

The effects of climate on tourism: would you travel to destinations where you may be in danger?

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Abstract

Tourism is a huge driver of growth and economic development, and is influenced worldwide by several factors, including political considerations, wealth of the generating and destination countries, economic activities, and, especially, the effect of climate on the tourism activities. The climate of any area or tourist destination influences the activities of participants, and, to varying degrees, the climate is influenced by greenhouse gas (GHG) emissions, which are said by influential environmental scientists, to be caused by the activities of man. This paper is a secondary-sourced literature review of the effects of climate (and climate change) on tourism activities, specifically in eastern and southern Africa, but which are equally applicable to tourism activities world-wide, as a first step towards a doctoral thesis on tourism and climate change. The paper defines tourism and weather, as a factor of climate, and considers multiple situations/activities influenced by the climate.

Introduction

The United Nations World Tourism Organization (UNWTO) (2019) notes that 1.4 billion people travelled in 2018, up by 6% over the 2017 figures. Tourism to the Middle East increased by 10%, to Africa by 7% (South Africa had a 0% accommodation growth (Horne, 2019), but grew by only 3% to the Americas. Inbound tourism to the United Kingdom is forecast to reach 38.8million in 2019, up from 37.5m in 2018, with spending at GBP24.9billion in 2019, also up from GBP23.1b in 2018. However, the Brexit issues have left tourism to the UK, especially from northern Europe, doubtful as bookings are down on the 2018 levels, despite the Pound at levels below those pre the Brexit referendum levels and the lower oil price, but with a general slowdown in the world economy (Visitbritain.org). China has now emerged as the leading tourism destination. The UNWTO (2019) confirmed that 'tourism is a serious driver of economic development and growth' ... due primarily to the stability of fuel prices which have led to affordable air travel, and revealed that national and international tourist receipts totalled US Dollars 1.6 trillion, 7% of total world exports. Cooper, Fletcher, Gilbert, Shepherd and Wanhill (1998:8) defined tourism as 'the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes'. Page (2003:7) agreed with this definition but added that the activity at the destination is 'not related to the exercise of an activity remunerated from the place visited', which definition is supported by George (2007:3), who emphasised several criteria:

- The movement of people
- The journey to, stay at, and return from a destination
- Taking place outside of the usual environment
- Is a short-term and temporary
- Visited for any reason other than permanent residence or employment.

If one pursues these definitions further then holidays, leisure, health, sport, religion or business (MICE tourism) suggests the reasons for the visit. If these reasons are considered further then it becomes clear that some of the activities will take place outdoors, in which case the weather becomes an important criterion. Bennett, Jooste and Strydom (2005:31-32) note that there are basic approaches to the study of tourism: the institutional approach, product approach, historical-, managerial-, economic-, sociological-,

interdisciplinary-, systems- and geographical approach; the latter includes the study of 'location, environment, *climate*, and landscape' topics. The majority of tourists have a number of major criteria to consider when planning to travel: the costs of the travel, also considered as the 'value for money' concept especially for long-haul travel, safety of the travellers (including health issues), the attractions and activities at the environment visited, and the climate at the destination; where the latter will influence the tourist to consider alternate destinations/activities, the timing of the visit, or whether to travel at all.

Climate change (increasingly referred to as climate disruption) can be divided into three distinct groups: *direct* climatic circumstances which affects the length and quality of 'climate-dependant' tourism seasons, *location* of destinations and attractions, the infrastructural development of tourism services, operating costs of tourism facilities, damage, and interruptions of tourism business', and *holiday demand*. There are also *indirect* changes which affect the natural tourism-asset base specific to a destination, which are crucial to attract tourists to the venue; environmental conditions could deter tourists, and operating costs and capacities of firms to practice sustainable tourism. In the third situation any climate change could impact on socio-economic growth (at an attraction/destination) and discretionary income, also used for tourism activities, increased political instability and security risks, and tourists' attitudes to travel. Finally, policy responses, such as migratory policies, could affect transport and other cost structures, and therefore destination choices (Scott, Gossling & Michael Hall, 2012:215). These authors note that climate change has a marked effect on how tourism operates at a destination/attraction (Scott et al., 2012:216) which requires continuing research, as climate change will appear to 'promote' certain areas, for example Canada, Northern Europe, Scandinavia, Alaska and Russia (Nicholls, 2014), and cause declines in tourism activities in tropical areas and small island destinations (the sea, sun, sand tourism), with Mediterranean destinations becoming 'too hot', by the 2020s (Scott, et al., 2012:216)

For the 'sea, sun, sand', or the winter 'ski and snow' tourism groupings, climate is very important as it will determine the weather conditions at any time and at any place; '(C)limate is not homogenous over the earth's surface and is not a tourism resource in all places' (Steyn & Spencer, 2012:125), where some climates promote and other hinder tourism. Heyman (2008 in Steyn & Spencer, 2012:125) points out that 'regional and seasonal (climate) changes will affect national and international tourism flows' and suggests that northern hemisphere countries are primary producers of GHC. Where climate is the driver of tourism, such factors as 'operating costs, ...heating and cooling, snowmaking, irrigation, food and water supply, and insurance costs' (Steyn & Spencer, 2012:125) are important consideration factors, as are widespread poverty, weak infrastructure and institutions, and natural disasters (Opondo, 2012:148). Hares, Dickinson and Wilkes (2010) question whether the average tourist is aware of the impacts of travel on the climate and climate changes. They note that in a United Kingdom Department of Transport Report (2008), only 66% of tourists were aware of a possible link between climate change and travel. Tourists need to factor pricing, weather conditions, family and friends, travel time and possible activities into holiday plans and are not specifically concerned with impacts on the climate when planning. The suggestions are that shorter but more frequent travel could reduce climate change impacts, especially when using air-travel as the mode of transport. However, changes in technology, marketing, and tourist' behaviour also needs to be considered in decision-making, including the time-benefit of air-travel (specific to low-cost airlines which boost travel for the masses) as other modes are 'slow'.

