIC, 2007). Research into how Australia’s regional tourism destinations can adapt to these changes has not been reported. Although reports such as that written by the PMSEIC (2007) Independent Working Group do discuss regional impacts and adaptation, they are not tourism specific. Moreover, this report states that further research is required on regional level climate change impacts and vulnerability in key sectors, identification of the adaptation options and their likely effectiveness, and analysis of potential direct and indirect effects of planned adaptation measures (PMSEIC, 2007).

Unlike mitigation efforts, where the benefits will be felt globally, adaptation benefits come to those that bear the cost. This means adaptation primarily benefits local communities through targeted responses to local or regional climate change issues. Therefore, adaptation is best implemented at the regional/local destination level, as this is where both the costs are usually incurred and the benefits largely felt (Scott et al., 2008; Simpson et al., 2008).
A destination adaptation approach will also be complex, due to the complexity of the tourism system and the large number of stakeholders involved in that system (Moreno & Becken, 2009). A tourist system comprises a variety of stakeholders (Sofield, 2006), including tourism businesses, public sector organisations, community groups, accommodation providers, transportation providers, those involved in forward and backward linkages to the tourism value chain and tourists themselves. Moreover, the tourism system is influenced by numerous external factors that may influence all, or part, of the tourism system, including environmental, economic, social, cultural, political, legal, and technological factors (Ritchie & Crouch, 2003; Sofield, 2006). Interaction between the tourism system and the climate system adds yet another layer of complexity to destination management.

Types of adaptation in tourism

Given that uncertainty remains regarding future global mitigation and resultant emissions scenarios, as well as likely climate change-induced physical, biological, economic, and social impacts, flexibility remains key to successful adaptation (Fussel, 2009). This is even more important in the tourism sector as little is known about the potential response of visitors to climate change impacts. As climate change intensifies tourism demand patterns will inevitably alter. Perceived ethical considerations may induce tourists to switch from travelling overseas to holidaying closer to home. Some of the policies being considered, and indeed implemented, by developed economies and being advocated by various concerned green groups on limiting GHG emissions from aviation could potentially have major impacts on markets reliant on long haul air transport (DeLacy, 2007). In this context, the tourism sector needs an adaptation framework that can be flexibly applied destination by destination. Various types of adaptation suitable for the tourism sector are discussed in the literature (IPCC, 2007b; Scott & Simpson, 2008; Scott et al., 2006, 2008). Scott et al. (2006) describe three broad types of adaptation that are summarised in Table 1.

As stated by Scott et al. (2006, p. 18) ‘... climate adaptations by each of the major actor groups in the tourism-recreation sector are not taken in isolation as a single discrete action’. Consequently, in order to place adaptation within a sustainable development context, a cooperative approach to adaptation is required. This will commonly involve various stakeholders and often include multiple adaptation strategies.

Although the potential negatives of climate change for the tourism sector clearly outweigh the positives, it is also important for destination managers to identify any opportunities brought about by climate change. Whether this is decreasing seasonality or an increasing number of beach days, understanding the implications of climate change for tourism, both good and bad, is necessary to gain a complete picture of possible impacts and plan accordingly. Furthermore, a negative impact in one part of the tourism system may constitute an opportunity elsewhere (Simpson et al., 2008). For example, a decrease in long haul flights from the UK to Australia, due to emissions concerns, may be offset by an increase in Australian domestic travel.

It is recognised that such a shift in the type of tourist visiting Australia may negatively impact on foreign exchange earnings and the nation’s balance of trade. However, from a regional destinations perspective the effects of such a change would be minimal.

Vulnerability and resilience in tourism

Vulnerability has been the focus of considerable research (Adger, 2006a, 2006b; Adger, Brooks, Bentham, Agnew, & Eriksen, 2004; Fussel, 2007; Fussel & Klein, 2006;
Vulnerability is often discussed in relation to biophysical impacts, such as sea-level rise, bushfires, or coastal erosion; however, it is important that socio-economic impacts are also considered. For example, what is the likely effect of climate change-induced impacts on destination appeal, tourist numbers, seasonality, cost of travel, etc.? The breakdown of impacts into biophysical and socio-economic can help gain a clearer knowledge of specific impacts, which in turn can assist in developing targeted adaptation strategies. However, it is important to understand how these dimensions operate together, as adaptations are rarely undertaken in isolation, but commonly involve multiple approaches that are specific to the destination climate and its tourism products (Simpson et al., 2008). Consequently, before destination adaptation strategies can be developed, a vulnerability assessment of the destination to climate change risks needs to be undertaken that investigates both biophysical and socio-economic implications.

