

**This week students will:**

1. Increase knowledge and awareness the impact of human decisions on the environment.
2. Learn about environmental impacts in terms of Carbon.
3. Learn the concepts of climate change and global warming.
4. Be encouraged to look at their individual behaviors.

**Learning outcomes****Year 3**

Geography ACHGK017

Digital Technologies ACTDIK007,  
ACTDIK008

**Year 4**

Science ACSSU073, ACSHE061, ACSHE062

Digital Technologies ACTDIK007,  
ACTDIK008

**Year 5**

Geography ACHGK029

Science ACSSU043, ACSHE217

**Year 6**

Science ACSSU094, ACSSU096,  
ACSHE098, ACSHE220

Mathematics ACMSP148

**Materials required:**

1. A tablet or smartphone.
2. Habitat the Game installed on the device.
3. Watch an animation on the greenhouse effect <http://www.epa.gov/climatechange/kids/basics/index.html>
4. Look through the learning resources at <http://www.epa.gov/climatechange/kids/impacts/signs/index.html>

**Activities:**

1. Open the app look go to your real world action page. Undertake some real world actions that you have done today. Look at your profile and see how much carbon you have saved. Work out how much carbon these simple actions have saved you. Which actions are saving the most carbon? Work out how much carbon your class would save if you collectively undertook these actions.
2. Climate Science
  - a) Draw a diagram that shows the make up of greenhouse gases in the world. Draw some of the things that contribute to these gases in your diagram.
  - b) Draw some of the signs of climate change eg Wild Weather
3. Climate Science and Geography
  - a) Pick a location in the world talk about how what are some of the changes due to climate change this area may see.

## Week 6 — Climate Science and Global Warming

Increases in carbon dioxide into the atmosphere can cause the temperature to rise. Humans create carbon dioxide in their everyday lives. In Habitat the Game we measure player's reduction in carbon dioxide every time they undertake an environmental action.

A recent study published in the journal Nature (2004) projected that at least a quarter of land animals and plants will be driven to extinction by 2050 if greenhouse gas emissions are not drastically reduced. The Intergovernmental Panel on Climate Change's (IPCC's) fourth assessment

report Climate Change 2007 predicts an even worse outcome; it states that 20-30% of species are likely to be at high risk of extinction with global warming of 1.5-2.5oC.

The IPCC report predicts global rises in temperature of 1.1-6.4oC by the end of the century based on current rates of greenhouse gas emissions.

Even if global emissions were to suddenly drop to zero, the earth will be 0.4oC hotter by 2050 regardless. (WWF Climate Change and species, author Dr Tammy Matson).

### So how does temperature rise?

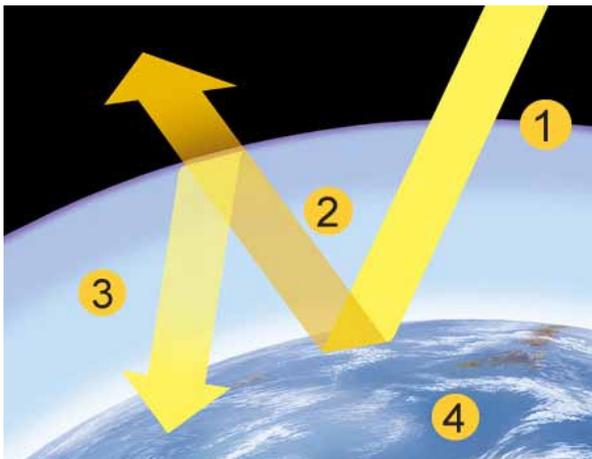
Greenhouse gases such as water vapour, methane and carbon dioxide stop heat escaping from the Earth into space. An increased greenhouse effect can lead to global warming and climate change.

### The greenhouse effect

Some gases in the Earth's atmosphere stop heat radiating into space from the Earth. This is called the greenhouse effect and the gases involved are called greenhouse gases. They include:

2. methane
3. water vapour
4. carbon dioxide.

The diagram shows how the greenhouse effect works.



5. Electromagnetic radiation at most wavelengths from the Sun passes through the Earth's atmosphere.
6. The Earth absorbs electromagnetic radiation with short wavelengths and so warms up. Heat is radiated from the Earth as longer wavelength infrared radiation.
7. Some of this infrared radiation is absorbed by greenhouse gases in the atmosphere.
8. The atmosphere warms up.

## Global warming

Some sources of greenhouse gases are natural and some are man-made. The table shows some of these sources.

Greenhouse gas	Natural source	Man-made source
Methane	Decomposing plant material	Rice paddy fields, cattle, coal mines
Water vapour	Evaporation from oceans, lakes and rivers	Burning hydrocarbon fuels
Carbon dioxide	Respiration by plants and animals, forest fires, volcanoes	Making cement, burning fossil fuels

The amount of man-made water vapour is insignificant compared to the amount of water vapour from natural sources. However, emissions of methane and carbon dioxide are contributing to increased global warming.

## Global warming

Human activities are causing the release of large amounts of carbon dioxide. These activities include:

deforestation — cutting down trees for fuel, farms, buildings and roads

increased use of energy (and so an increased use of fossil fuels).

As the percentage of carbon dioxide in the atmosphere has increased, so in general has the Earth's mean temperature.

## Climate change

Increased global warming will lead to climate change — changes in the average weather experienced over 30 years or more. Climate change may make it impossible to grow certain food crops in some regions. Melting polar ice, and the thermal expansion of sea water, could cause rising sea levels and the flooding of low-lying land.

## Difficulties

There is a good agreement between scientists about how the greenhouse effect works. However, there is less agreement about the extent to which human activities are causing an increased greenhouse effect, and so global warming with its associated climate change. The balance of scientific opinion is that human activities are to blame.

It is not just the release of carbon dioxide and methane that can contribute to global warming. Dust produced from factories goes into the atmosphere that reflects radiation back to the Earth and causing warming too.

However, it is not just human activities that can affect weather patterns and climate. Ash and gases released by volcanic eruptions also go into the atmosphere. They reflect radiation from the Sun back into space, causing cooling. This, and other effects, can make it difficult for scientists who study the atmosphere and global warming.

Reference: [http://www.bbc.co.uk/schools/gcsebitesize/science/ocr\\_gateway/energy\\_resources/global\\_warmingrev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/energy_resources/global_warmingrev1.shtml)