

Why does soil get washed away?

Investigating why some farmers lose their soil through erosion whilst others do not

Ask the pupils if they know anyone whose soil has washed away in the rain or know somewhere else where soil has been eroded.

What can be done to reduce this loss of valuable soil?

Investigate the difference that vegetation makes to the rate of soil erosion.

Set up two identical trays, resting on props so that they slope at the same amount, as in the first photo.

Half-fill each tray with the same type of soil, retaining it from slipping down with a piece of wood if necessary. Cover the soil in one tray with a thin piece of turf, but leave the soil in the other tray exposed. (Alternatively, the investigation could be started weeks in advance by sowing a quick growing crop in the vegetated tray).

Ask pupils in which tray they expect the soil to be washed away more quickly.

Sprinkle water onto the soil in each tray, using a watering can, (or an old can with holes punched in it).

In which tray does more muddy water build up in the space at the bottom?

Is this what the pupils expected?

Ask the pupils what they think should be done to protect soil from erosion. We can't just put a piece of turf on top to protect it!



The soil trays set up ready for the rain (BP photo)



Soil erosion on sloping bare ground, where it is not protected by the maize crop (Photo – P. Kennett)

The back up

Title: Why does soil get washed away?

Subtitle: Investigating why some farmers lose their soil through erosion whilst others do not

Topic: Investigating the effect of vegetation cover in protecting soil from erosion in heavy rainfall

Age range of pupils: 7 – 18 years

Time needed to complete activity: 15 minutes

Pupil learning outcomes: Pupils can:

- describe what happens when soil is exposed to rainfall under varying conditions;
- explain why soil needs to be conserved;
- take appropriate action once they are involved with farming or gardening.

Context: Soil erosion is a normal part of the natural rock cycle, but it can become a major problem in many rural areas where people depend on the land for their livelihood. This activity provides the opportunity to investigate some of the factors involved in limiting soil erosion.

Following up the activity:

- Investigate the resistance to erosion of a range of different soil types.
- Investigate the effects of different crops in resisting soil erosion.
- Investigate other ways of reducing soil erosion, e.g. by “ploughing” along the contour and not up and down the slope.
- Involve a local farmer or gardener who has suffered loss of soil from the land.
- Find out if any local river or reservoir has been silted up as a result of soil erosion within its catchment.

- Ask pupils to look out for good farming practice which could reduce soil erosion in their own district.

Underlying principles:

- Soil erosion is part of the rock cycle, whereby weathered material is eroded and transported away.
- Vegetation has the important effect of protecting the soil from direct impact by rain drops, slowing down any water flowing over the surface (a baffling effect) and binding the soil together with its roots – resisting erosion.
- Tree roots are particularly good at binding soil particles together. When trees are removed from hill slopes, disastrous soil erosion can result.
- Exposed soil can be removed by wind as well as by water.
- Eroded soil frequently finds its way into rivers, where it can cause silting up which often contributes to flooding.

Thinking skill development:

- The conditions which will promote or reduce soil erosion will soon emerge from this activity (establishing a pattern).

- The properties of some soils may pose an unexpected cognitive challenge, e.g. a clay soil with small particles might be expected to be washed away more easily than a sandy one, yet cohesion between the particles may make it less easily eroded.
- Relating the small scale investigation to real farmland is a bridging skill.

Resource list:

2 shallow trays, e.g. 30cm x 15 cm
 soil to half-fill each tray
 a thin piece of turf, or quick-growing seeds
 2 pieces of wood to fit the width of the trays
 2 props, e.g. blocks of wood
 water
 watering can, or old tin or plastic bottle with holes punched in the base.

Useful links:

<http://www.soilerosion.net/>
<http://www.soil-net.com>

Source: Earth Science Teachers' Association, (1993) *Teaching Primary Earth Science, No: 3, Soil, forming part of Teaching Earth Sciences, Vol. 18.*

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