How do certain factors affect the erosion of soil by water?

Water erosion is the process by which water wears away Earth’s surface materials and moves them from one location to another. When rain falls it soaks into the ground, evaporates, or becomes runoff. Runoff is the major cause of water erosion. Factors that affect runoff include the amount of rain, the time span over which rain falls, the slope of the land, and the amount of vegetation on the land. The effects of erosion may be immediate, or they may take years to become apparent.

There are different types of water erosion. Rill erosion begins when a small steam forms during a heavy rain. The stream carries away vegetation and soil. If a stream frequently flows along the same channel, rill erosion can evolve in to gully erosion. In gully erosion, rill channels become wider and deeper gullies.

Water can also erode without forming a channel. For example, when rain falls on a flat area, water accumulates and loosens and displaces surface soil. Sheet erosion occurs when large amounts of water flow along the surface from higher to lower elevations, washing away layers of soil.

Thousands of acres of farmland are destroyed by erosion each year. Embankments surrounding and supporting roads and buildings are also eroding. Precautions that can reduce these losses include terracing a hillside and planting vegetation to prevent the topsoil from washing away in heavy rain. Managed properly, soil is a renewable resource on which crops can be grown and structures built.

In this Virtual Lab you will measure the amount of sediment collected from water runoff to compare the effects of three variables on water erosion.

Objectives:

* Identify some of the factors that affect the erosion of soil by water.
* Compare the influence of different combinations of factors on the erosion of soil by water.

Procedure: Prepare a Data Table…See below

1. Make a hypothesis about how variables such as the slope of the soil, the presence or absence of vegetation, and the intensity of rain affect the erosion of soil by water.
   1. State your hypothesis on your paper.
2. To test your hypothesis, you will choose settings for each variable and measure the amount of sediment in the runoff from a rainfall.
   1. First, choose the slope of the embankment by dragging the diagonal arm of the angle to 10 degrees or 30 degrees.
   2. Record the slope gradient in the Table.
3. Choose whether or not the embankment has vegetation by clicking Yes or No. R
   1. Record the presence or absence of vegetation in the Table .
4. Choose the intensity of the rainfall by clicking Low or High.
   1. Record the intensity of rain in the Table.
5. Click the Rain button. Observe the erosion caused by rain.
6. Drag the beaker to the runoff.
   1. Record the amount of sediment in the runoff (Low, Medium, or High) in the Table.
7. Click the Reset button.
   1. Repeat the experiment using different variable settings.
8. After all possible combinations of the three variables have been tested, draw your conclusions.
9. Complete the Journal Questions.

Data Collection: Prepare a data table with the following headings. Add as many rows as necessary to complete the experiment as directed.

|  |  |  |  |
| --- | --- | --- | --- |
| Slope Gradient (Degree) | Vegetation? | Rain Intensity | Sediment Level |
|  |  |  |  |

Journal Questions: How do certain factors affect the erosion of soil by water?

1. Sate a problem.
   1. Describe what you want to find out about the relationship of the following factors to the amount of water erosion that occurs on a slope: slope gradient, presence or absence of vegetation, and rain intensity.
2. Make a hypothesis.
   1. Predict how the amount of water erosion that occurs on a slope will be affected by variations in the slope gradient, presence or absence of vegetation, and rain intensity.
3. Test your hypothesis.
   1. How will you use the computer model to test your hypothesis?
   2. What steps will you follow?
   3. What data will you record?
   4. Be specific about which of the variables you will adjust and when.
4. Analyze the results of your experiment.
   1. Explain any patterns you observed. Did the results of your experiment support your hypothesis?
   2. Why or why not?
5. Draw a conclusion.
   1. How did the slope gradient, presence or absence of vegetation, and rain intensity relate to the amount of water erosion that occurred on the slope?
6. Which variable do you think has the strongest influence on the amount of water erosion that occurs on a slope?
   1. Why?
7. What are some other factors that might influence soil erosion?
8. What could happen if the angle of the slope was increased to an angle steeper than 30 degrees?
   1. What would happen if amount of vegetation were cut by 50%?