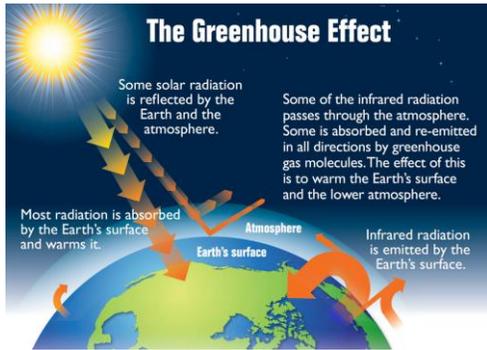


# THE EARTH'S FUTURE

Year 9

## Greenhouse Effect



Greenhouse gases make up only about 1% of the atmosphere. They act like the glass roof of a greenhouse – they trap heat and keep the planet warm. They let the Sun's light shine onto the Earth's surface, but they trap the heat that reflects back up into the atmosphere. This greenhouse effect keeps the Earth warm enough to sustain life. Scientists say that without the greenhouse effect, the average temperature of the Earth would drop from 15°C to as low as -18°C.

## What can we do about climate change?

In 2015, 178 countries agreed to these 17 Sustainable Development Goals.

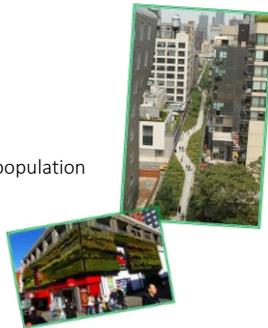


In 2016, the Paris Climate Agreement was agreed by 195 countries and will take effect from 2020. It includes:

## Sustainable City

A sustainable city offers a good quality of life to current residents but doesn't reduce the opportunities for future residents to enjoy.

- Solar, wind energy
- Lots of well-paid jobs
- Reliable public transport
- Enough services (Schools and doctors) for population
- Lots of green space
- Affordable housing



## Who is vulnerable to climate change –

Vulnerable = to be easily physically, emotionally, or mentally hurt or influenced

Those who live in poverty:

- Those who live in poverty do not have money available to be able to adapt to change such as drought
- Education is limited and therefore they may not know or understand what is happening and therefore cannot react to the change
- As the amount of diseases increase the healthcare will be unable to cope with the rising demand of people who require the service.

Other people are also vulnerable:

- Cities are becoming more vulnerable due to extreme levels of air pollution
- People who live on the coast are vulnerable to sea level rises
- Those with a lot of money may have to change their lifestyle and adapt to new ways of life

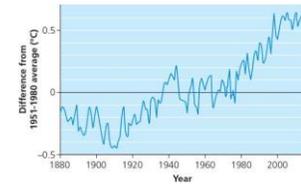
## What is the evidence for climate change?

The 20 warmest years on record have all come since 1995.

In the northern hemisphere since the beginning of the twentieth century, in the UK, summer rainfall is decreasing on average, while winter rainfall is increasing, leading to repeating patterns of summer drought and winter flooding.

The world's oceans are heating up as they absorb most of the extra heat being added to the climate system. Research suggests the global sea level has risen between 10 cm and 20 cm in the past 100 years.

Arctic sea ice has been declining since the late 1970s, reducing by about 4 per cent, or 0.6 million square kilometres



## Climate Change in UK

- Warmer global temperatures will cause glaciers and ice sheets to melt causing sea levels to rise and the loss of habitats and cities. For example London is expected to be submerged by 2050.
- Severe water shortages are expected as summers get drier and, by the 2050s
- Drought and reduced crop yields will cause food and water shortages in many areas. For example farms in the UK lost 20% of their crops in 2020.

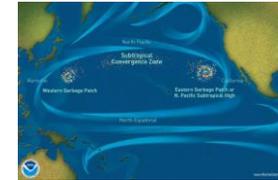
Two ocean currents in the Pacific cause a gyre (circular patterns of ocean currents) and trap plastic waste.

To reduce plastic in ocean

- Individuals
- Communities
- Wider world

Plastic takes hundreds of years to break down. For example, a plastic straw takes 200 years to breakdown. As it does it will turn into a microplastic which animals can then eat and bring into food chain.

## Plastic in Ocean



## What are the consequences of climate change?

- Rising maximum temperatures
- Rising sea levels
- Higher ocean temperatures
- An increase in hunger and water crises
- Health risks through rising air temperatures and heatwaves
- Increasing spread of pests causing increase in diseases such as malaria
- Loss of biodiversity as habitats destroyed
- Increase in time and intensity of monsoon season



## Causes of Climate Change:

Climate change is not new the world has been through a series of ice ages separated by periods of warming, called interglacial. Today, 97 per cent of scientists believe that human activity is to blame for this rise

### Physical Causes

- *Milankovitch Cycles* - The Earth's orbit can vary between being circular or more of an oval (elliptical) shape. These changes impact how much sunlight the Earth receives and can increase or decrease temperatures.
- *Volcanic Eruptions* - The ash and gases reach high up into the stratosphere and prevent some sunlight from reaching the Earth's surface. This means that the sunlight is reflected back into space which cools the Earth and lowers global temperatures.
- *Ocean Currents* - The changes in the patterns of these currents can lead to periods of warming (El Nino) and cooling (La Nina) around the Pacific Ocean

### Human Causes

- *Deforestation* - World-wide deforestation involves rainforest burning as well as clearing, which emits large amounts of CO2 into the atmosphere as well as reducing the amount of trees to absorb CO2.
- *Agriculture* - The amount of land needed for crop production has increased due to world population growth.
- *Use of fossil fuels* - The use of fossil fuels such as coal, oil and gas has been increasing as the world's population grows. The burning of these fuels for industry, transport and energy has led to a significant increase in CO2 levels across the globe.