<table>
<thead>
<tr>
<th>Adaptation type</th>
<th>What does it involve?</th>
<th>What does it require?</th>
<th>Examples?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical adaptation</td>
<td>This involves utilising technology and being innovative in order to determine methods of coping with climate change and vulnerability.</td>
<td>This often requires specialised equipment and/or the use of new technologies and innovations. Also, due to the cost and complexities of many technical adaptation options, this type of adaptation often requires government backing.</td>
<td>Desalination plants or snow-making machines.</td>
</tr>
<tr>
<td>Business management adaptation</td>
<td>Involves techniques used by tourism operators, regional governments, and tourism industry associations to reduce vulnerability to climate change.</td>
<td>This may require destination managers to change their marketing approach to try and increase or decrease travel during certain times, and/or redirect tourists to different locations, or encourage them to engage in different activities.</td>
<td>Marketing techniques such as new pricing strategies, product/ market diversification, and positioning can all be utilised.</td>
</tr>
<tr>
<td>Behavioural adaptation</td>
<td>This form of adaptation is normally associated with the tourist, as they have the ability to decide on the tourism activities they engage in and where and when they do so. This ability for spatial, temporal, and activity substitution subsequently provide tourists with substantial adaptive capacity.</td>
<td>Although behavioural adaptation is generally undertaken by the tourist, there are some strategies that destination managers can use to affect behaviour. This can be achieved by using the previous two types of adaptation (technical and business management) to manipulate the behaviour of tourists.</td>
<td>Adjusting the type of clothing worn, changing the activities engaged in, adjusting the timing of the visit, changing the destination altogether.</td>
</tr>
</tbody>
</table>
Recent research by Moreno and Becken (2009) identified a lack of tools to assess a tourism destination’s vulnerability to climate change risks. The study presented a methodology for assessing the vulnerability of coastal tourism areas to climate change. This involves a five-stage process to vulnerability assessment, which recognises that a tourism destination is a complex system consisting of many different vulnerability situations (Moreno & Becken, 2009). The five steps can be seen as linear or as cyclical if required and involve: (1) system analysis, (2) identification of activity and hazard sub-systems, (3) vulnerability for the different sub-systems at risk, (4) integration for the destination as a whole and scenario analysis, and (5) communication.

As identified by Moreno and Becken (2009), certain destinations will be more vulnerable to climate change risks than others. Systems that are highly exposed to climate change impacts, sensitive to their impacts, and less able to adapt are consequently more vulnerable. For example, destinations based around coral reef diving experiences may be very vulnerable as small increases in temperature cause coral bleaching with a resultant decrease in amenity and potential decline in tourism demand. At the same time, others will be more resilient to climate change risks. For example, a destination with experienced, very effective, and well-funded destination management in place may be able to implement sustainable best practices (including significant GHG mitigation) across the destination and subsequently rebrand the destination to attract a new LOHAS (Lifestyle of Health and Sustainability) market (LOHAS, 2009). Consequently, development of vulnerability frameworks are required that provide a general approach to regional tourism vulnerability assessment in order for destination managers to develop relevant adaptation strategies based on solid knowledge about climate change impacts.

In order to decrease a regional tourism destination’s vulnerability to climate change, a destination must increase its resilience and resistance to climate change impacts and increase its readiness to capitalise on potential opportunities. Resistance involves blocking the effects of a particular climate change-induced impact in order to reduce the number of impacts that are likely to affect tourism (such as sea-level rise) (Birkmann, 2007; Lorenz, Heard, Hoekstra-Fokkink, Orchard, & Valeri, 2008; Sivell, Reeves, Baldachin, & Brightman, 2008). Resilience involves limiting the damage of such an event by absorbing changes in climatic conditions (Birkmann, 2007; Lorenz et al., 2008; Sivell et al., 2008). Readiness, on the other hand, refers to the ability of regional tourism destinations to take advantage of the opportunities climate change will present (Birkmann, 2007; Lorenz et al., 2008; Sivell et al., 2008).

