

Factors affecting infiltration and runoff

http://www.ccge.org/resources/learning_centre/classroom_activities/river_runoff.asp

Introduction

Each spring you read news stories about the extensive flooding that has taken place in some areas. This flooding is responsible for millions of dollars of damage to property each year. When precipitation reaches the ground it will either evaporate, infiltrate or run off. Generally speaking, most of the water that does not infiltrate into the earth's surface will run off. It is this runoff water that flows into rivers, streams, lakes and the oceans. Sometimes this runoff water can cause flooding. What factors determine the amount of infiltration or runoff that will occur? In this experiment, you will investigate some of the factors that determine the amount of runoff. Keep in mind that infiltration and runoff tend to work oppositely. When conditions are bad for infiltration they usually lead to runoff.

Purpose

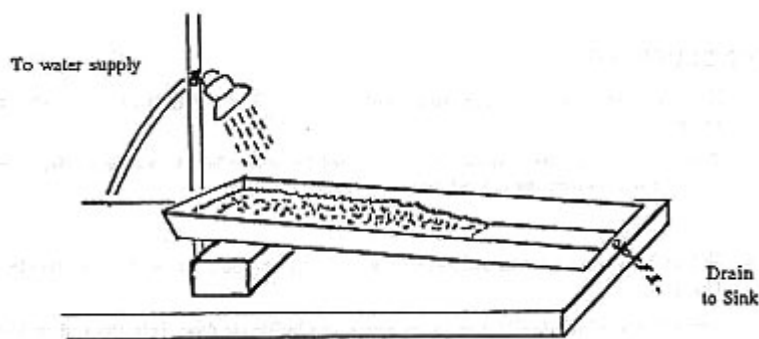
How do slope, particle size and the rate of precipitation affect the amount of runoff and infiltration?

Materials

- Stream table
- Water circulating system; pump, siphon or hose from sink
- Shower attachment
- Fine sand
- Coarse sand
- Small sand shovel
- Wood blocks
- Ring stand
- Buret clamp

Procedure

1. Set up the stream table, wooden blocks, and water circulating system as shown in the illustration.



2. Fill the upper 2/3 of the stream table with fine sand. Smooth out the surface of the sand to form a gradual slope from the top of the tray to the end of the sand. The bottom 1/3 of the tray should not contain sand. This area of the tray will collect the water that runs off the sand.
3. Turn on the water and observe the amount of runoff that flows down the sand. This set up will be your control. You will compare the amount of runoff that takes place as you change the conditions to this original set up.

4. Increase the slope of the tray by placing additional blocks under the upper end of the tray. What effect does this increase in slope have on the amount of runoff?
5. Increase the rate of precipitation on the slope by increasing the flow of water through the system. What happens to the amount of runoff as the rate of precipitation increases?
6. Turn off the water. Using the sand shovel, remove the fine sand from the tray. Fill the upper 2/3 of the tray with the coarse sand the same way that you did with the fine sand.
7. Turn the water back to the same rate that you used in the first control setup. What affect does the particle size have on the amount of runoff?

Data

Factor	Affect on Run Off	Affect on Infiltration
Increased Slope		
Increased Rate of Precipitation		
Increased Particle Size		

Conclusions

1. How could you increase the amount of infiltration that will take place in an area?
The amount of infiltration could be increased by increasing the particle size, decreasing the slope or decreasing the rate of precipitation.
2. What happens to the soluble minerals in the soil as water infiltrates down into the soil?
The soluble minerals dissolve in the water and infiltrate down into the soil with the water.
3. What methods can be used to reduce the amount of erosion caused by runoff on very steep slopes?
Any method that would decrease the amount or speed of the runoff would decrease the amount of erosion.
4. Why is runoff water a greater problem in the spring?
In many locations the spring is a rainy time of year. In addition, there is a great amount of runoff in the spring as melting snow is added to the normal runoff from the regular seasonal rains.

Suggestions for Further Study

- Both groundwater that has infiltrated and runoff water are used as major sources of drinking water. Where does the drinking water in your area come from? How is the water that is pumped out of the ground replenished? How is the water that is used from reservoirs replenished?
- In many urban areas the amount of infiltration that can occur has been greatly reduced because of all of the buildings and areas that have been paved over. How do these urban areas deal with the excess runoff water that is created?
- How is the water table recharged if less water is infiltrating into the ground?