



# Managing Climate Change

## Teachers notes

These lesson objectives are intended for the **KS3 Geography curriculum**, specifically focusing on the topic of **weather and climate**. However, the content can be tailored to suit different key stages, accommodating varying levels of prior knowledge and understanding.

The lesson on **Managing Climate Change** can be worked through at any pace, and it can be split into multiple lessons if needed. This flexibility allows you to adjust the flow based on the class's understanding and time constraints. If some sections require more in-depth exploration, feel free to extend them over additional lessons to ensure students fully grasp the concepts before moving on.

The worksheets can be filled in during the lesson, as homework, or in individual sections, depending on the pace of the lesson.

### Lesson Aim:

To understand the difference between mitigation and adaptation and explore real-world strategies used in the UK for managing climate change.

### Lesson Objectives:

- Understand the difference between mitigation and adaptation to manage climate change.
- Explore real-world strategies used in the UK.

### Assumed Prior knowledge:

- Basic understanding of climate change – Students should be familiar with what climate change is, its causes, and its global impact.
- Impacts of climate change – Students should have an understanding of the social, economic, and environmental impacts of climate change (as covered in a previous lesson).
- Understanding of environmental concepts – Familiarity with key terms such as greenhouse gases, global warming, and carbon footprint will help students grasp the content more easily.

### Resources:

- Lesson 8 worksheet
- Mini whiteboards and pen
- 2 different coloured highlighters or colouring pencils.

All the blank worksheets for this lesson can be found as a separate download within the 'Lesson 8' page of The Flood Hub KS3 Geography Weather and Climate Learning section. The answers for the worksheets can be found at the end of this document.



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## Notes for Each Slide:

Teachers should decide what students should copy into their workbooks. While most content is provided on the worksheet, any additional information can be recorded in the workbooks.

### Slide 1 - Learning Objectives

- Slide containing the aims and objectives of the lesson. Read these to the class to clarify the focus and expectations for the session.

### Slide 2 - Starter Activity

- Have whiteboards and pens ready for each student.
- Ask students to write down what they do in their own lives to reduce the impacts of climate change?
- Look for terms such as: recycling, reducing waste, energy efficiency, using public transport, walking or cycling, turning off lights, reducing water usage, eating less meat, using less plastic, planting trees, supporting renewable energy, reusing items, conserving energy, reducing carbon footprint.

### Slide 3- Mitigation and Adaption Definitions

- Explain to the students: Climate change strategies are divided into two main categories: mitigation and adaptation.
- Read the definitions aloud:
  - Mitigation: Actions to reduce or stop greenhouse gas emissions to slow down climate change.
  - Adaptation: Actions to adjust to the effects of climate change that are already happening or are expected in the future.
- Key things to mention:
  - Mitigation: Focuses on preventing climate change by cutting emissions (e.g., renewable energy).
  - Adaptation: Focuses on adjusting to the changes that have already happened (e.g., building flood defences).

### Slide 4- Fill in the Blanks: Adaptation and Mitigation Definitions

- **TASK:** Instruction to students: Ask students to fill in the blanks on their worksheet to complete the definitions of adaptation and mitigation.
- Emphasise that adaptation refers to adjusting to the effects of climate change, while mitigation focuses on reducing or preventing further climate change.
- Go through the definitions with the class, ensuring that everyone has the terms in the correct spot and that the definitions are clear and accurate.

### Slide 5 - Ongoing Task: Case Studies and Examples

- **TASK:** Tell students to write down any examples or case studies of mitigation or adaptation strategies that are mentioned throughout the presentation. They should add these to the mind map section of their worksheet.

### Slide 6 - Mitigation Definition

- Introduce the definition of mitigation again and ask students if they can think of any examples of mitigation strategies.
- Explain that the next slides will focus on different techniques for mitigation, such as renewable energy and reforestation. Let students know that they will be exploring real-world examples in the UK.



