

The Impact of Climates Change on Tourism in Africa

**By Smart N. Uchegbu, PhD, and Ejikeme J. Kanu,
Department of Urban and Regional Planning,
University of Nigeria, Nsukka, Enugu State, Nigeria**

Abstract

Today, new tourist centers and cities are planned to make them more environmentally friendly and sustainable; however, strategies inherent in these plans do not adequately address the severe and radical changes in local and African climate changes being witnessed today. Some African countries rely heavily on tourism as their main source of revenue. The effects of climate change on tourism do cause changes in the ecosystems and natural resources needed to sustain the tourism economy. Climate-change impacts that affect tourism in African countries include: beach erosion, saline intrusion, droughts, flash floods and landslides, coral-reef bleaching, less productive fisheries and agricultural systems, changes in the preferences of tourists, etc. The study reveals that there are some climate-induced challenges facing African countries in general. Natural disasters, such as rising sea levels, flooding, desertification, erosion and other health-related problems, are now rampant in African countries. These serious issues, most of which have been linked to the emission of greenhouse gases (GHGs), could be addressed in part by change of habit and new ways of thinking to reduce the effect on tourism in Africa.

Keywords

climate change, tourism, planning laws, skill, ecosystem

1. Introduction

Today, new tourist centers and cities are planned to make them more environmentally friendly and sustainable; however, the strategies inherent in these plans do not adequately address the severe and radical changes in local and African climate patterns being witnessed.

The effects of climate change are causing changes in the ecosystems and natural resources needed to sustain the tourism economy. Climate change impacts that affect tourism in African countries include: beach erosion, saline intrusion, droughts, flash floods and landslides, coral-reef bleaching, less productive fisheries and agricultural systems, rising sea levels, flooding, desertification, erosion and other health-related problems, all of which are now rampant in African countries.

These issues are linked to the emission of greenhouse gases (GHG) (Stainforth, 2005). Climate change is now at the forefront of debate with dire warnings that worldwide temperatures may continue to rise throughout the next 50 to 100 years (Dakaica, 2002). Some of the factors have human influences and some are natural (Uchegbu, 2002); climate change is likely to continue for many centuries changing human and animal life patterns (Uchegbu, 2009).

Tourism is closely connected to the environment and climate itself. At the same time, tourism is a contributor to greenhouse gas (GHG) emissions, including emissions from transport, accommodation and activities (Beatley, 1998). According to United Nations World Tourism Organization, tourism's contribution to GHG emissions was estimated to be approximately 5%. (UN, 1990). Tourism is a primary source of foreign exchange earnings in 46 out of 50 of the world's Least Developed Countries (LDCs) (Pickering and Owen, 1995). The sector needs both to mitigate its contribution to climate change by reducing its emissions of greenhouse gasses, as well as its overall environmental footprint and also to adapt to the impacts of climate change. Both aspects require substantial changes in the tourism production system.

2. Methodology

This paper adopted the survey design approach as its method of study. It is qualitative in nature, highlighting problems, causes and adaptation and mitigation strategies relative to the tourism sector based on a survey of environmental practitioners.

3.1. The Importance of Tourism to African Countries

To Brown (2001), tourism has the potential to lift people out of poverty through the employment and entrepreneurial opportunities it provides. The recognition of tourism's role in poverty alleviation has made it a substantial component of the international development and trade agenda.

Tourism is a vital part of the African and global economy (Uchegbu and Ugwuanyi, 2009). International tourism ranked as the fourth-largest industry in the world, after fuels, chemicals and automotive products (Uchegbu and Ugwuanyi, 2009). Tourism has been established as one of the main drivers of growth in many developing economies and is a good source of income especially for African countries.

The breadth of international travel also has greatly expanded in recent years to encompass African countries. In 1950, just 15 destinations, primarily in Europe, accounted for 98% of all international arrivals, but by 2007, that figure had fallen to 57% (IPCC, 1996).

African countries have now become major growth areas. Tourism is a key foreign exchange earner for 83% of developing countries and the leading export earner for one-third of the world's poorest countries (IPCC, 1997). For the world's 40 poorest countries, tourism is the second most important source of foreign exchange after oil (UNCHS, 2006).

