11 Climate Change

Introduction

Climate change poses a major threat to almost all forms of human activity on earth, including tourism. As Holden (2016: 227) argues:

> *Of all the challenges facing tourism's relationship with nature, it is not an exaggeration to state that climate change represents the greatest.*

Holden gives as his rationale for this statement that it is the stability and predictability of climate that is vital for the environments and ecosystems that are required for the continuation of current types of tourism, whether these are the traditional form of mass tourism, in terms of 'sun, sea and sand' holidays, or a niche activity which involves visiting a tropical rain forest with rare flora and fauna as the main attraction.

However, climate change should not be considered as entirely negative in its effects on tourism, as it also presents opportunities. If areas currently experiencing cool winters and mild summers get warmer, then new types of tourism may be possible including beach-based holidays where at present these are of little importance. Climate change is likely to lead to modifications in the weather at different times of the year so 'seasonality', which is a very important dimension to many forms of tourism, will be affected, probably to the extent that the high seasons of tourism activity will get longer in some parts of the world.

Although tourism is likely to be significantly affected by climate change, it has also contributed to climate change through for example the burning of fossil fuels in transport for tourism as well through the use of power in hotel accommodation.

Global warming

When we discuss climate change in relation to tourism and many other economic and social activities, most often the discussion is concerned with *global warming*. It is important to be aware that the process of regular daily and seasonal global warming is a natural occurrence and without it there would not be life on earth as we currently know it. However, when discussing global warming, we are usually talking about an

unbalanced situation where global warming is occurring more quickly, on an annual basis, than previously.

The regular process of global warming is a result of natural processes. In Chapter 4, we saw that the earth is warmed by the heat from the sun, and discussed what happens in terms of the amount of heat available at different places on the earth's surface (the effects of latitude), the effects on temperature of increasing or decreasing altitude, and also the impacts of seasonality on temperature.

However, it is important to be aware of what happens to solar radiation when it reaches the earth's surface. As noted in Chapter 4, the atmosphere around the earth is not heated directly by the solar radiation – the gases that make up the atmosphere cannot absorb the short wave radiation from the sun. Instead, the short wave radiation hits the surface of the earth, warms the solid or liquid (if it is an ocean, lake, sea or river) surface and is converted to long wave radiation which can heat the gases that make up the atmosphere. This means that the atmosphere is heated from below.

However, not all heat from the sun is available to heat the earth's surface and the atmosphere. This is because when the sun rays strike the earth, some rays are bounced back by reflectivity of the earth's surface. The term for reflectivity is *albedo*. The albedo varies, largely in relation to the nature of the surface of the earth. For example, a white, snow covered surface reflects a lot of solar radiation, so the albedo is high. A dark brown, ploughed field absorbs much more solar radiation, so the albedo is low. A liquid (water) surface reflects a significant amount of radiation and usually has a higher albedo than a solid surface.

On average, about 30% of the solar radiation is reflected back into space as a result of the albedo effect. This means, however, that about 70% of the sun's energy remains and is absorbed into the atmosphere by what we call the *Greenhouse Gases* (GHGs). The main GHGs are as follows: CO_2 (carbon dioxide), N_2O (nitrous oxide), CH_4 (methane) and O_3 (ozone). There is also water vapour in the atmosphere, which absorbs heat. The greenhouse gases make up only approximately 1% of the earth's atmosphere, but they have a high capacity to absorb and release energy.

To understand the effects being discussed here, it is important to understand what is meant by a *Greenhouse Gas*. A greenhouse is in reality a glasshouse and this allows the sun's energy (the short-wave radiation) through, but traps heat generated inside, because the short-wave radiation has been converted, when it passes through the glass inside the greenhouse, to long-wave radiation, once it reaches solid surfaces such as growing plants. The long-wave radiation is then able to warm the air (the mixture of gases) inside the greenhouse, but is not able to pass back through the glass, and is trapped inside. So the temperature of a greenhouse will be higher (assuming the sun is shining) than outside the greenhouse. Gardeners and farmers have known this for a long time, so in winter greenhouses, or glasshouses, are warmer during the day when the sun shines and can be used to grow crops that will not grow outside at that time of the year.