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## Slide 7 - Renewable Energy Sources

- Introduce the concept of renewable energy and explain how it is a key part of mitigation strategies. Highlight that renewable energy is energy that is produced from sources that naturally replenish.
- Examples to include:
  - Solar Energy: Solar panels capture sunlight and convert it into electricity. It is a clean energy source with low carbon emissions.
  - Wind Energy: Wind turbines convert wind into electricity. It is one of the most common renewable energy sources, particularly in coastal areas.
  - Geothermal Energy: This involves using heat from the Earth's core to generate power. It is most effective in regions with volcanic activity.
  - Hydroelectric Power: This uses the flow of water to generate electricity. Dams are often built on rivers to control water flow and produce energy.

## Slide 8 - Why is Renewable Energy Important?

- Read aloud the points on the slide. Then explain that renewable energy plays a crucial role in reducing the impacts of climate change and why it is a preferred alternative to fossil fuels.
- Discussion Points:
  - Reduces Greenhouse Gas Emissions: Explain that unlike fossil fuels, renewable energy doesn't produce harmful gases like carbon dioxide (CO<sub>2</sub>) that contribute to global warming.
  - Finite Fossil Fuels: Make sure to mention that fossil fuels (like coal, oil, and natural gas) are finite resources—they won't last forever. Renewable energy sources are sustainable and can be used again and again.
  - Cleaner and Sustainable: Highlight that using renewable energy doesn't pollute the air, making it much cleaner than burning fossil fuels, and it helps protect ecosystems.
  - Helps Fight Climate Change: Stress that switching to renewable energy reduces our reliance on fossil fuels, helping lower global temperatures and fighting climate change.

## Slide 9 - Hornsea One Offshore Wind Farm

- Introduce Hornsea One as the UK's largest offshore wind farm and explain why it's important for renewable energy.
- Ask students to consider how renewable energy projects like Hornsea One could impact local communities, wildlife, and the economy.
- Make sure to emphasise that large-scale renewable energy projects like Hornsea One are part of the UK's strategy to meet climate goals and reduce its environmental impact.
- Make sure students add this example to their mitigation mind map.

## Slide 10 - Carbon Capture and Storage (CCS)

- Explain CCS: A method to capture CO<sub>2</sub> emissions from industries and power generation, preventing it from entering the atmosphere.
- Steps:
  - Capture CO<sub>2</sub> from industrial processes or burning fossil fuels.
  - Transport it to a storage site.
  - Store CO<sub>2</sub> deep underground.

## Slide 11 - Why is CCS Important?

- Reduces CO<sub>2</sub> emissions: Prevents large amounts of CO<sub>2</sub> from contributing to climate change.
- Supports industries: Helps industries reduce their environmental impact while continuing operations.
- Meets climate targets: CCS is essential for achieving net-zero emissions.



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## Slide 12 - Fact File: Zero Carbon Humber Project

- Read the information on the project to the students.
- Explain how this project helps reduce CO<sub>2</sub> emissions by capturing and storing them underground.
- Make sure students add this example to their mitigation mind map.

## Slide 13 - Reforestation and Afforestation

- Introduce the concept of reforestation to the class.
- Explain that reforestation involves planting trees to absorb CO<sub>2</sub> and help combat climate change.
- Emphasise additional benefits of trees, such as preventing soil erosion, improving biodiversity, and providing habitats for wildlife.

## Slide 14 - The Northern Forest project

- Introduce The Northern Forest project and its goal to plant 50 million trees by 2050.
- Explain how the project helps tackle climate change by absorbing CO<sub>2</sub> and reducing flooding through better water drainage.
- Highlight the additional benefits of promoting biodiversity and improving local communities' quality of life.
- Ask students to add this example to their mitigation mind map.

## Slide 15 - Adaption Definition

- Introduce the definition of adaptation to students, explaining how it involves adjusting to the impacts of climate change rather than preventing it.
- Ask students if they can think of any examples of adaptation strategies.
- Explain that the following slides will focus on different adaptation techniques, such as flood defences, drought-resistant crops, and reforestation.

