

## LIKELY IMPACTS OF CLIMATE CHANGE IN VULNERABLE REGIONS

Media reporting of extreme weather events can give the impression that these events are increasing not only in severity but in frequency. This coincides with much of the present consensus on **climate change** (see key word box).

The Fourth Assessment Report (2007) of the Intergovernmental Panel on Climate Change (IPCC) concludes that human activity is the probable cause for a rapid increase in worldwide average temperatures over recent decades. If we accept that this is indeed so, it is probable that events of hot extremes, heat waves, and heavy precipitation will continue to become more frequent. By the middle of the 21st century, wintertime precipitation in the northern mid to high latitudes and Antarctica will rise. At the same time, Australasia, Central America and Southern Africa are likely to see decreases in winter precipitation. Accordingly the debate is now about methods to reduce further impact and to find ways to adapt to current changes. The main concern is the increase in carbon dioxide levels due to burning fossil fuels and from deforestation.

The aim of this **Geofile** is to examine some consequences of climate change and subsequent knock-on effects in each of two vulnerable regions. The two regions at risk are Alaska and Kenya.

### The Barrow Peninsula of Alaska (Figure 1)

In the Arctic regions of North America the ice-cap melted far more than normal in the summer of 2009. The year saw the third-lowest amount of Arctic sea ice on record (the lowest having been in 2007). Studies over the past 30 years show the rate of retreat of sea ice is growing very rapidly (scientists from NASA, University of Washington in Seattle, and Institute of Atmospheric Physics in Moscow). An indirect consequence of this has been growing pressure to open up the immense reserves of oil and gas in the waters off the north coast of Alaska. The arguments for and against relate to oil shortages; and the environmental and social costs of new fleets of rigs offshore. (See Geofile number 604 on potential oil exploitation in Alaska.)

Melting ice means the waters of the Beaufort and Chukchi Seas have

become more accessible and cost-effective places to drill. This, coupled with rising oil prices in 2008, meant that there were demands to take advantage of the reserves beneath the seabed off the Alaskan coast. With declining world supplies these demands will continue, even though prices have since fallen.

So far, environmental campaigners have thwarted the plans of the transnational oil company Shell. However, executives hope that public opinion is moving their way. The former Governor of Alaska, Sarah Palin said, in her speech accepting her nomination as Republican candidate for vice president in 2008, that the USA should produce more of its own oil and gas, and that Alaska had plenty of both.

Shell is ready to operate in 2010 and is waiting while Interior Secretary, Ken Salazar, develops Barack Obama's offshore energy plan. He is gathering evidence from the public. Salazar put a temporary stop to new leasing on taking office in February 2009. Offshore drilling plans had been pushed through by the Bush administration during its last days. During the consultations, almost 300,000 people have asked for oil and gas activities to be halted. Despite this, the Interior Department in October 2009 gave Shell approval to drill oil exploration wells in two leaseholds in the Beaufort Sea. This could lead to the first drilling in a decade in this area off the north coast of Alaska.

In response to worries of a major oil spill in these waters, Shell and other companies maintain that they are environmentally responsible and ready with the latest clean-up technology. The industry claims to have learned from problems like the Exxon Valdez spill, when an oil tanker breached off the south coast of Alaska 20 years ago. Of the total volume of oil, less than 1% ends up in the ocean. More than 100 exploratory wells have been drilled in US and Canadian Arctic waters without accident.

Environmentalists point out that there have been several major blow-outs on offshore rigs bigger than the infamous

