

Climate change – the story for teachers

Questions that you need to be able to answer:

- Is the climate changing?
- What has caused the climate to change?
- How much do we expect the climate to change in future?

Since 1988, more than 3,000 climate scientists, ecologists, technologists and economists from round the world have formed an Intergovernmental Panel on Climate Change. The view of this panel amounts to a scientific consensus on climate change, its likely impacts and what we can do about it.

In Britain, the key science working group has its headquarters at the British Meteorological Office's Hadley Centre for Climate Prediction and Research.

Scientific experts from around the world agree that, whatever we do now, significant climate change is now unavoidable.

It will take decades to reduce the concentrations of greenhouse gases in the atmosphere. Even then, because natural systems take time to readjust, global warming is a phenomenon that will figure prominently throughout the lives of children presently at school. This assumes that a concerted international effort will help reduce the effects of climate change. Early signs are not encouraging! If we do nothing, timescales will be reduced and the detrimental effects will be magnified.

Sea levels may continue rising for centuries.

Climate change facts

The climate change facts (resources download) are in large print and can be printed out on to coloured paper or card to display in the classroom. Here they are for reference:

- Changes in our climate are real and are under way.
- The average global temperature over land in 2002 was around 1°C higher than at the end of the 19th century.
- Warming in the 20th century was greater than at any time during the past 400 to 600 years.
- All ten of the hottest years on record have occurred since 1990. The warmest year since global records began in 1860 was 1998; the second warmest was 2005, the third warmest 2002, the fourth warmest 2003 and the fifth warmest 2004.
- The record for the hottest day ever in Britain was broken on Sunday 10 August 2003 as temperatures soared to 38.5°C in Brogdale, near Faversham in Kent.
- Mountain glaciers the world over are receding.
- The Arctic ice pack has lost about 40 per cent of its thickness over the past four decades.
- Global sea level has risen about three times faster over the past 100 years compared with the previous 3000 years.
- A growing number of studies show plants and animals changing their range and behaviour in response to shifts in climate.

Consequences – general

Climate change will seriously disrupt our lives. While, on average, the globe will get warmer and receive more precipitation, individual regions will experience different climatic changes, with different consequences for the local environment. Among the most severe are:

- a faster rise in sea level;
- more heat-waves and droughts, resulting in more and more conflicts over water resources;
- more extreme weather events, producing floods and property destruction;
- a greater potential for heat-related illnesses and deaths, as well as the wider spread of infectious diseases carried by insects and rodents into areas previously free from them.

If climatic trends continue unabated, global warming will threaten our health, cities, farms and forests, beaches and wetlands, and other natural habitats.

Consequences – UK

- Climate change will have direct and indirect impacts in the UK. Over the next century, it is likely that the UK will become warmer, sea levels will rise, rainfall and severe gales will increase, and there will be an increased risk of flooding.
- An increased risk of flooding, storms and sea-level rise will have serious detrimental impacts on land transport and marine operations. The provision of services across the UK can also be affected.
- In relation to public health, the secondary effects of climate change may result in increased air pollution and a higher incidence of respiratory diseases associated with damp conditions.

Be part of the solution

Clearly, global warming is a grave problem. It will take everyone – governments, industry, communities, and individuals – working together to make a real difference.

These are solutions that will help reduce global warming, and you can be a part of them.

But

- ‘Americans are driving more in less-efficient vehicles. Sales of sports utility vehicles and pick-up trucks have been amazingly strong considering the recession, and low pump prices are keeping people on the roads’ – Mike Lucky, analyst for John S Herold Inc, December 2001
- ‘One person flying in an airplane for one hour is responsible for the same greenhouse gas emissions as a typical Bangladeshi in a whole year.’ – Beatrice Schell, European Federation for Transport and Environment, November 2001
- ‘The Greenland ice sheet is likely to be eliminated [within 50 years] unless much more substantial reductions in emissions are made than those envisaged’ – Jonathan Gregory, climatologist at the University of Reading, April 2004, commenting on the fact that, upon melting, the world’s second largest icecap could raise sea levels by seven metres, flooding most coastal regions. Plot this on an OS Map of your nearest coastal area.

Climate change – upper primary

By using a range of materials and activities, we aim to focus on these outcomes and targets:

Pupil Learning Outcomes

- Climate is the synthesis of the weather over a long period of time.
- Climates change over long periods.
- Pollution has an effect on climate change.
- Saving energy will lower the effects of climate change.

Scotland: 5–14 Environmental Studies

People and place: the physical environment

- Level D: describe how extremes of weather and climate can disastrously affect people and places.
- Level E: describe and explain simply the main weather and climate patterns in Britain and the wider world, including extremes, and explain the effects on ways of life.
- Level F: explain in detail global patterns of weather and climate and describe the effects on economic activity.

