



CLIMATE RESILIENCY:

A Soil Solution

Ages 6-12

Purpose Students demonstrate soil erosion and its environmental effects while determining which natural covering protects against soil erosion best.

Estimated Time 60 minutes

Materials Needed

- Tarp for easy cleanup.
- Four large rectangular pans, such as aluminum baking pans, shallow plastic bins, or any containers that can hold soil material and are relatively sturdy.
- Four smaller bins or pans to collect runoff water from the larger containers.
- Two-by-four piece of wood at least 2 feet in length.
- Dirt or soil to fill each of the four larger containers halfway.
- Rocks or gravel to completely cover the soil in **one** of the larger containers.
- Mulch to completely cover the soil in **one** of the larger containers.
- Sod or native grass to completely cover the soil in **one** of the larger containers.
- A watering can that simulates rain, or anything you can find that could simulate rain (for example, using a 2-liter bottle that you poke several holes in the cap).
- Roll of masking tape.
- A marker.



Erosion and flooding are common hazards when soil has no covering to protect it.



Restoration area at the Rocky Flats Site in Jefferson County, Colorado.

Background and Climate Connections

As our world's climate continues to change, extreme weather events will happen more often. Heavy rainfall, frequent storms, and flooding destroy important layers of rich, organic soil necessary for plant and animal life. This environmental hazard is known as soil erosion and affects every community in the world.

Soil erosion damages or removes important topsoil necessary for good plant growth. Additionally, it increases sediment that can clog waterways and cause flooding, or it can do the opposite and create a more desert-like climate.

Legacy Management's mission is to protect human health and the environment at sites that were once contaminated with chemical and nuclear waste. Soil erosion poses a threat to land reclamation projects that are part of LM's mission. Failure to protect infrastructure from soil erosion could lead to exposure of contaminated material that may pose a risk to the public. While some soil erosion projects are too large for one person to manage, each one of us can play a part in our communities to prevent soil erosion in vulnerable areas. When communities can adapt and prepare for extreme weather events, it strengthens their resiliency to these climate changes.

Vocabulary Words

Climate

The averages and extremes of a location's long-term temperature and precipitation patterns. Climate descriptions can refer to local, regional, or global areas and different time intervals, such as decades, years, seasons, months, or specific dates of the year.

Climate Resiliency

The capability of society to cope with hazardous weather events or trending disturbances.

Erosion

Geological process where earthen materials are worn away and moved by natural processes such as water and wind.

Mulch

Organic material (such as leaves, bark, and compost) that is spread around plants to enrich the soil.

Soil

Material on the surface of the earth in which plants grow.

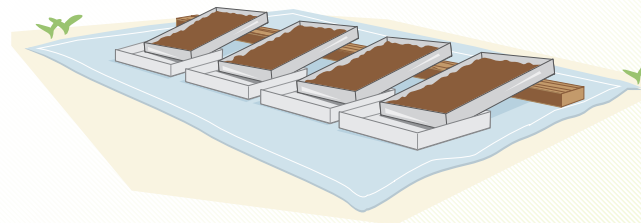
Worksheet

Have you ever seen soil erosion in your community? Some areas are more affected by soil erosion than others. Write down a few thoughts about what you think may happen near where you live if heavy rainfall or a flood were to occur.



Experiment Setup

- 1.** Lay out the tarp and place the two-by-four piece of wood on top.
- 2.** Use the marker and masking tape to label each of the larger pans with the numbers 1 through 4.
- 3.** Rest one end of each of the larger pans on the two-by-four so the end of each pan is at least 2 inches off the ground.
- 4.** Fill up each of the four larger pans halfway with the dirt or soil.
- 5.** Set the four smaller pans or bins at the lower end of the four larger pans so they can catch the water as it runs off each larger pan.
- 6.** Cover the soil in Pan #1 with sod or native grass.
- 7.** Cover the soil in Pan #2 with rocks or gravel.
- 8.** Cover the soil in Pan #3 with mulch.
- 9.** Completely fill Pan #4 with additional soil or dirt.



Before beginning the experiment, write down your hypothesis in the boxes below on what you think will happen to the soil or dirt in each of the pans, and what you think the water will look like as it flows over into each of the four smaller pans.

Pan #1	Pan #2	Pan #3	Pan #4

Experiment Procedure



- 1.** Using the watering can or other container for simulating rain, slowly pour water over the material in each of the four large pans or containers (ask a friend to help simulate the rain).
- 2.** Observe the process for 10 minutes. Write down your observations for each pan in the boxes below.
 - a.** Do you notice any water running off the lower edge of the four larger pans? If so, how much?

Pan #1	Pan #2	Pan #3	Pan #4

b. Is the water clear or dirty? If it is dirty, how dirty is it?

Pan #1	Pan #2	Pan #3	Pan #4

c. Do you see soil erosion happening in any of the pans?

d. What material do you think prevents the most soil erosion? Why?

3. Fill a bucket or container with water and quickly pour it onto each of the larger pans. This simulates a downpour or flood in each of the pans.

4. Write down your observations about what happens in each of the four pans.

Pan #1	Pan #2	Pan #3	Pan #4



Final Observations for Students

- 1.** Now that you have tested different types of soil coverings, which one do you think helps prevent soil erosion the most?
- 2.** Are there areas around your home or community that have soil coverings that are not good at preventing soil erosion?
- 3.** What can you do at your home or in your community to help prevent soil erosion in areas that might cause problems in the future?



For more information, visit [toolkit.climate.gov](https://www.toolkit.climate.gov), and check out the National Oceanic Atmospheric Administration climate resiliency activity book at: www.noaa.gov/sites/default/files/2022-07/Activity_Book_Online_Final_Small.pdf.