Figure 1: The Barrow Peninsula, Alaska



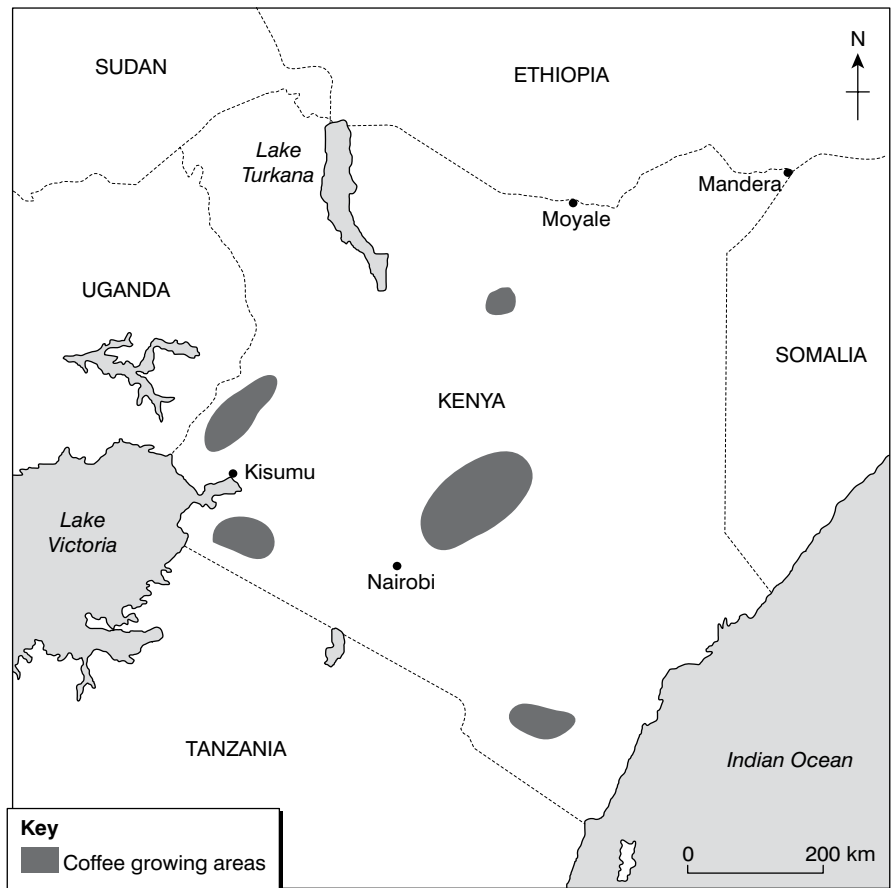
spill. They say Governor Palin did nothing to tackle the problem of global warming, even though Alaska is at the centre of the crisis and that, apparently, she does not believe it is caused by people. Marine scientists have decided that polar bears are endangered because of global warming and the loss of sea ice habitat, and that they will disappear from Alaska by 2050. Palin opposed their listing as a threatened species (she did not want to add other groups to the endangered list, either), in order to protect oil and gas development.

The **Inupiat** people (see key word box), among other native Alaskans, oppose development. For centuries their way of life has been based on hunting the creatures out at sea and on the winter ice. Now there is a fear that the waters will be polluted and that drilling offshore may endanger the culture of the few thousand people dotted along the coast. The local people depend on the food chain to survive and they don't want to give up their lifestyle for large companies which seem to do as they please. Figure 2 helps to describe the environment.

### Kenya, Africa (Figure 3)

Kenya, a land more than twice the size of Britain, was dry everywhere in 2009. In September of 2009 the International Director of the charity Practical Action wrote to supporters, saying: 'The crippling drought in Kenya is having a

Figure 3: Kenya

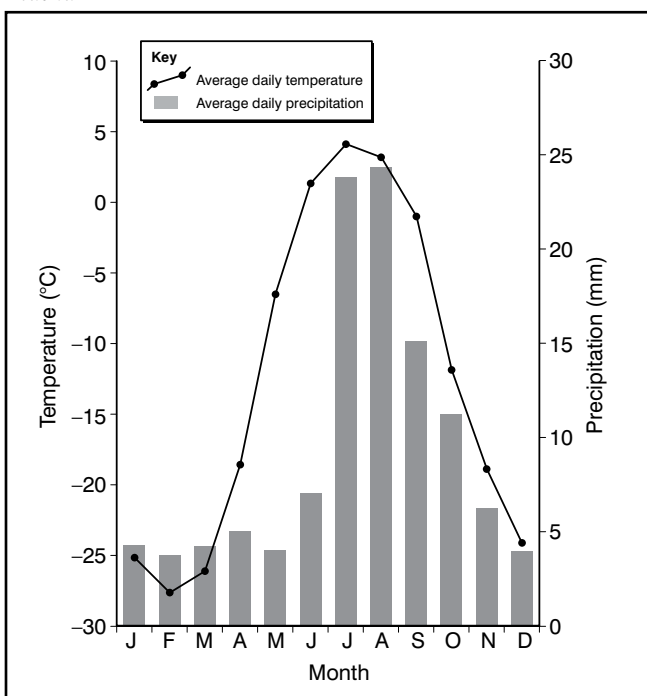


terrible impact ... the current drought is a long term issue made even worse by climate change...'

