



## The challenge of climate change towards sustainable tourism development: A conceptual approach

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### Abstract

This paper aims to study the progress of research on the challenges of climate change towards Sustainable Tourism and to outline and identify the key disciplines, journals, articles and authors. This is carried out through a wide, in-depth, and structured examination of published scholarly papers. In recent decades, sustainable tourism has been one of the most significant subjects among academics and practitioners. In this paper, a classification scheme and a comprehensive literature review are presented in order to clarify, categorize, and interpret the current research on sustainable tourism definitions and the challenges employed to it by the phenomenon of climate change. The classification scheme for this review contains 102 scholarly papers from 37 journals since the year 1996 up to 2016 categorized into 14 application areas. The scholarly papers are also sorted by (1) year of publication; (2) publication journal; (3) subject area citations.

**Keywords:** sustainable development; climate change; sustainable tourism; literature review

### 1. Introduction

The travel and tourism industry is one of the largest industries in the world. It is also one of the most climate dependent industries. However, the negative effects of tourism have become a major concern and need to be addressed very quickly. With this in mind, the concept of sustainable tourism has emerged with the aim of mitigating the negative effects of tourism activities, which has become almost universally accepted as a substitute and politically appropriate approach to tourism development (Sharpley, 2003). Sustainability covers all ingredients that make a complete tourism experience. According to the majority of scientists (Briguglio, Archer, Jafari, & Wall, 1996; Butler, 1991; Sharpley, 2000; Vellas & Becherel, 1999; WCED, 1987) 'sustainable tourism development' concerns an economic, social and environmental tourism development that aims at the continuous improvement of tourists' experiences. The tourism industry has a very large potential to contribute to sustainable development, particularly by job creating, including employment for women and other marginalized groups (Cukier, 2002; Gorg, 2000). The purpose of sustainable tourism is to make a balance between protecting the environment, maintaining cultural integrity, establishing social justice and promoting economic benefits, meeting the needs of the host population in terms of improved living standards both in the short and long term (Liu *et al.*, 2013) in both developed and emerging nations (Mitchell & Hall, 2005; Swarbrooke & Horner, 2004) while emphasizing both intergenerational equity and intra-generational equity (Liu, 2013) and in a form that can maintain its viability in an area for an indefinite period of time' (Butler, 1993, 1999). In community tourism, sustainable development is meant to improve the local populace quality of life by providing direct local economic benefits, protecting the natural and built environment and providing a high-quality experience for visitors (Bramwell &

Lane, 1993; McIntyre, 1993; Park & Yoon, 2009; Park, Yoon, & Lee, 2008<sup>[39]</sup>; Stabler, 1997). This research work seeks to study the progress of research on Sustainable Tourism Development (STD) by conducting a thorough and structured examination of peer reviewed journal articles in recent years and to identify the key disciplines, journals, articles and author.

Climate change and tourism are too diverse words, however interrelated due to the impact on each other. The study conducted by Peeters (2007) concluded that, climate change impacts tourism and tourism on the other hand also impacts climate change. Shedding more light on this conception, Hernandez and Ryan (2011) argue that emissions from tourism activities including transport and accommodation cause global warming and at the same time, climate change results and threatens the loss of natural resources such as landscapes, water, biodiversity, coastlines that make a destination attractive and on which tourism depends. This goes further to suggests that whilst there is a contribution from tourism through emissions to carbon dioxide and other greenhouse gasses, climate change also determines tourists flow and demand due to climatic variables on the different destinations.

### 2. Brief review of literature

Tourism is an important economic sector globally. Tourism is one of top three largest economic sectors and the most climate dependant sector in the world (Amelung *et al.*, 2007<sup>[4]</sup>; Scott, *et al.*, 2009). Furthermore, tourism has been observed to decline as a result of both natural and human-induced climate change (WTO, 2010). The nature of the impacts of climate on tourism is also dependant on the type of tourism and its location (Amelung *et al.*, 2007)<sup>[4]</sup>. Thomas *et al.* (2004) have opined that tourism is mainly biodiversity based and that the seasonal climatic changes have significantly affected the

balance in biodiversity and they further suggested that this has led to the extinction of some indigenous species. Yet, research on the role of climatic factors on tourism is inadequate (Manfield *et al.*, 2007). As a result of climatic changes the biodiversity has been uncontrollably been affected over the years as follows:

- Drop in the survival rate of animals (Midgley *et al.*, 2002)
- Increased vulnerability of fauna and flora (Bond *et al.* 2004).
- Increased salinity due to the rising sea level: causes loss of both fauna and flora species (Gitay *et al.* (2002),
- Shift in season: results in decreased faunas and birds colonies (Gitay *et al.*, (2002),
- Increased temperatures and extreme weather: affects the flow of tourists visiting, breeding of marine creatures and migration patterns (Mings 1997; Gitay *et al.*, 2002),
- Decreased rainfall: causing drought and desertification, loss of animals and their breeding (Ngugi *et al.*, 2003; UNEP, 2003)

### 3. Objectives

- a. To make a critical assessment of challenges faced by sustainable tourism due to climate change phenomenon.
- b. To assess mitigation strategies of climate change impacts on the sustainability of tourism industry.

