

What causes soil to erode and how does it affect farmers?

MY OWN FOOD CHAIN PROGRAM (K-2)

Soil Erosion **(ILS 12E)**

Overview

This curriculum explores the relationship between people and the food they eat. It aims to give children in grades K-2 a basic understanding of the flow of energy through the food chain, and the place of people in the food chain. If teachers complete the entire curriculum, their classes will explore food chains in nature, focusing on its individual links and looking at the flow of energy as a whole. Students will then look at the place of people in the food chain, and discover how people have appropriated nature's systems in agricultural practices – making the food chain our own. Classes will compare traditional and sustainable agricultural practices.

Sustainable Agriculture, for the purpose of this curriculum, shall be defined as "a system of food production, supported by consumers, where farming operations, practices and technologies work in harmony with the natural systems that sustain life on earth."

Suggested Grade Level

This curriculum is designed for kindergarten through second grade levels. The topics covered can be built upon in complexity throughout that age range.

Approximate Time

Approximately 1 hour for session 1, not including tray set-up (see appendix); 20 minutes for session 2.

Objectives

1. The students will observe and create soil erosion by wind and by water.
2. The students will determine the impact of soil erosion on agriculture.

Activity Abstract

In this lesson, students will use soil tables to compare bare soil with planted soil when wind and rain conditions are present. They will create weather conditions for bare and planted soil, and try to figure out how farmers could deal with the problems that they notice in their experiment.

Background Information

Good soils are essential for successful crop production. To be profitable, growers must manage soils to provide adequate and properly balanced nutrients. This must be done with minimum loss of soil through erosion and minimum movement of nutrients into ground or surface water. A healthy population of bacteria, fungi and other soil organisms

is also important in producing healthy crops. To optimize yield and quality of farmed crops requires a basic understanding of soil and nutrient management.

CAUSES OF SOIL EROSION from

<http://www.botany.uwc.ac.za/Envfacts/facts/erosion.htm>

Wind and water are the main agents of soil erosion. The amount of soil they can carry away is influenced by two related factors:

- speed - the faster either moves, the more soil it can erode;
- plant cover - plants protect the soil and in their absence wind and water can do much more damage.

THE IMPORTANCE OF PLANTS

Plants provide protective cover on the land and prevent soil erosion for the following reasons:

- plants slow down water as it flows over the land (runoff) and this allows much of the rain to soak into the ground;
- plant roots hold the soil in position and prevent it from being washed away;
- plants break the impact of a raindrop before it hits the soil, thus reducing its ability to erode;
- plants in wetlands and on the banks of rivers are of particular importance as they slow down the flow of the water and their roots bind the soil, thus preventing erosion.

Materials

For every group of four students

- 1/2 roll of sod (planting grass seed will work but take longer)
- topsoil
- 2 disposable, tin brownie pans (the kind you can cut) with one short end cut off (see illustration in Appendix)
- 2 buckets to catch water runoff
- watering can
- electric fan (optional; one fan can be shared by all groups)
- 2, 1" thick boards to elevate the erosion tables (or use a stack of wooden rulers rubberbanded together so that it's one inch high.
- Computer with internet connection.

Set-up

Create erosion tables according to the instructions in the appendix. This can be done by the teacher before class, or it can be done by students as part of session 1.

Procedure (Session 1)

1. **Share with neighbor.** Hold up a handful of soil in front of your mouth. Ask the students to predict what would happen if you took a deep breath and then blew out as hard as you could right now. Have students share answers with their neighbor.

2. (Optional) Test if the kids are correct! Blow the dirt and ask if this is what they predicted. (Don't do this without expecting a mess to clean up!)
3. Explain that what they just saw (or imagined would happen) is like erosion. Ask if they have heard that word. If not, that's ok. The class will do some scientific experiments to figure out what erosion means.
4. **Hands on Experience.** Break students into groups of four. Create or pass out erosion tables (appendix), one per group. Demonstrate the correct set-up (elevation and bucket placement) and check to ensure that each group has this done correctly.
5. Explain that these trays are like the ground. They are going to try to make it like bad weather outside and see what happens to the ground.
6. Each time they make bad weather, they are first going to guess what will happen to each tray, just like they guessed what would happen when you blew in the dirt.
7. Have each child make a prediction about that will happen to the grass when they make it windy. Older children should write their predictions; younger children should share with their neighbors.
8. Go around with the fan and blow it (on high) over the grass, for ten seconds, starting at the elevated end. (In the absence of a fan, bend down and blow across the tray.) Ask the children what happened and have older children write the actual results after their predictions. (The grass may sway, but nothing should blow away)
9. Repeat steps 7-8 with the dry soil tray. This time, soil should blow away from the fan. (If not, the soil is too wet or the fan is too weak or improperly aimed.)
10. Have each child make a prediction about that will happen to the grass when they make it rainy. Older children should write their predictions; younger children should share with their neighbors.
11. Have children (or teacher; go around to each table) pour the watering can over the raised end of the tray. To keep amounts constant, start with a full can and pour for 20 seconds. Observe what happened and what the water that runs off the other end (into the bucket) looks like. Ask the children what happened and have older children write the actual results after their predictions. (The water should run through slowly and relatively clear).
12. Repeat steps 10-11 with the dry soil tray. (The water should run through quickly and be very muddy in the bucket; a lot of soil will leave the tray.)
13. Ask students if they have ever seen anything similar outside to what they saw on the trays.
14. SAVE THE BUCKETS of water runoff for the water quality lesson; label them or place them so you remember which is which.

