



Flood Risk Activity

ICE Scotland 2019

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Activity Aim

The aim of this activity is to introduce first and second level pupils to the idea that we can affect the likelihood of our communities flooding by how we use the land around us. A large part of civil engineering is learning how we can live in harmony with our environment - our built environment should not be at the expense of the natural environment. It introduces pupils to the idea that civil engineering is as much about preventing flooding as it is protecting people from flooding or restoring infrastructure after flooding.

Curriculum links

Please see Appendix B for possible links to Curriculum for Excellence.

Partnership links

The Institution of Civil Engineers will try and arrange a practising engineer to come into school and run this session with your pupils. Please contact the ICE Scotland Education Co-ordinator, Alison Ward, for further details (alison.ward@ice.org.uk).

Equipment required

Prior to using this resource for the first time, the pupils will need to prepare the land use simulation trays as per Appendix A.

- 4 paint roller trays prepared as per instructions in Appendix A
- Soil, sticks and turf
- 4 no. empty 2l drinks bottles with holes in the lids
- A box to carry it all in if required
- An agreed form of measuring the depth of water in each tray (a ruler works well or a scale marked on the side of the trays)

Introductory Presentation

Introducing flooding and what happens to communities at home and abroad when flooding occurs.
Can the class name any natural disasters? e.g.

- Hurricane
- Earthquake
- Tsunami
- Volcanic eruption
- Avalanche
- Disease epidemic
- Wildfires

Activity

Divide the class into 4 groups. The pupils in each group should note how much water is in their bottle and what sort of surface is in their tray. The pupils could fill the bottles themselves or they could be pre-filled. They should then carefully empty their bottle over the surface they've been given as if it were raining, ensuring the whole area is covered by the "storm" and that no water escapes onto the floor.

The pupils should then wait and see how much water collects in the deeper part of the tray (this is called run-off). They can use a scale on the side of the tray to measure the depth of water or the same ruler to measure in each tray. This is a good opportunity to discuss the importance of consistent measuring whilst carrying out experiments.

The groups should then come back together and feedback as to the depth of water they measured. Which land use had the deepest flood? Can the pupils think why they might be different?

Presentation continued

The second discussion should cover the concept of sustainable drainage systems (SuDS) and how civil engineers use these to help prevent flooding from new and existing developments

Watch the animation “Ever wondered where the rain goes?” (3½ minutes)

Can the pupils think where they might have seen any of these in their community?

- Wetlands
- Permeable paving
- Swales
- Wet basins and ponds
- Dry basins
- Tree pits
- Rain gardens
- Green roofs

How could the pupils change their school environment to make it more sustainable? Are there any other ways in which we use water that they could improve in the school? (e.g harvesting rainwater runoff from the roof to use in the garden?)

Question & answer session

Finish off with a Q&A session on SuDS, flooding and civil engineering in general.

Possible extension activities

The pupils could find an appropriate graphical method to show the different run-off amounts for each land use.

Appendix A - Preparation of land use trays

Make up the filler if necessary and use to create a “reservoir” in 3 of the trays (see photo below). The fourth tray should have the whole shallow part of the tray filled. This represents hardstanding which could be a tarmac surface like a school playground or road, or a paved surface like a driveway or patio. Ideally each tray would have a measuring scale fixed to the side of the deeper part of the tray.



When you are about to run the activity, fill the shallow parts of the remaining three trays as follow; one with soil, one with turf and one with turf and plant material (in this photo, an old Christmas tree!). The trays should be labelled hardstanding, soil, grass, forest or similar so the pupils know which is which.



Appendix B – Possible Curriculum for Excellence links

Science

Through carrying out practical activities and investigations, I can show how plants have benefited society. SCN 2-02b

I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things. SCN 3-05b

I have contributed to discussions of current scientific news items to help develop my awareness of science. SCN 1-20a

I can report and comment on current scientific news items to develop my knowledge and understanding of topical science. SCN 2-20b

Technologies

Having analysed how lifestyle can impact on the environment and Earth's resources, I can make suggestions about how to live in a more sustainable way. TCH 2-02a

During practical activities and design challenges, I can estimate and measure using appropriate instruments and units. TCH 1-13a / TCH 2-13a

Social Studies

I can consider ways of looking after my school or community and can encourage others to care for their environment. SOC 1-08a

I can discuss the environmental impact of human activity and suggest ways in which we can live in a more environmentally-responsible way. SOC 2-08a

I can consider the advantages and disadvantages of a proposed land use development and discuss the impact this may have on the community. SOC 2-08b

Having explored the landscape of my local area, I can describe the various ways in which land has been used. SOC 1-13a

I can explain how the physical environment influences the ways in which people use land by comparing my local area with a contrasting area. SOC 2-13a

Possible extension work linking to measurement in mathematics:-

I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems. MNU 2-11b

I can explain how different methods can be used to find the perimeter and area of a simple 2D shape or volume of a simple 3D object. MNU 2-11c

Using technology and other methods, I can display data simply, clearly and accurately by creating tables, charts and diagrams, using simple labelling and scale. MTH 1-21a

I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology. MTH 2-21a / MTH 3-21a

There are various opportunities within this activity for partnership working and the opportunity for outdoor learning within the school grounds.



Appendix C– links to other flooding resources

Education Scotland Ready for Emergencies

<http://www.educationscotland.gov.uk/readyforemergencies/flooding/index.asp>

Citizen Science Scotland Counts Flooding Factsheet

http://www.environment.scotland.gov.uk/media/202590/flooding_factsheet_tcv.pdf

Scottish Environmental Protection Agency (SEPA)

<https://www.sepa.org.uk/environment/water/flooding/education/>

Young Engineers and Science Clubs Flood Emergency activity

http://www.yecscotland.co.uk/primary_school_resources.html