

C3: GLOBAL WARMING

Overview

The Earth's atmosphere is our protective layer, shielding us from harmful cosmic rays as well as helping to maintain a relatively safe environment for us to live in.

In the 19th century scientist John Dalton worked out that this protective layer was composed of various gases, principally nitrogen and oxygen. In 1896 the Swedish chemist Svante Arrhenius introduced his theory of 'greenhouse' warming but at that time the greenhouse effect was not considered a threat to life. Since then a variety of studies have shown that our atmosphere is composed of carbon dioxide, water vapour, methane, sulphur dioxide, ozone and various oxides of nitrogen. These gases absorb heat energy from Earth and so contribute to heating the atmosphere, creating knock-on effects on the global temperature.

The industrial revolution relied heavily on the burning of fossil fuels for energy, and this led to an increase of gases in the atmosphere, particularly carbon dioxide. Carbon dioxide is also emitted as part of the respiration process. There is a delicate balance between the emission of this gas and its re-absorption into nature. However, overabundance of this gas is one of the factors contributing to our changing climate and the overall rise in global temperature.

Today there is much debate about global warming or climate change. There are some who still believe global warming to be just another theory whereas over 97% of climate scientists agree that climate-warming trends over the past century are extremely likely due to human activities.

Source: <https://climate.nasa.gov/scientific-consensus/>.

C3 ACTIVITY 1: GLOBAL WARMING IN A BOTTLE is a small scale investigation of the effect of an overabundance of carbon dioxide.

One of the consequences of global warming is the increase in sea levels. The second activity, **C3 ACTIVITY 2: THE EFFECT OF GLOBAL WARMING ON THE POLAR ICE CAPS AND MELTING GLACIERS**, looks at two simple models to assess what happens when an iceberg in the sea melts and when an ice mass melts into the sea.

Suggested approaches:

- Ask the students to list the sources of carbon dioxide:

- ✓ *Respiration of all living organisms*
- ✓ *Plants using it as part of the photosynthesis process*
- ✓ *Burning of fossil fuels in homes*
- ✓ *Factory emissions*
- ✓ *Transport emissions*

Prompt the students to consider the importance of the rain forests and the global consequences of depleting these areas.

- **STRAND A: ENERGY AND SUSTAINABILITY** looks at how we manage our energy resources. Now consider the consequences of mismanaging them. This is a great opportunity for the students to enhance their research and debating skills by examining the various treaties relating to climate change:
 - ? *Were there successful outcomes?*
 - ? *Which countries were signatories and which were not?*
 - ? *What reasons may have been given for an inability to comply with the proposed recommendations?*

Resources:

- The [United Nations website](#) focuses on all aspects of climate change.
- The [Center for Climate and Energy Solutions website](#) looks at climate change and energy demands.
- [Click here](#) for an overview of the main issues relating to climate change.
- The [Environmental Protection Agency \(EPA\)](#) website contains a wealth of excellent source material pitched at a local level, as well as a number of short videos explaining the various challenges to environmental protection.