

What is a Watershed?

Chicago River Classroom Activity

Summary

Students will create models of a landscape. They will then make and test their predictions about the location of rivers and watershed boundaries. Students will then find their watershed address. This lesson can either be done as a classroom demonstration, or by students in groups of 3-4. Lesson extension models non-point source pollution.

Background

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 is reaching it so quickly. 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 can not, 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.

Because non-point source pollution comes from across the watershed it is more difficult to regulate than point source pollution. Reducing non-point source pollution will take the commitment of everyone in the watershed to change their behaviors.

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.

Grade Level: 6th –12th

Duration: one class period

Objectives:

1. Students will be able to define a watershed.
2. Students will know what watershed they live in.
3. Students will be able to define non-point source pollution and understand how it differs from point source pollution.
4. Students will be able to give examples of non-point source pollution.

Materials:

- ◆ Map of IL watersheds (<http://www.sws.uiuc.edu/hilites/map.asp>)
- ◆ State map of Illinois
- ◆ Student journals

Done as a classroom demo:

- ◆ White plastic tablecloth
- ◆ Newspaper
- ◆ Spray bottles with colored water ,as many as you like
- ◆ Food coloring, vegetable oil, sprinkles, cocoa powder

Done in groups, one for each group of 3-4 students

- ◆ Aluminum 9x12 pan
- ◆ Piece of white paper
- ◆ Water soluble markers, one red and one blue
- ◆ Spray bottle with water

Standards:

6th- 8th: 11.A.3a, 11.A.3f, 12.E.3b, 13.B.3, 17.A.3b, 17.B.3a. 9th/10th: 11.A.4a, 17.A.4b, 17.B.4a 11th-12th: 11 A 5a 17 A 5

Procedure

Ask students where they think the water in a river comes from. Write answers on the board as you would when diagramming the water cycle. Ask students if they recognize what you have begun to draw. Then ask the students to fill in the missing pieces of the water cycle. Let students know that understanding the water cycle is the first step in being able to answer the question – where does the water in a river come from?

Making a Watershed Model: Classroom Demonstration

- Tell students that they are going to be creating a model of a landscape.
- Have students crumple pieces of newspapers 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 the edges of the tablecloth are flat against the floor. This will prevent water from running on your floor. You may also want to consider doing the activity in the schoolyard.
- Have students stand around the edge of the tablecloth. Ask students to predict where the water will go if rain were to fall on this piece of land. Have them write their thoughts in their journal.
- Have students spray the colored water on the tablecloth for about one minute (enough 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 and that the flowing water).
- 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 – i.e. 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 – 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)
- Refer back to the water-cycle diagram on the board. Ask students to tell you what are all the ways water reaches a river and what all the ways water is lost from a river.

Making a Watershed Model: Small Groups

- Let students know that they will be creating models of landscapes and using them to answer the question posed to them – where does the water in a river come from?
- Show students how to make a landscape:
 - Take a piece of white paper. Hold the middle of the paper and with the other hand and squish the sides of the paper together to create a long and thin object.

- Spread the paper open and lay it in the aluminum tray so that the edges touch the bottom of the tray but there is still a distinct mountain in the center.
- Divide students into groups of three or four and pass out aluminum pans, markers and paper to each group. Have groups create a landscape as you demonstrated.
- Then instruct students to discuss with their group, where they think the rivers would be flowing in this landscape. Have each student draw one river with the blue marker.
- To test out their thoughts, pass out the spray bottles filled with water and ask students to gently spray their models and observe: is water flowing down the river? Where is the water coming from?
- Now have students circle in red the area from which they think water drops would flow into their river. Have students spray their model again paying particular attention to whether only water falling within the red boundary flows into their river and whether all the water falling within the red boundary reaches their river.
- Walk around helping students and explaining things as you go. Perhaps pick up one group's model to highlight what they did.
- Let students know that the area they highlighted in red is called the watershed boundary. It is located along the tops of ridges surrounding rivers. Rain falling on this land can reach the river – either by flowing over the land, as it did in their models, or flowing through the soil.
- Refer back to the water cycle diagram on the board. Ask students to tell you what are all the ways water reaches a river and what all the ways water is lost from a river.

Finding your Watershed Address

- Display the two maps – the watershed map and “regular” state map. Have two volunteers locate their city on the state map. Then have two other volunteers locate their city on the watershed map and find their watershed address (the name of watershed they live in). Show the students how their river flows into a neighboring river and that that river flows into another river until eventually it all flows out to a large lake or an ocean. The Chicago and Calumet Sag Channel in the Chicago area flow into the Chicago Sanitary and Ship Canal, then into the DesPlaines, the Illinois and the Mississippi and eventually out to the Gulf of Mexico.
- Share with students that we are all part of a watershed community – the people, plants, animals and other resources that are found in our watershed. Explain to the students that knowing their watershed address and being aware of what is happening in their watershed is important because every member of the watershed community is responsible for caring for the watershed they live in.

Reflection and Assessment

- Have students write or draw their definition of a watershed, including all the ways water reaches a river (water flowing over the land, water flowing through the land, rain falling directly on the river) and all the ways water is lost from a river (evaporation, flowing downstream, seeping into the ground).
- Have students reflect on what it means to them to be part of the Chicago River watershed. Is it different from what it means to be part of Chicago (or whichever city they live in)?

Extension: Non-Point Source Pollution

- Return to the watershed model. Have students brainstorm different types of pollution that might be found on the land in their neighborhood. You can guide them by having them think about different areas in their community – houses, parks, lawns, streets, dog parks, farms, factories, etc.
- For each of the types of the different types of pollution the students identify, have them add some mock pollution on the watershed model. For instance, red cool aid can be pesticides, vegetable oil can represent car oil and cocoa can represent soil.
- Have the students predict what would happen to this pollution if it were to rain.
- Then have the students spray water on the model and observe what happens.
- Follow with a discussion on what ways they think they could help reduce the pollution entering the river. Examples could include: picking up after your dog; not using (or using sparingly) pesticides, fertilizers, herbicides and salt; taking care of your car properly and planting plants along side the river to trap pollutants.
- End with the thought that the only way to control non-point source pollution (pollution that enters the river from throughout the watershed and not from a distinct pipe) is for everyone to