Figure 4, the graph for Nairobi, is taken to represent the two-season savanna climate. With increasing

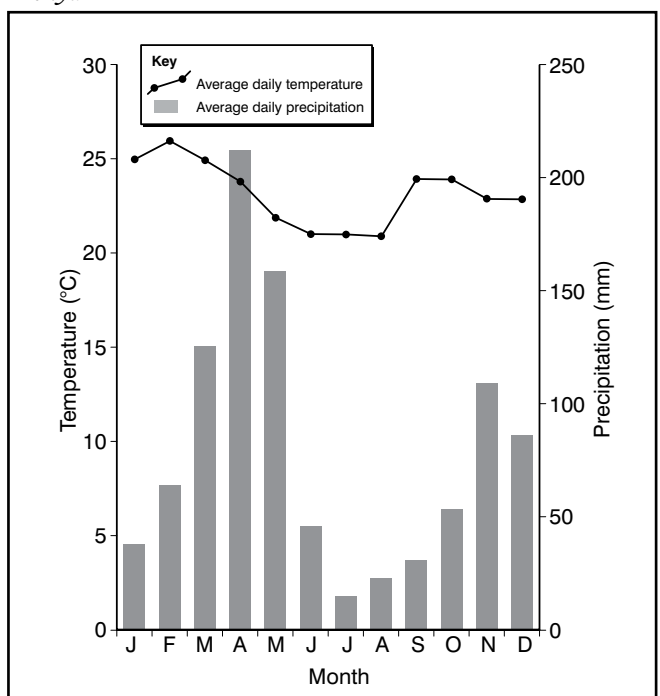
distance north or west the conditions get drier. Although Kenya is positioned on the equator, annual rainfall over most of the country is unexpectedly low, and rather variable from year to year. This is due to the intertropical belt of cloud and rain

Figure 2: Monthly precipitation and temperature for Barrow, Alaska



Source of data: US National Oceanic and Atmospheric Administration

Figure 4: Monthly precipitation and temperature for Nairobi, Kenya



Source of data: US National Oceanic and Atmospheric Administration

passing quickly across Kenya in April and October. Also, the prevailing seasonal winds, the north and south monsoons, have a track parallel to the coast, and pass over large areas of land before getting to Kenya. There is a double rainy season between March and May and between November and December, with two intervening dry seasons. There is a small difference in temperature from month to month through the year. More dramatic droughts and more dramatic precipitation are expected in future. The direction of the monsoons does not have to shift very far to take more or less rain a different route. The UN's Intergovernmental Panel on Climate Change provide the view that droughts are becoming more and more frequent.

What has happened is an ecological disaster, resulting from a combination of deforestation, over-grazing, the extraction of far too much water, and massive population growth.

Communities in different parts of Kenya swing between drought and flood. Currently, there is a long-term drought so serious that a national crisis was declared in January 2009. The following rainy season brought so little water that the situation only worsened. There are those who thought that this drought would finish in October, with the coming of the long rains, and everything would go back to normal, but this proved not to be the case. The

Kenya Meteorological Department wrote on their website: 'Heavy storms are likely to occur during the season, October to December, and more so, during the rainfall peak month of November. However, the levels of enhancement are not likely to reach those that were recorded in 1997/98 period' (<http://www.meteo.go.ke/>).

The drought is unlikely to finish with these rains. The next paragraphs examine the effects of climate change on three aspects of Kenyan economics: wood gathering, pastoralism and coffee-growing. The examples are taken from different areas and show the knock-on effects of climate change.