Research methodology

Climate change (the authors will use this terminology rather than the developing term 'climate disruption' as it is the wording envisaged in the proposed doctoral study) is a problem, but only limited quantitative research has been done, mainly geographical in nature. This article presents the initial planning for a doctoral thesis on the effects of climate, and climate change, and on tourist' activities when away from the normal home and the work environment. It summarises an introduction to some available secondary literature sources on tourism and climate, and offers illustrations on, and a case study about, climate change. This research is necessary to address such issues as (i) the consequences of, for example, sea-level rises which could impact negatively on coastal tourism with the destruction of tourism infrastructure and coastal eco-tourism, losses of bio-diversity and high-value beach development (Atzori, Fyall & Miller, 2018:13). It is also necessary to investigate the need for engineered shore tourism and a redefined coastal management programme, and (ii) to monitor climatic changes which affect travel and

destination choices. Research is also needed to (iii) establish weather conditions as they affect tourism activities, and finally (iv) the effects of climate changes as these impact on, for example, diseases, forest fires, water restrictions, heat waves and reduced beach activities.

Climate, and climatic effects on tourism

'Climate change is a very complex, pervasive and uncertain phenomenon, generally difficult for people to conceptualise and to relate to their daily activities, arguably because it cannot easily be translated into the language of popular culture' (Dillimono & Dickinson, 2015:439). The climate has been a topic for general discussion from time immemorial and is the topic for academic interest for generations; however, the study of climate and its effect on tourism has only received considered interest since the early 1990s (Hall & Higham, 2006). In order to understand the effects of climate change on tourism it is necessary to explain the term 'climate'. According to Gomez-Martin (2005:572) 'climate is the weather patterns observed over a period of time', and the weather is the 'state of the atmosphere' as it is observed and measured over a period of time and at a specific place (a destination for tourism). As early as 1991 Burton (1991) decided that warm temperate zones were ideal for sun and beach tourism; he emphasised that the Mediterranean and eastern African coasts were ideal for water and beach activities. The climate at a specific place (destination) will determine where an attraction is developed; when (and if) tourists will support the development; what type of investments could be made for the development, and what specific infrastructure is needed at the attraction. Tourism, particularly nature-based tourism, 'requires geographical' space for development, which will use 'physical and biological' elements, some created by human-effort, and topography, geology and plants and animals (flora and fauna) (Steyn & Spencer, 2012:126). The World Wildlife Fund (WWF) note in their report the 'Living Planet' (Brits, 2019) that human activities since 1970 have destroyed 60% of all bird species, fish, reptile, amphibious and mammals, 50% of all coral reefs, and 20% of the Amazon rain-forests. Research published by the Biological Conservation Institute states that 40% of all insect-species (moths, butterflies, bees, wasps, ants and ground-beetles), are under extreme pressure (Brits, 2019).

Climate includes the elements of wind, temperature, rainfall and (hours of) sunshine, all of which are necessary for a successful 'sea-sun-sand', outdoor, and sport types of attractions, including winter and health tourism. Bardon (1991) found that 89% of Spanish tourists viewed a sunny climate as important when planning a vacation, which would have a huge economic influence on a destination. Scott, Jones and Konopek (2007) were at pains to emphasise the effect of climate on the natural environment and nature-based tourism, as climate is a 'renewable and non-degradable' resource which, when experienced now, has no consequence on the climate to be experienced sometime in the future (Gomez-Martin, 2005, as cited in Steyn & Spencer, 2012:126). Climate is non-consumable (this is not to say it is not changeable due to human activities, including GHG emissions) in contrast to the consumption of water, electricity and flora.

Shami and Arad (2014) caution that the effects of climate change could be exaggerated as the planet is generally in a 'warming-up' period, and that human activities do influence climate through the emission of Green House Gases, but that any changes could be reversible through changes in the attitudes to, and the activities of, human behaviour. The AOAA (2019) noted that between 1885 and 2018 the temperature deviation varied between 0.5 and 0,75 degrees centigrade, including a decline between 1880 and 1910 of 0.5 degrees. George (2011:63), therefore, explains that global warming is the result of human activities, 'including the (mis)use of chloroflourocarbons (CFCs)', and has resulted in the increase and ferocity of storms (typhoons/hurricanes/cyclones), which affect sea levels. The depletion of the ozone layer (caused by GHG emissions) has had a serious effect on beach resorts, and an increase in skin cancers. A negative effect of climate change, including the carbon emissions from tourism transport (especially air transport) and accommodation, will be the increasing level of GHGs which could change the tourism flows from northern Europe, the Caribbean, 'coastal, mountain and nature-based destinations in the least developed countries and small islands' (George, 2011:534) to destinations free from GHGs. George (2011:543) notes that British engineers worked on a 'hypersonic' aircraft that could fly at five times the speed of sound which would have a major decrease in the amount of fuel used, and therefore the levels of gas emissions, as the plane would fly on liquid hydrogen, which could address the United Nations World Tourism Organizations', (UNWTO, 2007a:7) concern on greenhouse gas emissions from (tourism) aircraft. Historically, carbon dioxide emissions from the global use of fossil fuel combustion and industrialisation

between 1757 and 2017 has progressively increased, initially gradually, to about 5 000 tons by 1947, and to around 37 000 tons annually now.

As the proposed study concerns the eastern and southern regions of Africa, considering the possible negative climatic implications on tourism in areas of eastern and southern Africa, including the Langebaan Lagoon in the Western Cape of South Africa (a major breeding ground for migrant northern hemisphere birds), the Ngorongoro Crater National Park (endemic animals) and the Serengeti (annual animal migrations) in Tanzania, Lake Malawi (fish species) and the Aberdares National Park in Kenya (primates), and the Murchison Falls and the source of the Nile River at Lake Victoria in Uganda, including increasing populations in these countries. The implications of droughts (and resulting fires) on the smallest floral kingdom in the world on the Cape Peninsula in Cape Town, which contains over 8 500 species of plants (reeds, ericas and proteas) in an area of less than a quarter of one percent of the world's total land surface, would be devastating on tourism to all the areas mentioned above.