Although uncertainties remain regarding the probabilities and consequences of climate change impacts, it is clear that tourism, which is intrinsically linked with climate and weather, is especially vulnerable. Adaptation aims to reduce such vulnerability and enhance a destination’s resilience to climate change impacts. A delayed response to climate change issues may lead to higher costs in the future, or even irreversible damage. Adaptation should be planned, and based upon an assessment of the vulnerability to climate change impacts, and evaluation of the future costs and benefits of action, versus inaction.

Analysis of existing adaptation models/frameworks in tourism

A large amount of literature exists that addresses climate change adaptation, including government reports (Australian Government, 2005, 2007, 2008; PMSEIC, 2007; Willows & Connell, 2003), United Nations reports including the UNDP’s ‘Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies and Measures’ (Lim, Spanger-Siegfried, Burton, Malone, & Huq, 2005), and UNEP’s ‘Climate Change. Adaptation and Mitigation in
the Tourism Sector: Frameworks, Tools and Practices’ (Simpson et al., 2008), as well as numerous academic references (inter alia: DeLacy, 2009; Fussel, 2009; Fussel & Klein, 2006; Scott et al., 2006). However, most of the studies examining adaptation are either non-tourism specific, or are not designed for implementation at the regional level.

Only Simpson et al. (2008), Becken and Hay (2007), and Scott et al. (2006) have specifically developed models or frameworks for tourism adaptation. However, there is no report of their work being tested in or applied to regional tourism destinations, other than skiing destinations, and no reports exist of adaptation strategies involving detailed consideration of visitor preferences. As mentioned previously, reports such as that written for the Australian Government by the PMSEIC Independent Working Group in 2007 discuss regional impacts and adaptation; however, they are not tourism specific.

The adaptation model put forward by Simpson et al. (2008, p. 35) is perhaps the most comprehensive as it considers the sequence of events in adaptation as ‘an iterative cycle of problem definition, adaptation implementation, and evaluation of outcomes’ while providing lines for feedback between the various stages. Although emphasising the importance of a participatory, multi-stakeholder approach, Simpson’s model does not specifically consider the role of the tourist in its iterative cycle. Despite stating that ‘stakeholders should be sought, both those directly involved in the tourism sector and those whose livelihoods are affected by tourism’, tourists themselves are not included among the plethora of suggested stakeholders (Simpson et al., 2008, p. 36).

As tourists have been identified as having the greatest adaptive capacity of all the tourism stakeholders (Scott et al., 2008), it is necessary to have an understanding of how any adaptation implemented may impact on their perceptions of a destination, behaviour at the destination, or decision to travel.

The model presented by Scott et al. (2006) provides a valuable representation of the types of adaptation available in the tourism sector. However, rather than providing a step-by-step model for adapting to climate change impacts, they provide a conceptual framework for considering adaptation to changes in climate. That is, rather than providing a representation of the stages involved in adaptation, they present a number of elements of tourism adaptation and clarify their relative variability, need for coping strategies, adaptive capacity, etc. Furthermore, as outlined earlier, they also provide information on three basic forms of adaptation: behavioural, technical, and business management. This framework may assist destination stakeholders in understanding the relative importance of various types of adaptation in tourism; however, it does not provide policy-makers or destination managers with a tool to work through the many phases involved in developing an adaptation strategy.