Procedure (Session 2)

1. Review the results from session 1's experiments. Use the word "erosion" to explain the soil getting washed or blown away.
2. Review the four things plants need to survive – sun, soil, air, water.
3. Ask class what they think will happen to the plants if they're missing one of the four needs. (They can't live).

4. **Introduce scientific principle.** Explain that this is why it's important for farmers to do things that prevent erosion: they can't grow plants if all the soil washes or blows away.
5. Brainstorm ways that farmers can prevent erosion. (Cover crops, no till -- see extension). Remind students that the windiest time of the year is during the winter, when most plants can't grow!
6. Look on the internet for pictures of farm fields in the winter. (Go to google.com; type in "winter farm field" and click on "Images.") Discuss how the farmers are or aren't preventing erosion in the pictures. (The teacher can find images alone before class and print them, if desired.)

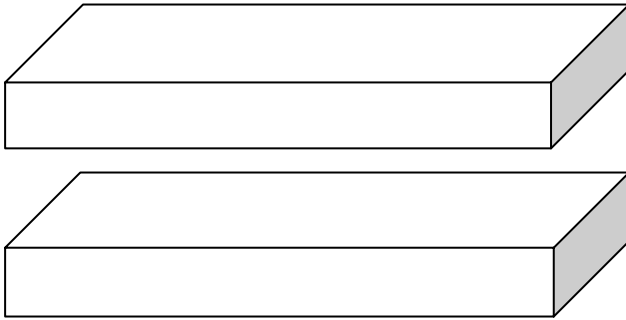
Extensions (optional)

1. Go outside to a gravel trail or other area where erosion is extremely visible. If possible, visit the area before and after a big rain. Note the changes and differences.
2. Obtain more 1" pieces of wood and make the stream tables steeper. Do another experiment to see the effect that this has on erosion.
3. Repeat the experiment with dead grass versus live grass. Does it still provide the same benefits? Relate this to farmers who don't till their fields after the growing season, but rather leave the dead plant stalks in the field all winter long.

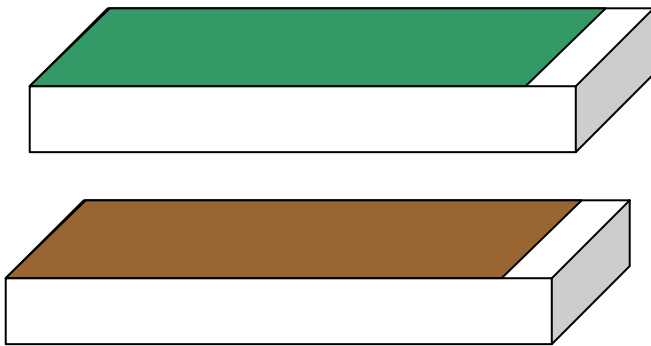
References

<http://www.botany.uwc.ac.za/Envfacts/facts/erosion.htm>

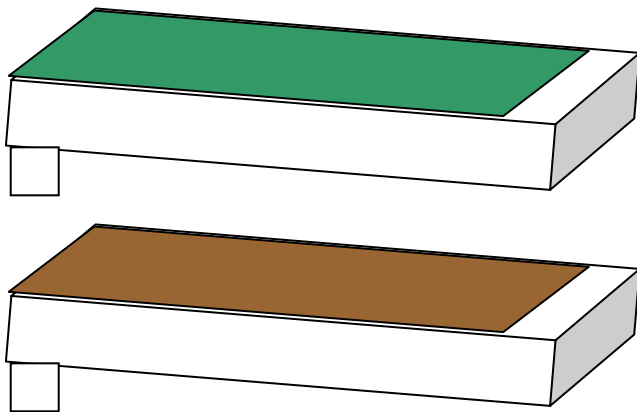
Appendix A: Soil Tray Set-up.



1. Cut the gray side out of two brownie tins, so that they have three sides and one open end.



2. Cut sod to fit one tin and place sod inside.
3. Fill the other tin with dry soil, about two inches deep.



4. Place the 1" boards under the closed end of the tins.
5. Now you have erosion tables! Place them at the edge of a table so that when water goes out the open end, it goes off the table
6. Put buckets under the tins to catch runoff water.