The United Nations Framework Convention on Climate Change (2009) noted that two options were available to interested parties for addressing climate change; mitigation and adaptation (Opondo, 2012). The Intergovernmental Panel on Climate Change (IPCC) defines mitigation as 'an anthropogenic intervention to reduce the anthropogenic forcing of the climate; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks' (Opondo, 2012:150). Adaptation, she said, is the 'adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm, or exploits beneficial opportunities'. So, an adaptive policy will ensure a country, area, or destination could adjust to any climatic change to control possible damages of weather vagrancies (IPCC, 2007). According to Opondo (2012:150) climatic adaptation policies of legislators are aimed at supporting 'socio-economic' impacts to reduce the 'vulnerability' of disadvantaged communities to climate vagrancies, whereas mitigation refers to the reduction of the GHG which are said to be responsible for climate changes.

Impacts of climatic change on tourism

There is a consensus among scientists and politicians that the world's climate is changing as a result of the GHG emissions, which are causing global warming and changes in weather patterns. Nicholls (2014) wrote in the 5th IPCC Assessment Report, that travel contributed 4.9% of carbon emissions, which were expected to increase by 130% between 2005 and 2035 as the world became more affluent and promoted more travel. These changes are expected to have major impacts on world destinations by the year 2050, including melting icecaps at the poles and glaciers, droughts and storms (Gore, 2006; George, 2011:533; Steyn & Spencer, 2012:128). These are among the obviously expected impacts on tourism; there are however other less obviously anticipated climate changes. The Geophysical Research Letters say that within the next 20 years the Arctic area will be ice-free under the present climatic conditions (Tempelhoff, 2019a), as sea-ice melts at increasing rates.

Tourism has two central aspects: the *demand* for tourism which stems from the desires and needs of tourists to experience places/activities that are not available at the place of residence, and the *supply* of the attractions, accommodation, facilities and events at the destination. Most discussions on climate change address the impacts on the supply of tourist facilities; little attention is paid to the demand side. Hall and Higham (2006) say that the complete relationship between tourism and climate must be considered to obtain a full impression of the impacts: the tourist generating area, the travel to and return from a destination, and also the destination, and attractions/events at the destination, must be considered.

Figure 1 clearly demonstrates the interaction of the climate on tourism at unique destinations and allows for the impact of government policies on climate (change) and tourism. The authors have drawn various aspects of tourism (for example, source markets, location, seasonality, marketing, monetary measures, health issues and entrepreneurship) into one over-arching framework to demonstrate the relationship between climate and tourism. Dillimono and Dickinson (2015) caution that developing countries are probably more susceptible to climate change because of the (sometimes extreme) prevailing weather conditions of a country/area, and inadequate capacities due to poverty, poor infrastructure (referring to clean water supplies, health, food security, and snow depth, for example), population growth, declining crop yields, and rising sea levels, to deal with the problem. Some places/destinations/businesses are susceptible to climate change and adaptive capacities. Countries

which are dependent on tourism to promote GDP are more prone to climatic influences, and political interference is clouded by these impacts, leaving poor prospects for long-term tourism development which could be further hindered through carbon emissions and the consequent increase in taxes to mitigate these emissions.

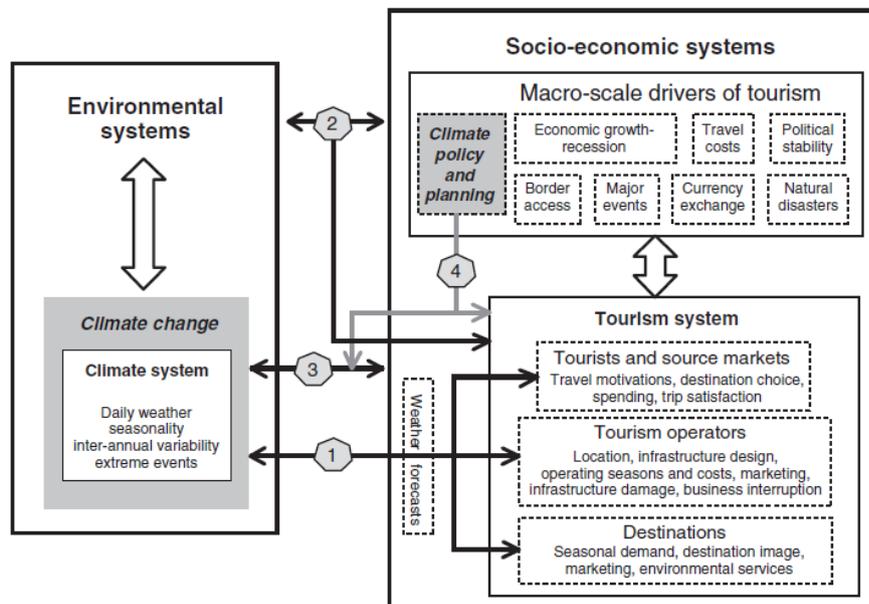


Figure 1: Climate change impact pathways on international tourism
Source: Scott, Gossling and Hall (2012:215)

4.1) Changing demand patterns

At the generation area tourists should be conscious of the climate changes which could affect the decision-making processes regarding perceptions of the destination and the available activities. The climate (at the destination) could also affect the seasonality of travel and visitor flows to the destination/attraction, not necessarily the desires to travel, which are largely driven by economic factors, but possibly the 'travel preferences in space and time' (Steyn & Spencer, 2012:128). Perry (2006) speaks of 'good' summers in the northern hemisphere which will persuade visitors to stay in the area rather than moving to other destinations for recreation and holidays. Some destinations may lose their tourist appeal, or even disappear, as a result of the effect of climate change on traveller-motivations.

