

Connecting Land and Water

Watersheds and Non-Point Source Pollution

Chicago River Classroom Activity

Summary

Working with a model, students will define what a watershed is and observe the impact of non-point source pollution on area waterways.

This lesson can be used as a pre- or post-lesson with a Chicago River field trip exploration.

Background Information

A watershed is the land that drains into a body of water such as a stream, lake or wetland. Because water flows downhill, watershed boundaries are always located on the top of hills or mountains. Rain falling on one side of the hill will flow into one water body, while rain falling on the other side of the hill will flow into another water body.

Any changes to the land in a watershed will affect the river or lake it drains into. For instance, replacing forests and prairies with housing developments decreases the amount of water that can seep into the ground. More water flows over streets and sidewalks into street drains that empty into the river (either directly or via a water treatment facility). Thus, the river tends to flood more often when it rains because so much water reaches it so quickly. When so much water is in the river, the water is able to greatly erode the banks of the river. Tree roots are left exposed and the sediment ends up in the river turning the river water a murky brown. The sediment can clog the gills of fish and insects, cloud the water so much that plants can not photosynthesize and bury insects and fish eggs living on the bottom of the river.

Grade Level: 3rd – 4th

Duration: One class period

Objectives:

1. Students will define what a watershed is and observe the impact of non-point source pollution on area waterways.

Materials:

- White plastic tablecloth
- Newspaper
- Spray bottle filled with colored water (fill the bottle with water, add two drops of blue food coloring and mix together)
- Small amount of vegetable oil, cocoa powder, chocolate sprinkles, and multiple colors of kool-aid ©
- Students should have their journals

Standards:

11.A.2b, 11.A.2d, 13.B.2f, 17.A.2b

NGSS:

3-5-ETS1-3, 5-ESS3-1, 4-ESS2-2

While flowing over streets, rainwater also picks up pollutants such as salt, oil and sand. These pollutants can then reach the river. This type of pollution, which is spread across the landscape and cannot, once it reaches the river, be identified as coming from any one particular person or company, is called non-point source pollution. It is one of the major threats to rivers today.

A watershed is more than just land, it is also a community. A watershed community includes all the people and natural resources located within a watershed.

Procedure

Based on activity by Julie Schultz, EarthForce (www.earthforce.org).

Part 1

- Tell students that they are going to be creating a model of a landscape.
- Have students crumple pieces of newspapers in differing sizes and pile the papers on the floor to create a landscape.
- Once the papers are all in place, place the white plastic tablecloth over the crumpled newspapers. Make sure that the edges of the tablecloth lies flat against the floor. This will prevent water from running onto the classroom floor. Have students stand around the edge of the tablecloth.
- Ask students to predict in their science journals where the water will go if rain were to fall on this piece of land.
- Spray the colored water on the tablecloth for about one minute (spray enough water to observe how the water flows over the land). Ask students to point out where water is going (it is flowing down hill in rivers into pools of water that could be small ponds or lakes).
- Have students pay attention to one particular pond or lake. Tell them to carefully observe where the water in the lake or pond comes from, what part of the landscape drains into the lake. Spray more water on the landscape around this pond or lake while students observe what is happening. Point to locations inside and outside the watershed and ask students if they think water falling here would drain into the pond or lake. Why or why not? If students are unsure, spray more water and have students observe. Invite several students to show what land they think drains into the lake or pond.
- Let students know that the areas of land that drain into a body of water, a river, lake or pond, is known as a watershed. Have students locate the watershed boundaries of other water bodies in the simulated landscape. Ask students what is the same about all watershed boundaries? (They are always located at the top of hills and mountains and encircle the water body.) Ask students to explain how there can be two watersheds right next to each other. (A ridge separates the two areas.) Have students write their observations and thoughts in their journals.
- Leave the model in place as you will be returning to it.

Part 2

- Ask the students to predict what would happen to any pollution on the land when it rained. For example, where would excess fertilizers on lawns, salt on sidewalks and oil on roads end up? Give time for students to respond in their journals.
- Have students give you examples of pollution that might be found in their neighborhood. Sprinkle the kool-aid ©, cocoa, oil and chocolate sprinkles on areas to represent different types of non-point source pollution, such as fertilizers, pesticides, road salt, erosion, oil dripping off of cars onto roads, and dog waste. Then spray water on the landscape to represent a rain storm. Have students observe what happens to the “pollution”.
- Ask students to describe one area (pond or lake) and ask them what they think is in it (the colors should have blended and it will be hard to say). Discuss how pollution, like the kind they observed in their model, that comes from many small sources throughout the watershed is known as non-point source pollution. (In contrast, point source pollution is pollution that comes from one particular place with an obvious pipe that empties into the river or lake. Examples would include factory outfalls and sewage pipes dumping into a river.) Non-point source pollution is a major issue/problem in rivers today.
- As a class discuss the impacts of non-point source pollution and soil erosion. Ask students to describe why they think this is so difficult to control (non-point source pollution comes from many sources, and it is not obvious who is responsible for the pollution). Ask students to come up with things that they could do to help reduce non-point source pollution in their neighborhood.

Reflection

In their journals, students will describe how non-point source pollution reaches a river. In their discussion students should correctly use the word watershed. Students will also reflect on how they can help keep their watershed healthy.

Extension

Students can investigate how improper disposal of common household products can harm the watershed and describe how they should be disposed of.