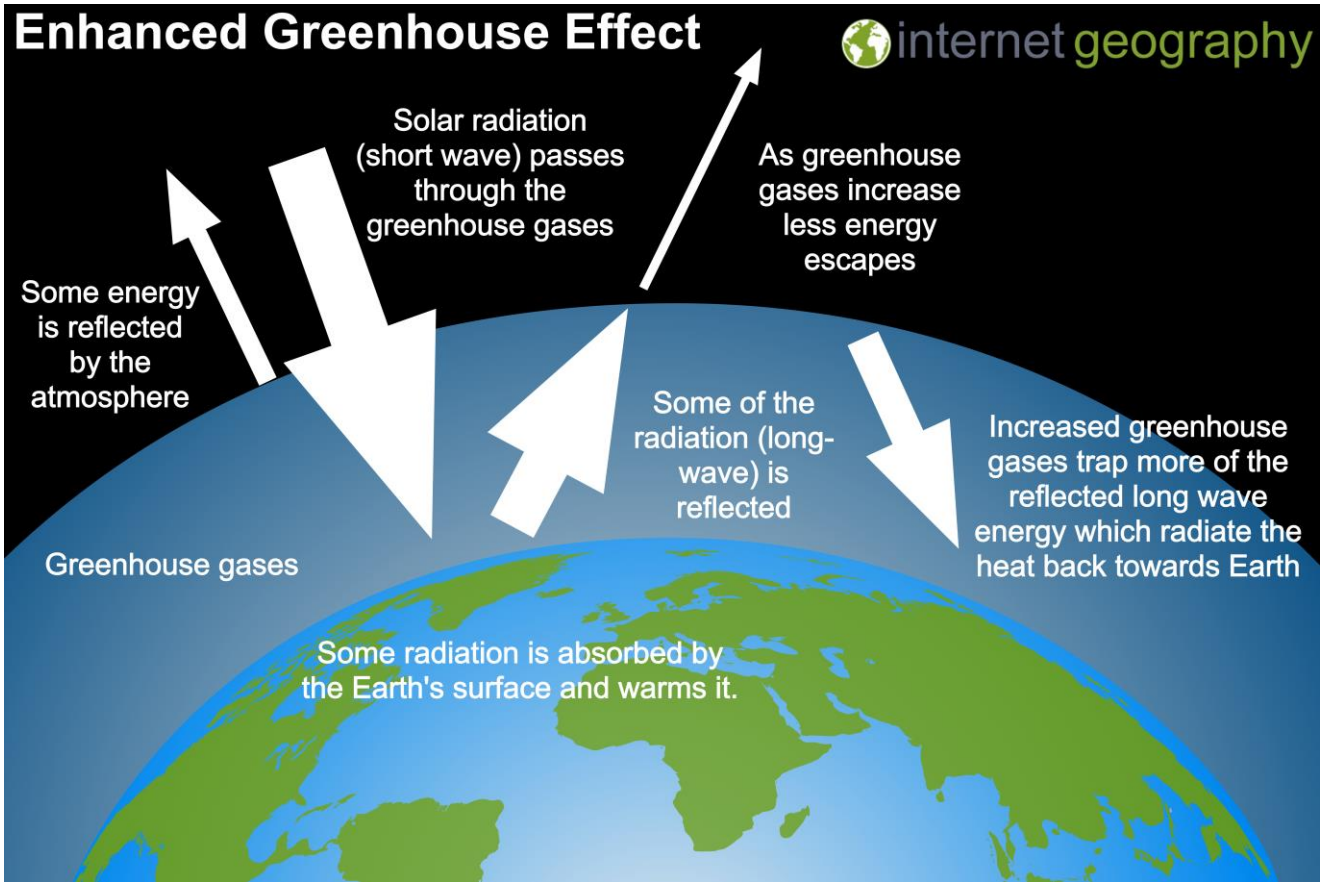
Climate Change

The Enhanced greenhouse effect

- The Greenhouse effect is a naturally occurring phenomenon that keeps the Earth warm enough for life to exist. It is estimated that the Earth would be 33° colder without the greenhouse effect.
- The atmosphere allows most of the heat from the Sun to pass through it to warm the Earth's surface. Gasses then trap some reflected energy resulting in less heat escaping from the earth's atmosphere and increasing temperatures on earth.
- The enhanced greenhouse effect involves human activity increasing the layer of greenhouse gases which naturally exists.
- Activities that generate greenhouse gases include burning fossil fuels, transport, agriculture and deforestation.