New regulations on energy produced could also affect travel patterns, especially long-haul travel. National and international policies introduced to monitor and control GHGs could increase travel costs and impact on environmental attitudes, leading to a change in tourist demand patterns, for example a change in transport modes. Environmental concerns based on the carbon footprint featured in a study by Gössling, Hansson, Horstmeier and Saggel (2002) on the Seychelles islands; it was found that almost 100% of the carbon deposits were caused by aircraft to the islands. Such greenhouse gases could result in the demise of a tourism industry, and/or a redistribution of activities. While intercontinental travel would probably continue, and to grow, mass tourism may choose closer destinations for holidays. The international tourist-industry falls hugely in the North America-Europe-Asia band in the northern hemisphere, and tourists are expected to travel mainly in this band, which is not good for the tourism industries in southern hemisphere countries. Much of tourism takes place around bodies of water and coastal regions; these destinations/attractions are especially vulnerable to sea-level increases, storms, and even droughts (a good example would be the devastating floods of New Orleans in the Gulf of Mexico). McGuire pointed out in 2006 that rising sea levels could erode the pristine beaches of the Indian Ocean islands and, in the case of the Maldives which are only one to two metres above sea levels, submerge the islands completely below sea levels. Nicholls (2014) notes that one-third of Caribbean resorts are less than one metre above surrounding sea-levels. The IPCC forecasts sea-level increases of between 0.45m and 0.82m by the turn of this century, which implies that 49% to 60% of these resorts will be seriously

damaged, with 21 airports disrupted and 35 ports inundated, and the costs of maintaining/repairing this damage is forecast at between USD10b to USD23billion (www.ipcc.ch).

Tourism is dependent on the provision of fresh products for hotels and restaurants. Communities supplying such produce are susceptible to droughts (the Western Cape Province in South Africa experienced the worst drought in 100 years in 2017/18, resulting in no water for the farming communities, and only 50 litres a day per person for household and personal use, and in May 2019 Sydney again introduced water-restrictions), flooding and aridification; subsistence farming would therefore be devastated. Such events could have a totally negative effect on the economies of regions and nations, and increase (existing) poverty levels; similar events in the 1990s and early 2000s in Zimbabwe resulted in the degradation of soil fertility, famines and population migrations (Steyn & Spencer, 2012:130), especially to southern Africa (some of this is a political issue due to the policies of the former Zimbabwean president, Robert Mugabe). The contestation for the reduced availability of 'good' land could lead to inter-tribal/inter-regional conflicts and wars (in Rwanda in the 1990s for example), and to serious health issues, such as the cholera outbreaks in Zimbabwe in 2008/9. These issues, due in part to climatic change, are not conducive to the development of any infrastructure or tourism superstructure, let alone tourism development, which could sustain poor/marginalised communities. The pressures on 'good' farmland could lead to the invasion of nature parks/reserves for arable land and killing of edible game. The World Health Organisation (WHO, 2018) stated that climate change did affect health issues through provision of clean air, safe drinking water, sufficient food sources, and secure shelter, and predicted that adverse climate could cause 250 000 additional deaths per year between 2030 and 2050, through malnutrition, malaria, diarrhoea and heat stress.

4.2) *Impacts on the range and distribution of resources*

A classic example to protect resources is the efforts of the Dutch nation to protect the low-lying areas of the Netherlands from rising sea-levels through the construction and maintenance of the Dyke system. McQuire (2006) predicted that sea-levels 'could be 72mm higher by 2030, while the melting of the Greenland and Antarctic ice sheets could contribute as much as 25cm to (current) ocean levels (Steyn & Spencer, 2012:131). International cities and tourism destinations/attractions developed along coastal areas and on river estuaries are specifically susceptible to rising sea-levels brought about by melting ice regions and unsustainable heavy rain-water runoffs, which lead to the erosions of escarpments, destruction of sea-side resorts, the tourism infrastructure, roads, provision of sewage maintenance, communications, yacht basins, harbours and the local fishing industries. The devastating tsunami in 2004 in east Asia caused tidal rushes around the whole Pacific rim and included metre-high tidal waves along the whole eastern coast of Africa, destroying habitation along coastal areas (Steyn & Spencer, 2012:131). The terrible flooding of Mozambique and Zimbabwe in March and April 2019 (hurricanes Idia and Kenneth), resulting in over 1 000 deaths and the destruction of infrastructure and arable land-usage, is an example of the impacts of the weather in the region. Cyclone Fani has also caused terrible damage in parts of the Indian sub-continent. Excessive climate changes could translate into 1cm sea-level rises, which means a '1.5 metre retreat of shorelines ... by 2030 shorelines could be expected to have retreated by at least 108 metres, and possibly up to 375 metres, in low-lying coastal areas' (Steyn & Spencer, 2012:131), causing stagnation in economic growth, political unrest and health issues, and tourists' seeking safer destinations.

4.3) *Increase in investment risks*

When climate changes have a visible effect on tourism destinations, through the destruction of the local infrastructure, investors will withdraw from the area in preference to 'safer' destinations/attractions, due to higher maintenance and insurance costs. This would result in adaptive uses of immovable and fixed tourism-related capital, and redesign of urban and resort infrastructure and layout. Rising sea levels could have a devastating effect on the economic activities of coastal properties, where flooding, infusion of saltwater into the fresh water sources (as happened in the flooding in New Orleans (the USA) in the early 2000s, and the development of the Dyke system in Holland), erosion of beaches, and coral reef-barrier islands. Hauer, Evans and Mishra (2016, in Atzori et al., 2018) projected that millions of people (and millions in US Dollars) would be at risk from rising sea-levels in continental United States, the state of Florida and the Everglades parks being an example, from cyclone activities. Hauer et al. (2016, in Atzori

et al., 2018) are concerned that most studies on climate change ignored the effects of (natural and immigration) population growth on coastal development, and the wave effect on undermining foundations, and Atzori et al. (2018) estimate that by 2100 1.2 million people could be displaced if climate change caused a 0.9metre rise in sea-levels. Professor Mark New of the African-climate initiative at the University of Cape Town has estimated that climate change will cause droughts in the Cape Town region every 15 years, instead of the previously envisaged 50 years (Tempelhoff, 2019b), resulting in anticipated water-consumption policy changes.

4.4) *Threats to sustainable practices*

Climate changes will impact on eco-systems, especially water-based resources. Decreasing rainfalls and aridification (dry area caused by insufficient water to support vegetation) will affect vegetation and ground covers and have serious effects on farming, and delivering produce for tourists' sustenance, economic activities, deforestation and wildlife tourism. Aquatic life (farming and recreation resources) would be particularly affected by raising temperatures, increased wave-height activities (also for power generation), and rising sea temperatures, to the detriment of 'sea, sand and sun' holidays. The effects of such climate change will impact the livelihoods of resident populations, and certainly subsistent farming, causing food shortages for these communities and tourists' in local accommodation and restaurant facilities, and will certainly lead to increased levels of poaching of game, and the illegal collection of firewood in protected areas, leading to further destruction of flora and fauna. Under pressure from distressed communities, governments may abandon wildlife protection policies in favour of more sustainable practices of food production, resulting in the reduction of nature-based tourism resources.