3.2. Advantages of Tourism Over Other Industries

Tourism is consumed at the point of production so that it directly benefits the communities that provide the services. It enables communities that are poor in material wealth but rich in culture, history and heritage to use their unique characteristics as an income-generating comparative advantage (Calthorpe, 1993).

Tourism has helped to provide employment and alleviate poverty, the first of the United Nations' Millennium Development Goals (MDGs) (UNCHS, 2006). It creates networks of different operations, from hotels and restaurants to adventure sports providers and food suppliers. This enables tourist centers to form complex and various supply chains of goods and services, supporting a versatile labor market with a variety of jobs for tour guides, translators, cooks, cleaners, drivers, hotel managers and other service-sector workers.

Many tourism jobs are flexible or seasonal and can be taken on in parallel with existing occupations, such as farming and trading. It tends to encourage development of multiple-use infrastructure that benefits the host community, including roads, healthcare facilities and sports centers, in addition to the hotels and high-end restaurants that cater to foreign visitors. With its tendency to produce flexible labor markets and offer diverse working opportunities, tourism can also help realize the second Millennium Development Goal (MDG) – promoting gender equality. In Mali, the World Tourism Organization's Sustainable Project for Eliminating Poverty (ST-EP) program has supported an effort to train female artisans of Djenne, one of Mali's oldest and most visited towns.

Tourism has potential for not only protecting the natural environment, but also preserving historical, archaeological and religious monuments and stimulating the practice of local traditions, arts and crafts and cuisine. As tourism by definition involves the transfer of people, culture and ideas, it is ideally placed to foster effective global partnerships as stipulated by the eighth MDG.

In addition to advancing Development Goals, some have credited tourism with helping to build and sustain peace. Tourism is an instrument that creates a global language of peace through its tendency to promote communication between nations and cultures. Tourism can also help promote peace and stability in African countries by providing jobs, generating income, diversifying the economy, protecting the environment and promoting cross-cultural awareness.

Kenya identified the potential for tourism quickly by opening its first national park in 1947 and building a flourishing industry based on safaris, and by the 1990s, providing mass tourism commonly associated with the resorts of the Spanish coast. Kenya's eco-tourism has been able to deliver concrete benefits to its people by involving local communities. Kenyans also have been involved in developing tourism through programs, such as Parks Beyond Parks, that encourage the management and conservation of wildlife areas outside of parks and protected wilderness areas; they play the leading role in managing and conserving wildlife areas in their own communities.

4. The Effects of Climate Change on Tourism in Africa

The challenge of climate change is particularly significant for the African countries because the sector is both a victim (i.e. increased health and natural disaster risks) and contributor to greenhouse gas emissions. African countries are vulnerable to the impacts of climate change, such as rise in temperature, rainfall, sea-level rises, coral bleaching, increased storm intensity, saline intrusion, food shortage and unemployment.

4.1. Beach Erosion

Beach erosion can result from a number of factors, including the simple inundation of the land by rising sea levels resulting from melting of the polar ice caps and frequency of harsh storms. One of the hot spots of beach erosion is found in Barbeach, Lagos, Nigeria. (Pickering and Owen 1995)

The importance of coastal zones to the tourism industry and the need to protect such resources is not only vital to the economy of nations but presents a growing dilemma for many localities and regions. Beaches have become synonymous with tourism and with current predictions of climate change and sea-level rise; they are under significant threat of erosion worldwide as shown on Figure 1.

4.2. Rises in Temperature

Global warming has resulted in disappearing glaciers. A trickledown effect of temperatures leads to the presence of mosquitoes where they never used to exist. Higher temperatures bring about a decline in vegetation and cause wildlife to migrate toward areas that still have water. Rivers that were known to be permanent in the 1960s have now turned into seasonal rivers and are drying up.

4.3. Changes in Tourist Preferences

Changing climate and weather patterns at tourist destinations and African countries can significantly affect the tourists' comfort and their travel decisions. Changing demand patterns and tourist flows have impacts on the tourism businesses and host communities, as well as “knock-off” effects on related sectors, such as agriculture, handicrafts or construction.

4.4. Coral Bleaching

Coral bleaching, otherwise known as whitening of coral reefs, is a phenomenon affecting coral reefs by which they lose their natural color as a result of increased water temperature or other environmental stressors such as pollutants. Coral bleaching occurs when ocean waters becomes too warm, causing stress on the zooxanthellae algae that live inside coral animals and provide them with food in a symbiotic relationship (Calthorpe, 1993).

