



BIG IDEAS
on global issues



Global
Education
Time

CLIMATE CHANGE

KEY CONCEPTS
AND LEARNING OUTCOMES



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WHAT IS CLIMATE CHANGE

Today's climate change is a long-term, large-scale rise in Earth's global average temperature, causing shifts in weather patterns. Some models predict rises in global temperature of 4 degrees Celsius by the end of the 21st Century, which could make advanced civilisation unsustainable, lead to a major reduction in the human population, and cause extinction for many other species. The UN aims to keep temperature rise to between 1.5 – 2 °C.

"The Earth's climate is changing at a rate that has exceeded most scientific forecasts" (IPCC 2022)¹.

"Our greatest threat in thousands of years... The collapse of our civilizations and the extinction of much of the natural world is on the horizon" (David Attenborough 2018)²

"2023 is the hottest year on record, with global temperatures close to the 1.5°C limit" (Copernicus 2024)³



Learning outcomes

- Students can explain the significance of the threat that climate change potentially poses to life-forms on earth.
- They are aware that the speed of change is exceeding most scientific forecasts, and that 1.5 degrees would be a prudent target.

^[1] <https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/>

^[2] <https://www.bbc.com/news/science-environment-46398057>

^[3] Copernicus is the EU programme aimed at developing European information services based on satellite Earth Observation and non-space data <https://climate.copernicus.eu/copernicus-2023-hottest-year-record>



2

HUMAN ROLE IN CLIMATE CHANGE

There is greater than 99% consensus on human caused climate change in the peer-reviewed scientific literature⁴. More and more scientific studies show that the cause of the "modern" climate and biodiversity crises is primarily the disrespect for nature and all living things that is at a core of many, mainly western, societies. "We are on a highway to climate hell with our foot still on the accelerator." (Antonio Guterres, UN Secretary General). Scientists, as well as people outside research, widely use the term Anthropocene to mean a time in Earth's history when humans are having severe biophysical impacts on the planet⁵.

Nevertheless many people underestimate the effects of it, are sceptical of it or deny its existence⁶.



Learning outcomes

- Students understand that the scientific consensus is that human activities, such as burning fossil fuels and land degradation are causing today's climate change.
- They are aware that the way we care for nature plays an essential role in addressing climate change.

¹⁴ <https://iopscience.iop.org/article/10.1088/1748-9326/ac2966>

¹⁵ <https://www.nature.com/articles/d41586-024-00815-0>

¹⁶ <https://www.nature.com/articles/s41562-022-01490-9>



3

HOW CLIMATE CHANGE WORKS

Solar energy absorbed at Earth's surface is radiated back into the atmosphere as heat.

Greenhouse gases in the atmosphere like carbon dioxide (CO₂), carbon methane (CH₄) and nitrous oxide (N₂O) - trap much of that heat and thus keep it near the Earth's surface, producing the greenhouse effect.

Lifestyles of many humans nowadays rely on plundering of natural resources and burning fossil fuels for energy.

Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials, and as a result of certain chemical reactions (e.g., cement production).

Methane is emitted during the production and transport of coal, natural gas, and oil, as well as from livestock and other agricultural practices, land use, and by the decay of organic waste in municipal solid waste landfills.

Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater.



Learning outcomes

- Students are able to make the link between patterns of human consumption and climate change.
- They can explain the processes that cause climate change, name some of the activities that are responsible and make the connection between these and things that they consume.



4

INDUSTRIAL ECONOMIES ROLE IN CLIMATE CHANGE

Most of the greenhouse gases that we humans have added to the atmosphere come from a process of global industrialisation (from the 1800s on) by the Minority World countries (in Europe & North America); and more recently the Majority World (esp. China, India). It's being driven by a global economic system that encourages **over-consumption**, including demand for energy and consumer goods (especially from the wealthy Minority World countries). The result has been an increase of CO₂ by almost 50% since 1750 (the pre-industrial era). However, most of the people in the world still use very little energy and consume little⁷. In 2021 the average per capita emissions of high income countries are 32.76 times higher than the average per capita emissions of low income countries⁸. In 2022 in United Arab Emirates or Brunei the average per capita emission is higher than 20 Tons of CO₂ per year, in Somalia or Democratic Republic of Congo lower than 0,1 Tons⁹.

Then industrial agriculture adopting synthetic fertilisers, chemical pesticides and high-yield cereal hybrids produces greenhouse gas emission, pollutes air and water, and destroys wildlife too.¹⁰

The question of who's **responsible** for all this CO₂ is tricky. Some countries are producing more CO₂ in recent times, some have been producing a lot of CO₂ for a long time. If something is produced in China for someone in Europe, is China or Europe responsible for the CO₂?