Where climate change is due to continuing and increasing GHG emissions governments may be forced to introduce restrictive practices on travel, especially air and distance travel, which could impact negatively on the resident tourism industry as greenhouse taxes are introduced to reduce vehicle emissions (imagine the effect on the tourism industry of barring air traffic to Indian Ocean islands and the Caribbean). Dickinson, Lumdson and Robbins (2011) urge the use of road travel instead of planes (including low-cost airlines), pricing changes to decrease demand for travel which would lead to reduced carbon footprints (contributors to GHG), and a general adoption of 'slow travel' to counter climate changes brought about by tourists' demand. The exact contribution to GHG emissions is brought about by the distance travelled, modes of travel, the length of stay at a destination, and the energy usage for accommodation and activities. These authors urge that change in tourist behaviour is needed towards train, coach, cycle and foot travel.

Emission taxes on all, or any, form of transport could result in the geographical contraction of tourism-related activities; on the other hand, such policies could lead to the development of low-emission forms of travel, such as the hypersonic aircraft using liquid hydrogen as fuel, or the experimental solar-powered boat, the Turanor (George, 2011:534). As far back as 2005 the UNWTO produced data which showed that international and local tourism produced about 5% of GHG; transport alone accounted for 75% of this figure (40% by aircraft). The study showed that tourism in the five major regions represented 2.7% of trips but accounted for 17% of GHG. This was contrasted by coach and rail travel which constituted 34% of travel but contributed only 13% of GHG (Steyn & Spencer, 2012:135). The same UNWTO (2007a) survey estimated that carbon dioxide emissions could grow by 152% by 2035 if careful control on these emissions was not exercised.

Tourism does contribute to environmental changes, especially for eco-tourism at altitudes, and the impacts include on policies regarding tourism infrastructure, resort development, roads and communications, attraction-maintenance, resources demand on water, electricity and refuse removal. Scott, Hall and Gossling (2012:6) note that the scale or rate of climate change is influenced by human activities on habitats, waste products, consumption of fresh water, electricity provision and communication systems, and production changes (paper products to plastic), and deforestation which leads to changes in rainfall patterns. These authors also emphasise the time lag between events/activities and the effects of climate change on landscapes, including the introduction of exotic flora.

In Figure 2 the authors have tried to demonstrate the impacts of GHG emissions on both the tourist generating and destination areas, in terms of the effects on the (natural and man-built) environment as a result of climate changes. Wade and Jennings (nd) appear to support the assumptions in Figure 2, while

supporting the Schreuder's Economic Team report; they say that the climate changes will contribute to inflation through general price changes and agricultural shortages (due to increased droughts and flooding), and reduced land availability and higher energy costs (increased demand for cooling and heating).

4.5) Economic impacts

Tourism is the world's largest industry, employing about 300 million persons, and accounting for approximately 4% of the total Gross Domestic Product (GDP). The UNWTO (2019) estimates that almost 2 000 million tourists travel internationally, with the number of national tourists a guesstimate of double this number as many countries do not keep accurate data on travel. This movement of people contributes to an increase in wealth in the destination countries, and a re-distribution of income in national economies. Climate change does impact on the economic wealth of tourist' countries, and adverse climate will impact negatively on tourists' flows and therefore on the economic prosperity of a region/country. The transport industry is under threat from the emissions of carbon dioxide, and the constantly rising cost of petrol and diesel does also impact travel. As early as 2006 Stern (cited in Steyn and Spencer, 2012:136) concluded that climate change could result in as much as a 20% reduction in the global GDP by the second half of the 21st century, seriously impacting on the economic growth and development in, especially, tourism receiving areas/countries.

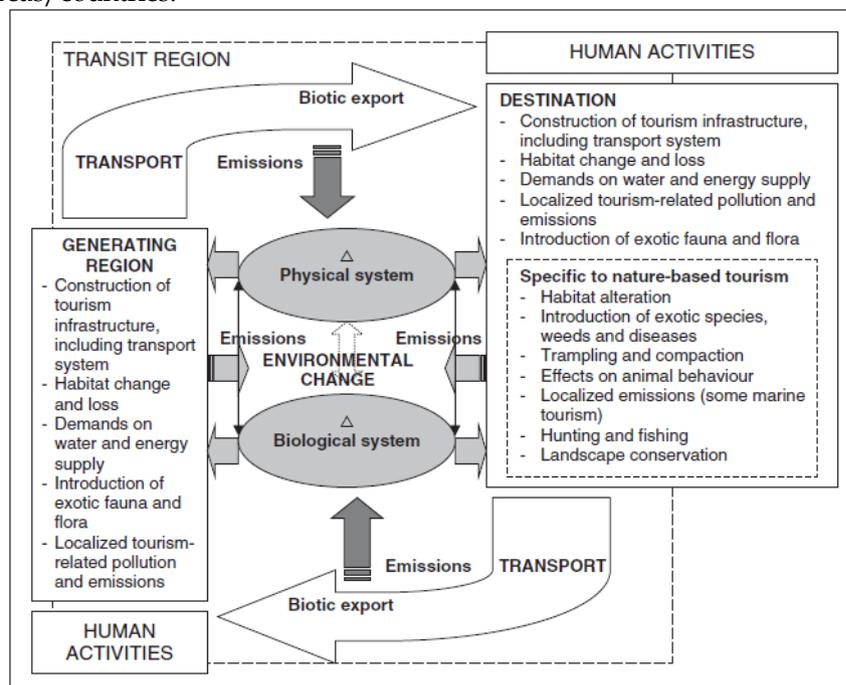


Figure 2: Contribution of tourism to environmental change

Source: Scott, Hall and Gossling (2012:9)