The model presented by Becken and Hay (2007) differs from Simpson et al.’s (2008) and Scott et al.’s (2006), as it takes a risk science approach to adaptation. A risk science approach involves estimating the risk of various impacts by determining the likelihood of exposure to various stressors, and the magnitude of consequences to such exposure, in order to determine risk profiles. A risk science (or risk management) approach has been widely used when examining adaptation strategies (Becken & Hay, 2007; Lorenz et al., 2008; PMSEIC, 2007; Preston et al., 2006). An effective risk assessment provides a clear knowledge of the risks that can be tolerated and provides a system that identifies and addresses those risks that cannot be tolerated (Lorenz et al., 2008). Consequently, the ability to appropriately identify and quantify climate change risks provides the foundation required for an effective adaptation plan. A key problem with using a risk management approach for climate change risks and especially the risks of climate change to the tourism sector is the large degree of uncertainty, scientifically, geographically and temporarily, in identifying and quantifying the risks (Preston et al., 2006).
Furthermore, none of the existing models discussed focus on regional tourism adaptation. This is important because, as identified previously, adaptation is best applied at the local or regional level, as it is at this level that costs and benefits from implementation occur. A framework is required that is suitable for estimating regional impacts and developing adaptation options in order to provide decision-makers with the knowledge to prepare a planned and co-ordinated response to climate change impacts. The design of these plans should incorporate sustainable development ideals, with economic development and vulnerability reduction objectives, as a core regional challenge (Preston et al., 2006).

In addition, the role of the tourist is also largely neglected in the models analysed. This is of some surprise given that tourism is clearly a consumer-driven industry, and it is the tourist who has the greatest adaptive capacity of all the tourism stakeholders. Consequently, the inclusion of a consumer behaviour element, or demand-side analysis, would enable a more holistic review of the implications of adaptation, by incorporating an external or demand perspective, with the internal supply-side perspective.

Finally, other models, particularly those taking a risk science approach, do not fully consider the opportunities made possible by climate change. Reducing the risks of climate change may be the priority; however, the role of the destination manager should also be to identify and take advantage of any opportunities. Whether it might be more sunny days, milder winters, or the growth of new target markets, early identification of potential benefits from climate change can assist in offsetting the negatives. Clearly, to provide a more inclusive view of adaptation, identifying and assessing these opportunities should also be incorporated into any adaptation model.

The effective implementation of adaptation strategies is essential for reducing the future vulnerability of regional tourism destinations to climate change risks. Therefore, the development of a conceptual framework that incorporates suitable elements of the models discussed, while increasing the focus on regional issues, practical adaptation measures, the role of the consumer, and adaptation opportunities, is necessary to assist regional tourism destinations to remain sustainable.

**Developing a conceptual framework**

Due to the complex nature of climate change adaptation in general and adaptation in the tourism system in particular, a conceptual model is recommended to illustrate the process involved in regional tourism adaptation to climate change, and the relationships between various stages in this process. Conceptual models can come in many forms; however, each has the goal of improving the understanding of a particular situation by graphically representing a number of factors. They can provide a quick and easy means of understanding complex systems and issues. The following definition is proposed by Haggett and Chorley (1967, p. 22): ‘A model is . . . a simplified structuring of reality which presents supposedly significant features or relationships in a generalized form’. Furthermore the provision of relationships between the different factors can display not only the direct sequence of events (causal factors), but it can also demonstrate where feedback or return lines of communication are necessary.

Adaptation for various regional destinations will involve different stakeholders, products, landscapes, ecosystems, experiences, consumers, climate change risks and opportunities, and different options for adaptation. However, providing a conceptual model offers simplified guidelines for destination managers and policy-makers to follow, and despite the heterogeneity of different regions the same basic steps should be required.
The proposed framework model for regional climate change adaptation

The proposed model for regional tourism adaptation to climate change, presented in Figure 1, draws on the adaptation models discussed in the previous sections. The aim was to provide a holistic representation of the steps involved in assessing a destination’s vulnerability and resilience, and developing an appropriate adaptation action plan.

After reviewing the literature, two major phases became apparent when designing the adaptation framework. The first assesses the vulnerability and resilience of the destination, and involves defining the tourism system, establishing the climate change risks and opportunities and determining the adaptive capacity. The second details the process of identifying, evaluating, and implementing adaptation options in order to increase resilience, resistance, and readiness.

The aim of the framework model is to provide a guideline for adaptation whereby the key vulnerabilities are assessed, and appropriate adaptation actions are identified and implemented, in order to increase the region’s resilience and resistance to climate change risks, and increase readiness to capitalise on any opportunities presented. The following section details the steps involved in both phases of the regional adaptation framework.

Phase 1: vulnerability assessment

The first phase of the adaptation framework model involves an assessment of a destination’s vulnerability and resilience. It involves three main steps – defining the tourism system, establishing the risks and opportunities, and determining the adaptive capacity of the destination.

