Climate Change

Exhibition Notes

What is Climate Change?

The climate on our planet is a very complicated dynamic system that has always changed. There are many different reasons for these changes and they all act together to shape our climate:

- The output of the sun – it varies a little over time
- The orbit of the earth around the sun – it's not a perfect circle!
- Volcanic activity and plate tectonics
- Life – the eco-system has the power to change the climate
- Us – what we do affects the climate

The earth is naturally warmed by rays from the sun which pass through the earth's atmosphere and are reflected back out to space again. The atmosphere is made up of layers of gases, some of which are called 'greenhouse gases'. They are mostly natural and make up a kind of thermal blanket over the earth. They keep the earth the right temperature for humans, plants and animals to survive.
But if extra greenhouse gases are produced through activities that release carbon dioxide, methane, nitrous oxide and ozone, then the thermal blanket gets thicker and too much heat is kept in the earth's atmosphere.

Currently the majority of climate scientists believe that the climate is changing too quickly for the planet to adapt. They also think it is likely that most of the recent changes can be attributed to human activity:

- We burn fossil fuels, like coal, gas and oil, which release about 6.5 billion tons of carbon dioxide into the atmosphere each year.
- We have cut down forests to develop land for agriculture. Trees absorb carbon dioxide, so with fewer trees, more carbon dioxide builds up in the atmosphere.
- The agriculture that has replaced the forests means more animal waste that gives off methane.

These extra greenhouse gases are helping to slowly heat up the earth and the seas, effectively adding more energy to the oceans. The result is more extreme weather such as heavy rain, winds and drought. Ice from the polar caps and glaciers is also melting, resulting in rising sea levels.

Interactive: Giant World Globe + fuzzy felt icons.

Silurian Seas 425 million years ago

425 million years ago, the world was a very different place. Britain was covered in a warm shallow tropical sea, rather like the Bahamas today. The rocks that make up Britain were in the tropics, thousands of miles south of where they are today.

Because the Earth's surface is not one single piece of rock, but is made up of separate pieces or plates that are constantly moving, the rocks formed in this southern sea have slowly moved thousands of miles north over time. And they are still moving northwards today! This process is called plate tectonics and over millions of years the climate of a place can change as it moves around the globe.

Fossil evidence shows us that there were trilobites, cephalopods, sea-scorpions, gastropods, crinoids and brachiopods living among coral reefs.

Interactive: magnetic fishing game – fishing for Silurian creatures

Carboniferous Forests 300 million years ago

300 million years ago, the rocks that make up Britain were drifting across the equator, on their journey north. Vast tropical forests of tree ferns, club mosses and giant horsetails covered lowland plains that were frequently flooded by rivers. Spiders grew to almost half a metre, giant plant eating millipedes scavenged through the leaf litter and spectacular dragonflies developed wingspans of sixty centimetres.

When these plants and animals died, their remains became preserved in the sediments of the shallow swamps and were fossilised. The plants that had captured millions of tons of carbon during their lives, formed the coal that powered the industrial revolution - the beginning of the wholesale burning of fossil fuels.

Interactive: balancing dragonflies

Displays of Silurian & Carboniferous fossils and their modern relatives

Late Ice Age 13,000 years ago

13,000 years ago the last ice age had ended and the planet was warming up very quickly, much faster than today. Unlike the Silurian and Carboniferous periods, this had nothing to do with plate tectonics but was due to the orbit of the planet.

The glaciers had gone, leaving a tundra landscape rather like Siberia today. Mammoths were perfectly adapted to life in this cold, bleak, treeless grassland, grazing the low growing vegetation.

Remains of mammoths have been found all over Britain – the most important are the Shropshire mammoths found in 1986. It is likely that this unique find of an adult and three juvenile mammoths became trapped in a muddy, watery hollow while searching for food. Their struggles to escape would have made them sink further into the mud and they may well have starved to death.

It was a changing climate that probably caused their deaths as the hollow they were found in was formed by a melting block of ice.

Interactive: Microscope + samples of mud from site + other associated material + maggot pupae

Displays of mammoth tusk and tooth and Ice Age animal bones

Interactive: Mammoth Game

More Recent Climate Changes

The Middle Bronze Age **3,500 years ago**

During the early Bronze Age, the climate was warmer and drier than it is today. Gradually it became wetter, the valley bottoms became swampy and boggy and it became more difficult to farm the upland areas. The remaining land had to be protected and farmsteads became defended sites with ditches and palisades - the best examples of these are the hillforts of the late Bronze Age and Iron Age. Hoards were placed near rivers and bogs to appease the Gods and stop the water levels rising. Such superstitions still survive today when we throw a coin into a well.