As a result of this stress response, the relationship between the corals and the zooxanthellae breaks down, the corals lose their color, and become white. These bleached



Figure 1. A Gully site along Nkpor/Onitsha Express Way (Field work, 2010).



Figure 2. A Gully at Uturu-Kanu Road near Abia State University, Uturu.

corals are still alive, but they are weakened. If excessively warm-water conditions continue for too long, the bleached corals will die.

Acidifying seas also threaten coral reefs as well as increased sedimentation resulting from the chopping down of forests or changing farming methods inland, leading to soil erosion that causes sediments to enter the rivers and then the sea.

Pollution is also a problem. Nutrients coming from sewage or from fertilizers encourage the growth of algae and plankton, which can either out-compete the corals or smother them by blocking out sunlight (Beatley, 1998) – thereby denying people a wide variety of benefits from reefs. Many coastal communities draw large portions of their food from fisheries. Coral reefs are also important to economies across the tropics, attracting tourists who enjoy diving, snorkeling, fishing or simply lounging on beautiful beaches.

Coral reefs are a source of white sand that protects beaches from erosion by reducing wave energy. The loss of coral reefs also produces “knock-off” effects through the marine food chain and associated ecosystems. This destruction of coral reefs ultimately threatens food security, livelihoods and the economic integrity of local and national economies.

4.5. Saline Intrusion

Climate change leads to saltwater moving into freshwater bodies. It has been observed in surface water, groundwater bodies and freshwater aquifers. It is caused by groundwater pumping from coastal wells, navigation channels or oil-field canals. The channels and canals provide conduits for saltwater to be brought into freshwater marshes. Saltwater intrusion can also occur as a result of a natural process such as a storm surge from a hurricane. Saltwater intrusion occurs in virtually all coastal aquifers, where they are in hydraulic continuity with seawater.

When freshwater is withdrawn at a faster rate, water tables are drawn down and hydrostatic pressure is reduced. When this happens near an ocean coastal area, saltwater from the ocean is pulled into the freshwater aquifer. The aquifer becomes contaminated with saltwater and coastal communities suffer as a result.

4.6. Food Shortages

The ecological and political reasons for production problems vary widely. They range from natural disasters, such as drought, flood or fungus, to political disasters, such as civil conflict, to misguided economic policies, such as price controls – all of which effect production of essential foods (Huntley, 1991). Tourists avoid regions that have food scarcity and those who do come are deprived of the normal diversity of foods and cuisine indigenous to the area.

4.7. Unemployment

People whose jobs have been lost or interrupted because of climate change or resultant disasters become insecure and if little or no help is rendered in time by the government, might in some cases resort in desperation to acts such as theft, armed robbery, prostitution, etc.

4.8. Ecological Imbalance

Ecological imbalance, such as destabilization and destruction of a fragile environment, as a result of economic development has been observed. A change in the food chain may also lead to ecological imbalance (Environmental Agency, 1998). The factors responsible for imbalance include: pollution due to industrialization, deforestation, fuel consumption, disproportionate cultivation of land, expansion of urban areas, change of locations of water reservoir, etc.

Many industries like textile, paper, sugar, steel, petroleum, cement, food and chemical manufacturing release wastes into nearby water bodies thus creating pollution and ecological imbalances that affect the air, water and soil condition. Invasion of soil surface by fertilizers and pesticides has led to imbalances in several food chains between micro- and macro-organisms as well as chemical reactions. Ecological consequences such as increased soil erosion create loss of surface soil and exposure of un-weathered infertile soil. This reduces crop yields and atmospheric-nitrogen fixation. Improper use of non-renewable resources, cutting down forests and jungles, chemical wastes left in the sea, etc. affect not only humans but all the living species on the planet.

4.9. Biodiversity Loss

Climate change, with its effects on temperature, precipitation and other weather/climate elements, will surely impact biodiversity. Biodiversity can be said to include all life forms, such as fungi, protozoa, bacteria, plants, insects, fish and mammals (Uchegbu, 2002).

Climate-change-induced rises in temperature may lead to sea-level rise with its consequent flooding, which may tend to disturb the biodiversity-ecosystem balance (Uchegbu, 2009).

A decrease in rainfall and persistence of dry seasons may lead to drought conditions, which in turn negatively affect biodiversity by reducing the lifespan of livestock and other species – resulting in lost food resources for human populations.