In Western Kenya, women and children search the land for vital fuel. For hundreds of people there is a fuel crisis – an immediate need for firewood – and its pressure comes down to personal choice. Are children sent to school, or to collect wood? Do women take crops to market, or collect fuel? Collecting energy resources wins every time. Without fire, people cannot cook the food they need to survive. They look all day. Decades of deforestation have made wood scarce, so families burn crop residues, charcoal, animal dung, plastic – putting their health at risk. Sadly, people die from respiratory diseases caused by these indoor pollutants. Food is also a problem. Maize is the principal diet of the area and the main harvest is likely to be 30%

lower than usual. As a result, market prices have risen by 130%, leaving households unable to feed themselves. Communities have even less money when animals become feeble and less marketable through lack of water. Practical Action and Christian Aid, along with other charities, are helping the pastoral nomads (see key word box) to cope. Practical Action believes that disasters cannot be controlled, but they can help people adapt to their environment, and as a consequence they promote intermediate technology. Community animal care workers help pastoralists produce healthier herds to cope with drought. Small-scale technologies such as boreholes, hand and solar pumping systems allow families to access clean water. Fireless cookers make resources stretch further. The food is cooked on a traditional stove, before it is transferred to the fireless cooker, a basket insulated with local materials like banana leaves, which reduces fuel use by 40% (Figure 5).

Moyale is on the Ethiopia-Kenya border. 60 years ago, the land was savanna with plenty of grass, big trees and elephants, lions and rhino. Now the grasses have almost been replaced by brush. There is a vicious circle (Figure 6). Here the nomad families from the Borana tribe have seen their animals die in the drought, and have decided to stop cattle herding. The families who traditionally travelled

Figure 5: Diagram to show the advantages of the fireless cooker

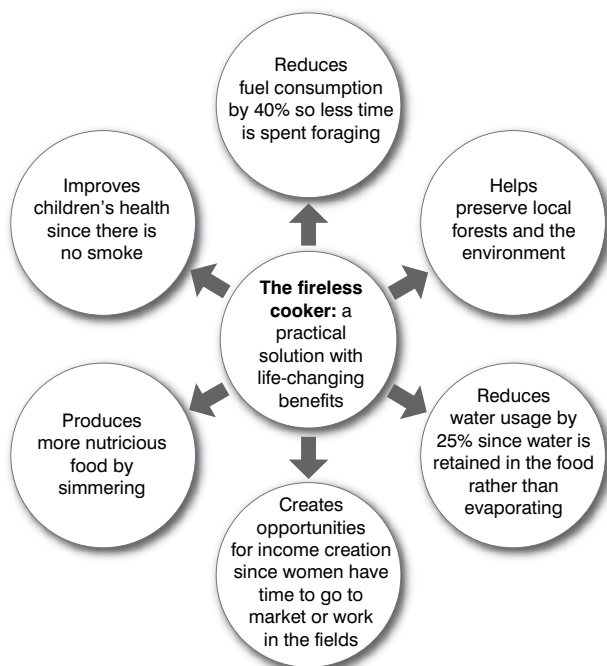
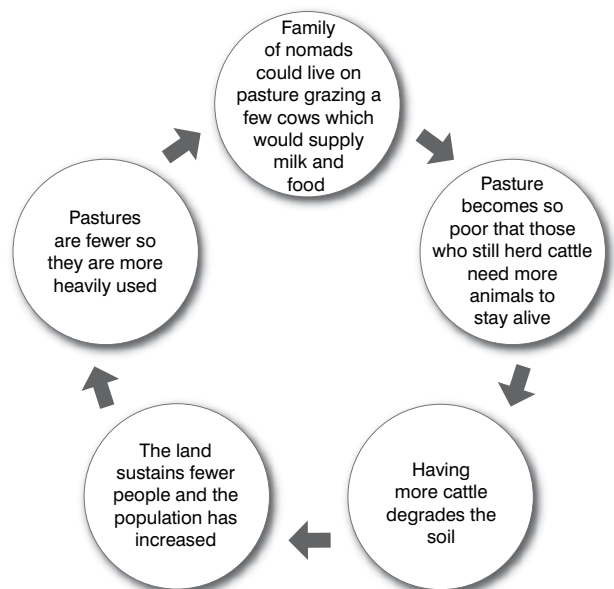


