

Climate change?

The comments below are from people who have been asked the question: 'What does climate change mean to you?'. Cut out the cards and sort them into groups that make sense to you. These could be groups depending on:

- whether you agree with what is said or not,
- whether what is said is true - or not,
- whether you already know this or it is something new to you,
- or any of your own ideas.

There are blank spaces to add your own ideas.



We can all do our bit to slow down climate change.



Climate change means more floods in this country.



Some people will be more affected by climate change than others.



Many species of animals and plants will become extinct because of climate change.



It's all a con - climate change isn't really happening! It's just an excuse for the government to raise taxes on petrol!



Climate change is caused by other countries like China and the USA burning too much fossil fuel. There's nothing we can do anyway.





The scientists will solve this problem. We should not worry too much - life is too short!



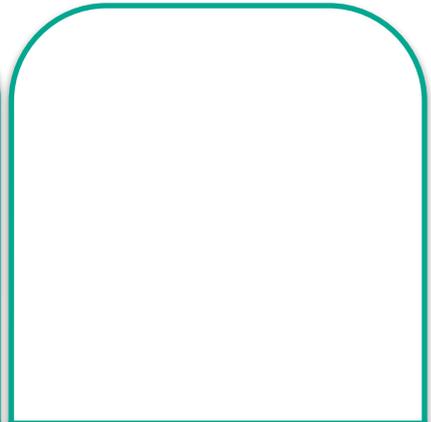
Food will get more expensive because farmers will not be able to predict the weather.



Climate change won't really affect me - but I'm glad I won't be around in the year 2114 when the effects become noticeable.



Climate change won't really affect us in the UK - except the winters might get a bit warmer and the summers a bit drier.



Climate change - everyone has an opinion but what do we really know? And what can be backed up by evidence? One way to find something out is to look on the internet - but how can you be sure you will find anything useful?

1 Construct better searches

Go for simple search terms and use up to 4 words. Do not bother with words like 'the' or 'a'.

Search term	Finds pages containing	For example...
climate	the word 'climate'	Nearly a billion pages with many of the top references about what weather you can expect on your holiday in far flung places!
climate change	the words 'climate' AND 'change'	Over a billion pages now but many of the top ones do seem to be about climate change. Of course, when you get there you may not trust what you see!
climate OR change	either 'climate' OR 'change'	Over a billion pages - but one of the top ones is about how to develop online petitions!

2 Don't always pick the top reference

Sometimes the most popular references are not the most useful. Look over a number of pages before you pick the one you want. Sometimes a search will take you to a page that might link to other useful pages. Online encyclopaedias like wikipedia are particularly useful in this way.

3 Add more terms

Notice that the more terms you add the smaller the number of pages found. This can help to narrow down your results and bring more relevant ones to the top.

4 Give up!

If you are getting no useful results don't be frightened to start again with a new search term. If you can't see anything useful within about three pages its probably better to start again.

5 Keep records!

There's no point in finding useful information and then losing it again! Many browsers have a bookmark feature which lets you find a page again by clicking on a link. In Safari on MacOS the key is ⌘ and D

Or you could keep notes in a text file. Have a column for the URL (copy this from the address bar) and add notes in the next row of the table.

Do not just copy and paste lots of pages - you will never have time to read them all!

URL	Notes
practicalaction.org/food-and-agriculture	Useful information about Practical Action projects all over the world. There's some great stuff on climate change here!

Name:

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Gathering information from textbooks or the internet is not always easy. Don't just copy and paste lots of text and pictures into a folder! One way to organise your information as you collect it is to keep a journal. This shows the headings a journal might have. Use it to build your own learning journal about climate change and its effects.

Source	
Where did I find this out?	Does it seem a reliable source?
What evidence makes me think this is true?	
What did I find out?	
This was new ...	This was surprising ...
This I understand ...	This I need to find out more about ...
What will I do next?	
People who could help	Possible sources of more information
Anything that does not fit in the boxes above	

Name:

Class:

