

Where Does the Water Go?

Part II - Runoff

Objective: The student will observe and describe how plants and mulch help prevent soil erosion by simulating rainfall on covered and uncovered soil.

Grade level: 1-3 4-6

TEKS:

S- 1.10A,B; 2.10A,B; 3.3C S- 4.3C; 4.5A; 5.3C; 5.11A

TAKS:

GRADE

OBJECTIVES

Reading:	3, 4, 5, 6	1, 4
Writing:	4	1, 2, 3, 4, 5, 6
Science:	5	1, 2, 3, 4

Assessment Summary:

Materials:

1. 3 disposable aluminum baking pans, 3" deep, approximately 12"X 20".
2. Enough soil to fill all 3 boxes.
3. 3 pint or quart sized jars.
4. Grass clippings
5. 12" x 20" piece of grass sod (trimmed to 1" thick)
6. Sprinkling can

Assessment:

1. Teacher guided discussion.
2. Grades 4-6 can read the Background Information and complete Erosion Quiz
3. Have students research and write an informative paper on one of the following subjects:
 - Dust Bowl
 - USDA Natural Resources Conservation Service
 - Cultural Practices Farmers Use to Control ErosionIncluding:
Conservation Tillage, Contour Plowing, terracing, etc.

Background Information

Where Does the Water Go? Part II

Runoff

Erosion is the movement of soil from one place to another by wind or water. Erosion caused by water is the most wide spread problem. When it rains, the water will either move into the soil, or it will run off, depending on how steeply the land is sloped and whether or not the soil is covered. When soil on a slope is left bare due to drought, crop harvest, cultivation, construction or other soil disturbance, rain falling on that soil can begin moving down hill faster than it can soak in. As the water moves down hill it carries soil with it. The faster the water moves, the more soil is carried. This causes the top soil, the most productive layer, to be carried away.



The top soil is where most of the organic matter is found. This organic matter contributes greatly to the productivity of the soil. Therefore, when top soil is carried away or eroded, the remaining soil is not as productive as before and crops do not grow as well.

Farmers can protect their soil from erosion in several ways. They can build terraces on sloped land which slow down the water and move it off the field in a controlled manner. They also use contour plowing which means that, instead of plowing up and down the slope, they plow across, or at right angles to the slope. This allows water to soak in and not run off. Most farmers use a combination of terraces and contour plowing.

When farmers harvest their crop they leave the stubble, or crop residue, on the surface of the soil. This keeps rain drops from striking the soil directly. When rain drops strike bare soil they can cause the soil to pack and water cannot soak in. The farmer only plows the field when he is ready to plant another crop. Some farmers may not plow the field at all. They just plant the seeds for the new crop directly through the residue left from last year's crop.

Erosion can also be caused by wind blowing across soil. Sandy soils are the most likely to be eroded by wind because they tend to be looser than other types. Farmers in windy areas try to keep their soil covered to prevent wind erosion. They also plant wind breaks on the side of the fields that the wind usually blows. These are trees or shrubs that help keep the wind from blowing directly across the field.

The Dust Bowl of the 1920's and 1930's was caused, in part, by wind erosion.

Rainfall/Erosion Simulator

Use this as a demonstration to show erosion and how streams, rivers and lakes can become filled with sediment. Also, agricultural practices such as contour plowing and terracing can be demonstrated.

Procedure:

1. At one end of each pan bend the edge so that it forms a spout for runoff water to drain.
2. Box 1 - fill 2" from the top with soil and lay sod on top.
Box 2 - fill 1" from top with soil and cover generously with grass clippings.
Box 3 - fill 1" from top with soil and leave bare.
3. Prop one end of each box 2-3" above the table. Hang the lower edge off the edge off the table.
4. Predict which box will be the most likely to suffer erosion.
5. Predict which box will have the least runoff.
6. Predict which jar will have the cleanest runoff water.
7. Place a jar under the spout below each box.
8. Pour a measured amount of water in sprinkling can and use it to "make it rain" on one box at a time. Continue to add water in measured amounts until water runs into jar.
9. Repeat for each box.
10. Have students answer questions based on their observations

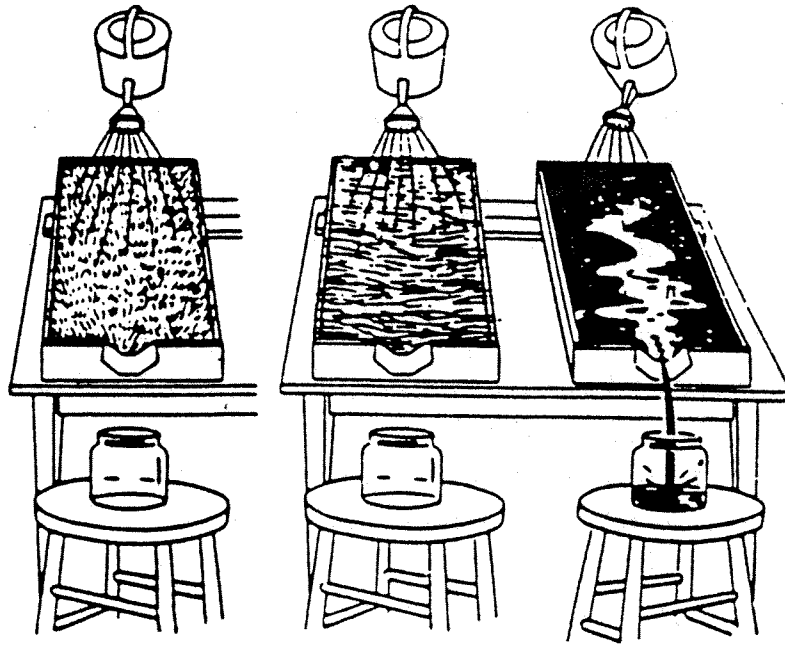
Additional Demonstration:

1. On the pan with the bare soil, construct ridges running across the pan, to simulate contour plowing. Repeat the sprinkling demonstration
2. Using the same pan construct two higher ridges of soil to simulate terraces. Place one about 3" from the top edge of the pan and the other about 3" from the bottom edge of the pan. Repeat the sprinkling demonstration.

