

# Anthropogenic Climate Change

## Background, National Curriculum links and suggested aims

This lesson is intended for use when teaching about anthropogenic climate change to Years 10-11. It has been written for use in a Biology lesson.

## Teacher background knowledge

No special background knowledge required for a Science teacher of any particular specialism. Climate change cuts across all the sciences. Teachers should, of course, know that 'anthropogenic' means 'resulting from human actions'. It will be helpful if teachers know what students are being taught about climate change elsewhere on the curriculum, particularly in geography.

It is important to realise that while anthropogenic climate change is not as sensitive a topic as some others, debates among students can get heated. Most students will probably accept its reality (indeed, you may need to get them to be critical of simply presuming that it is the case) but some students are likely to come from families that do not accept the validity of anthropogenic climate change, and may even consider it a left-wing conspiracy.

## Cross-curricular links

There are links to Philosophy (ethics), to Economics and to Politics.

## Student background knowledge

Students should know what is meant by 'anthropogenic' and the distinction between climate and weather.

## Resources and timing

One lesson of 50 minutes. By the time students have got to Year 10 or 11, it may be that there will be sufficient factual knowledge about climate change within a class for you not to need to set them any work undertaking factual research. Instead, obtain such knowledge, filtering and supplementing it as appropriate, directly from the students.

## Activities

1. Start by getting students to propose and evaluate the evidence that humans play a role in climate change. Such evidence is mainly correlational (e.g. global temperatures have risen over the last several decades as atmospheric carbon dioxide levels have increased). Students should think about how strong such evidence is (as opposed to the direct experimental testing of theories). Students should also appreciate the importance of scientists being able to propose mechanisms for phenomena that they are trying to explain and should therefore know mechanisms to explain the following:
  - a. Global warming (the 'greenhouse effect' resulting from rising levels of atmospheric carbon dioxide, methane and certain other gases);
  - b. Acidification of the oceans (rising levels of dissolved carbon dioxide);
  - c. Rising sea levels (melting of land ice – not sea ice – and thermal expansion of seawater);
  - d. Increase in other extreme weather events, such as flooding and hurricanes (not as clear cut but possibly due to changes in water temperature and air and water currents).
2. Get students to list present and future possible effects of anthropogenic climate change, on the assumption that humanity doesn't do much to alleviate the problem. Encourage students to think:
  - a. Of the present and in the future;
  - b. Of effects on humans and on other species (wildlife, crops, pests).
3. Get students to think about how anthropogenic climate change might be ameliorated. It might be useful to get students to think about different *categories* of responses:
  - a. Feasible technological (e.g. reduction in fossil fuel usage, increase in sustainable energy usage);
  - b. Speculative technological (e.g. terraforming, colonising Mars, dramatic improvements in batteries);
  - c. Relatively minor lifestyle choices – whether chosen by individuals or driven by governments (better home insulation, fewer long-distance journeys, especially in aeroplanes, less consumption of meat from farmed animals, fewer purchases of new clothes and other items, less use of air-conditioning and heating);
  - d. More major lifestyle choices (e.g. deciding not to have children, going vegan).

4. Get students to discuss why there is controversy about the importance of anthropogenic climate change, including:
  - a. Some uncertainties still in the science – though these are reducing over time;
  - b. Suspicion by some people of governments;
  - c. Suspicion by some people of scientists;
  - d. Vested interests – e.g. among fossil fuel companies.

### Resource links

- The evidence that humans play a role in climate change:  
<https://climate.nasa.gov/scientific-consensus/>,  
[https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5\\_Chapter08\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf).
- The present and likely future effects of anthropogenic climate change:  
<https://www.myclimate.org/information/faq/faq-detail/detail/News/what-are-the-effects-of-climate-change/>,  
<https://rmets.onlinelibrary.wiley.com/doi/abs/10.1002/joc.6104>,  
<https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/OECD%20Climate%20Change.pdf>.
- Ameliorating climate change:  
<https://www.forestresearch.gov.uk/tools-and-resources/urban-regeneration-and-greenspace-partnership/greenspace-in-practice/benefits-of-greenspace/climate-amelioration/>,  
<https://www.theguardian.com/environment/climate-consensus-97-per-cent/2017/dec/26/us-government-climate-report-looks-at-how-the-oceans-are-buffering-climate-change>.
- The climate change controversy:  
[https://royalsociety.org/-/media/Royal\\_Society\\_Content/policy/publications/2007/8031.pdf](https://royalsociety.org/-/media/Royal_Society_Content/policy/publications/2007/8031.pdf),  
<https://www.nytimes.com/2019/05/27/us/politics/trump-climate-science.html?fbclid=IwAR2YJCtCix72CCgYGvjLMHJtHs1jv4N5QQY9XWogu9W1nnVel58dM5i04Q>,  
[https://en.wikipedia.org/wiki/Politics\\_of\\_global\\_warming](https://en.wikipedia.org/wiki/Politics_of_global_warming).