### 4. Research methodology

The present research aims at understanding past and current research, creating some direction for future studies, and therefore advancing the application of sustainable development in the tourism industry. In order to do such an analysis, a large set of publications is taken into consideration to have an accurate picture of Sustainable Tourism Development research. For this reason, it was decided to investigate as many articles as possible in order to discover several areas of the STD domain, which was necessary to ensure the reliability and representativeness of the results. It also should be noted here that the number of citations and the popularity of publishers are the most significant criteria for publication selection to clarify the authenticity of them. Journal articles with a high impact on the scientific community were downloaded from six online databases, including Elsevier, Springer, Kluwer, Wiley, Emerald, and Taylor & Francis. They were accessed between 15 Jan 2017 and 21 Feb 2017. With guidance from the journal ranking literature, 37 refereed academic journals in the field of sustainable development and tourism were chosen for analysis.

In total, 102 journal articles from the 37 sustainability and climate change journals, published between 1996 and 2016 were examined. Therefore, the recent trends in sustainable development and climate change research have been captured, based on studies published over the last 20 years. However, this paper excludes any study whose major concepts were not directly focused on sustainable development and climate change impacts. As it can be seen there is an overall increasing number of papers over the last 5 years with a total of 57% of the articles published in 2011–2016. Content analysis is adopted to identify categories and produce

descriptive information on the content of previous research (Silverman, 1997). The scholarly papers are sorted by (1) year of publication; (2) publication journal; (3) subject area; (4) authors' nationality; (5) region of focus; (6) number of nationality citations. It is believed that these aspects can provide information on the progress of sustainable development research in the tourism context over the period of investigation. Moreover, it is expected that such an analysis uncovers the potential gaps in the literature and identifies future research opportunities.

Each article's subject area is investigated in the second step of the analysis. The scholarly papers are classified into 6 categories of subject areas, named (1) sustainable development (2) Sustainable tourism development (Table 2); (3) Climate change; (4) Global Warming; (5) Adaptation; (6) Mitigation strategies. In the third step, each article is arranged according to its focused geographic region, of which Europe, Asia, Africa, North America, Latin America, and Oceania are identified as key regions. It should be noted here that some papers could be classified into several categories as the concepts of some categories are close; however, this research focused on the main concept of each research work.

### 5. Discussion

Temperatures have been rising throughout the globe by about 0.74°C on average in the last 100 years (Intergovernmental Panel on Climate Change (IPCC), 2007). The scientific are in general agreement that human activity such as the release of greenhouse gases into the atmosphere will continue to contribute to further warming of many regions. The expected temperatures depend on the atmospheric concentration of greenhouse gases, usually expressed in the form of carbon dioxide equivalent. A stabilized concentration of 500 parts per million would most likely result in a temperature increase of approximately between 2 and 4 degrees Celsius.

Under different warming scenarios, for example those developed by the IPCC (2000), some tourist destinations are likely to gain competitiveness while others will become less attractive or will have to shift their seasons, as for example suggested for the Mediterranean which might change from its current pattern of a summer peak season into a bimodal spring-autumn pattern (Amelung & Viner, 2006) <sup>[3]</sup>. While global or regional models on tourist flows have some important limitations (Gössling & Hall, 2006) <sup>[25]</sup>, they are useful in understanding potential 'winners' and 'losers' from climate change. The results generally show a shift in preferred destinations to higher latitudes (e.g. for a comparison of tourism in Alaska and Florida in 2050 see Yu *et al.*, 2009) and to higher elevations in mountainous areas (e.g. Bigano *et al.*, 2005 for Italy) <sup>[6]</sup>. Tourists from European nations that currently dominate international travel are expected to take more domestic holidays to take advantage of new climatic opportunities closer to home. More specifically, Hamilton *et al.* (2004) <sup>[27]</sup> found that as a cool country warms it first attracts more tourists, but once the mean annual temperature exceeds 14°C, fewer tourists will visit. Similarly, the country will initially generate fewer tourists, but once the temperature reaches 18°C it will generate more tourists as people will seek opportunities to travel to cooler climates. Spain could see a decrease between 5 to 14% in annual tourist flows, whereby