## Slide 16 - Flood Defences

- Read the slide aloud to the students and explain the different types of flood defences.
- Discuss the following flood defences:
  - Sea walls: Strong walls built along coastlines to protect areas from rising sea levels and storm surges.
  - Flood barriers: Large structures that can be put in place during heavy rainfall or high tides to prevent flooding in vulnerable areas.
  - Dikes: Similar to sea walls, but specifically built along rivers or coasts to keep water out of low-lying areas.
- Emphasise how these defences are used in the UK to protect communities from the impacts of climate change.

## Slide 17 - Why are Flood Defences Important in Climate Change Adaptation

- Explain that flood defences protect homes, businesses, and communities from flooding due to rising sea levels and severe storms.
- Emphasise that, with climate change causing more flooding, these defences are crucial.
- Highlight that they reduce damage, help keep farmland safe, and ensure people can stay in flood-prone areas.
- Flood defences also save long-term costs by minimising flood damage.



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## Slide 18 - Flood Defences in the UK

- Read through the examples of UK flood defences, highlighting their purpose and locations.
- Encourage students to add these examples to their mind maps:
  - Thames Barrier (London): Protects the city from storm surges and rising sea levels.
  - Hull Tidal Surge Barrier: Helps prevent coastal flooding in a vulnerable area.
  - Managed Retreat (Essex, Medmerry in Sussex): Instead of building walls, land is allowed to flood naturally.
- Remind students to add any local flood defences they may know to their mind maps as well.

## Slide 19 - Drought-Resistant Crops

- Read through the slide and discuss how these crops are adapted to survive with less water.
- Discussion Points:
  - How could drought-resistant crops help farmers in dry regions?
  - Why is it important to reduce water usage in farming?
  - What might be some challenges with growing drought-resistant crops?

## Slide 20 - Drought-Resistant Crops Fact File

- Read through the example of drought-resistant crops in East Anglia and explain how these crops are helping farmers in drier conditions.
- Ask students to add this example to their adaptation mind map

## Slide 21 - Sustainable Drainage Systems (SuDS)

- Explain SuDS: designed to manage rainwater, reduce flood risk, and benefit the environment.
- Discuss examples: green roofs, rain gardens, permeable pavements, wetlands/ponds.

## Slide 22 - Manchester Sponge City Approach

- Read the key points on the slide and explain map that Manchester is using this approach to tackle increased rainfall and flooding caused by climate change.
- Ensure students add this example to their mind map.

## Slide 23 - Categorising Strategies Activity

- **TASK:** Instruct students to use two different colours to highlight mitigation and adaptation strategies on their worksheet.
- Remind them to colour in the key at the top so it's clear which colour represents each type.

## Slide 24 - Debate: Should the UK invest more in adaptation or mitigation?

- Hold a class discussion on whether the UK should prioritise adaptation or mitigation.
- Encourage students to consider both sides. Possible discussion points:
  - Mitigation: Reduces future climate change impacts, lowers emissions, and helps global efforts.
  - Adaptation: Protects communities from immediate threats like flooding and heatwaves.
  - Balance: Should we focus on both? Are some areas more in need of one than the other?
  - Cost & Feasibility: Which strategies are more affordable and practical in the long term?

## Slide 25 - Homework Task

- Read through the task with students and check they understand: 'Should the UK invest more in adaptation or mitigation to tackle climate change?'
- Students should write a paragraph explaining their answer, using examples from the lesson.



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## Fill the blanks:

**Mitigation** aims to reduce the causes of climate change by reducing greenhouse gas emissions. This includes switching to renewable energy and planting more trees.

**Adaptation** focuses on adjusting to the effects of climate change. This includes building flood defences to protect against rising sea levels and using drought-resistant crops to withstand drought.