4.10. Decrease in Snow Cover and Shrinking of Glaciers

A decrease in snow available for winter sports/activities requires in turn the use of snow making, with consequent, further impacts on the environment – increased costs for ski areas, shortened winter-sport seasons and landscape aesthetics. This is found at Tiffindell, the highest mountain peak in the Cape, and a ski resort, in South Africa (shown on Figure 3).



Figure 3. Tiffindell South Africa.

4.11. Water Availability

It has been argued that persistent climate change may lead to a drastic reduction in the level of streams, flow of streams/rivers, volume of underground water and the like (Ukpong, 1994).

Climate change may lead to shrinkage in the surface-water supply as well as the quantity and regularity of water supplies in some parts of Africa. This is the conclusion of a study on “Effective Planning and Management as Critical Factors in Urban Water Supply and Management in Umuahia and Aba, Abia State, Nigeria” (Uchegbu, 2009).

As shown in Table 1 (below), 23.8% of the respondents in Aba reported the influence of climatic factors (especially temperature) on water sources to be great while in Umuahia this was 23.4%. But more respondents in Aba, 34.3%, reported either moderate or little influence. Reduced precipitation combined with increased evaporation in some regions is leading to water shortages, competition over water (between tourism and other sectors), desertification and increased wildfires threatening infrastructure.

Table 1. Climatic factors’ influence on water sources (Fieldwork, 2006).

Response	Aba # Respondents	Percentage	Umuahia # Respondents	Percentage	Total %
Great	34	23.8	26	23.4	24
Moderate	49	34.3	32	12.8	32.4
Little	49	34.3	8	7.2	22.8
None	2	1.4	9	8.1	4.4
No response	15	10.5	36	32.4	20.4
Total	149	100	111	100	100

5. Adaptation and Mitigation Strategies of Climate Change in the Tourism Industry

Adaptation is a process by which strategies that aim to moderate, cope with and take advantage of the consequences of climate changes are enhanced, developed and implemented (UNEP, 1995). It is equally referred to as a change in natural or human systems in response to actual or expected climatic conditions that “moderates” or “exploits” beneficial opportunities (Karl and Trenberth, 2003). The design and implementation of effective adaptation strategies requires consideration of the adaptive capacity of a given system to respond successfully to climate variability and change. It includes adjustments in behavior, resources and technologies and requires deliberate policy decisions, plans and implementation by both the public and private sectors in a timely manner. Various mitigation/adaptation strategies include the following:

- **Re-think their choice of destinations:** Tour operators can restructure the choice of destinations they offer, by replacing more distant ones with closer ones of similar attraction value.

- **Support low-carbon holiday options and carbon labeling:** Tour operators should seek to market low-carbon holiday options. Packages and journeys can also be carbon-labeled, i.e. indicating the emissions caused by the option.

- **Develop new low-carbon products:** Tour operators should seek to strategically develop attractive low-carbon packages (e.g. a train-based holiday).

- **Traveling less often and staying longer:** Tourists could consider traveling less frequently and staying longer at their destination.

- **Minimize air travel:** Any air travel that can be avoided will be a major factor in reducing individual emissions.

- **Reward airlines with sound environmental management:** Tourists should favor airlines that are committed to serious environmental management, using aircrafts with new fuel-efficient engines and airframe designs.

- **Reward pro-environmental and pro-community development tour operators:** Tourists should favor tour operators engaging in pro-environmental management (for instance providing carbon labeling or certified packages), and those that provide community benefits particularly when operating in Africa.

- **Capacity building:** There is a need to build capacity for adaptation and mitigation in response to climate change across government bodies, tourism institutions and organizations at national, regional and destination levels. To this end, outreach and communication efforts should be viewed as the first step in building capacity in African countries that climate change is likely to impact, and be impacted by, tourism.

- **Other adaptive measures:** Changing one's environment; encouraging irrigation in drought-prone areas; change in behavioral patterns; living within the working place; designing multi-purpose buildings; shifting from fossil fuels to renewable energy; cutting back on the use of energy; using energy efficiently; car pooling; using bicycles; and walking/trekking.



Figure 4. Using bicycles.