Defining the tourism system, both the supply and demand sides, involves establishing the context of the destination under review, and determining who the key stakeholders are. Tourism is a highly complex and diverse sector involving stakeholders from a range of different sub-sectors including transportation, accommodation, hospitality, environmental management, etc.; therefore, it is important to have a clear understanding of the whole tourism system. This examination looks at not only the direct tourism businesses within the destination, but also other components of the value chain and associated stakeholders, including suppliers, tourism staff, the local community, local, national, and international tour operators and agents, transport systems, and of course, both domestic and international tourists themselves.

It is imperative to get the relevant stakeholders within the tourism system engaged in developing the destination adaptation strategy if it is to be effectively implemented

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**Figure 1. Regional adaptation framework.**
(Simpson et al., 2008). All the different components of the tourism system will need to do a preliminary assessment of their own vulnerabilities and resilience to climate change and share this knowledge with other stakeholders in order to improve future decision-making. The eventual success of the adaptation process relies upon getting the right people involved in a participatory approach from the outset (Simpson et al., 2008).

Once the context of the destination is determined and the key stakeholders are identified, the potential effect of climate change on tourism at the destination must be identified, and as far as possible the level and timing of impacts estimated. This involves exploring how climate change is likely to impact on the region’s geography and ecosystems and infrastructure in general, and then establishing what are the specific risks and opportunities for tourism. This stage involves defining the problem and identifying, assessing, and categorising the risks and opportunities. Further details of this stage are given in Table 2.

Next the adaptive capacity of the region must be determined, and the effect this will have on both risks and opportunities identified. A destination may have a greater ability to adapt to different impacts, and this will have an effect on the adaptation action plan chosen by destination managers. Adaptive capacity can vary greatly from region to region and is dependent on social, educational, institutional, and other factors (Simpson et al., 2008). These determinants are not mutually exclusive and the adaptive capacity of a region will be determined by a combination of these factors. Such factors represent the conditions that either limit or enhance a region’s vulnerability to climate change, and determining the underlying factors affecting adaptive capacity can assist in evaluating the best options for adaptation. Consequently, it is important that the adaptive capacity of a region is determined prior to assessing and categorising potential adaptation options.

Phase 2: increase resilience, resistance, and readiness

The second phase of the adaptation framework involves increasing resilience, resistance, and readiness. Resilience is the ability to absorb changes in climatic conditions, resistance reduces the number of impacts that are likely to affect tourism, and readiness is the ability of the destination to capitalise on opportunities that arise (Birkmann, 2007; Lorenz et al., 2008; Sivell et al., 2008).

In order to increase resilience, resistance, and readiness, appropriate adaptation options must be identified, assessed, implemented, and evaluated. As well as this, adaptation options should be tested with consumers to determine their opinion of various adaptation options. This step is vital because the consumer has the greatest adaptive capacity of any tourism stakeholder and ultimately makes the decision whether to visit a destination or not.

Identifying adaptation options is a major step in the entire process and involves developing a portfolio of adaptation options suitable to the particular destination given its vulnerability to various stressors, and its relevant adaptive capacity. Communication with the key stakeholders identified in Stage 1 is vital at this stage in identifying relevant options and in ensuring that time is not wasted on inappropriate ideas or options that are impractical. A participative, community-based approach to adaptation throughout both the development and implementation stages is likely to receive greater stakeholder support than an independent, ad hoc approach (Moreno & Becken, 2009; Simpson et al., 2008). It may be necessary to revisit the problems caused by climate change to ensure that the adaptation options selected are appropriate and that similar adaptation options have not already been commissioned. Participation of relevant experts in climate change science and key stakeholders in the region is recommended, and the use of interviews, focus groups, or a Delphi approach can be useful in identifying adaptation options (Simpson et al., 2008).
Since tourists make the final decision as to whether to travel to a destination or not, they are key stakeholders in any adaptation process. It is therefore imperative that their attitudes towards the different adaptation scenarios proposed are understood. It is important to consider how any adaptation strategies may affect destination appeal or tourist satisfaction. Of all the stakeholders in the tourism system, tourists have the greatest adaptive capacity to climate change impacts by substituting the place, timing, and type of holiday. Therefore, the impacts of any adaptation strategy on tourist attitudes towards a destination must be considered. In order to do this, the adaptation strategies that have been identified and evaluated in the previous stages must now be communicated with tourists and their opinions sought. This could be done by surveying tourists at destination ‘hot spots’ or by conducting focus groups. The aim of the research is to determine which adaptation strategies they consider important and/or viable, and why? A pre-determined rating scale should be agreed upon prior to conducting the research, and once tourists have provided relative scores, a shortlist of the top few adaptation strategies can be compiled.

