

Session plan: is soil endangered?

Session overview

Students will be introduced to the importance of soil moisture, and build a kit that is capable of measuring soil moisture along with temperature and light level. They will use this to discuss why soil moisture matters and consider its importance to a range of people.

Depending on the context of the class, this session will take around two hours including an optional 20 minutes of practical activity building a sensor kit.

Session opener

Take the students to a window or go out into the school grounds and ask them to point out where water is hiding. As well as pipes, gutters, tanks, clouds, ponds, trees and so on, make sure they understand that soil can store moisture.

Objectives	Activities	Resources	Outcomes
<i>Preamble</i> Global soils	Investigate soil types from different regions of the world. How do they store moisture?	“Where is the water?” Display images of a selection of soil types and different soil moisture levels.	Understand some of the processes relating to the water cycle, and the storage of water in its various forms.
<i>Main activity</i> Introduction to the soil moisture kit. Experiment: ecosystems and soil moisture. Use the kit to collect data on the behaviour of soil across different ecosystems.	(Optional) Assemble the kit in class. Introduce each element of the kit and their functions. Ask students to replicate a selection of ecosystems (arid, semi-arid, maritime, tropical) using soil, drainage, plants and environment. Feed each the same amount of water and ask students to compare the results of each ecosystem.	Kit components, guide and safety equipment as required. Different types of soil and drainage material e.g. sharp sand, polystyrene pieces. A selection of plants (herbs, cacti, etc) and appropriate places to put them (windowsill, cupboard, greenhouse) Website: soil sensor experiment: http://bit.ly/soilexp	Understand key terminology relating to ecosystems. Create a miniature model of a particular ecosystem, and assess its response to the addition of water. Describe the likely effect of high and low moisture conditions on a range of ecosystems.
<i>Session close</i> How does soil affect us? Who would find soil moisture data useful?	Using the role cards, students should consider how each of the professions are affected by changes in soil moisture.	“Why does soil moisture matter to these people?”	Understand why the presence or absence of soil moisture matters to different people. Understand how human and physical processes interact.

Discussion

One issue with climate change is the idea of resilience. Are our soils ready for the future?

Further learning

Farmers are extremely reliant on soil, but are typical farming practices helping or harming it? Explore the ways farmers safeguard their soil and consider the importance of soil moisture to the issue of national and global food security.

Students could also be asked to plan out a sequence of questions and instructions that would use coding to automate the process of watering a plant. How would this code differ for different ecosystems and purposes?

Where is the water?

Which of these do you think would be most likely to have the most moisture in their soils? Cut out the cards and place them in order. Be prepared to discuss your choices.

Desert soils: sandy or stony	Somerset levels
Your school	Field with livestock
Permafrost and tundra landscape	Irrigated land
Deciduous woodland	The centre of London
Typical arable crop land	Tropical rainforest
The Great Plains of North America	The Sahara Desert
Mangrove swamps	Tropical savannah

Why does soil moisture matter to these people?

Soil moisture is not something that students may have thought about much before this lesson, but for other people, it is very important. Hand out the role cards, and ask students to consider how the person they have been given information about would be affected by high or low levels of soil moisture. Ask students to suggest and create other role cards based on their work during this lesson.

Farmer

Farmers make important decisions about what to grow in their fields, and which jobs to carry out each day, depending on their knowledge of the soils on their farm.

How would dry or wet conditions affect farmers?

Hydrologist

Hydrologists study rivers, and measure the flow of water in them. They use this information to make decisions related to flooding, water supply and water quality, and planning decisions on land close to rivers.

How would dry or wet conditions change decisions made by hydrologists?

Climate Scientists

Climate scientists think in the longer term than the day-to-day weather conditions that we are exploring here. Climate is the long-term average weather experienced in a location.

Why might climate scientists be interested in soil moisture?

Insurance Assessor

Houses in some parts of the country are affected by subsidence. This can be caused when soils dry out and contract. Houses can suffer cracks, and structural damage as a result. There are also issues in some properties with moisture, which can cause damp.

What impact will dry and wet conditions have on insurance quotes?

Engineers

Construction needs secure foundations, whether it is a road or a building that is being built. Soil moisture reduces the strength of soil, and drainage has to be thought of when building anything. Water moves downhill, so even 'flat' car parks have a slight slope on them.

What advice would you give to colleagues based on whether there were wet or dry conditions?

Cricket groundsmen

Dry and wet conditions in the soil will affect how a cricket pitch reacts, and whether play is possible. The humidity of the air also affects how a cricket ball moves and spins. Pitches need to be specially prepared.

How would dry and wet conditions make your job difficult?

KS3 Geography Curriculum links

Key aims

All pupils are competent in the geographical skills needed to:

- > collect, analyse and communicate with a range of data gathered through experiences of fieldwork that deepen their understanding of geographical processes
- > interpret a range of sources of geographical information, including maps, diagrams, globes, aerial photographs and Geographical Information Systems (GIS)
- > communicate geographical information in a variety of ways, including through maps, numerical and quantitative skills and writing at length.

Key attainment targets

Pupils should:

- > develop greater competence in using geographical knowledge, approaches and concepts [such as models and theories] and geographical skills in analysing and interpreting different data sources. In this way pupils will continue to enrich their locational knowledge and spatial and environmental understanding
- > understand, through the use of detailed place-based exemplars at a variety of scales, the key processes in physical geography relating to weather and climate
- > 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.

Detail from KS3 Geography Curriculum (2013)

<http://bit.ly/1ALwa6C>

KS3 Computing Curriculum links

Key aims

All pupils:

- > can understand and apply the fundamental principles and concepts of computer science, including data representation
- > can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- > are responsible, competent, confident and creative users of information and communication technology.

Key attainment targets

Pupils should:

- > understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- > understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally
- > undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users
- > create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability.

Detail from KS3 Computing Curriculum (2013)

<http://bit.ly/1ffIM67>