



Inroads on Erosion

Summary:

Farmers can institute practices that may reduce the loss of soil through erosion.

Background information:

Much of Puerto Rico's topography has slope to it -- some of it considerable -- which predisposes many areas to serious soil erosion, particularly when vegetative cover does not exist to hold soil in place. Open sloping cultivated fields in Puerto Rico have contributed greatly to loss of soil through erosion. However, there are practices that can minimize soil erosion.

Grade Level: 3-12

Goal: See how interventions may help to mitigate soil erosion for Puerto Rico agriculture in sloping terrain.

Objectives:

After this lesson, students will:

- 1.) Understand the concept of erosion.
- 2.) Test and understand how factors of land slope, vegetation cover, and rainfall frequency and intensity all influence degrees of erosion.
- 3.) Have created and tested various interventions for minimizing erosion.

Teaching location:

Classroom or science lab

Lesson time:

Activity 1: 60 minutes

Activity 2: 10 minutes for each student

Subject areas for infusion:

Science

Standards:

Science

C.4.4 C.8.3
C.4.5 C.8.4
C.4.6 C.8.6
C.4.7 C.8.7
C.4.8 C.8.9-11
C.8.1 C.12.5
C.12.6

Environmental Education

A.8.3
B.8.15-17
B.8.5
B.12.10-12

Materials:

- Sand table with some blocks to create a slope
- Small blocks of wood to shape the sand surface
- Sprinkler can
- Jug of water
- Sink available
- Newspaper shredded into 2" squares
- Catch basin
- Images of various interventions for minimizing soil erosion

Set-up:

Gather and prepare the materials. Make sure that a catch basin is in place to contain the water that flows out of the model. Monitor the basin so that it does not overflow.

Procedure:**Introduction:**

Exposed loose soil on sloped topography is prone to erosion. Puerto Rican agriculture has not avoided growing crops on slopes, which has resulted in considerable erosion. There are practices that can reduce rain-induced soil erosion.

Activity 1:

Introduce the vocabulary terms *erosion* and *slope* so that students have an understanding of them as they examine the sand table.

Have students set up a slope for the sand table (use the wood blocks as shims to tilt the sand table longitudinally).

1. Have students "rain" on the sandy soil and note what happens. (Is there any erosion taking place? If so, how much?) Students should write what they observed.

In succession, introduce the vocabulary and the concepts for different interventions that students may apply in the model to minimize soil erosion from rain:

2. Apply *contour plowing* as an approach to limit soil erosion (see the photo example). Use spread fingers to till the sand. Rain on the model. Have students write what is the same and different from the first run-through.
3. Next, create some *terraces* in the model (see the photo example). Rain on the model. Have students again write what is the same and different from the first two rain events.
4. With the sand smoothed out underneath, spread newspaper pieces on the model (see the photo example). This represents non-living vegetative matter that could be left on or distributed across a farm field. Rain on the model. Have students indicate in writing what they noticed the same and different this time. This activity may

Vocabulary:

Erosion: the wearing away of soil or rock by natural processes such as rain

Splash erosion: erosion by the impact of rain

Slope: incline, slanted land, non- flat terrain

Contour plowing: plowing perpendicularly to the fall line of a slope

Terracing: a raised bank of earth having vertical or sloping sides and a flat top

Sculpting: small individually terraced spots created for individual plants

demonstrate how non-living vegetative matter cover could diminish the impact of *splash erosion*.

5. Finally, have students create sculpted "mini-terraces" on the slope. Rain on the model. Have students note in writing what is the same and different from the other examples.

Explain that, in Puerto Rico, the last intervention (#5) seems to have had some success in holding soil in place for individual plants. Tell students to write their opinion as to whether they think this would hold up.

Activity 2:

Ask for students to compose their own experiments for seeing what may help to minimize soil erosion. They may change the slope of the model. Students may try other approaches, or combinations of approaches tried in activity 1, to see what results. Students may want to test other variables such as rain intensity (by using a watering can with larger holes) or rain frequency (create several rain events). Have students write an outline of their experiment proposals and then demonstrate these to the rest of the class. Students should then finish the proposals with the outcomes and their own conclusions.

Assessment:

Activity 1: Review the student write-ups.

Activity 2: Observe the student experiments and review their written proposals and conclusions