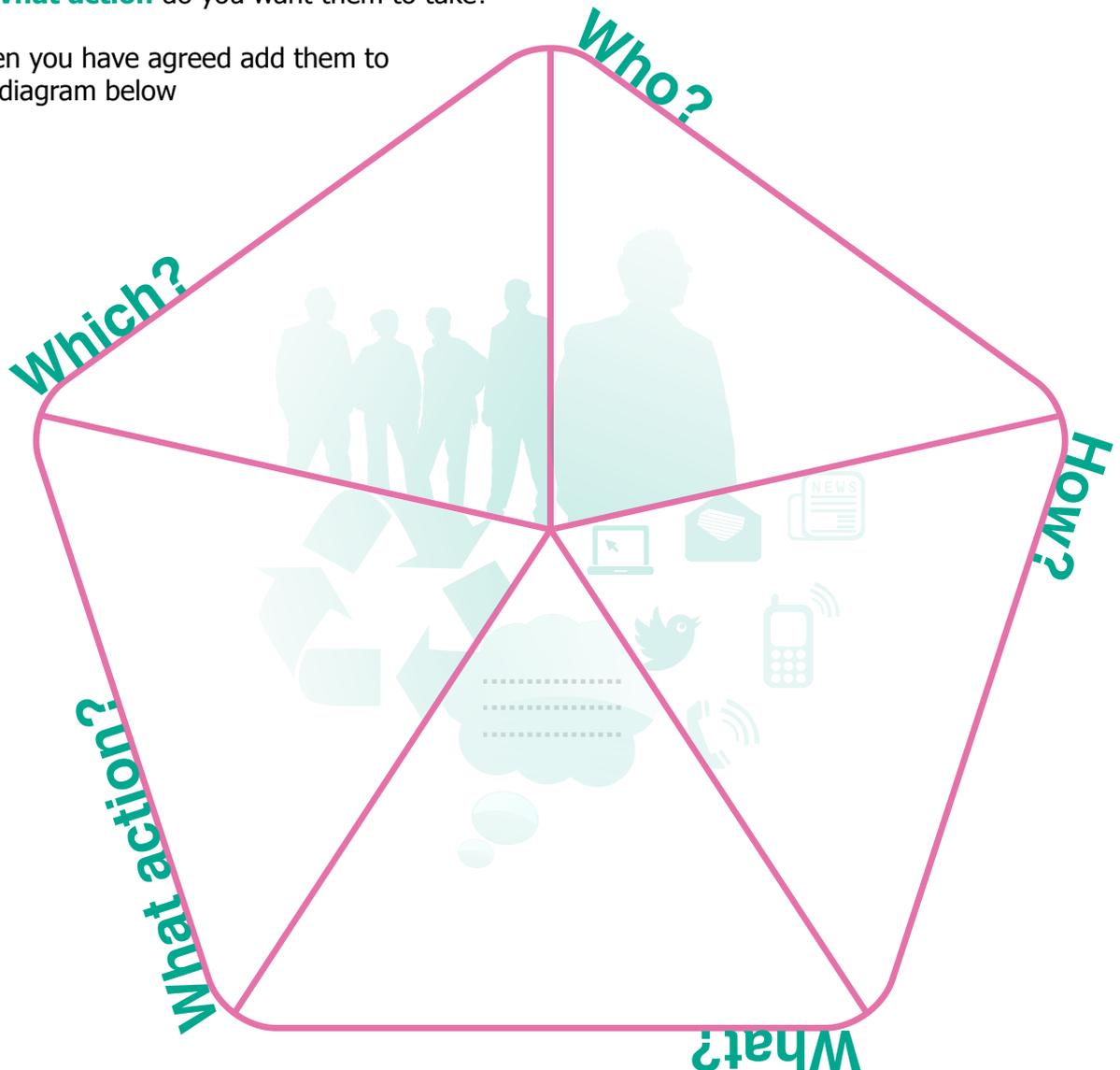
Date:

Climate change is a complex topic. You are now experts on climate change and how it affects people across the planet. How can you convince others the harm it is doing and that they need to take action.

In your groups, identify different groups of people who can make a real difference to reducing climate change. Then decide what you think you need to tell them about that will make them change their behaviour. This will be different depending on which group you choose. Then tell them exactly what action you want them to take to reduce climate change. Think about:

- **Which** groups of people can make a real difference in reducing climate change?
- **Who** will your campaign focus on?
- **How** will you reach them?
- **What** will you tell them to make them want to take action?
- **What action** do you want them to take?

When you have agreed add them to the diagram below



Wild weather

Spreading the word!

Name:

Class:

Date:

Prepare a document that will support your campaign about global warming. Make sure it fits in with the targets you have identified in your pentagon diagram. The examples below might give you some ideas.

A comic strip for children at primary school explaining about how fumes from cars, lorries and buses contribute to global warming. The comic would encourage them to walk to school instead of being brought by car.

A briefing document for a campaign group who want to convince the local council to adopt a low-carbon policy to reduce their energy usage at work e.g. printing less, recycling batteries, not using air-conditioning.

A leaflet to hand out to shoppers at a local shopping mall. The leaflet explains what causes global warming and how people can change things they can do (particularly when shopping!) to help reduce the problem.



Making a change

As well as trying to influence others can you make a change in your own life and environment? If you want to, write down an action that you will take in the box below.