6. Mitigation Strategies

A discussion of mitigation measures must include technological, economic and social changes and substitutions that can be employed to attain reduction in GHG emissions from tourism. These include: reducing energy use/focusing on energy conservation by changing transport behavior (for example, using more public transport, shifting to rail and coach instead of car and aircraft, choosing less distant destinations); changing management practices, for example by greater use of videoconferencing for business

meetings rather than traveling to meetings; and generally eliminating GHG emissions by circumventing activities that can be avoided without significant change to the tourist experience (Blakely ED, 2005).

Other measures include:

- Increasing the use of renewable or carbon-neutral energy;
- Substituting fossil fuels with energy sources that are not finite and that cause lower emissions, such as biomass, hydro, wind and solar energy;
- Substitution of practices that account for large GHG emissions with practices that have a low-carbon footprint;
- Use of fuel-efficient cars by tour operators, hotels and resorts;
- Employing measures, such as effective ventilation and appropriate roofing, to reduce temperature in buildings;
- New buildings designed with the conservation of energy in mind;
- The use of more efficient lighting and energy-efficient appliances;
- Development of alternative energy sources, e.g. solar, wind, bio-fuel, and hydro – except large dams, cessation of gas flaring, windbreaks and shelterbelts;
- Use of buses and trains for urban transport;
- Soft coastal protection to prevent erosion (e.g., reforestation of mangroves or reef protection);
- Enhanced design, setting standards and planning guidelines for tourism establishments;
- Integrate climate-change factors into regulatory frameworks for tourism development, such as Environmental Impact Assessment for tourism infrastructure and establishments;
- Implementation of tourism development plans within the framework of Integrated Coastal Zone Management (ICZM) processes and spatial planning;
- Shade provision and crop diversification; and
- Reduction in tourism pressures on coral reefs.

Further methods include: encouraging water-conservation techniques such as rainwater storage, the use of water-saving devices and wastewater recycling; diversification of the tourism product to less climate-dependent and seasonal activities; encouraging eco-tourism; education/awareness among tourism businesses and their staff, as well as tourists; the introduction of programs on awareness and preparedness to face extreme climatic changes and disasters at the national and local levels through improved coordination between disaster management offices, tourism administrations, businesses and host communities (Uchegbu, 2010); the provision of information on climate change to the tourism sector through cooperation with national meteorological services; providing insurance coverage (or alternative schemes) for the recovery of infrastructural and other damage; drainage and watershed management to reduce flood and erosion risks; protected-area management, and other means of conservation of coastal ecosystems in order to enhance their resilience; protection of wildlife to maintain ecological balance; proper land-use planning; restriction of industrial production within industrial zones; pollution control through environmental laws/polices as well as their enforcement; switch to use of raw materials that reduce the production of carbon; and enforcing solid-waste recycling policies that embody the three Rs (reduce, reuse and recycle) (Uchegbu, 2009a).

7. Conclusion

The tourism sector is affected profoundly by climate change. It is therefore very important that African countries adapt and militate against impending climate change to promote and sustain growth. To undertake this task, governments must come together to formulate policies, which would ensure that the sector remains sustainable. It is essential that governments and policymakers become involved in the process at a very early stage, since climate change is an environmental, and ultimately a developmental problem. With the formulation of mitigation and adaptation strategies and the appropriate policies in place, the tourism sector can play a key role in dealing with climate change and encouraging sustainable growth in the sector.

REFERENCES

- Beatley, T. (1998). "The Vision of Sustainable Communities." Burby (ed). Cooperating with Nature: Confronting Natural Hazards with Landuse Planning for Sustainable Communities, Washington D. C. 233-262 R. J. Joseph Henry Press.
- Blakely ED, (2005). Climate Change: Exploring the literature and Research Opportunities. Planning Education and Sustainability: Sustaining Planning Education, Conference Proceedings organized by University of South Australia, 30 September-2 October 2005.
- Brown, V. (2001). "Planner and the Planet: Reforming the People / Planet Relationship: Do planners have a Role", Australia Planner Journal of the Royal Australia Planning Institute V. 38 Building, Proceedings of the UNDP Symposium, Delft 3-5 June, 1991. IHE, Delft.
- Calthorpe, P. (1993). The Next American Metropolis: Ecology, Community and the American Dream, Princeton Architectural Press: Princeton, USA.
- Chan, W. W. and Lam, J. C. (2003). Energy-Saving Supporting Tourism: A Case Study Change Adaptation in the Cook Islands. Presentation at the UNFCCC Expert change as a security risk. Berlin, Germany: German Advisory Council on Global Change.
- Crowley, T. J. (2000). "Causes of Climate Change Over the Past 1000 Years." Science Vol 289 Issue 5477.
- Dakaica, S. (2002). "The Challenges of Education Sustainability of Small Island Developing Countries of the South Pacific in Planning Education and Sustainability, Sustainability Education. Conference Proceedings, 30 September-2 October. University of South Australia.
- Dube, O.P., Tarazona, J. and Velichko, A.A. (2007). Ecosystems, their Miracle of Capitalism, Princeton: Princeton University Press.