## Sustainable tourism

Eco-tourism – Tourism which aims to be sustainable and educate the tourists about conservation

### Campi ya Kanzi

An award-winning boutique eco-lodge

- Everything is built by employing local Maasai people, teaching them how to build, only using local materials, and not cutting a single tree.
- Electricity created by solar panels
- They recycle gray (water already been used) by filtering it and then the water is then used in ponds for the wildlife.



## Key words:

**Adaptation** - Action that helps cope with the effects of climate change - for example construction of barriers to protect against rising sea levels, or conversion to crops capable of surviving high temperatures and drought.

**Agriculture** – The practise of farming

**Carbon dioxide (CO<sub>2</sub>)** - a gas in the Earth's atmosphere. It occurs naturally and is also a by-product of human activities such as burning fossil fuels. It is the principal greenhouse gas produced by human activity

**Climate** - is the typical weather conditions in an entire region for over 30 years.

**Climate Change** - when changes in Earth's climate system result in new weather patterns that last for at least a few decades

**Deforestation** - The permanent removal of standing forests that can lead to significant levels of carbon dioxide emissions.

**Development** – The processes of becoming 'better'

**Extreme Weather** - a weather event is significantly different from the average or usual weather pattern.

**Fossil fuels** - Natural resources, such as coal, oil and natural gas, containing hydrocarbons. These fuels are formed in the Earth over millions of years and produce carbon dioxide when burnt.

**Global warming** - The steady rise in global average temperature in recent decades, which experts believe is largely caused by man-made greenhouse gas emissions.

**Greenhouse effect** - The insulating effect of certain gases in the atmosphere, which allow solar radiation to warm the earth and then prevent some of the heat from escaping.

**Microplastic** = tiny pieces of non-biodegradable plastic

**Bio-degradable** = able to break down

**Milankovitch cycle** - a cyclical movement related to the Earth's orbit around the Sun

**Mitigation** - the action of reducing the severity

**NEE**- New Emerging Economy – Eg: China

**Carbon footprint** - The amount of carbon emitted by an individual or organisation in a given period of time, or the amount of carbon emitted during the manufacture of a product

**Precipitation** - rain, snow, sleet, or hail that falls to or condenses on the ground.

**Renewable energy**- Is energy created from sources that can be replenished in a short period of time. The five renewable sources used most often are: biomass (such as wood and biogas), the movement of water, geothermal (heat from within the earth), wind, and solar.

**Sustainable**- Meeting the needs of the present without compromising future generations to meet their needs

**Weather** -The state of the atmosphere with regard to temperature, cloudiness, rainfall, wind and other meteorological conditions on a day to day basis.

## Revision Tasks:

- Make a mindmap/ poster/ revision cards/notes/ presentation/ song/ answer the following questions.

1. Define climate change
2. Define greenhouse gases
3. Cities in which part of the world are predicted to be the worst affected by the effects of flooding caused by global warming?
4. What name is given to the impact that each of us has on the planet through our actions and our lifestyle?
5. How many years of average weather does climate take into consideration?
6. What is sustainable travel?
7. List two positive changes and two negative changes for the UK, which are consequences of climate change.
8. Define sustainability.
9. Describe the evidence of climate change
10. Describe the distribution of predicted global temperature change (use the map on the other side)
11. Where is plastic in the ocean likely to end up?
12. Explain two human causes of climate change
13. Explain why an increase in global temperatures is leading to an increase in rainfall around the world.
14. Explain why sea levels are rising, and how this is an indicator of climate change.
15. Using figure 1, explain why climate change is a controversial issue
16. Discuss who is the most vulnerable to climate change
17. Evaluate whether climate change is a natural or human induced issue.
18. Suggest how each of the following people is likely to feel about climate change:
  - a. A farmer in the Midlands
  - b. A resident in York, living next to the river
  - c. A hotel owner on the south coast of England
19. Assess whether the UK should be worried about climate change.
20. Identify what the sustainable development goals are trying to achieve
21. Describe the features of a sustainable city.
22. Using a diagram, explain the greenhouse effect.
23. Evaluate whether the future for the planet lies in doing nothing, adapting and mitigating.
24. In 2017, the USA withdrew from the Paris Agreement. President Trump said 'The Paris Accord will undermine (the US) economy,' and 'puts (the US) at a permanent disadvantage.' Explain what he meant by this and what new problems this creates for the world.

Figure 1:



We can't destroy the competitiveness of our factories in order to prepare for non-existent global warming. China is thrilled with us!



We are the first generation to be able to end poverty, and the last generation that can take steps to avoid the worst impacts of climate change. Future generations will judge us harshly if we fail to uphold our moral and historical responsibilities.

## Command Words:

**Analyse** - Take apart an idea, concept or statement and criticise it.

**Assess** - Come to a conclusion about the overall value or significance of something; discuss its positive and negative aspects to show balance.

**Compare** - Identify similarities and differences.

**Define** - State the meaning of an idea or concept.

**Describe** - Set out the main characteristics of something; DON'T EXPLAIN.

**Discuss** - Set out both sides of an argument (for and against) and come to a conclusion; there should be some evidence of balance.

**Evaluate** - Make a judgement about the effectiveness of something; discuss its strengths **and** weaknesses and come to a conclusion about its overall success or importance.

**Explain** - Give reasons why something happens.

**Give** - Produce an answer from recall.

**Justify** - Support an idea or argument with evidence; for the outcome chosen, the positives must outweigh the negatives.

**State** = name