most of the loss is expected in the summer months (18 to 26% depending on the climate scenario). Some northern areas of Spain were modeled to become net winners of tourist arrivals (Hein *et al.*, 2009) <sup>[31]</sup>. The economic impacts of such changing patterns have been modeled by Berritella *et al.* (in press): Welfare loss will be unevenly spread across the globe, with changes in GDP between about -0.3% (e.g. Kiribati, Palau, Qatar, Cambodia and Sri Lanka) to around +0.4% in 2050 (e.g. Canada, Finland, Switzerland, and Belarus). Experts use the experience from recent warm summers (so-called climate analogues) to better understand how changes towards warmer conditions might influence tourism in the future (Giles & Perry, 1998) <sup>[23]</sup>. The Deutsche Welle (2006) <sup>[15]</sup> reported “Tourism Experts say hot summer means higher turnover” as German seaside resorts profit from warmer than normal temperatures. Other changes in consumption were observed during the 2003 heat wave in France, where camping sites with shade and swimming pools were most favored and attractions such as caves benefited from higher visitation. Urban tourism experienced a decline in the 2003 summer and sales of soft drinks (+13%) and ice creams (+14%) went up (Létard *et al.*, 2004 in UNWTO, UNEP & WMO, 2008). Periods of extreme hot weather pose other limitations on tourists and recreationists. During drought, as for example experienced in Australia over the last few years, there might be local restrictions on the use of water for irrigating green areas or filling swimming pools (UNWTO, UNEP & WMO, 2008). Forest areas may be denied to tourists due to the risk of fire, mountain streams might dry of for fishing and the water quality of lakes declines with possible algae blooms (International Institute for Sustainable Development, 1997; Smith, 1990) <sup>[32]</sup>. Already, under conditions of drought as experienced in Colorado (USA) in 2002 anglers were restricted from fishing in many rivers because fish populations were highly stressed by low water levels and high water temperatures. Low water levels also shortened the river-rafting season substantially with some companies losing 40% of their normal business (Scott & Lemieux, 2009). Periods of hot temperatures increase the risk of fire by influencing ‘flammability’, but at the same time it is essential to monitor changes in visitation numbers. Tourists constitute a major ‘ignition source’ which in combination with drier conditions leads to an increased number of forest fires. Hence, McEvoy *et al.* (2006) concluded for the Peak District National Park in England’s northwest, that human impact in combination with amenable weather conditions will be the key risk factors for more forest fires in the future. In some areas, fire risk might increase substantially. In the Blue Mountains, Australia, there are currently, on average, 13.3 days when the Forest Fire Danger Index is ‘very high’ or ‘extreme’. Climate projections by the CSIRO predict that this will increase to 13.8–16.3 days by 2020 and 14.5–23.6 days by 2050. It is also possible that the fire season will expand under climate change from currently early October to mid-January to late July to mid-February by 2050 (STCRC, 2009). Hot temperatures also increase the need for cooling (and costs for air conditioning, e.g. in the tourist destination in and around Darwin, STCRC, 2009) and cause major damage to transportation systems, for example due to bleeding of asphalt or buckling of pavement (Mills & Andrey, 2002). Thus operational and maintenance

costs are expected to increase substantially under different global warming scenarios. These need to be factored in as part of today’s decision making and investment, and adaptive measures such as heat proofed building designs will be beneficial.

### 5.1 Mountain destinations

Winter sport destinations around the world are now seriously considering the implications of climate change (Agrawala, 2008; Scott *et al.*, 2006; STCRC, 2009) <sup>[2, 33, 34]</sup>. At present, a ski resort in Switzerland is considered “snow-reliable” if in seven out of ten winters there is a snow covering of at least 30 cm on at least 100 days between 1 December and 15 April. Currently 85% of Switzerland’s ski resorts are considered to be snow-reliable. With the line of snow-reliability rising to 1500 m, as is projected to occur by 2030 to 2050, the number of snow-reliable ski resorts drops to 63%. A rise to 1800 m results in only 2% of small ski areas and 44% of larger ski resorts qualifying as snow reliable. For every 1°C rise in temperature there will be about 14 fewer skiing days (Schwarb & Kundewicz, 2004, in Becken & Hay, 2007) <sup>[5]</sup>. Winter tourism entrepreneurs in Finland reported that they require an average season length of 90-120 days to operate profitably (Tervo, 2008). It appears that a warming trend poses less of a risk to these operations than an increased number of extreme events.

### 6. Conclusion

Both weather and climate are extremely important for tourism, and it is often the perception of climate that may be more important than the reality. Tourists make decisions based on what they believe the climatic conditions of a destination are. As a result tourists will learn over time and adjust their decision making (Ehmer & Heymann, 2008) <sup>[16]</sup>. This is not only relevant with respects to perceived temperature and precipitation (e.g. “too hot”, Gossling & Hall, 2006) but also in relation to perceived safety, for example in response to the (perceived) risk of hurricanes or other extreme events. As such there may well be “Winners and Losers” as suggested in a Deutsche Bank (2008) <sup>[16]</sup> report. Actual impacts of climate change on tourist destinations are potentially much further reaching, as they affect the resource base of tourism, both directly and indirectly. Already, challenges such as water shortages or increased incidence of forest fires pose themselves to destinations. Environmental changes, for example the distribution of wildlife or coral bleaching, are also of fundamental importance for tourism. Understanding these changes is a first step towards managing them and adapting to new circumstances.

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