4.6) Policy options pertaining to climate change

All governments regulate their tourism industries, mainly through tourist taxation (airport departure tax, visitor accommodation tax, additional entrance fees for 'foreign' visitors at attractions) and recognise both the positive and negative influences of visitors, including the adverse effects of climate change on destinations. Most governments apply mitigation policies through technological, economic and socio-cultural controls which could lead to GHG emission reductions, as was envisaged during the Vienna Climatic Change Talks in 2007, which sought to reduce emissions to well below the 2000 levels by mid-2050. The UNWTO envisaged four major mitigation strategies to lower GHG emissions (UNWTO, 2007b; Steyn & Spencer, 2012:39):

Reduce energy usage which can be achieved by changing 'destination development and marketing (tour operators), destination choices (tourists), as well as shifts in transport from car and aircraft to rail and coach' (Steyn & Spencer, 2012:139). Staying longer at a specific destination could also reduce gas

emissions, but an international trend towards shorter but frequent travel appears to be the direction for future tourism. This trend could lead to a trade-off between gas emissions and tax costs on fuel, and possibly to improved technology to offset travel costs, including more efficient aircraft.

New technology in energy efficiency should promote reductions in fuel-demands, reducing gas emissions.

Numerous forms of energy are available to the tourism industry, including the use of renewable energy through improved use of wind, water, photovoltaic, solar, biomass, geo-thermals, and energy generation through waste produce. Certainly, at island destinations, where it would be expensive (and add to GHG emissions) to transport fossil-fuels.

Carbon dioxide could be stored in 'sinks'; depleted or worked-out mines, or through afforestation (as opposed to deforestation).

Unfortunately, the costs of avoiding or reducing GHG emissions are borne by governments and only partly passed on to the causes of these gases; in large the tourism industry through the demand for travel.

4.7) *Coasts, beaches and islands*

Protection requires timely identification of vulnerable facilities through the development of (for example) seawalls and breakwaters, and the enhancement and preservation of natural defences which could include the adaption of building guidelines and tourism infrastructure. This would include strategies to protect, accommodate and retreat forms of coastal, mountain and desert areas; for example, the provision of artificial snow at marginal ski-resorts, avalanche monitoring, and changing demographic patterns in areas that are too wet or too dry.

4.8) *The built environment*

This aspect of tourism development is entirely within the control of governments and developers, and would include alternate buildings designed to accommodate climate change, restricting construction on vulnerable land (flooding, landslides, drainage), alternate planning for transport nodes and routes and the best type of transport for a specific area, revised planning for the supply of water, electricity or energy, communications, and waste removal: that is, consideration of the 'green environment'. The development of a tourism superstructure may have to be written off over shorter periods in climate susceptible areas affecting property prices, which may also require higher insurance cover, and therefore premiums. Adaptive measures may be required for immobile tourism infrastructure, and a change to 'green' sources of energy and water sources.

4.9) *The tourism sector*

To counter the effects of climate-change each destination/attraction will have to adapt its policies and strategies, which could include the interchangeable use of man-made and natural attractions, revising marketing planning and market segmentation, changing seasonality and therefore tourism flow patterns, finding alternate modes of transport, planning for changing health patterns, restricting the use of sensitive eco-systems, and promoting greater inter-governmental co-operation.

4.10) *Government policies*

Governments, certainly in developed western countries, are aware of the impacts of climate change and most have plans and strategies to limit/prevent/counter catastrophic events such as typhoons, flooding, and droughts caused by changes in weather patterns. These could include accelerated depreciation on infrastructure in vulnerable areas, compensation legislation, restriction on the use of water or energy sources, encouraging developmental investment in infrastructure, addressing education and training directed at emergency situations, planning and re-planning of transport modes and nodes aimed at reducing GHGs, developing emission-control regulations, and energy-saving policies (especially the use of solar-heating and wind power).

It will also be necessary to adapt an 'integrated approach to tourism management in order to accommodate medium- and long-term concerns, especially those centred on global warming ... monitoring ... climatic changes, focusing specifically on issues such as physical changes to destinations, visitor health and safety, changing markets, and changing tourist offerings (Steyn & Spencer, 2012:143).

5) Conclusions

Tourism is a major world industry and a huge contributor to the GDP of participating countries. The attractions (built and natural), events, and socio-cultural activities are all susceptible to the weather, and therefore climate change must be carefully monitored to ensure the continued economic sustainability of the industry. The excellent scenery, national park-systems protecting both flora and fauna, pristine beaches, good accommodation, sunny climates (and the winter equivalent for snow activities), healthy populations and adequate recreation facilities are all dependant on the daily weather and the climate over an extended period. All this infrastructure could be at serious risk as a result of rising sea-levels, increasing temperatures, extended droughts and aridification, poverty, increasing levels of crime, changing health patterns, reductions in GDP; impacts of changes in climate as a result of GHG emissions.

Climatic changes could have negative consequences on farming and fishing: food production is vital to ensure tourism sustainability, and for job security and advancement. Warmer climates could also enhance tourism activities, including birding, water sports, and mountain- and trail biking activities and the promotion of the natural environment. However, warmer weather could promote diseases; mosquitoes in the tropical regions would thrive, and cholera could range due to insufficient, and clean, water sources. A report by Templehoff (2009) suggested that food production in African states could decline by 50%, and poverty-driven situations could lead to increased crime, impacting on communities and therefore on the tourism industry in these regions. Amelung, Nicholls and Viner (2007) noted the increase in the number of cyclones/hurricanes in the Gulf of Mexico which had caused alternately drastic flooding and droughts, with the consequent change on daily livelihoods, tourist' push (resorts, travel) and pull (destinations, attractions) factors, and on aspects including school holidays, seasonality, natural (including climate), and institutional and economic perspectives. Amelung et al. (2007) quote the devastation on coral reefs (including the Great Barrier Reef on the east coast of Australia), which could experience a decrease of 33% in extent by 2050 because of climate impacts, and the huge increases in heat-waves in the oceans which are estimated to have increased by 54% in recent years (Templehoff, 2019b).