European Environmental Agency. (1998). Europe's Environment: The Second Assessment Elsevier Science.

Gunder, M. (2005). After the Post-Modern Abyss: Is the Discourse of Sustainability Really Planning's Saving Grace? In Planning Education and Sustainability: Sustaining Planning, Education. Conference Proceedings, 30 September-2 October. University of South Australia.

Huntley, B. (1991). "How Plants Respond to Climate Change: Migration Rates, Individualism and the Consequences for Plants Communities," *Annals of Botany* Vol.67.

IPCC. (1990). IPCC Special Report: "The Regional Impacts of Climate Change, An Assessment of Vulnerability.

IPCC. (1996a). IPCC Special Report; "The Regional Impacts of Climate Change, An Assessment of Vulnerability." Nairobi.

IPCC. (1996b). Climate Change 1995: The Science of Climate Change, Contributions of Working Group I to the Second Assessment Report of IPCC, Cambridge Univ. Press.

IPCC. (1997). The Regional Impacts of Climate Change, An Assessment of Vulnerability, Cambridge Univ. Press.

Karl, T. R. and Trenberth K. E. (2003). "Modern Global Climate Change," *Science*, Vol 302, Issues 5651.

Moan, J., Dah/back A, Henriksen T. and Magnus, K. (1989). Biological Amplification Factor for Sunlight – Induced Non-Melanoma Skin Cancer at High Latitude" *Cancer Res.* Vol.49. New York, 165-182.

Pickering, K.T. and Owen L.A. (1995). An Introduction to Global Environmental Issues London Rutledge Publishers.

Running, S.W. and Scott, M.J. (2007). "North America." In Parry, M.L., Canziani, (ed) Scenarios of Climate Change. *Climatic Change*, 79 (3-4).

Stainforth, D. A. (2005). "Uncertainty in Predicting of the climate Response to rising levels of Greenhouse Gases." *Nature* Vol 433: the Case of Calvia, Spain. *Current Issues in Tourism*, 10 (4).

Uchegbu, S. N. (2010). "Planning Education and Practice in Nigeria: The Case of University of Nigeria." *The Journal of Building and Land Development Special Issue* June.

Uchegbu, S. N. (2009). "Effective planning and management as critical factors in urban water supply and management in Umuahia and Aba, Abia State, Nigeria." *Journal of the Physics and Chemistry of the Earth Netherlands*. Elsevier Publishers Ltd. Vol 34.

Uchegbu, S. N. (2009a). "The Relationship between the Quality of Surface Water Available for Domestic Consumption and Climatic Factors in Umuahia and Aba, Abia State, Nigeria." *Journal of Applied Sciences*, Vol 12, No 1.

Uchegbu, S. N. and Ugwuanyi, B. (2009b). "Climate Change: Problems and Solutions". *Journal of the Nigerian Environmental Society (JNES)*, Nigeria, Vol. 5.

Uchegbu, S. N. (2002). *Environmental Management and Protection*, 2nd edition, Enugu Spotlite Publishers.

Ukpong, S. J. (1994). "Global and Nigerian Environmental Problems Analysis." *SIRF, Calendar* 3rd Nov.

UN. (1990). "Global Environment Outlook 2000," Earth Scan Publications Ltd.

UNCHS (National Centre for Human Settlement). (2006). *Urbanization and Sustainable development in 3rd World. An Unrecognized Global Issue*. Nairobi: UNCHS.

UNEP. (1995). *Environmental Effects of Ozone Depletion 1994 Assessment*, *Ambio* vol. 3.

WTO-UNEP-WMO. (2008). *Climate Change and Tourism: Responding to Global Challenges*.