

River Rush, Stone Slide, Swept Away

Objective: Students will observe how different soil particles are affected by water runoff at different times. Students will also observe how different types of soils and rocks/boulders affect water flow. Students will observe how vegetation affects runoff.

Materials: Gravel, sand, clay, rocks of different sizes, silt (optional), water, at least a two gallon basin, a flat surface ~12"x18," a large cup or pitcher, four cans of different sizes (soup, coffee, etc., must be at least 2" – 3" in diameter), cheesecloth, pencil, and paper for notes.

ACTIVITY SUMMARY:

This activity simulates how soil particles are affected when water runs over them at various inclines and how larger objects, such as a boulder, affect the flow of running water. Furthermore, observations can be made as to how soil particles react when they are placed into water:

Do they float? Sink? Float then sink? Remain suspended?

The various heights used in this experiment will show how topographical inclines potentially affect erosion of the soil surface.

BACKGROUND INFORMATION:

Take a look at the GETTING THE DIRT ON SOIL introduction as well as the lesson *Bronx River Soil Composition* on the preceding pages. This works as an excellent prelude to these activities.

PROCEDURE:

Explain to the students that they will be trying to simulate what may happen when water runs down natural slopes of different grades, and how clay, silt, and rocks may respond to this runoff.

Fill the clear basin with approximately two inches of water. Prop the flat board you are using up on the smallest can. Place a horizontal line of moist but firm clay across the board. This line should be approximately one inch in width and span the entire board.

EVERYBODY

IN THE CLASSROOM

Skills:

Communication, Using Scientific Tools, Critical Thinking, Observe/Compare

Subject/Discipline:

Science, Math

Science Standards:

S1, S3, S4, S5, S6

Time:

Prep + 1 class meeting.

The Inside Track:

For more information about soil quality, contact the New York City Soil and Water Conservation District (NYCSWCD).
212-431-9676 x335
www.nycswcd.net



NOTE:

Call the Bronx River Alliance at 718-430-4665 to obtain location information and permission to take soil samples on parkland.

Ask the students what they think will happen. Students should make a note of these predictions and note particle behavior during the activity.

Very slowly, pour one to two cups of water down the board from the top.

Have students observe what happens to the clay as the water runs down the board. Also, have them observe what the *clay* does when it hits the water.

NOTE: Watch your incline! If the incline is too great, your media will fall into the water before you pour. Though this is a lesson unto itself, it may be frustrating if you have a limited amount of class time.

Try a pre-experiment during prep to test your inclines.

Repeat this process for the sand, gravel, and silt. After this has been completed for each type of particle, have the students make conclusions about each.

Lastly, repeat the process at different levels of incline and have the students discuss why the incline affects the movements of the particles down the board. Discuss the relevance inclines have on runoff and erosion.

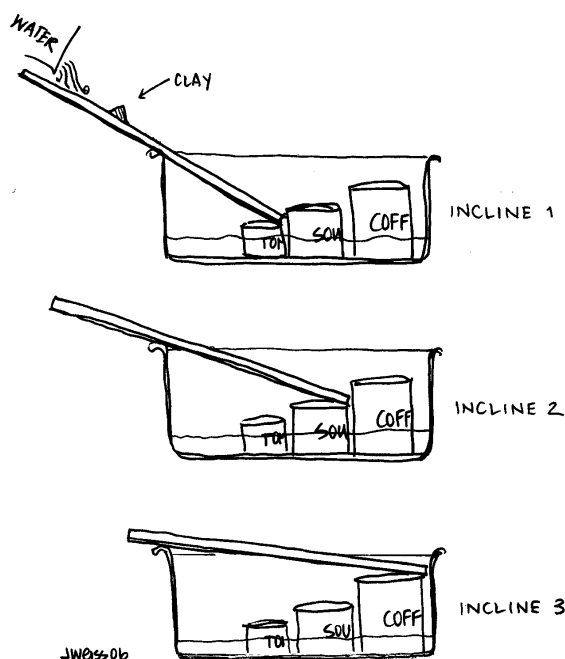
For determining how obstructions affect water flow, repeat the process as before starting with the lowest incline. Place different sized rocks on the board at each incline. Allow the students to observe if the water flows over or around the various sized rocks.

Have the students predict what would happen if the soil was covered by vegetation. To demonstrate, cover a line of silt with a layer of terrycloth or cheesecloth (you will have to fold the cheesecloth so that four layers are covering the soil). Pour the water over the cloth.

EXTENSIONS:

1. Combine this activity with topographic maps. Students should select a section of the Bronx River to work with and record a few of the slopes at which the river runs from the highest to lowest elevation. Considering this as a scale model, students can then simulate the movement of soil down the river at each slope. To do this a ratio should be created. For instance, if the board was propped up one inch, this can equal 100 ft. in elevation (or rise): 1in. = 100ft.

Students predict where soil particles will move most quickly and at which slopes will the different particle sizes be most affected. Run the experiment to test these predictions.



Suggested experiment set up.

For information and activities regarding topographic maps, see *Mapping the Bronx River Watershed* lesson found in this section.

2. Use real Bronx River soil to run the tests. Compare the Bronx River soil to the other soil materials. Ask:

How were the results the same, how were they different?

How do runoff and erosion affect the Bronx River and its watershed?

(Examples: Turbidity from increased erosion, pollutants from runoff, loss of land and trees, land eroding toward pathways and the Bronx River Parkway.)

What can we do to slow or stop runoff and subsequent erosion?



*Based on a lesson plan created by Deana Grimaldi and Jennifer Agnew.
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