The envisaged doctoral study on the possible effects on tourism of climate changes is limited to southern and eastern Africa but could draw comparable examples from other world regions where these have a direct relevance on the study. The outcomes of the doctoral study should determine any scope for further research. One item that will need further investigation is the concept proposals on South Africa's future actions regarding the use of fossil fuels, published for public comments in the second week of May 2019.

6) Case study: South Africa's policy towards climate change

Although the policy addressed in the case study was developed a decade ago (2009), the promises and undertakings made were not implemented. In fact, the policies of the state-controlled electricity supply commission (ESCOM) have proved to be abysmal, and have led to massive corruption (including by the axed previous South African president), mismanagement, and stagnation of the economies of southern Africa, and are generally not understood by the majority of South African's, except that it is impacting heavily on their pockets as power cuts force citizens to purchase alternate forms of power generation. South Africa's case is not totally unique as Zhang and Wen (2008) discovered in their studies of Nigeria and China. They found that climate change was due to 'human activities' which participants said was expected, despite all the technological developments, as the citizenry sought to make life easy for themselves by using machines and the 'fuel' (for China read coal) to generate power even if emissions were dangerous and caused to health difficulties and climate change.

Huge industrial development has contributed to these GHG emissions and nobody, including the government, is taking responsibilities for the carbon pollution of the atmosphere, and the dense levels of smoke over industrial cities, which is causing respiratory-related illness. This is a similar situation to the industrial Highveld regions of South Africa with the huge iron and steel production plants, and, on a smaller scale, the oil refineries in the Gauteng area. No government will want to jeopardise an economy and will therefore turn a blind eye to emission-leakages, oil spills, toxic material dumps into water sources.

The case study by Masters (2009) analyses South Africa's commitment to the control of GHG emissions but reserves the 'right' not to implement this undertaking where it will counter any progress of the South African economy. It explains quite specifically that South Africa is really dependant on fossil-fuel for the continued and continuing development of the South African economy, which is vital for the re-distribution of the country's wealth, and the promotion of job-creation for the benefit of the previously marginalised black communities. The case study was presented before Jacob Zuma usurped power from Thabo Mbeki to become president of the country, and commenced with his (and the governing ANC) deliberate capture of state assets and enterprises which included the Electricity Supply Commission of South Africa, ESCOM, with the help of the Indian Gupta family.

South Africa's Policy Towards Climate Change

South Africa depends on fossil fuels to produce energy for itself and other countries of the SADC region. While these fossil fuel sources are abundant and cheap by world standards, they are classed as dirty in terms of the pollutants and the quantities there-of that power stations pump into the atmosphere. South Africa's carbon dioxide pollutions are far higher than those of Europe and the USA, when measured on a per capita basis. South Africa's 'emissions are 7.4 metric tonnes of CO₂ per annum, compared to a world average of 4 tonnes.

South Africa is a signatory to several climate change agreements, including the Vienna Convention for the Protection of the Ozone Layer. The Government adopted the White Paper on Renewable Energy (2003), the National Climate Change Response Strategy (2004), and hosted the National Climate Change Conference in 2005, all seeking to eliminate (or at least seriously reduce) greenhouse gas emissions and address climate change issues. It also decided 'to demonstrate our seriousness and commitment to greenhouse gas reduction'.

The Government is showing signs of commitment to achieving the objectives of reducing greenhouse gas emissions through several actions. Separate departments have been created for Minerals and Energy, and for Tourism and Water and Environmental Affairs, ostensibly to 'allow more time and energy to be devoted to each, thus improving performance' said Buyelwa Sonjica (Minister of Water and Environmental Affairs).

In July 2008 the Long-Term Mitigation Scenarios (LTMS) were introduced, which highlighted a move to regulatory state action and to economic actions through taxes (including a carbon tax and a tax on air travel) and incentives for companies seeking energy efficiency. This was followed by the National Climate Change Summit in March 2009, to demonstrate the importance Government attached to domestic and international climate change negotiations.

Building nuclear power stations, and using the country's vast uranium deposits as fuel, is a long-term project. In the short term the Government's answer to the immediate energy crises is to re-commission moth-balled coal-powered stations, and to build new ones, using the abundant reserves of coal (which Eskom – the national power provider – claims are of poor standards), thereby increasing the carbon gas emissions, contrasting with Government claims of moving away from pollution in the interests of negating adverse climate change. South Africa also exports huge quantities of coal thereby contributing to dirty emissions in other parts of the world.

South Africa's policy on climate change does seem to be contradictory when considering world-wide demands for the reduction of greenhouse gases, and her own internal political and economic realities. The Ibhubesi oil-gas field development off the West Coast is going ahead, renewing the reliance on hydrocarbons.

While the Required by Science Scenario in the LTMS document called for no new coal-fired power stations, and the phasing out of liquid fuel from coal processes, the Government is proceeding with fossil fuel power generation. But, the LTMS document is not the official view of Government, who are therefore not bound by its findings or recommendations.

While present Government policy towards the use of fossil fuels, the control of greenhouse gases, and the commitment to ensure positive climate change is somewhat incoherent and credible, a Green Paper was published in 2010, aiming at a 'final National Climate Change Response Policy' which should recognise the seriousness of the climate change problem, and the development of finite policies towards South Africa's obligation to combat adverse climate change. Political will is needed, and hard decisions will have to be taken at national and international levels.

Source: Masters (2009)

References

- Amelung, B., Nicholls, S., & Viner, D. (2007). Implications of global climate change for tourism flows and seasonability. *Journal of Travel Research*, 45(3), 285-296.
- AOAA@Statista. (2019). file:///C:/Users/jpsf/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/FOC2SSOA/statistic_i1 [2 May 2019].
- Atzori, R., Fyall, A., & Miller, G. (2018). Tourist responses to climate change: Potential impacts and adaptation in Florida's coastal destinations. *Tourism Management*, 69, 12-22.
- Bardon, F.E. (1991). Summary of the study on the degree of satisfaction of the national and foreign tourism demand in relation to the tourist product Espenol. Report. Madrid: Ministry of Transportation. [translated from the original Spanish text]
- Bennett, A., Jooste, C., & Strydom, L. (eds.). (2005). *Managing tourism services: a southern African perspective*. Pretoria, South Africa: van Schaik Publishers.
- Brits, E. (2019). The earth's time is running out. *Die Burger*: 15, February 28. [translated from the original Afrikaans text]

