

Earthlearningidea

Why does soil get washed away?**为什么泥土会被冲走?****Investigating why some farmers lose their soil through erosion whilst others do not****调查为什么一些农民经受泥土流失之害，而另外一些能够幸免**

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

问学生认不认识一些人经受大雨冲刷导致的泥土流失，或者哪里的泥土受到侵蚀。

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

可以采取什么措施来降低重要泥土的流失?

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

调查植被对水土流失率的影响。

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

架立两个同样的盘子，用物体把它们一端支撑起来形成同样的斜度，如图片所示。

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).

把盘子的半边填上同样的泥土，用一块木头阻止泥土滑下来。在其中一个盘子的泥土上覆盖草皮，另一个盘子的泥土保持裸露。（另一可选方案是，提前几个星期把易长植物的种子播在其中一个盘子的泥土里。）

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?

问学生他们认为哪个盘子里的泥土流失更快。

用洒水壶（或者用旧壶子戳上很多小孔做成）往两个盘子上洒水。

流出到哪个盘子底的泥水更加浑浊？这是他们所预期的吗？

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!

问学生他们认为怎么样可以防止泥土流失。就在上面铺块草皮是保护不了的！



The soil trays set up ready for the rain (BP photo)
架好泥土盘子准备经受雨水冲刷（BP图）。



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

倾斜荒地的泥土流失，那里没有玉米作物的保护（图- P.Kennett）

The back up

Title: Why does soil get washed away?

标题: 为什么泥土会被冲走?

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

副标题: 调查为什么一些农民经受泥土流失之害，而另外一些农民能够避免

Topic: Investigating the effect of vegetation cover in protecting soil from erosion in heavy rainfall
主题: 研究植被对防止泥土在大雨中流失的作用。

Age range of pupils: 7 – 18 years

学生年龄范围: 7 – 18 岁

Time needed to complete activity: 15 minutes

活动所需时间: 15 分钟

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.

学生学习成果: 学生可以:

- 描述在不同条件下泥土暴露在降雨中会发生的不同结果。
- 解释为什么泥土需要被保护。
- 当他们参加与农业和园艺相关的活动时, 采取适当的行动。

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.

背景知识: 泥土流失是自然岩石周期的一部分, 但它可以变成许多依靠土地为生的农业地区的人们的重大问题。这个活动提供调查防止泥土流失因素的机会。

Following up the activity:

后续活动:

- Investigate the resistance to erosion of a range of different soil types.
- 研究一系列不同的泥土种类对侵蚀的抵御能力。
- Investigate the effects of different crops in resisting soil erosion.
- 研究不同作物防止泥土流失的作用。
- Investigate other ways of reducing soil erosion, e.g. by “ploughing” along the contour and not up and down the slope.
- 研究其它降低泥土流失的方法, 比如沿等高线犁地而不是沿着斜坡方向。
- Involve a local farmer or gardener who has suffered loss of soil from the land.
- 让经受过泥土流失之害的本地农民或园丁参与进来。
- Find out if any local river or reservoir has been silted up as a result of soil erosion within its catchment.
- 看看有没有本地的河流或水库因为它们流域的泥土流失而充塞淤泥。
- Ask pupils to look out for good farming practice which could reduce soil erosion in their own district.

- 让学生寻找降低泥土流失的良好的惯用农业做法。

Underlying principles:

背后的原理:

- Soil erosion is part of the rock cycle, whereby weathered material is eroded and transported away.
- 泥土流失是自然岩石周期的一部分, 风化的材料被侵蚀然后被带走。
- 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.
- 通过减慢水流流过表面的速度 (缓冲作用) 和用它们的根抓住泥土来抵御侵蚀, 植被具有重要的保护作用, 让泥土不受降雨冲刷直接影响。
- Tree roots are particularly good at binding soil particles together. When trees are removed from hill slopes, disastrous soil erosion can result.
- 树根特别能把泥土颗粒抓牢在一起。当山坡上的树木被砍伐, 可能的结果就是灾难性的泥土流失。
- Exposed soil can be removed by wind as well as by water.
- 暴露的泥土除了被水带走, 也可以被风带走。
- Eroded soil frequently finds its way into rivers, where it can cause silting up which often contributes to flooding.
- 被侵蚀的泥土经常会落到河流里, 在那里形成淤积, 进而导致水灾。

Thinking skill development:

思维技能发展:

- The conditions which will promote or reduce soil erosion will soon emerge from this activity (establishing a pattern).
- 提高或者降低泥土流失的条件很快会在活动中出现 (形成模式)
- 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.
- 一些泥土的特点可以造成预期不到的认知挑战, 比如说预期中小颗粒的粘土可能会更容易被冲走, 但是事实上颗粒间的粘力使它们反而不容易被冲走。
- Relating the small scale investigation to real farmland is a bridging skill.
- 把小规模研究跟真实的农场相关连是一种联系技能。

Resource list:

资源清单:

2 shallow trays, e.g. 30cm x 15 cm
2 个浅盘子，例如 30 厘米 x 15 厘米大小
soil to half-fill each tray
填盘子的泥土
a thin piece of turf, or quick-growing seeds
一块薄草皮，或生长速度快的种子
2 pieces of wood to fit the width of the trays
2 块和盘子同宽的木头
2 props, e.g. blocks of wood
2 个支撑物，例如木块
Water
水
watering can, or old tin or plastic bottle with holes
punched in the base.
浇水壶，或者用就铈壶或塑料壶打洞做成。

Useful links: <http://www.soilerosion.net/>
<http://www.soil-net.com>
有用链接: <http://www.soilerosion.net/>
<http://www.soil-net.com>

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