Skills in social subjects – enquiry

- Level D: select and use known enquiry methods and/or equipment to access, select and record relevant information from a variety of straightforward sources.
- Level D: select techniques to process/classify information in a variety of ways.

Earth and space: changing materials

- Level D: describe the effect of burning fossil fuels.

Skills in science – investigating

- Level C: select and use appropriate measurement devices or make appropriate observations

England and Wales National Curriculum

Geography

Key Stage 2

- 1b: collect and record evidence
- 2a: use appropriate geographical vocabulary
- 2b: use appropriate fieldwork techniques
- 2c: use atlases and globes, and maps and plans at a range of scales
- 2d: use secondary sources of information
- 3a: identify and describe what places are like
- 3d: explain why places are like they are
- 7b: study a range of places and environments in different parts of the world

WALT

We are learning to ...

Understand what climate change is and how it can be prevented.

Phase 1 Overview

Assess the children's prior knowledge by asking the following questions:

- What is climate change?
- Why is it sometimes called 'The Greenhouse Effect'/'Global warming'?
- How can we prevent it?

Phase 2 Input

Energy from the sun, mainly in the form of visible light, heats up the earth. In turn, the earth gives off heat, in the form of invisible infra-red radiation. Much of this heat escapes to outer space and cools the earth, but some of it is trapped by greenhouse gases in the atmosphere, which makes the earth warmer than it would otherwise be. Most of these gases are natural but, in the last 100 years or so, human activities have caused an increase in greenhouse gases – particularly carbon dioxide from the burning of coal, oil and gas. This means that more heat gets trapped by the atmosphere, and this is causing the earth to warm and climate to change.

There are ways in which everyone can make a difference and conserving energy is the key.

Phase 3 Process

The Greenhouse Principle in a jar

What you need:

- one large glass jar
- two thermometers
- a sun lamp or access to a sunny area
- a stopwatch
- paper and pencil

Place the two thermometers beneath a sun lamp or in the sun. Wait three minutes for the temperature to adjust, then record it on the paper. Turn the jar upside down and place one of the thermometers inside. Use the stopwatch to measure the temperature on each thermometer every minute for ten minutes. Record the measurements on the paper.

The air around the exposed thermometer is constantly changing, being replaced with cooler air throughout the experiment. The air surrounding the other thermometer, however, is trapped and becomes warmer and warmer. This is similar to what happens on the earth's surface. The sunlight passes through the atmosphere and warms the earth's surface. The heat radiating from the surface is trapped by greenhouse gases.

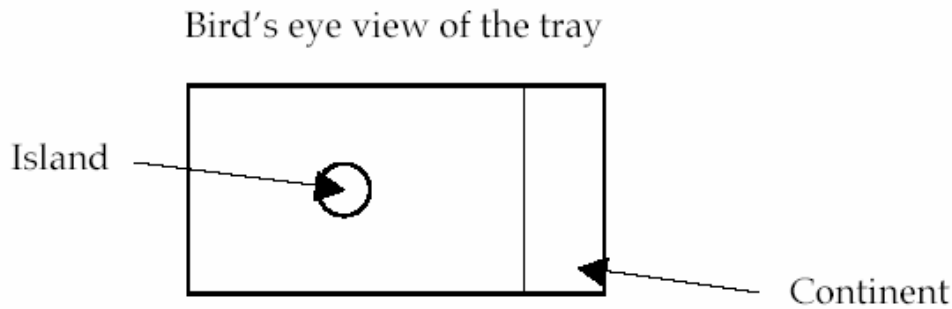
Ice melt

If all the icecaps on earth were to melt, the outcome would be devastating. The following model demonstrates this effect.

What you need:

- a classroom tray
- plasticine
- water
- ice

Create an island with the plasticine in the middle of the tray. Make it about half the height of the tray. At the edge of the tray, create a continent as high as the tray.



Fill the tray with water to make the sea. Leave the top of the island above the water level. Pile up ice-cubes on top of the continent and leave them to melt.

- What happens to the sea-level?
- What happens to the island?

Posters

Children can use the following 'dos and don'ts' for climate change and make up their own posters:

DO

- turn out lights after use.
- turn off your TV at the switch.
- put on a jumper if you're cold.
- walk, cycle or use public transport to school.
- keep your doors closed to keep heat in.
- recycle as much as possible.

DON'T

- leave curtains open at night-time.
- leave your TV or hi-fi on standby.
- boil a full kettle for one cup of tea.
- adjust your thermostat if you're cold.
- waste electricity.

Phase 4 Review

Discuss:

- What is climate change and how will it affect us in the future?
- What can be done to prevent it?