Causes of Climate Change

Natural Causes of Climate Change

Human action is widely accepted as the current cause of climate change by scientists and experts. However, there are some historical natural contributors including:

Orbital changes - Milankovitch cycles are variations in the tilt/orbit of the Earth around the Sun, causing natural warming and cooling periods.

Volcanic activity - Carbon dioxide is released into the atmosphere during eruptions.

Solar output - The amount of radiation emitted by the Sun fluctuates. High levels of radiation lead to an increase in Earth's temperatures.

Human Causes of Climate Change

Burning fossil fuels - When coal, oil and gas are burned, carbon dioxide is released into the atmosphere.

Agriculture - Increased pastoral (animal) farming leads to more methane being released into the atmosphere.

Deforestation - Trees absorb carbon dioxide during photosynthesis. When trees are cut down, less carbon dioxide will be absorbed, leading to increased concentrations in the atmosphere.

Evidence of Climate Change

Weather records - Thermometers have been used to measure temperature since the 1850s accurately. This provides reliable, short-term data on climate change.

Tree Rings – Each year a tree grows, it forms a new ring. The width of the ring indicates the climatic conditions for the year. The thicker the ring, the warmer and wetter the climate for that year giving an indication of climatic conditions over time.

Ice Cores – Taken from ice caps by drilling into the ice. They can go back over 800,000 years. Trapped air bubbles tell use the temperature it was in each year.

Effects of Climate Change

Social effects

- Increased risk of disease such as skin cancers
- Crop yields affected – maize will decrease by up to 12% in South America.
- Drought reduces food and water supplies in sub-Saharan Africa. Water scarcity in the south and southeast of the UK.
- Flood risk increases, 70% of Asia at increased risk of flooding e.g. 2022 Pakistan floods.
- Extreme weather events become more intense e.g. tropical storms

Environmental effects

- Increased drought and risk of forest fires.
- Sea level rise includes flooding and erosion.
- Change in climate affects ecosystems.
- Coral bleaching and decrease in biodiversity.

Managing Climate Change

Mitigation

Alternative Energy Production

Developing renewable energy solutions such as wind, solar and tidal energy reduces our reliance on fossil fuel burning power stations. This helps reduce carbon dioxide emissions being released into the atmosphere.

Carbon Capture

Carbon capture involves reducing carbon dioxide emissions from fossil fuel-burning power stations. Carbon Dioxide is removed from waste gases. Once captured, the Carbon dioxide is then converted into a dense liquid that can be stored in safe locations

Planting Trees

Planting trees helps reduce the amount of carbon dioxide in the atmosphere as trees absorb it as part of photosynthesis.

International Agreements

International agreements encourage countries to take responsibility for reducing CO_2 emissions. Targets are more likely to be met if legally binding e.g. Paris 2015. However, financial support may be provided to LICs.

Adaptation

Changes in Agricultural Systems

Farmers respond to climate change by adapting their farming practices. This can include changing the type of crops they grow to those better suited to a warm climate, e.g. grapes. Areas at risk of desertification will need to change approaches to farming. Low-technology solutions to this include the use of stone lines.

Managing Water Supply

There may be a greater need for developing water transfer schemes. This involves moving water from areas of surplus (more water than is used) to areas of water deficit (not enough water). This can be achieved by building water transfer pipelines. An example of this is the Kielder water transfer scheme in the north-east of England

Reducing the Risk of Rising Sea Levels

This involves developing coastal defences to protect areas at risk of coastal flooding. These aim to reduce the risk of further land being eroded away. It is estimated that sea levels will rise between 28 and 43cm by 2100, putting settlements and valuable agricultural land at risk.