

Learning about ...

Climate Change

Climate change is a subtle form of human rights violation. There is no direct persecution or threat but combustion of fossil fuels in industrialised nations has jeopardised the ability of certain societies to maintain their traditional practices, diminishing their cultural identity and their connection with their natural environment.
Mary Robinson, UN High Commissioner for Human Rights

What's happening to our climate?

The climate has always been changing – with or without the presence of humans. The power of the sun varies, there are patterns of warming and cooling in the oceans and droughts and floods have always featured in human history. So when considering climate change what we are referring to is **man-made climate change**. That is, how the greenhouse gases from our homes, factories, cars and livestock are accelerating those changes. Understanding what is happening to our climate is incredibly difficult with so many factors involved in the air and the oceans. The science is still evolving, but records are continually being broken with the wettest or hottest month on record, more frequent longer droughts and floods and so on.

Is climate change man-made?

An error in the UN Intergovernmental Panel on Climate Change (IPCC) report six years ago resulted in much press coverage which sought to downplay the effect of climate change. But the fifth assessment report which the IPCC delivered in September 2013, crystallising the findings of over 800 scientists, concludes that the world is warming and the science to show this is robust. Over the last century there has been a rise in global average temperatures of 0.9 degrees Celsius. In May 2013 the level of carbon dioxide in the atmosphere reached an average daily level above 400 parts per million, a concentration not seen on the earth for millions of years. The IPCC report included a reference to a **pause** in global warming, however overall warming of the entire climate system has continued rapidly over the past 15

years, even faster than the 15 years before that. And the Met Office states that *'the recent pause in global surface temperature rise does not materially alter the risks of substantial warming of the Earth by the end of this century'*.

Can you believe everything you read and hear?

There is a strong and powerful climate sceptics lobby funding a disinformation programme. This involves seemingly authoritative 'think tanks' with 'experts' producing false theories with the aim of spreading confusion about climate science. The challenge of using accurate, credible information has caused difficulties at the BBC, which has been criticised for its coverage of the IPCC report as the 'most comprehensive scientific study on global warming yet published'. Prominent climate experts have accused the corporation of bias towards "climate sceptics" at the expense of mainstream scientists. The Climate Minister challenged the BBC to 'look very hard, particularly at whether they are getting the balance right', suggesting that "the sceptic press" often used research that had not been peer-reviewed to bolster its position and accused the "Sunday newspapers" of presenting comment as science.

Where will you be 'The day after tomorrow'?

Abrupt climate changes are brought about by 'tipping points', when conditions create strongly amplified feedback loops in the climate system leading to rapid and irreversible change. Both rapid cooling and rapid warming tipping points are thought possible. The dramatic Hollywood film featured a cooling tipping point triggered by a shut-down of the North Atlantic Ocean circulation which keeps Northern Europe warmer than it would otherwise be. Although the last Ice Age was caused by something similar models show this to be unlikely in today's warmer climate. More probable are warming tipping points. Increased carbon dioxide released from warmer oceans, burning forests, additional methane released from thawing tundra and sudden loss of sea ice

could, scientists speculate, create a tipping point leading to disintegration of polar ice shelves and a catastrophic rise in sea-level.

What are the effects of warming oceans, sea level rises, mega droughts - all outcomes of increased global temperatures - going to be on our planet and its people?

Warming oceans

The deep ocean has warmed since the 1980s as the National Oceanography Centre (NOC) monitoring system demonstrated. The NOC warns that the oceans are vast and a small rise can have an effect on the atmosphere above. Observations show that changes in ocean temperatures can affect the location of rain-bands and monsoon cycles; however these effects are unevenly distributed so some areas will be more seriously affected than others.

