

Activity Guidance

There will be rain

Introduction

This activity enables teachers to introduce the work of the Environment Agency into their lessons and deliver elements of the National Curriculum. The main part of the activity is a design challenge for the pupils highlighting how the Environment Agency solve flooding problems.

It is designed to be delivered either by a teacher or an Environment Agency STEM Ambassador (if one is available) can deliver this session together with a teacher.



Topic | Flood management



User Teacher



Age group Ages 11 - 16



Length of activity 50 - 60 mins



Subjects Biology, Chemistry, Geography

At the end of this activity pupils should be able to do the following:

- Describe flooding
- Explain causes of flooding
- Explain the link between climate change and flooding
- Describe the role of the Environment Agency
- Evaluate the design of a model to see if it can be improved
- Build a model of Natural Flood Management

> What is the activity about and how to organise it?

This is meant as a guide to running the activity, but please feel free to adapt it to suit your particular requirements.

The powerpoint presentation shows the full structure of the activity and there are guidance notes for some slides.

If an Environment Agency STEM Ambassador is present in person discuss with them in advance of the session how much they wish to deliver. It may be that they would prefer you to deliver the session and they support the groups as they build their models. Or they may feel more confident and want to deliver the whole session with your help. In either case give the STEM Ambassador the opportunity to introduce themselves to the pupils. Slide 2 can be used for this purpose by inserting the name and a photo of the STEM Ambassador at work.

This activity is separated into 2 parts:

Part 1

 **Approx 15 mins**

The pupils will be learning about floods, what causes them and how they link to climate change.

Initially find out how much pupils know about floods, why they happen and why they are a problem. Slides 1 to 6 give prompts to activities to do this.

Slides 7 covers the following content:

- What is the link between climate change and flooding?
- How can the Environment Agency reduce the effects of flooding?

This information is part of a recorded video which is inserted into the activity slides and is vital for the pupils to understand the role that the Environment Agency plays in mitigating against the effects of flooding.

Part 2

 **Approx 35-40 mins**

The second part of the activity, starting at slide 7, challenges the pupils to develop a model of Natural Flood Management. Organise the class into groups of up to 4 pupils per group. Each group will be given a wooden ramp to represent a hillside and 12 marbles or other spherical objects such as molymods to represent rainwater. The challenge is for pupils to add structures to this ramp to retain half of the marbles on the ramp but allow half of the marbles to run down the ramp in the slowest possible time. The winning group gets half the marbles to the bottom in the slowest time. The other half of the marbles must stay on the ramp to win.



An example of materials used on a ramp to trap some marbles, but not others.

The challenge is introduced in slide 9 which can be done by the teacher or an Environment Agency STEM Ambassador if one is present. If necessary, clarify that all groups know what they are aiming to achieve and remind pupils that the ramp represents a hillside, and the marbles represent water.

(Remember all the hillside (ramps) must be set at the same angle and be the same length and each group is given the same amount of each of the building materials that are being provided).

Finally, after a specified amount of time (30 mins, depending on session length), it is testing time.

More able pupils could calculate the speed of the marbles as they reach the bottom of the ramp using the formula:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$




Once the students have completed the activity get them to reflect upon their designs and explain how they could be improved.

Finally explain to the students that the materials that they add to the ramp represent Natural Flood Management (slide 11). Natural Flood Management includes trees planted on hillsides, protecting riverbanks with fences, adding inland storage pools, adding woody debris to streams that feed into rivers.

Extension

If there is time, there is an extra video embedded in slide 11 showing in more detail how Natural Flood Management works using a model.

> Equipment needed for session

-  The activity slides provided for the session
-  Speaker equipment and projector to play the video clips
-  Participant, winner and/or class certificates as required (remember to add in the name of the teacher and/or STEM Ambassador who ran the session)

Each group will need

- Wooden ramp (all the same length)*
- Stand for one end of the ramp to create an incline (all the same height)
- Scissors
- 12 marbles or other spherical objects such as molymods
- Stop clock
- Calculator if you have an able group and are asking them to calculate speed
- No more than 30cm of Sellotape per group
- Building materials from*:
 - Cardboard
 - Paper / Newspaper / Kitchen towel
 - Art Straws
 - Modelling clay / Plasticine / Blutak
 - Aluminium Foil
 - Old carpet
 - Cocktail sticks/bamboo toothpicks

**If you do not have access to ramps (usually held in science departments for physics investigations) you can use stiff cardboard*

**If you do not have access to all the building materials you can substitute them for something you might have*

> Where does this fit into the National Curriculum?

Science Key Stage 3: Chemistry

- the production of carbon dioxide by human activity and the impact on climate.

Geography Key Stage 3

- understand how human and physical processes interact to influence, and change landscapes, environments and the climate; and how human activity relies on effective functioning of natural systems

Science Key Stage 4: Biology

- positive and negative human interactions with ecosystems.

Science Key Stage 4: Chemistry

- evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change
- potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate

Geography Key Stage 4

- Changing weather and climate – The causes, consequences of and responses to extreme weather conditions and natural weather hazards, recognising their changing distribution in time and space and drawing on an understanding of the global circulation of the atmosphere. The spatial and temporal characteristics, of climatic change and evidence for different causes, including human activity, from the beginning of the Quaternary period (2.6 million years ago) to the present day.

> Key words

Pupils' speak definitions for subject specific terminology you may use in this session:

Science

Biodegradable - A material that can be broken down by microorganisms

Carbon dioxide - A gas present in the atmosphere at a low percentage and is a greenhouse gas

Carbon footprint - The total amount of carbon dioxide and other greenhouse gases emitted by a person or over the full life cycle of a product, service, service or event.

Global warming - the increase in the Earth's temperature due to increases in carbon dioxide and other greenhouse gas levels

Climate emergency - A scenario in which people, wildlife and the environment cannot adapt as fast as the climate is changing.

Embankments - A raised structure, usually made of earth, near a river or seafront to reduce the flood risk.

Erosion - Wearing away and removal of material by a moving force such as a breaking wave

Flood – an overflow of water from rivers, the sea or heavy rainfall

Floodplain - Relatively flat area forming the valley floor either side of a river channel that is sometimes flooded

Meander - A wide bend in a river.

Greenhouse gas – gases which trap heat in the Earth's atmosphere such as carbon dioxide and methane

Sustainable resource - A resource that will not run out because it is being managed responsibly to meet the needs of both present and future generations.

Geography

Biodiversity - Short for biological diversity, the variety of habitats and species on Earth or in a particular ecosystem.

Climate Change - The long-term change in weather patterns which leads to more extreme weather, rising sea levels and continued increases in temperature that affect people, wildlife and the environment.



> Further resources

The Environment Agency - Living better with a changing climate

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1025955/environment-agency-climate-change-adaptation-report.pdf

The Environment Agency - Personal flood plan

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/444659/LIT_4112.pdf

The Environment Agency - Flood Warnings Information Service

<https://flood-warning-information.service.gov.uk/warnings>

The Environment Agency - Long Term Flood Risk Service

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/postcode>

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