

## Droplets and Downpours

### Summary

Participants sketch a landscape design map of their yard or the study site. By doing three experiential activities, participants learn how stormwater flows through different habitats/landscapes and ultimately how to prevent erosion and other nonpoint sources of pollution. First participants drop wet tennis balls (simulated rain drops) down hill through different landscapes (road/path, lawn, forested/vegetated area) to discover what landscapes slow the flow of rainwater the best and what pollutants a water droplet may pick up. Using a watering can, they observe erosion in different habitats. Next participants compare the runoff from a newly raked area with a naturally mulched area to discover the value of duff or "nature's mulch" (leaves, twigs pine needles often found in forested areas). Finally students each create a sandcastle that they hope will withstand a downpour. Participants revisit their landscape design to add arrows to depict the flow of stormwater. Then they sketch in improvements that will divert stormwater away from the nearby waterbody to protect water quality.

**Time:** 45 -60 minutes not including pre and post activities.

**Grade level:** 4-8

**Maine Learning Results:** Science and Technology

B. Ecology -5. Describe various mechanisms found in the natural world for transporting non-living matter and the results of such movements.

M. Implications -4. Describe an individual's impact on an environmental system.

7. Explain the connections between natural resources, population and economic development.

**Location:** A sloping area outside that has a variety of habitats or landscapes- vegetation with natural duff, lawn, gravel path or road, and bare soil for Activities 1 and 2. A sand box or beach area for the third Activity.

### Materials:

Rake, old tennis balls, yard or meter sticks, watering can, access to water, bucket, pictures of eroded areas and local laws (Waterfront Brochure, info on NPS), sandy area for making sand castles, touch box or bag with soil, dust pan and white container

### Web Links:

Waterfront Property Information <http://www.maine.gov/dep/blwq/doclake/waterfront.pdf>

Nonpoint Source Pollution Info. <http://www.maine.gov/dep/blwq/doceducation/nps/index.htm>

**Pre activity:** (optional but could be a great assessment tool)

Have participants draw the elements of a landscape either the school yard or their own back yard. Include the location of buildings and their gutters, paved areas, paths, gravel areas, parking areas, lawn, trees, shrubs, bare soil, streams, drainage ditches, and stormdrains. Also include location of hills. Doing this first as a class in a small portion of the school yard may be helpful.

### Procedure:

#### **Activity 1 Evaluating Different Landscapes.**

A wet tennis ball is used to simulate a rain drop. Ask, "When it rains where does the water go?" (Down hill, into the ground, stays in a puddle) Introduce infiltration, evaporation and surface run-off. When it hits the ground and runs downhill it is called stormwater. If needed use a watering can to demonstrate and observe stormwater.

Each participant drops a wet tennis ball from the top of a vertically placed yard or meter stick. Demonstrate dropping the ball. It is important to use the same procedure each time. It is best to drop the balls one at a time. Have each participant measure the distance their ball rolled using their feet, or the yardstick, as a measuring device. Note any obstacles the water droplet (tennis ball) encounters and what, if any, items that have become attached to the ball. Repeat this ball dropping activity on lawn, forest or whatever habitat is available. Have the participants fill out the "Droplets and Downpours" worksheet for each habitat. Gather together and discuss results. Have participants answer questions individually and then discuss answers as a group.

### **Activity 2 - The Value of Duff**

Go back to the naturally forested area to observe the components of duff (leaves, twigs pine needles often found in forested areas). Why do people rake up duff? (They think it looks neat -- a cultural belief.) Rake up duff in a small sloped area. Use the watering can to make it "rain" on the unraked duff area and the raked duff area. Use a dust pan to collect the run off and pour it into a white container to observe the turbidity of the runoff. Compare the amount and clarity of the runoff from the raked and unraked duff. (They should observe erosion on the raked up area.) The message you want to convey is that it is best to just leave the duff. It is less work, it slows and filters runoff and protects the lake.

Regulations in Maine: There are many laws to protect waterbodies, rivers and the ocean (see [Waterfront Property](#) link). There are local laws relating to erosion and clearing of vegetation in the shoreland zone. For Example, The Maine Law Sedimentation and Erosion Control Law requires erosion control practices to prevent any soil from leaving a construction site. As of 2005 all sites in Priority Watersheds that have eroding soil must be stabilized. By 2010, all eroding sites in the State of Maine must be stabilized.

Show pictures of eroded areas. Have students look for eroded areas nearby. Discuss any other erosion control practices that pertain to the location.

Have some soil in a touch box or paper bag. Ask the students to think to themselves the answer to this question: "What is the number one pollutant to water?" Then have them each reach in a feel the soil to confirm their answers.

### **Activity 3 Sand Castle Contest**

Delineate an area where students can make sand castles that can withstand a downpour from the watering can. Encourage students to use erosion control by gathering debris to stabilize the sand and to simulate vegetation and duff. When they are finished or the time is up, use a watering can to make it rain on each sand castle and discuss the results. Be sure to encourage the students to extrapolate to the real world. What types of landscapes are good? How does development impact stormwater runoff and pollution of the water?

### **Post activities:**

Review the landscape design and add arrows to show the flow of stormwater in their backyards or the schoolyard. Using these arrows, decide where to add more plants or water diversion features.

Follow up with a buffer planting activity or make "Plant a Buffer" T-shirts.

Name \_\_\_\_\_

# Droplets & Downpours



Ground Cover or Use →	Lawn	Road or path	Buffer forest
My ball traveled (measurement in your feet)			
My ball picked up			



1) Which ground cover slows the ball (raindrop) down the most?

\_\_\_\_\_

2.) Which ground cover slowed the ball (raindrop) the least?

\_\_\_\_\_

3.) What kinds of things got stuck to the ball?

\_\_\_\_\_

4.) Which ground cover do you think would cause stormwater to pick up the most pollution and why? \_\_\_\_\_

\_\_\_\_\_

5.) What did you learn about duff on the ground? \_\_\_\_\_

\_\_\_\_\_

6.) What is at least one thing that you (or your family) could do to prevent erosion?

\_\_\_\_\_