Sea level rise 10:10

Around 10% of the world's population lives in coastal areas less than 10m above sea level, leaving approximately 0.7 billion people vulnerable to sea level rise. Global warming data also predicts more intense cyclones, hurricanes and typhoons, meaning increased risk of storm surge flooding. Countries with over 40% of their population living in low-lying areas include the Suriname (70%), the Netherlands (70%), Vietnam (55%), Bangladesh (45%) and the Gambia (40%). Tuvalu in the South Pacific, an island made up of coral atolls standing at less than 4.5m above sea level, has already approached Australia and New Zealand to accept its population of 12,000 people if rising sea levels make evacuation necessary.

Mega-drought

A warmer atmosphere sucks water from the land and climate change models indicate that severe droughts are likely to become more frequent in a warmer world. Droughts adversely affect agricultural production and drinking water supplies. The Sahel, a region bordering the south Sahara, has experienced a prolonged period of low rainfall since the 1970s, the cause of several disastrous famines.

Economic growth and poverty alleviation

In most of the 'developed' nations carbon dioxide emissions have stood at very high levels over the last 25 years, despite pressure

to reduce production. The additional level in global emissions has been largely driven by increased emissions from India, China and the other growing economies. Energy is an essential ingredient for economic growth and access to reliable, affordable and clean energy, electricity in particular is a key factor in alleviating poverty and enhancing global development. It is estimated that the energy needs of developing countries (often producing goods for the 'developed world') will increase by over 230% by 2050.

This scenario raises a multitude of issues, including the rights of poor countries to develop and reduce poverty, the tensions between parts of the world already pumping out high levels of carbon dioxide and those wishing to grow, and the costs of meeting energy needs in low carbon ways. The International Energy Agency predicts that US\$300bn per annum is required to meet the energy needs of developing countries to 2030 - the World Bank estimates the premium to achieve this development in a low-carbon manner may be as little as 10%.

Deforestation

Soil is one of the largest sources of carbon in the world; it absorbs carbon as plants which have fixed carbon from carbon dioxide in the air decay. Human activity has cleared forests on a massive scale to make way for agriculture over recent centuries. The rate of deforestation is increasing, with resultant tree burning sending carbon dioxide into the atmosphere estimated at almost 20% of current greenhouse gas emissions. If new trees are planted they will take decades to sequester the carbon originally held in the lost bio-mass.

Curbing new deforestation an effective way of reducing greenhouse gas emissions and it also helps to preserve biodiversity and protect soil and water quality. However, it has implications for the development of countries such as Brazil and Indonesia, whose economies cannot bear the burden of curbing deforestation alone.



Learning in a global context

Children are entitled to learn in a global context. They encounter world views from their families, cultures and communities. A school curriculum, set in a global context, deepens their understanding and engagement with the complexities of that world. Teaching about **Climate Change** requires teachers to be familiar with global issues that affect all our lives and to impart knowledge, skills and values that will equip children to live and be active in an interdependent, globalised world.

Real, relevant, current issues

The impact of **Climate Change** affects pupils' past and present. It requires us all to develop new ways of thinking, acting and living for a sustainable and equitable future. Many in the global south, particularly indigenous peoples, have strong connections with nature and implicit understanding of sustainable living. This knowledge is essential if human kind is to find a sustainable future within the planet's resources and in tune with earth's well-being. It gives purpose to work across the curriculum, with rich data and real-life scenarios around sustainable development and current issues. It opens up debate around alternative ways of tackling extreme poverty and inequality and offers differing perspectives on poverty and wealth.

Social justice, not just charity

Fundraising campaigns that aim to evoke sympathy may instil feelings of guilt, with limited educational value. Encouraging children to research and question global issues helps them understand that there are more effective ways for governments and people to achieve a more sustainable and equitable world than charity.

Broaden perceptions, counter stereotypes

No country is uniformly rich or poor: inequality exists within, as well as between countries, including the UK. There is much to be learnt from others, whatever their situation. Media coverage of people and places may reinforce common stereotypes. Adverts and images can imply dependency and uniform poverty in southern countries, especially in the diverse continent of Africa.