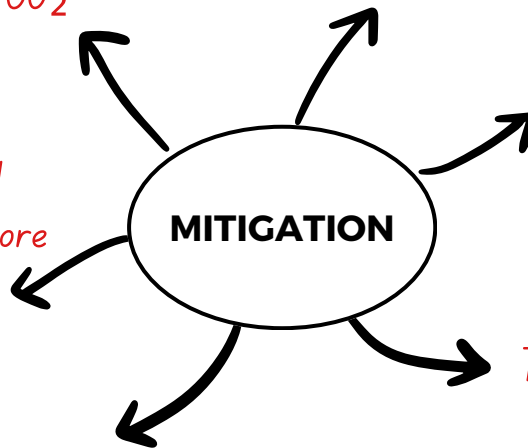
## Examples in the UK:

On your mind maps, write down any examples of mitigation or adaption we come across in the lesson.

Northern Forest Reforestation Project  
- Planting trees to absorb CO<sub>2</sub>

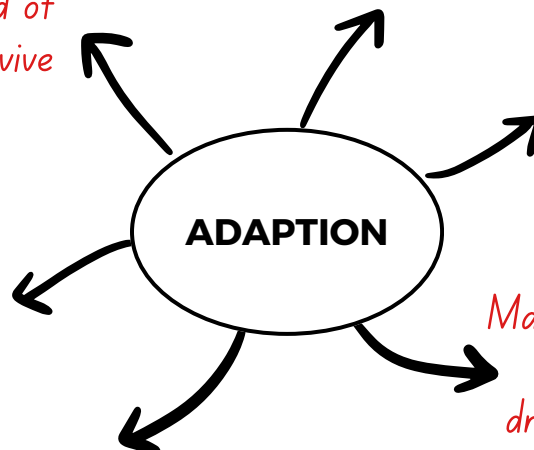
Carbon Capture & Storage (Zero Carbon Humber) - Storing CO<sub>2</sub> underground

Hornsea One Offshore Wind Farm - The UK's largest offshore wind farm, generating clean energy



Electric Vehicles & Public Transport - Reducing reliance on fossil fuels

Managed Retreat (Essex, Medmerry in Sussex) - Allowing land to flood naturally instead of using hard defences that survive with less water



Drought-Resistant Crops (East Anglia) - Growing crops that survive with less water

Thames Barrier (London) - Protects against rising sea levels and storm surges

Manchester Sponge City Approach - Using green spaces and drainage to absorb excess water

Hull Tidal Surge Barrier - Prevents flooding in vulnerable coastal areas



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Colour code the climate change strategies into the correct category:

**Adaptation** (learning to live with climate change)

**Mitigation** (reducing the causes of climate change)

Building sea walls and flood barriers to protect coastal communities.	Using drought-resistant crops to cope with drier conditions.	Planting more trees to absorb carbon dioxide (reforestation).
Expanding offshore wind farms to reduce reliance on fossil fuels.	Improving public transport to reduce car emissions.	Constructing homes on stilts in flood-prone areas.
Creating sustainable drainage systems (SuDS) to prevent flooding.	Developing carbon capture and storage technology.	Raising roads and railways to prevent disruption from flooding.
Switching to electric vehicles to cut down on air pollution.	Increasing green spaces in cities to reduce the urban heat effect.	Installing solar panels on homes and businesses.
Encouraging people to cycle or walk instead of driving.	Introducing early warning systems for extreme weather events.	Building reservoirs to store water for future droughts.

**Should the UK invest more in adaptation or mitigation? Explain your answer with examples.**

*The UK should invest more in adaptation because climate change is already happening, and we need to protect communities. For example, flood defences like the Thames Barrier help prevent damage from rising sea levels. Drought-resistant crops in East Anglia also ensure food production despite changing weather. While mitigation is important, adaptation directly helps people cope with the impacts we are already facing.*

Or they could argue for mitigation instead:

*The UK should focus on mitigation to slow down climate change and prevent worse impacts in the future. Investing in renewable energy like offshore wind farms reduces greenhouse gas emissions. Reforestation projects, such as in the Scottish Highlands, absorb CO<sub>2</sub>. Without strong mitigation, climate change will continue to worsen, making adaptation even more expensive and difficult.*