

Rip-Rap: Controlling Run Off

Estimated Time: 30 minutes

SUMMARY

In this experiment, you will design your own landscape and erosion control setup to try and contain the most topsoil and prevent topsoil from entering the waterways. If soil enters the waterways in large volumes it not only washes away habitat, but it also creates turbid and cloudy water for animals living downstream. One of the most common forms of erosion control is rip rap, which is large rocks set on the shoreline of lakes and streams.

WHAT YOU'LL LEARN

- When rain falls on loose soil, it moves the soil off the area and it enters the waterways, carrying with it everything in the soil.
- To combat runoff, designers and engineers create barriers to keep the soil and debris from entering waterways.
- Random riprap consists of various sizes of stone that produce a dense, uniform, and stable layer of stone with no large voids, while using smaller rocks prevent undercutting and erosion by flowing water, and helps to keep the larger rock in place.

Materials Used	
<ul style="list-style-type: none"> • 9 x 13 baking dish or plastic container • Plastic grocery bags • Aluminum foil • Water • Watering can or plastic cup with small holes cut from the bottom 	<ul style="list-style-type: none"> • Rice • Beans or lentils (2 varieties if possible) • Couscous or quinoa • Cocoa Powder • Coconut flakes • Sunflower seeds • (optional) food coloring

WHAT TO DO

1. Before starting the experiment, you will need to design a landscape that has areas of higher elevation and lower elevation. You can place plastic grocery bags, small bowls, newspaper balls or something similar in your baking dish. Cover with aluminum foil and create some channels around your objects. (see photos)
2. Once your landscape is set, place enough cocoa powder on the highest elevations so that you do not see foil underneath. Make this a relatively even application so that there are not mounds of cocoa.
3. Next, look at your remaining ingredients. Place them on the slopes of your elevated areas, with these considerations:



- a. Which material will stop the soil from entering the waterway?
 - b. Should you use a variety of materials or just one kind?
 - c. What is the most stable material? What will get washed away in the rainfall?
4. Once you are satisfied with your layout, it's time for a rainstorm. Carefully pour water on your higher elevation areas in a steady rain like fall. It is important to have your rainfall last the same amount on each spot.
5. Evaluate your erosion barriers. Was there a material that worked the best? Did you combine any materials for a better result?
 6. (Optional) Add some food coloring to the surface of your cocoa. When you make a rainfall this time, track the movement of the color along the water – this can be similar to a pollutant in the soil entering the waterway. How could you change your erosion control to limit the movement of pollution?



TIPS

- For some added fun, place some figures in your landscape!
- Create a watershed area in your landscape by adding cut up sponges. These act with the erosion barrier to stop smaller particle flow and “clean” the water!
- Try looking around your yard for spots of erosion after the last rainfall. What could you create to limit the amount of soil leaving your yard?