Teaching about... **Climate Change**

Thinking critically about Climate Change

A nation's carbon dioxide emissions are the sum of its citizens' individual carbon footprints. Each person's carbon footprint is made up of their primary footprint: direct use of fossil fuels for transport, heat, and light and secondary footprint: indirect use for goods and services whose provision requires fossil fuels. A typical UK carbon footprint (personal carbon load) is split about equally between the primary and secondary uses. One idea to reduce carbon footprints is carbon trading. Each person would hold a 'carbon card' storing their carbon credit status. In future, carbon credits may be forfeited along with cash, when filling up the family car.

Work through these questions with this in mind:

Self-reflective questions:

Focus - what do I think about this?

Why do I think like that? To what extent am I open to changing my point of view?

- ~ What do you think your carbon footprint is? Do you think it is above or below UK average?
- ~ How does your upbringing or value system affect your carbon footprint?
- ~ How would you react to a carbon card?

Group Dialogue questions:

Focus - what do other people think about this?

How can I find different perspectives?

Analyse assumptions, implications and contradictions? And how can I engage with complexity, conflict, uncertainty and difference?

Discuss these questions with others:

- ~ Why do people in different parts of the world have different carbon footprints?
- ~ What links poverty and low carbon footprints?
- ~ Is a 'western' lifestyle possible for everyone?
- ~ Does the 'western' lifestyle have to change?
- ~ Is it possible to have a low carbon footprint and not live in poverty? What about local variations?
- ~ Is it fair that some people use far more resources and therefore contribute far more to the nation's carbon footprint?
- ~ What is the relationship, if any, between those who add a bigger burden on the earth and those who do not?

Curriculum planning

Literacy, Language and Communication

~ Take on other roles and debate issues, e.g. as a citizen of a country at high risk of flooding due to climate change and sea level rises, or a farmer in a drought region;
~ Talk and write about their opinions, and explain their views, on this topic and inform others about what they find out;
~ Read fiction and non-fiction books and picture books relating to climate change and the effects on people and planet.

Physical

~ Consider the impact of pollution on health: investigate levels of pollution in the air for several cities and consider the impact on the lives of children living there, e.g. in Beijing where in many schools, outside play and physical education is cancelled due to dangerously high pollution levels;
~ Investigate cities where global sporting events are held and how this can bring both benefits and harm to people and environment.

Personal, Social, Health, Citizenship and Economic Education

~ Pupils develop their sense of social justice and moral responsibility and begin to understand that their own choices and behaviour can affect local, national or global issues like climate change;
~ They learn how to make more confident and informed choices about the environment; to take more responsibility individually and as part of a greater whole;

~ They learn that resources can be allocated in different ways and that these economic choices affect individuals, communities and the sustainability of the environment.

Knowledge and Understanding of the World

~ study a contrasting non-European country, e.g. a study of Bangladesh, where climate change dangers are evident;
~ study lives of significant individuals who improved things for the better e.g. Kenyan environmental activist Wangari Maathai;
~ examine different religious beliefs and other sources of wisdom that remind us that that we have a responsibility to look after the earth through stewardship, respect and acknowledgement of interdependence.

Creative

~ Pupils respond to the issue of climate change through creating their own art as a response to what they have learnt. Visual representations, including photography, can be used to develop their interest and skills, for example through photo journalism i.e. National Geographic;

~ Pupils develop their own imaginative and creative ways of expressing their commitments to the environment locally, nationally and globally, which can be shared with the school community and more widely.

Mathematical, Scientific and Technical

~ problem solve using real life data including software e.g. comparing CO₂ levels for different countries or changes through time;
~ explore examples of human impact (both positive and negative) on environments, e.g. the negative effects of deforestation;
~ develop a critical understanding of technology's impact on daily life and the wider world, and work together to design and building a sustainable solution to a problem, e.g. a flood-proof way to grow food.

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