My Climate Change Action:

Signed Date

Name:

Class:

Date:

Watch the video clip from IFAD about farming in Bangladesh and climate change.

[youtube.com/embed/auFoBr1Paqs?rel=0](https://www.youtube.com/embed/auFoBr1Paqs?rel=0)

Now see how many questions you can answer.



1. How much land will be submerged as a result of sea level rise in Bangladesh?

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2. How many people will this affect?

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3. Give two problems which the farmers of Bangladesh have to face because of climate change.

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4. What is the name for the fine particles of rock carried in a river that make it look brown and muddy?

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5. Sluices on the coastal dams prevent seawater flowing into the rivers. Why is this important?

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6. What is the main crop grown in this area?

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7. A new variety of rice has been developed that has two benefits. What are these?

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8. Suggest two ways the government and scientists are helping to protect the farmers in this area from the effects of climate change.

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Wild weather

Salted seedlings

Deepak has a problem - the sea keeps getting into his fields. The salt in the seawater damages the plants. As sea levels rise the problem can only get worse.

One solution may be to find crops that can survive a dose of seawater. Deepak could then grow these.



Plan an investigation

Plan and carry out an investigation into the effect of seawater on seed germination and growth. To help you to start planning your investigation here are a few thoughts from other scientists working in the area.

Can we find a way to assess how well the seeds germinate - not just if they do or not? Even after flooding the farmers can get some crops.

We could wet some seeds with seawater and see if they germinate?

How will we know the seeds we use are alive? If they don't germinate it might be that they are dead anyway?

How much salt should we use? Is a little OK but a lot will kill the seeds? And what's the best way to measure how much salt we add?

How will we analyse our results? Maybe draw a graph or chart?

I know seawater is about 3.5% salt in water.

Wild weather

Flooding and floating

Here are some of the ways in which scientists and engineers have worked with people to develop technologies that help with the effects of flooding.

Floating gardens

Floating gardens allow people to grow food on rafts that float when the floods arrive. They do not require large building projects like dams and flood barriers. The floating gardens give them somewhere to grow plants during the wet season that can then be planted out when the dry season comes.



Weaving bamboo and hyacinth to make a raft



Covering the raft with soil, compost and cow dung

Floating gardens in Bangladesh are made from rafts of water hyacinth. These plants grow very rapidly in the wet season and are normally seen as weeds!

A mat of bamboo canes holds the water hyacinth plants together. Soil and fertiliser are added on top and then the seeds are planted in small balls of fertiliser directly into the rafts. The seeds germinate and the plants develop into healthy seedlings with a good supply of water. As the water levels fall in the dry season the rafts settle on the ground allowing the farmers to transplant the plants or to leave them where they are to grow.

Dams and dykes

Dams can be built to protect the land from seawater flooding. They prevent seawater from flowing upstream to damage fields in low-lying land in Bangladesh. The farmers can plant their seedlings and know that they will not be washed away.

But dams and dykes need large government investment. This takes time and is beyond the means of many poor farmers. The dykes also need maintenance and must be high enough to cope with not just this year's flooding but also the rising sea levels, due to climate change, that will come in the next 20 years. They also do not protect against flood waters coming down from the rivers draining water from the higher ground.



A dyke in Bangladesh

Name:

Class:

Date:

Questions

1. Which flood defence system costs the most to build?

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2. Which system protects against incoming seawater from high sea levels?

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3. Which system would be easier to build quickly?

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4. You are an advisor to the Bangladeshi government on flooding. Which technologies would you suggest they could encourage farmers to use?

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5. You work for an international development organisation that helps people in coastal areas cope with the effects of climate change. Which technologies would you suggest farmers in these regions use and why?

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Bidding for research

Science and Technology can be used to address problems faced by farmers around the world. Often only a relatively small amount of research and investment is needed to develop solutions.

Here are some problems faced by farmers which could be solved by further scientific research.

Which one would you choose to work on?

We've tried micro-irrigation but the water never seems to get to the end of the distribution pipes. It comes out very quickly near the reservoir but barely dribbles out at the far end. Do we just need more reservoirs and shorter pipes? Would fatter pipes help? Or different sized holes near the reservoir? Or should we just give up with micro-irrigation altogether?