- Burton, R. (1990). *Travel geography*. London: Pittman.
- Cooper, C., Fletcher, J., Gilbert, D., Shepherd, R., & Wanhill, S. (1998). *Tourism principles and practice*. Harlow, England: Pearson Education.
- Dickinson, J.E., Lumsdon, L.H., & Robbins, D. (2011). Slow travel: issues of tourism and climate change. *Journal of Sustainable Tourism*, 19(3), 281-300.
- Dillimono, H.D., & Dickinson, J.E. (2015). Travel, tourism, climate change and behavioural change: traveller's perspectives from a developing country - Nigeria. *Journal of Sustainable Tourism*, 23(3), 437-454.
- George, R. (2007). *Managing tourism in South Africa*. Goodwood, Cape Town: Oxford University Press.
- George, R. (2011). *Marketing tourism in South Africa*. (4th ed.). Goodwood, Cape Town: Oxford University Press.
- Gomez-Martin, B. (2005). Weather, climate and tourism: a geographical perspective. *Annals of Tourism Research*, 32(3), 571-591.
- Gore, A. (2006). *An inconvenient truth: the planetary emergency of global warming and what we can do about it*. New York: Rodale Books.
- Gössling, S., Hansson, C.B., Hörstmeier, O., & Saggel, S. (2002). Ecological footprint analysis as a tool to assess tourism sustainability. *Ecological Economics*, 43(2-3), 199-211.
- Hall, C.M., & Higham, J. (2006). *Tourism, recreation and climate change*. New Delhi: Viva Books.
- Hares, A., Dickinson, J., & Wilkes, K. (2010). Climate change and the air travel decisions of UK tourists. *Journal of Transport Geography*, 18(3), 466-473.
- Horne, W. (2019). Nil income growth in tourist accommodation. *Die Burger*: 13, February 19. [translated from the original Afrikaans text]
- Intergovernmental Panel on Climate Change (IPCC). (2007). Summary for policy makers and technical summary. In Parry, LM. et al. (eds.). *Climate change 2007: impacts, adaptation and vulnerability. Contribution of the working group 11 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. pp 21-73. Cambridge: Cambridge University Press.
- Masters, L. (2009). The road to Copenhagen: climate change, energy and South Africa's foreign policy (Occasional Paper, no. 47). Johannesburg: SAIIA.
- McGuire, B. (2006). *Halifax Travel Insurance Report: climate change to drive radical changes in global tourism*. http://blog.sustainabletravel.com/press-releases/climate_change_to_drive_radica.html [4 October 2011].
- Nicholls, M. (2014). *Climate change: Implications for tourism*. Intergovernmental Panel on Climate Change (IPCC). 5th Assessment Report. University of Cambridge Institute of Business Leadership. www.cisl.cam.ac.za/ipcc [21 May 2019].
- Opondo, M.A. (2012). Bottom-up approach to climate change adaption policy: a case study of a community drought resilience project in Sakai sub-location, Makueni District, Kenya. In Musyoki, A., & Khayesi. M. (eds.). *Environment and development: selected themes from eastern and southern Africa*. pp 148-164. Gaborone: Bay Publishing.
- Page, S.J. (2003). *Tourism management: managing for change*. Oxford, UK: Butterworth-Heinemann.
- Perry, A. (2006). The Mediterranean: how can the world's most popular and successful tourists' destination adapt to climate change? In Hall, C.M., & Higham, J. (2006). (eds.). *Tourism, recreation and climate change*. pp 86-95. New Delhi: Viva Books.
- Scott, D., Gössling, S., & Hall, C. M. (2012). International tourism and climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 3(3), 213-232.
- Scott, D., Hall, C.M., & Gossling, S. (2012). *Tourism and climate change: Impacts, adoption and mitigation*. London: Routledge.
- Scott, D., Jones, B., & Konopek, J. (2007). Implications of climate and environmental change for nature-based tourism in the Canadian Rocky Mountains: A case study of Waterton Lakes National Park. *Tourism Management*, 28(2), 570-579.
- Shani, A., & Arad, B. (2014). Climate change and tourism: Time for environmental skepticism. *Tourism Management*, 44, 82-85.
- Stern, N. (2006). *The economics of climate change: The stern review*. Cambridge: Cambridge University Press.
- Steyn, J., & Spencer, J. (2012). Global warming and the potential threats to the tourism industry of eastern and southern Africa. In Musyoki, A. & Khayesi. M. (eds.). *Environment and development: selected themes from eastern and southern Africa*. pp 125-147. Gaborone: Bay Publishing.
- Tempelhoff, E. (2009). Climate change could seriously damage Africa's tourism. *Die Burger*: 4 March 2009. [translated from the original Afrikaans text]
- Tempelhoff, E. (2019a). On thin ice. *Die Burger*: 11, March 1. [translated from the original Afrikaans text]
- Tempelhoff, E. (2019b). Heat waves ravage oceans. *Die Burger*: 6, March 7. [translated from the original Afrikaans text]
- United Nations World Tourism Organization (UNWTO). (2007a). *UNWTO world tourism barometer*. Madrid: UNWTO 5(3), 1-47.

-
- United Nations World Tourism Organization (UNWTO). (2007b). *Conference on climate change and tourism. Davos, Switzerland*. <http://www-world-tourism-org/sustainable/climate/finalreport> [4 May 2019].
- United Nations World Tourism Organization (UNWTO). (2019). 2018 Arrivals Report. <http://www2.unwto.org/press-release/2019-01-21/international-tourist-arrivals-reach-1.4-billion-two-years-ahead-forecasts> [2 May 2019].
- VisitBritain. (2019). 2019 inbound tourism forecast. <http://www.visitbritain.org/2019-inbound-tourism-forecast> [18 May 2019].
- Wade, K., & Jennings, M. (n.d). The impact of climate change on the global economy. *The Economist*.
- World Health Organisation (WHO). (2018). Climate change and health. <http://www.who.int/news-room/fact-sheets/detail/climate-change-and-health> [20 April 2019].
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