Learning outcomes

- Students can describe the link between patterns of human consumption and climate change.
- They can explain how what we consume results in greenhouses gases production.
- They are able to support their views on who is responsible with clear arguments.

[7] <https://edgar.jrc.ec.europa.eu/overview.php?v=booklet2018&dst=CO2pc&sort=deso>

[8] <https://ourworldindata.org/inequality-co2>

[9] <https://ourworldindata.org/grapher/co-emissions-per-capita>

[10] <https://www.unep.org/news-and-stories/story/10-things-you-should-know-about-industrial-farming>



The impact on the **natural environment** of climate change can be seen in global temperatures, warming and acidification of oceans, rise in sea-levels and extreme weather events (like heat waves, extreme rain, floods, drought). "The global mean sea level (GMSL) in 2022 was the highest ever measured. GMSL reconstructions based on tide gauge observations show a rise of 21 cm from 1900 to 2020 at an average rate of 1.7mm/year. The rate of GMSL rise accelerated to 3.3mm/year over the period 1993-2018 and 3.7mm/year over the period 2006-2018, more than twice as fast as during the 20th century" (EEA 2024)¹¹.

Impact on **people, animals and plants**. These changes already have extreme consequences for humanity and other life-forms. The greatest initial impact is currently on millions of people especially in the more vulnerable hotter majority world countries, in coastal communities, low-lying countries, and wildlife all around the world, but climate change is increasingly affecting us all, even in urban areas where we use to live. The 2019 UN Report stated that around 1 million animal and plant species are threatened with extinction. More recent research finds climate change could drive up to 6 million different species to extinction over the next 50 years¹². Some call this the Sixth mass extinction – the next in line after the Fifth one when Dinosaurs and many other species went extinct. Millions of poor farmers in the majority world, who were not responsible for creating the problem, are trying to adapt to challenges like hotter climate and different rainfall patterns. As crops fail, many people are already forced to migrate, creating a new phenomenon of **climate migrants** and displaced people¹³. They are not legally protected by the UN refugee convention, as climate change alone is not listed as criteria to qualify as a refugee. "In the Global South, in 2022 disasters triggered a record 32.6 million internal displacements of which 98 per cent were caused by weather-related hazards such as floods, storms, wildfires and droughts,"(UNHCR 2023)¹⁴.

[11] <https://www.eea.europa.eu/en/analysis/indicators/global-and-european-sea-level-rise>

[12] Wiens & Zelinka, 2024, 'How many species will Earth lose to climate change? Global Change Biology'
<https://pubmed.ncbi.nlm.nih.gov/38273487/>

[13] UN Global Compact for Migration July 2018 is the first time governments recognise the climate migrants:
(<https://www.un.org/sustainabledevelopment/blog/2019/06/lets-talk-about-climate-migrants-not-climate-refugees/>)

[14] <https://www.unhcr.org/us/news/stories/climate-change-and-displacement-myths-and-facts>



In Europe, climate change events are already creating high economic costs (coastal and land erosion, storms, floods, damaged infrastructure, loss of crops)¹⁵. The World Health Organisation and the World Bank are now concerned that hundreds of thousands more people will die each year from disease, malnutrition and heat stress, and force 100 million people into extreme poverty by 2030¹⁶.



Learning outcomes

- Students can name some different consequences of climate change and how these affect people, animals and plants.
- Students can explain how and why Climate Change affects some places and communities more than others e.g. people in the majority world. They can describe in simple terms the connection between climate change and migration.

6

DISCUSSION ABOUT FUTURES

Climate change is accelerating. The global consensus is that we are just seeing the initial phase of climate change, with relatively small effects. Most scientific models predict much more drastic changes. We can expect to see some of these in all our lifetimes. Addressing the problem has stimulated discussion of how to address the underlying cause – human consumption. The relationship between the prevalent model of economic growth and consumption is now being examined. Experts and global organisations, like the World Bank, say reducing **net emissions** of carbon dioxide to zero by 2050 is the only way to slow climate change sufficiently.¹⁷

[15] <https://www.ecologic.eu/sites/files/publication/2018/2811-coacch-review-synthesis-updated-june-2018.pdf>

[16] <https://edition.cnn.com/2019/01/16/health/climate-change-health-emergency-study/index.html>

<https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

<https://openknowledge.worldbank.org/bitstream/handle/10986/22787/9781464806735.pdf>

[17] <https://www.worldbank.org/content/dam/Worldbank/document/Climate/dd/decarbonizing-development-report.pdf>



Learning outcomes

- Students understand that climate change will have an effect on their future and the lives of everyone in the world.
- They know that there are a number of different possible futures, and what individuals and the global community as a whole do now, will determine the probable future in terms of life on Earth.

