

Soil Erosion Article

(OPTIONAL) Link to the original website in case you want to see the whole article.

<https://www.nrdc.org/stories/soil-erosion-101#intro>

1. This article and worksheet will mainly focus on **soil erosion** on land and especially involving farm land. Other than farms, can you think of another place where people would be harmed by **erosion** removing soil?



Erosion in an unprotected Tennessee cornfield following a brief storm *Credit: Tim McCabe/USDA NRCS*

Introduction

When you hike through the woods you tend to focus on the plants. But what about the dirt? Soil is one of the planet's most underappreciated natural resources. Healthy soil is needed for farming. Soil also plays a vital role in protecting the air, the water, food, and even our climate.

Unhealthy soil can cause major trouble. In the 1930s, there was an event called the **Dust Bowl**. After many years of over farming and drought, millions of acres of farmland in the Midwest and Southern Plains dried up. A single dust storm could move 300 million tons of soil all the way to the East Coast.

Below is a photo of a dust storm blowing large amounts of healthy soil away. This is an example of [soil erosion](#).



Soil loss continues to threaten farms even today. One inch of [topsoil](#) can take several hundred years to form. Scientists estimate that the United States is losing soil 10 times faster than nature's ability to replenish it. Soil scientists believe that if soil continues to degrade at the same rate then, all of the world's [topsoil](#) could be gone within 60 years. However, there are techniques to help conserve our soil so that it may continue to exist for generations.

2. Roughly how long does it take for 1 inch of [topsoil](#) to form naturally?



A farmer and his sons walk through a dust storm in Cimarron County, Oklahoma, in 1936. *Credit: Library of Congress*

During the [Dust Bowl](#), storms choked farm animals with thick clouds of dust. Tragically, about 7,000 people perished from an illness called “dust pneumonia.” In April 1935, Congress declared [soil erosion](#) “a national menace” and created national agencies to teach farmers how to prevent [erosion](#).

3. What was a negative health impact from soil erosion in the [Dust Bowl](#)?

What Is Erosion?

[Erosion](#) is a process in which earth (i.e., soil, rocks, [sediments](#)) is **transported** over time by natural forces such as water or wind. Sometimes

erosion is sped up by poor land use. The natural process of [river erosion](#) caused the Colorado River to create the Grand Canyon. The difference between [weathering](#) and [erosion](#) is that in the process of weathering, materials are **worn away but not transported**. And erosion is when natural forces **move materials from a location**.

[Soil erosion](#) refers to the erosion of the top layer of dirt known as [topsoil](#), the fertile soil vital to life. Soil erosion depends on what the soil is made of, plants, wind, and rain. Humans have the power (and the responsibility) to prevent soil erosion.

4. What is soil erosion?

What Causes Erosion?



Logging clear cuts in a forest in Lincoln County, Oregon *Credit: Hal Bergman/iStock*

Soil erosion happens if dirt is exposed to strong wind, hard rain, and flowing water. Farming and removing plants leaves soil vulnerable to erosion. When farmers plow the soil before or after growing crops they leave soil exposed to weather. The grazing of plants by farm animals like cattle and sheep can also leave large areas of land empty of **ground-covering plants**. Plants hold the soil in place with their roots. **Clearcutting** is also really bad for soil health. This is when trees are cleared away and exposing land to wind and rain without roots to prevent the soil from being swept away.

5. Why do farming and **clearcutting increase soil erosion?**

Climate is also a major driver of **erosion**. Changes in rainfall and water levels can wash away soil. Fast temperature changes can dry out soil and make **topsoil** more vulnerable to erosion. Long droughts can prevent plants from growing. This leaves soil exposed without protective plants.

6. How is **climate change making **soil erosion** worse?**

Impacts of Erosion

Soil erosion reduces farmable land that can be used to grow crops. Scientists estimate that over the past 50 years humans have caused over half of all **soil erosion**. Federal agencies say cropland across Iowa has lost an average of 6.8 inches of **topsoil** since 1850. And **soil erosion** in the United States costs the country about \$37.6 billion in losses each year. Severe soil erosion can result in:

- the loss of food crops
- negatively impact community economy
- change ecosystems by reducing diversity.

7. How does **soil erosion harm farming?**



A dead catfish lies on the shoreline of an algae-filled Lake Erie in Toledo, Ohio. *Credit: Andy Morrison/The Blade via AP*

Where does the soil go after [erosion](#)? 60 percent of soil ends up in rivers, streams and lakes. The soil brings with it whatever is in the soil, including chemicals and other pollutants. The chemicals create harmful [algal blooms](#) and pollute waterways. The impacts of excess fertilizer in rivers can be disastrous for aquatic ecosystems as well as public health. In Summer high levels of manure and fertilizer are responsible for harmful [algal blooms](#) that kill aquatic life by removing oxygen in the water. Blooms make water undrinkable and unsafe for swimming. In 2014, the city of Toledo was told to avoid their tap water when unsafe levels of toxins were found in Lake Erie algal blooms.

8. How does soil erosion harm aquatic life?

Erosion Control



Spring no-till planting at Hundley-Whaley Research Center in Albany, Missouri Credit: Kyle Spradley/Curators of the University of Missouri

Soil erosion is essentially **a battle between two forces: flowing water or wind versus the gravity that holds soil in place**. The ability of soil to stay put relies on how well we work to eliminate or minimize the erosion forces and maximize soil stability.

Methods to control Erosion

Below are some common strategies for reducing erosion. Different locations may require different strategies to help control erosion.

- Grow Plants
- Use control matting

- Less plowing
- Rotational grazing
- Increase soil organic matter

9. What are some strategies for reducing erosion?

- **Grow Plants:** Trees, shrubs, and ground plants can block [wind erosion](#). Adding [ground cover](#), such as through planting cover crops, also helps bind soil to roots so it cannot erode away.
- **Use erosion control matting:** Control matting is also known as an erosion control blanket. It is [ground covering](#) is often made of weaved, natural materials that shield the soil and support the bare ground. This erosion control method is often used on solar farms and construction sites where soil is exposed and vulnerable to wind and water erosion.

10. The “Grow Plants” and “Control Matting” both fall into the “Ground Cover” strategy. What are both of those sections encouraging people to do to prevent erosion?

- **Less Plowing:** Farmers have been [plowing](#) farm fields for centuries. However scientists showed that [plowing less](#) may offer more benefits. Not mixing soil decreases [erosion](#) and runoff which benefits crops and water quality. [Less plowing](#) can also help decrease the loss of nitrogen and other nutrients. So farmers need to use less fertilizer.
- **Rotational Grazing:** [Rotational grazing](#) is a method that moves farm animals from one pasture area to the next. Each area gets a rest period and plants are allowed to regrow. This reduces soil erosion. The plants

are able to regrow and protect the soil from erosion before the farm animals return to eat more.

11. How does “Rotational Grazing” help reduce erosion?

- **Build soil organic matter:** To be healthy, soil needs a mixture of water, air, minerals, and organic matter. Soil organic matter is made up of decomposing plant and animal material. It is the glue that helps keep soil together and keeps it on the ground. Research shows that increasing organic matter from 1 to 3 percent can decrease erosion by 20 to 33 percent. Soil organic matter increases the soil’s ability to hold water. This makes the soil less likely to blow or wash away.

12. Why is “Soil Organic Matter” important?