

Soil erosion, agriculture, and climate change

How might agriculture and climate change impact soil erosion?

Background

Erosion is the wearing away of the soil's surface by wind or water. Soil can become susceptible to erosion when its surface is disturbed or altered. Plants play a crucial role in soil stability. By removing plants and their roots that hold in soil, it is easier for wind and water to move the soil texture particles from place to place, leaving low spots that act like conveyors for water during rain events. This can accelerate the loss of topsoil, the most valuable soil, and reduce agricultural yields over time.

The practice of no-till or strip-till farming can reduce erosion. These practices leave part or all of last year's crop residue on the field, making it harder for falling rain to reach the soil and wash it away. Conventional tillage, as done in the past, breaks the surface and turns it over, exposing the soil to wind and rain. By implementing modern agricultural practices, such as no-till, strip-till, and/or cover crops, the soil is protected from erosion.

Other factors that affect the type and rate of erosion include the soil types and slope. Soils with different percentages of sand, silt, and clay erode differently depending on the percentage of each component and the soil's structure. Soil structure is the ability of soil to allow water and air to move freely within it. The slope of the soil's surface can have a major impact on the speed of erosion during a rain.

Erosion types

- **Splash erosion** occurs when raindrops hit the soil surface, causing soil particles to splash and dislodge. This type of erosion is typically the first stage in the erosion process and can lead to the formation of larger erosional features if left unchecked.
- **Sheet erosion** occurs when thin layers of soil are gradually removed from the surface, often resulting in a loss of topsoil and reduced soil fertility. This type of erosion is common on sloping terrain and can be exacerbated by heavy rainfall or improper land management practices.
- **Rill erosion** occurs when small channels, known as rills, form on the soil surface due to the concentrated flow of water. These channels can deepen over time, leading to further erosion and the loss of soil nutrients.
- **Gully erosion** occurs when larger channels, known as gullies, form on the soil surface due to the rapid flow of water. Gullies are typically deeper and wider than rills and can cause significant damage to agricultural land and infrastructure.
- **Floodplain erosion** occurs when rivers or streams overflow their banks and erode the surrounding floodplain. This type of erosion can lead to the loss of valuable agricultural land and habitat destruction.
- **Streambank erosion** is the progressive undercutting, scouring, and slumping of natural rivers and streams as well as man-made drainage channels by the intense movement of water. When land managers remove vegetation or ranchers allow their livestock to overgraze the land near streams and riverbanks, it can exacerbate the problem.

Erosion identification

Erosion type	Splash	Sheet	Rill	Gully	Floodplain	Streambank
Photo number						

Materials

- Pictures of soil erosion types (splash, sheet, rill, gully, floodplain, streambank)

Instructions

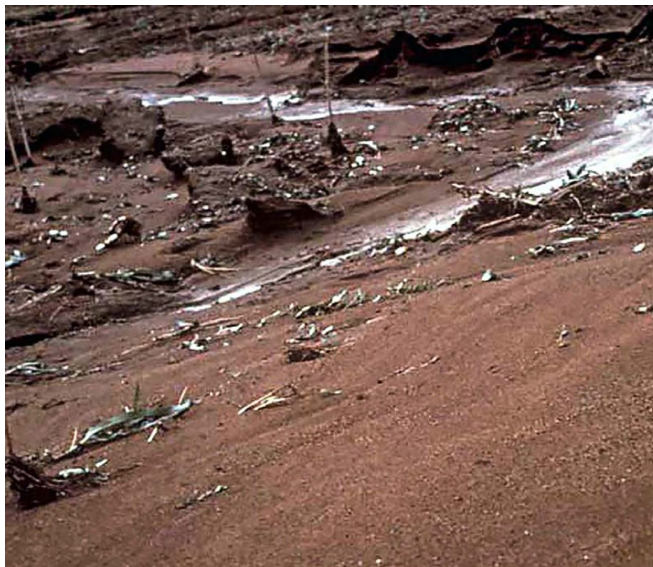
1. Match the erosion photos to the correct erosion type as described above.
2. What similarity do you notice in all the pictures?
3. What appears to be different in the various types of erosion?
4. How would you describe the rainfall that might lead to each picture?

Reflection

1. Which type of erosion would be most likely to occur if someone clears brush along a stream to increase land for farming?
2. What soil texture particle might be most likely to erode in splash erosion?
3. How might the use of cover crops during the off season prevent types of erosion?
4. How might no-till farming help to prevent specific types of erosion?
5. How might climate change impact erosion in the future?



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