<table>
<thead>
<tr>
<th>Stage</th>
<th>What does this mean?</th>
<th>How can this be done?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define the problem</td>
<td>Overview of what climate change will mean for the destination and what changes are likely to occur.</td>
<td>Knowledge is shared and all stakeholders have access to, and are provided with, relevant information on climate change.</td>
</tr>
<tr>
<td>Identify the risks</td>
<td>For example, increased coastal erosion due to the combination of sea-level rise and more frequent storm surges, loss of biodiversity, increased wildfire, a shift in consumer demand.</td>
<td>Both biophysical and socio-economic impacts on tourism should be considered, and both short- and long-term scenarios taken into account. A key component is securing the views on possible risks from the stakeholders themselves via interview, survey, focus groups, etc.</td>
</tr>
<tr>
<td>Assess/categorise the risks</td>
<td>In this step, the likelihood of each risk occurring and the consequences of their occurrence should be assessed. The list of possible climate change trends presented by the IPCC (2007b) could be used as a guide to predict impacts.</td>
<td>By using a risk matrix to plot the likelihood of an impact occurring, and the consequence of its occurrence, the relative risk of each impact can be evaluated.</td>
</tr>
<tr>
<td>Identify the opportunities</td>
<td>The opportunities brought about by changes in the climate may in fact reduce the negative impacts of tourism on both the biophysical and socio-economic environments. For example, decreased seasonality may in turn reduce the negatives associated with overcrowding during peak times.</td>
<td>Changing the timing of special events, introducing new activities to certain areas, looking to attract new market segments, or even repositioning the destination are all opportunities. Stakeholder input and ideas are crucial.</td>
</tr>
<tr>
<td>Assess/categorise the opportunities</td>
<td>In order to determine which opportunities provide the greatest potential benefit for tourism development, both the potential benefit to tourism and the capacity to capitalise on the opportunity should be analysed.</td>
<td>A matrix can again be used to classify potential opportunities. Each opportunity can be rated in terms of its potential benefit to tourism, and the capacity to implement the particular option.</td>
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</table>
The final stage in the adaptation process is monitoring and evaluating the adaptation options selected. As climate change often presents long-term impacts such as sea-level rise, or deals with infrequent events such as severe storms, or damaging wildfire, the evaluation of adaptation strategies is intrinsically problematic. Evaluation of adaptation must therefore occur over the long term and the situation continually monitored to determine if the intended benefit has eventuated. The fact that an adaptation has not yet delivered the expected amelioration of risks or benefits does not necessarily mean the adaptation was inappropriate.

By increasing resilience and resistance to climate change impacts the region’s vulnerability will be reduced. And by increasing its readiness, the region will be best positioned to capitalise on potential opportunities. Table 3 outlines the steps involved in the adaptation process required to increase a region’s resilience, resistance, and readiness.

The proposed model for regional adaptation presented in Figure 1 incorporates the essential elements from the models previously examined. The aim is to provide a holistic representation of the steps involved in assessing a destination’s vulnerability and resilience and developing an appropriate adaptation action plan. The framework incorporates two major phases: the first assesses the vulnerability and resilience of the destination, and involves defining the tourism system, establishing the climate change risks and opportunities and determining the adaptive capacity. The second details the process of identifying, evaluating, and implementing adaptation options in order to increase resilience, resistance, and readiness.

Table 3. Increasing resilience, resistance, and readiness.