Figure 6: A vicious circle of declining pasture



Source: Based on a leaflet produced by Practical Action

thousands of miles a year in search of water and pasture, have collectively decided to settle down. They have given up on centuries of custom. Livestock was crucial to the Borana people, part of their status, identity and destiny. All that is gone, along with independence and self-sufficiency. They were proud of owning and looking after animals in a harsh land. The customary ways of predicting and adapting to drought aren't working. Nomads would look for signs of coming drought or rain in the stars, in the guts of butchered animals or in small changes in vegetation. When drought arrived, elders would be sent to arrange deals over grazing rights in places not so seriously affected. Cattle would be sent to relatives in distant communities. People would cut the size of their herds, selling some and slaughtering the best, preserving the meat for the tough times ahead. When the pasture was good, the milk was good, and butter could be produced. There was no need for money. Now there is. The former pastoralists are prepared to make charcoal and sell firewood. Their children will look to the army or to trading for a future. The drought has forced them to live in one place, to change their lives and to educate their children.

Small-scale coffee-growers in Kenya are suffering too. Coffee is directly influenced by climate change, because the plant only grows in a narrow temperature range. Optimum growing conditions include temperatures from 15 to 24°C, high humidity, and protection from windy conditions. Research carried out by the German Technical Corporation has shown that growers are being forced to higher altitudes at a rate of 3–4 metres a year as temperatures rise. Growers are facing more problems with pests and disease as temperatures rise and they face protracted drought. Those least able to deal with climate change are affected the most – such as those who rely on a single crop and cannot afford irrigation equipment. Incomes could fall by up to 90% in the next 15 years. The quality and quantity of Kenya's coffee could go down. CafeDirect has helped farmers diversify into new crops like passion fruit. The British Government has donated £12m to the Fairtrade Foundation. Their products pay a premium to small-scale growers to shield them from the vagaries of worldwide commodity markets and the buying power of transnational corporations.

### Key Word Box

**Climate change** is a variation in the statistical distribution of weather, over periods of time that range from decades to millions of years. It can be a change in the average weather, or a change in the distribution of weather events around an average, for example greater or fewer extreme events.

**The Inupiat** are the indigenous people of Barrow, Alaska. They practise subsistence living and depend on summer sea ice to hunt their food. As the changing climate causes sea ice to thin and melt, the hunters put their lives in greater danger to hunt food for their families.

**Pastoral nomads** are groups of people who are dependent on animal husbandry and subsist on animal products (milk, blood, meat), and who move from place to place along with their cattle.

**Appropriate technology** is the simplest level of technology that can effectively achieve the intended purpose in a particular place. It usually describes technologies suitable for use in less economically developed countries.

**Intermediate technology** is similar to appropriate technology and refers to tools that are more effective and costly than traditional methods but are still cheaper than technology from more economically developed countries. They can be easily bought and used by poor people and can lead to greater productivity, while minimising damage to the local community. They can be built and maintained using locally available materials and knowledge.

### Useful websites

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALDEVELOPMENT/0,,contentMDK:21951825~pagePK:210058~piPK:210062~theSitePK:244363,00.html> (film of the Inupiat People of Barrow, Alaska)  
<http://www.meteo.go.ke/> (Kenyan meteorological service website)  
<http://www.cafedirect.co.uk/index.cfm> (coffee-growing in Kenya)

### Acknowledgements

The environmental loss/economic gain issue was covered regularly by the *Washington Post* and *Seattle Post-Intelligencer* during 2008 and 2009. I would like to acknowledge the help received from the charities Practical Action, Christian Aid, Concern Worldwide, CIFA UK, and the ethical business CafeDirect.

## FOCUS QUESTIONS

1. In your atlas, find all the places mentioned in this unit.
2. Make notes about effects, responses to climate change using an A-map, topic web, mind map or something similar.
3. Ken Salazar met lobbyists wearing polar bear costumes or boiler suits and hard hats on his fact finding visit to Alaska. Which view would you adopt – environmental loss or economic gain? What would you say to him, and why?
4. This **Geofile** describes how two traditional ways of life are under threat. Does it matter whether they survive? Is this an inevitable result of progress? Justify your opinion.
5. Critically evaluate the possible effects of the phenomenon known as global warming on an Arctic or a tropical wet/dry savanna climate, and suggest possible responses to them.