7

ADDRESSING CLIMATE CHANGE

Because of the potentially catastrophic consequences of climate change, scientists and climate activists encourage world, regional and governments leaders to adopt a **precautionary principle** to avoid tipping points and address the main causes before it's too late. Governments are being pressed to consider laws that help stop the worst scenarios materialising. Many different types of action are needed to avoid the worst scenarios predicted by scientific models. These include actions to both mitigate climate change and to adapt to it. Another needed type of action is changing individual behaviours, as a critical customer, preferring more sustainable products and services; this may mean addressing the **contradiction** between people's awareness about the issue and individual people changing how they act.



Learning outcomes

- Students understand that action on climate change is taking place at local, national and global levels across the world.
- They can explain the importance of the role that individuals can play. Students understand that there is frequently a disjuncture between people's awareness of the problem and people actually changing their behaviour.



8

MITIGATING AND ADAPTING TO CLIMATE CHANGE

Climate risks are threatening energy and food security, ecosystems, infrastructure, water resources, financial stability, and people's health.

There are many actions we can take to **mitigate** climate change, the most important are:

- Reducing our consumption of all sources significantly (energy, material and non-material goods, etc.) and respectful using of them (reusing instead of wasting or discarding).
- Increasing renewable energy production and use it instead of fossil fuels. (wind turbines and solar panels produce enough electricity to power entire communities, or your own home).
- Switching to lower-carbon fuels (like biomass or other renewable sources), when it's not possible to use renewable energy.
- Protecting and renewing natural carbon sinks (e.g. plants, soil, oceans). To achieve this, it is essential to adopt agricultural techniques based on respect for natural processes and increase biodiversity.

There are also ways to **adapt** to climate change, namely preventing or minimising the damage they can cause:

- Building infrastructures that are resistant to hazards and using nature-based solutions like floodplains or defences to protect against sea-level rise.
- Reducing vulnerable groups (elderly, children and those in poor health) exposure to environmental health hazards and extreme weather events.
- Investing in urban planning and building codes, economic incentives and insurance, early-warning systems and information campaigns, urban agriculture, creating more liveable public spaces, protecting cultural heritage.

If these efforts are successful, we will live in resilient contexts, more equipped to face the effects of climate change.



Learning outcomes

- Students can name some different types of renewable energy.
- They can mention the main strategies to slow climate change.
- Students can explain the difference between mitigating and adapting to climate change.

9

ACTIONS

At high **institutional level**, 195 Governments worldwide have come together to combat climate change - signing the 2015 Paris Climate Agreement. This aims to strengthen the ability of countries to deal with the impacts of climate change and emphasises the need for collective action to limit overall temperature rises. In December 2020, EU leaders took a further step towards climate neutrality. As an intermediate step towards the 2050 target, they agreed that by 2030 EU greenhouse gas emissions should be reduced by 55% compared to the 1990 levels.

Since 1988 Intergovernmental Panel on Climate Change (IPCC) is the United Nations body that provides governments with scientific information that they can use to develop climate policies: regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.



Learning outcomes

- Students can name the most recent prominent agreements signed to address climate change and can describe the main aims of the agreements.
- They understand that international agreements are strengthened by a strong global or regional partnership.
- They know that governments can be assisted by scientific institutions support when designing and deciding policies addressing climate change.



At an **individual level** there are many people trying their best to live a more sustainable and respectful life. They are aware of their carbon footprint as the measure of the total amount of emissions of carbon dioxide (CO₂) that is directly and indirectly caused by an activity or accumulated over the life stages of a product. These people are reducing their consumption – using and buying less, e.g. reducing their food waste and the amount of clothes they buy; buying renewable energy reducing endothermic cars and replacing the remaining with electric ones; protecting old-growth forests and other natural ecosystems; creating natural gardens, rewilding landscapes and cities; supporting bio agriculture; joining No Mow May and other types of actions that nurture carbon sinks as well as increase biodiversity.



Learning outcomes

- Students can explain what a carbon footprint is and describe practical things people can do to reduce their footprint.
- They are aware that the more goods and services a person consume, the bigger her carbon footprint is an important part of the collective effort to slow climate change.

At a **collective level** there are many small and very large, formal and non-formal, local and global groups and networks taking action, farmers' organisations included. People join campaigning alliances, or advocacy organisations they are already members of. Businesses are responding to this 'demand' by providing more environmentally friendly products and services (e.g. power). These collective and individual actions can help governments to make policy changes.



Learning outcomes

- Students can explain the importance of people participating in collective action on climate change and give examples of successful collective actions (e.g. the replanting of forests in Kenya, advocacy campaigns).

Lead Partner



Project Partners



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