

The Busy Teacher's Simple Guide to Climate Change

1. What is the problem?

The world is getting warmer. The average temperature of the Earth's surface has increased by about 1 degree centigrade since 1880, 0.6 degrees of this warming occurring in the last three decades.

The IPCC (International panel on climate change) say that 'Global warming is likely to reach 1.5°C between 2030 and 2052, if warming continues at the current rate'.

2. Why is this happening?

Greenhouse gases in the atmosphere trap heat mainly carbon dioxide (CO₂) methane (CH₄) and nitrous oxide (N₂O). There are a number of other greenhouse gases that occur in smaller amounts.

The use of fossil fuels such as Coal , Oil and Gas for industry, transport, heating and cooling buildings, generating electricity and agriculture releases greenhouse gas emissions, particularly CO₂. These are adding to the "natural greenhouse effect" - the way the Earth's atmosphere traps some of the energy from the Sun.

Without some greenhouse gases in the atmosphere the earth would have remained too cold for plant and animal life to develop. It is the added gases or "enhanced greenhouse effect" of the last few hundred years that is the problem.

Living trees take in CO₂ store the carbon (C) and give out oxygen (O₂).

However, when forests are cut down the trees no longer take in the CO₂. Even worse, if the forests are burnt down the carbon stored in them is released into the atmosphere as CO₂.

Keeping large areas of rainforest around the world is very important for a stable global climate, but they are being cut down for their wood, for mining, to farm cattle (which emit methane, another greenhouse gas), and to plant crops such as soya beans and palm oil. Around 10% of global greenhouse gas emissions come from deforestation.

The concentration of CO₂ in the atmosphere is now higher than at any time in at least the last 800,000 years and in May 2019 it was 414ppm (parts per million). It was no more than 300ppm before the industrial revolution.

3. What are the effects?

Higher temperatures, melting ice, extreme weather events and less predictable weather, droughts, floods and higher sea levels.

These are all linked to a warming climate and could have an increasingly drastic effect on the world's regions. The rate of sea-level rise has accelerated in recent decades, placing islands such as Tuvalu and the Maldives, and low-lying countries like Bangladesh at risk. Droughts, leading to crop failure, are getting more frequent in many areas.

4. What does the future hold?

Higher temperatures, more extreme and more frequent extreme weather events. The scale of potential impacts is uncertain and linking any single event to global warming is complicated.

Climate changes could bring shortages in freshwater, major changes in food production conditions and a rise in the number of casualties from floods,

storms, heat waves and droughts. This affects people all over the world, but far more in countries where people have fewer resources to respond to a crisis.

Climate change affects much of the biodiversity of the world, especially species that don't easily adapt. Living conditions change with changes in habitat such as warming and more acidic seas, less snow and ice, higher temperatures, desertification and possibly continued deforestation. There is a risk of dieback of forests if temperatures continue to increase.

Sources of information

BBC '6 graphics that explain climate change' – click here for the graphics -
<https://www.bbc.co.uk/news/science-environment-46384067>

Find out what countries agreed to do about this at the COP24 Climate Change Summit in 2018 -
<https://www.bbc.co.uk/news/science-environment-46582265>

NASA

This is from NASA so resources fit the US curriculum but the animations etc are very useful and up to date -

<https://climate.nasa.gov/resources/education/>

<https://climate.nasa.gov/>

https://climate.nasa.gov/climate_resources/191/nope-earth-isnt-cooling/

The UK Met office

<https://www.metoffice.gov.uk/climate-guide>

<https://www.metoffice.gov.uk/weather/learn-about/climate-change>

Physics & Ethics Education Project

This site has a lot of very useful material for teachers

<https://www.peep.ac.uk/content/1833.0.html>

IPCC – Intergovernmental Panel on Climate Change

This is a very clear document for teachers with suggestions for activities from the international experts.

IPCC Special Report “Global Warming of 1.5°C” Summary for Teachers -

https://www.ipcc.ch/site/assets/uploads/sites/2/2018/12/ST1.5_OCE_LR.pdf

Global Action Plan

This is a recent and very useful set of powerpoints and notes including links to short films.

<https://www.globalactionplan.org.uk/youth-and-schools/climate-chaos-response-schools-toolkit>