The Medieval Warm Period **1,000 years ago**

The period between 850 and 1250AD was a time of unusually warm climate caused by high solar activity and output. The Vikings were able to explore and colonize many areas in Northern Europe, previously inaccessible to them.

The Black Death **700 years ago**

The summer of 1348 was abnormally wet, ideal conditions for the spread of disease. The Black Death, a bacteria born disease carried in the blood of wild black rats, swept through Britain with a terrifying speed and fatal consequences. Some 2 million people died, accounting for between 30 – 40% of the entire population. Climate change today is linked to an increase in disease-carrying pests and the further spread of diseases such as malaria.

The Little Ice Age **300 years ago**

The Little Ice Age brought bitterly cold winters to many parts of the world. The river Thames often froze over and people skated and held frost fairs on the ice. An elephant was led across the ice during the last frost fair in 1814. Scientists have identified two causes for the Little Ice Age, decreased solar activity and increased volcanic activity.

Interactive: Bury Ditches Hillfort jigsaw

Displays of Bronze Age replica swords and axes, a rat and fleas telling the story of The Black Death and artefacts from the time of the Little Ice Age

Why does Climate Change Matter?

Climate change has the potential to affect us all. In the industrialised world we have the money and technology to partly protect ourselves from the worst effects of climate change. But the developing world will suffer far more as they are less able to cope with these changes. Africa as a whole contributes about 2.5% of global greenhouse gas emissions while Europe contributes 27.7%.

The Gambia ~ the Smiling Coast

The Gambia, the smallest country in West Africa, is one of ten countries in the world most vulnerable to rising sea level due to climate change. A sea level rise of just one metre will lead to:

- the loss of Banjul, the commercial capital of The Gambia through devastating flooding
- wide spread poverty through the loss of homes, land and livelihoods
- the spread of water-borne diseases and malaria leading to high infant and maternal mortality rates
- food shortages due to the loss of farmland in low lying areas
- salt intrusion ruining crops such as rice
- the loss of vital habitats
- greater coastal erosion and the subsequent impact on tourism
- a drastic set back to current development within the country

Montage of photographs of smiling faces, - challenge stereotypical view of an African nation.

Under the Mango Tree

Interactive: Full height mango tree with seat. Audio recordings of Gambian music and everyday sounds, artefacts to handle.

The Balance of Nature

The seasons are changing and spring is arriving earlier each year as a result of climate change. One of the biggest problems is that species don't adapt to changes in climate at the same rate. So if you have a bird that feeds on an insect that relies on a certain plant for food, and any one of those responds to warming differently to the others, the whole system can break

There are winners and losers in the natural world's response to climate change. Losers include the sensitive and already threatened butterfly species such as the Scotch Argus and Mountain Ringlet whose habitat is diminishing as the climate warms. They are now vanishing from large areas.

Among the winners, the Comma, a resident British butterfly is expanding its range northwards and specimens are found in Scotland. Peacock and Tortoiseshell butterflies that commonly hibernate through cold periods can now be found earlier and later in the year and Red Admirals, seasonal visitors to Britain have been found overwintering in sheltered parts of northern Europe.

Displays of Puffin and sand eels, butterflies, baby crocodile and giant cockroaches

What can we do about it?

Climate change is one of the most urgent issues of our time. We don't yet fully understand how all the factors that can change our climate interact but it remains the greatest environmental challenge we face today as a global community. And though we are all vulnerable, it is the world's poorest people who will suffer the most, despite having done little to contribute to the causes of the problem.

At the current rate of carbon emissions, global average temperatures seem likely to rise by 2 degrees centigrade by 2050 (IPCC)
The expected consequences of that rise would include:

- The creation of 150 million environmental refugees
- Acute water shortages for 1-3 billion people
- 30 million more people going hungry

Every little helps. Because climate change is happening all over the world, it means we are ‘all in it together’. One small action may not make much difference, but billions of people doing small things makes a huge difference.

After all, it was the small actions of millions of people that put all this extra carbon dioxide in the air to start with!

- Avoid over packaged food and reuse water bottles.
- Turn off lights you aren’t using and change to energy saving light bulbs
- Leave the car at home and walk or cycle
- Insulate your home and turn the heating down
- Take a shower instead of a bath
- Recycle more
- Help others to learn about these things

Think globally, and act locally

Interactive: clear Perspex unit with holes in top to post ping pong balls into the pledge of your choice….

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