Questions for discussion:

1. Which box had the most runoff?
2. Which box had the least runoff?
3. Which box had the cleanest runoff? Why?
4. What happens to soil in a farmer's field when water runs off too quickly?
5. What effect might this have on the soil that remains in the field?
6. What effect might this have on the crops the farmer plants in this field?
7. If you were a farmer what could you do to help protect your soil from erosion?

Diagram of how Rainfall Simulator should be set up.

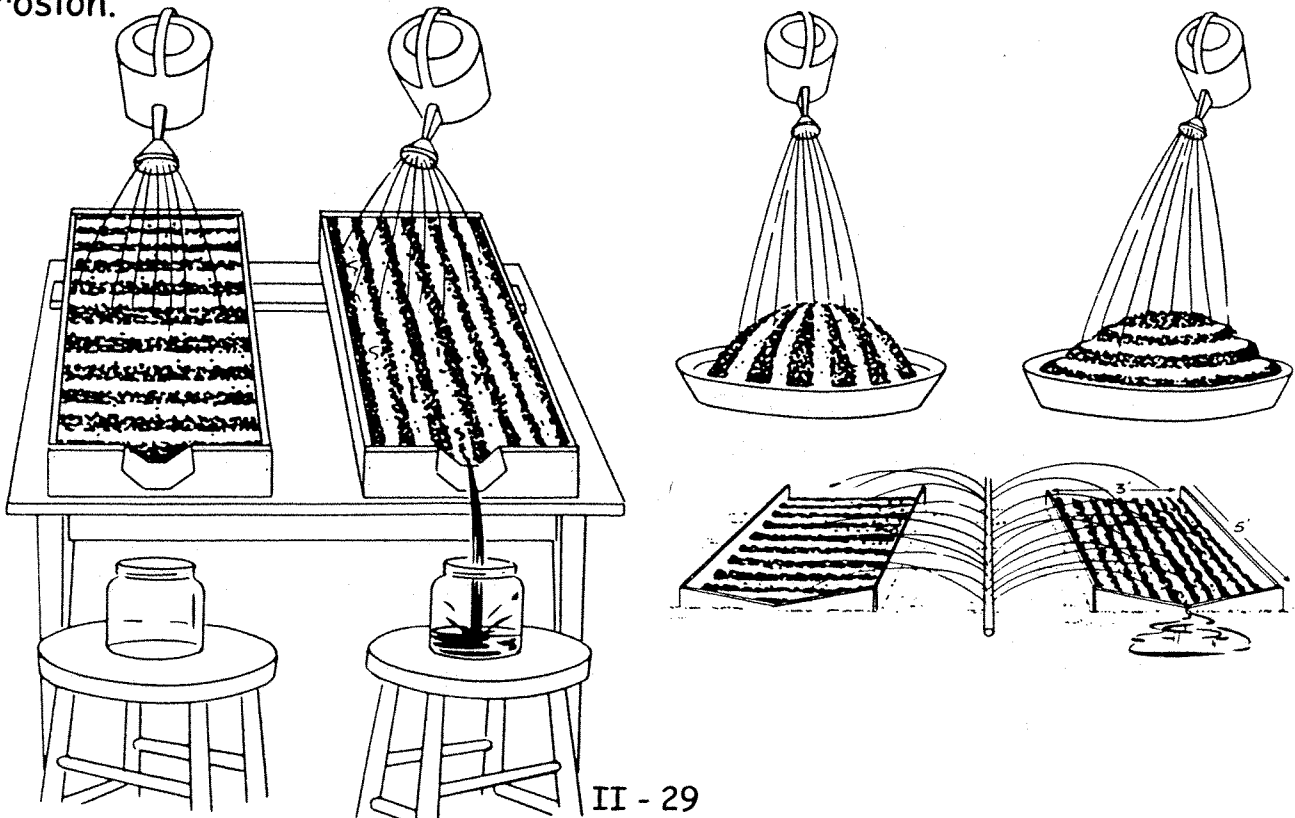


Sod

Mulch

Bare

Additional Demonstrations to show how contour plowing helps control erosion.



Erosion Quiz

Name _____ Date _____

Directions: Fill in the correct circle

A B C D

1. Erosion is

- A. building up of the soil
- C. harvesting of crops

- B. movement of soil
- D. heavy rainfall

2. Erosion can be caused by which of the following:

- A. rain falling on steeply sloping land
- C. rain falling on bare soil

- B. a very hard rainfall
- D. all the above

3. Top soil is the most productive layer because

- A. that is where rain falls
- C. it is where most organic matter is found

- B. it is the warmest
- D. it is the coolest

4. Farmers can protect their soil from erosion by

- A. making sure the soil is always plowed up
- C. keeping the grass mowed

- B. building terraces and contour plowing
- D. building a fence

5. The Dust Bowl of the 1920's and 1930's was caused by

- A. wind erosion
- C. water erosion

- B. heavy rainfall
- D. blizzards

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ANSWER KEY

Erosion Quiz

1. B
2. D
3. C
4. B
5. A