<table>
<thead>
<tr>
<th>Stage</th>
<th>What does this mean?</th>
<th>How can this be done?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify adaptation options</td>
<td>Identify potential options based on the risks and opportunities. Assemble a portfolio of adaptation options. The list of options will be destination specific.</td>
<td>An initial list of adaptation options for each climate change impact (increased bushfire risk, sea-level rise, coastal erosion, etc.) should be identified working with relevant stakeholders such as climate change experts, environmental scientists, risk scientists, and local managers, to ensure all possible options are considered.</td>
</tr>
<tr>
<td>Assess adaptation options</td>
<td>Refining and reducing the list of potential options.</td>
<td>Stakeholders to rate the adaptation options across a number of criteria, for example, effectiveness, local acceptance, ease of implementation, distribution of benefits, and affordability. This could be done by surveying tourists at destination ‘hot spots’ or by conducting focus groups.</td>
</tr>
<tr>
<td>Test adaptation options with consumers</td>
<td>The adaptation strategies that have been identified and evaluated in the previous stages must now be communicated to tourists and their opinions sought.</td>
<td></td>
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<tr>
<td>Implement adaptation options</td>
<td>Implementation of the chosen adaptation options requires a clear outline of stakeholder responsibility, resource requirements, and timelines.</td>
<td>Implementation should be in line with other regional development and sustainability plans, while also considering local development initiatives, and national development plans. Seeking continual feedback from stakeholders and visitors.</td>
</tr>
<tr>
<td>Evaluate adaptation options</td>
<td>Need to monitor and evaluate ease of implementation, costs, adverse impacts, and benefits delivered (both as a direct and indirect effect of the adaptation).</td>
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</table>
The framework provides a guideline for adaptation whereby the key vulnerabilities are assessed, and appropriate adaptation actions are identified and implemented in order to decrease the region’s vulnerability to climate change risks and capitalise on any opportunities presented. Although the model is presented in a linear fashion, the entire process can also be considered cyclical, as the process of adaptation should be recognised as part of an ongoing approach to sustainable tourism development.

Conclusions
Even if mitigation efforts are successful in dramatically reducing GHG emissions, the Earth will continue to warm and its climate will continue to change. This is why adaptation is vital in tourism’s overall strategy to tackle climate change. Although various models and frameworks presently exist to guide adaptation to climate change risks, they are either non-tourism specific, or do not incorporate all the elements necessary to assist regional destination managers develop appropriate adaptation strategies. The model proposed in this paper does provide such a framework for regional destination managers.

The development of adaptation strategies is a complex task. For regional tourism destinations to adapt to climate change successfully, they need to assess the vulnerability and resilience of the destination, and then develop an appropriate adaptation action plan that increases the destination’s resilience and resistance to climate change risks, while increasing their readiness to capitalise on any opportunities that may arise.

However, for such a process to be successful there needs to be an environment that encourages knowledge sharing and enables those involved to make well-informed sustainable decisions based on solid information. Consequently, a participatory process, involving a range of stakeholders is recommended, whereby a sense of transparency and ownership facilitates optimum results. Furthermore, involving all stakeholders throughout the entire process engenders further credibility and support for the chosen adaptation strategies and reduces the likelihood of conflict.

In summary, the adaptation framework developed represents a model for regional tourism adaptation. It builds upon existing tourism adaptation models by increasing the focus on regional issues and emphasising the value of adaptation at the local level. Furthermore, by emphasising the role of the consumer, a more holistic view of adaptation is provided, which is particularly important given tourist’s relatively high adaptive capacity. Finally, the need to investigate adaptation opportunities is addressed in order to improve a destination’s ability to make proactive decisions. Each of these elements adds value to the existing models on tourism adaptation and should assist destination managers and policy-makers to manage the challenge of climate change.

The development of the conceptual framework presented in this paper adds to the literature on adaptation to climate change by the tourism sector. It is also designed to provide a practical tool for regional tourism managers and policy-makers to utilise when making decisions regarding an increasingly uncertain future. Further research is required to test the framework across a range of regional tourism destinations in order to best compare and contrast the role of adaptation in various situations.

The proposed framework focuses on regional tourism adaptation as this is the level that adaptation is deemed most effective; yet, research at this level has been identified as lacking in the tourism sector (Simpson et al., 2008). The framework is in the process of being tested at Victoria’s Surf Coast in Australia, and this would be one of several situations where the framework should be tested before trialling its application to broader destination types.
References