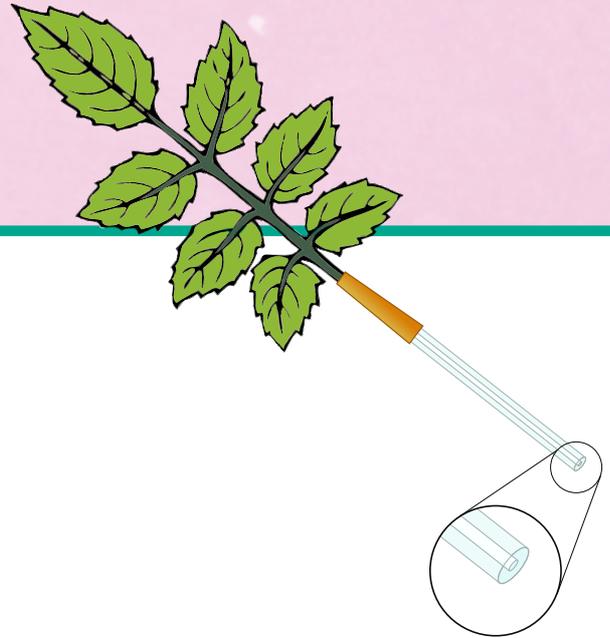
Our land gets flooded by sea water more and more often. Even after the waters have receded our crops just don't seem to grow well. But my neighbour seems to have much more luck - his crops grow much better. We think its something to do with the type of rice he grows (he uses seeds from his father's farm). Can we find rice varieties that can cope with flooding?

We get heavy downpours of rain that seems to run straight over the surface of the ground into the rivers and cause floods downstream. A few days later and we're almost as dry as before the rains came! We're looking at ridges of soil in our fields to hold the water there until it can sink into the ground a bit. But how tall do these ridges need to be? How wide? And how quickly will the water get through the soil?

Making your bid

Prepare a poster to show:

- the research you think needs to be done (what do you want to find out?)
- how you will do this research (how will you find out?)
- what data will you be able to collect and how long will it take?
- how the results from the research will be applied to improve people's ability to cope with climate change



The diagram shows a potometer. This is a piece of equipment that shows how quickly water evaporates from a leafy twig.

1. Put the potometer and leafy twig underwater.
2. Cut the twig so that it fits tightly into the rubber tube at the top of the potometer.
3. Lift the twig out of the water and fix it upright. Dry the wet leaves gently with a paper towel. The water should stay in the capillary tubing - if it dribbles out there is a leak between the twig and the rubber tubing so start again.
4. The water column in the capillary tubing should move slowly towards the leafy twig. To push the end back towards the bottom, dip the open end in a beaker of water and squeeze gently on the rubber tubing. This pushes the air out of the capillary. Release the pressure on the tubing and fresh water will be sucked into the capillary.

The water column in the capillary tubing is sucked into the twig as water evaporates from the leaves. The faster water transpires from the leaf the quicker the end of the water column will move.

What's the real problem?

What do people who grow the crops think is the real problem? No water - of course! But what conditions make plants wilt most quickly and so need more water to grow? Here are some ideas you could test.

It's the wind. When the wind blows - even if its a cool wind - I can almost see my crops wilting!

Heat! The plants always suffer when the temperature rises - particularly during the midday sun.

We are growing the wrong crops! With climate change we should change to new types of plants. Not all plants have the same rate of water loss you know. But which plants lose less water in hot, dry conditions?

More leaves mean more water is needed. If we had crops that could still make food with fewer leaves we would need less water. Or leaves that are smaller? Or leaves that are waxy?

Name:

Class:

Date:

The table below shows the yield from tomato plants grown in a dry area. Some were irrigated and had enough water all of the time but in some cases the irrigation failed.

Watering regime	Eventual yield of fruit / kg
Never allowed to wilt	20.4
Allowed to wilt once before fruit formed	18.3
Allowed to wilt once after fruit formed	17.5
Allowed to wilt often	14.8

Table 1: Yield of tomato plants given different amounts of water.

1. What percentage increase in tomato yield does good irrigation provide?

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2. If you have a limited amount of water (so the plant will wilt at some point) when is the best time to irrigate the plant? Give a reason for your answer.

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3. The amount of water needed by different plants varies. Suggest some plants that need very little water - this is a chance for you to use any background knowledge you have to come up with some predictions.

Plants which can cope with dry areas	Reasons why I think these might work well

Name:

Class:

Date:

Micro-irrigation uses small pipes to distribute small amounts of water directly to the plants. Rainwater is collected and then poured into a large container held on a wooden stage about 1 metre above the ground to feed the pipes. The photograph here shows a micro-irrigation scheme in Kenya.



In traditional open-channel irrigation the water flows along channels near the fields. The photograph here shows concrete channels running alongside fields near Guilin in China. Water can then be pumped out of the channels into the fields when needed. Sometimes the channels are not made of concrete so the water can just leak into the soil in the fields without any need for pumps.

Questions

1. Give two advantages of a micro-irrigation system over the open channel system for areas that are very dry.

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2. Why is the water reservoir in the micro-irrigation system lifted above the ground?

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3. The water entering the pipes of the micro-irrigation system is filtered. Why?

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