



Lessons from the Bay

A River Runs through It

How does land use along a river impact the health of the river and the Chesapeake Bay?

Objectives

Students will

- assess the impact of a variety of land use scenarios on the health of an imaginary river by
 - applying knowledge of runoff, erosion, and watersheds
 - interpreting a written description of land use
 - predicting the consequences of the land use
 - inferring cause and effect relationships.
- recommend changes that reduce the impact that each land use scenario has on the river.
- assess the impact of land use in their schoolyard.

Background

Rivers, creeks, and streams throughout the Chesapeake Bay watershed are fronted by a wide variety of land types. The impact of the land use surrounding the upper portions of the river is felt all the way downstream, influencing the water quality of the river and, ultimately, the Bay.

Perhaps the greatest negative impact results from conditions that contribute to increased runoff, sediment, and nutrient levels in the water. Increased runoff causes erosion and flooding of waterways. The rapid water picks up and spreads pollutants. Erosion and runoff from exposed soil contribute sediment to the water. The sediment blocks the sunlight underwater grasses need to produce the oxygen that benefits other organisms in the water. Increased nutrients cause algal blooms that also block sunlight. Several of the scenarios in this lesson also deal with air pollution and animal waste, another source of increased nutrients.

The most effective method of reducing runoff, erosion, and pollutants entering the water is the maintenance of vegetation along the riverbank. Vegetation serves as a natural filter and slows the flow of runoff. Vegetation also shades the waterway and prevents the water from reaching unhealthy temperature levels. Farmers who practice no-till farming and/or contour plowing help to reduce erosion and runoff. Developers who maintain a vegetated buffer along waterways are helping to reduce the potential runoff of pollutants and sediment. Contractors who use retaining fences also slow down the level of erosion and runoff from building sites.

Related Standards of Learning

Science:

3.1.a; 3.1.j; 3.6.a; 3.6.b; 3.6.c;
3.9a; 3.9.c; 3.9.d; 3.10.d; 4.5.c;
4.5.f; 4.9.a; 5.7.f; 5.7.g; 6.7.b;
6.7.c

English:

3.1; 3.2; 3.3; 3.6; 3.7; 3.9; 3.10;
3.11; 3.12; 4.1; 4.2; 4.6; 4.7.b;
4.7.c; 4.7.d; 4.7.g; 4.7.i; 4.8; 5.1;
5.7; 5.8; 5.9.d; 5.9.e; 6.2; 6.4; 6.7;
6.8

History and Social Science:

VS.1.b; VS.1.d; VS.1.h; VS.1.i;
USI.1.e; USI.1.f; USII.1.f; USII.2.b

Time Required

Two 45-minute sessions

Materials

- piece of drawing paper with edge cut to resemble the edge of a riverbank
- long piece of blue bulletin board paper to represent a river
- self-stick notes
- large piece of paper cut into the shape of a raindrop

For each group:

- Land use Scenario, cut from handout (page 107)

Classroom Assessment Suggestions

- *Conduct an informal assessment during the activity. Do students accurately report harmful/helpful impacts of the land area they were assigned?*
- *Grade students' solutions for solving land use problems.*

Procedures

Session 1 (45 minutes)

Conduct this session in the classroom.

1. Divide the class into 10 groups, or pairs, of students. Give each group a piece of drawing paper and a Land Use Scenario. Instruct each group to draw a picture of their piece of land, using information described in their Land Use Scenario. Impress upon them to include in their drawing all the details from the scenario.
2. Give at least 1 self-stick note to each group. Direct each group to list on their self-stick note items from their land that could end up in the river. These items might enter the water with or without the aid of surface run-off.
3. When all groups have finished, have students place their drawings along the edge of the blue bulletin-board-paper river.
4. Beginning at the start of the river, move the paper raindrop downstream. As you pass by each land use picture, ask that picture's group to read their Land Use Scenario to the class, describe what they have drawn, and read the list from their self-stick note. Have the group then place their self-stick note on the raindrop. Proceed to the next land use picture.
5. Upon reaching the end of the river, read the self-stick notes that are on the raindrop, and discuss the items. Ask students to name the items that appear most frequently. *Are some items more harmful to the water than others? Are there any that could be helpful?* Discuss possible improvements to each piece of land that would decrease the negative impacts.
6. Have the groups modify their drawings to reflect better stewardship of their land.

Session 2 (45 minutes)

Conduct this session in the schoolyard.

1. Take the "river" and "raindrop" used in Session 1 outside. Again, give students self-stick notes. Tell students to imagine that the river passes through the schoolyard.
2. Direct students, working in the groups from Session 1, to search the schoolyard for land use practices that could impact the river. Tell them to look for both negative and positive impacts and to record their findings on their self-stick notes.
3. When students have completed their investigation of the schoolyard, have them attach their self-stick notes to the raindrop.
4. Discuss the items listed on the raindrop. Ask students to name the items that appear most frequently. *Are some items more harmful to the water than others? Are there any that could be helpful?* Discuss possible improvements to the land that would decrease the negative impacts.

Resources

“Build Your Own Rain Garden.” Project Action Guide. *Lessons from the Bay*. 13–17.

Chesapeake Bay Program. <<http://www.chesapeakebay.net>>.

Chesapeake Bay Foundation. “Bay Buffers,” “Sources of Sediment.” *Watershed Action for Virginia’s Environment (WAVE)*. (See <http://www.cbf.org/site/PageServer?pagename=edu_educators_curriculum_va_index>, or contact the Virginia Office: Capitol Place, 1108 E. Main Street, Suite 1600, Richmond, VA 23219; phone 804-780-1392.)

Chesapeake Bay Foundation, and Maryland Dept. of Natural Resources. “Schoolyard Report Card.” *Bay Grasses in Classes*. (See <http://www.cbf.org/site/PageServer?pagename=edu_educators_restoration_grasses>.)

ChesSIE: Chesapeake Science on the Internet for Educators. Chesapeake Bay Program. <<http://www.bayeducation.net>>.

Holling, Holling C. *Paddle to the Sea*. Boston: Houghton Mifflin, 1941. ISBN 0395150825.

Locker, Thomas. *Where the River Begins*. 1984. New York: Puffin, 1993. ISBN 0140545956.

Project WET Curriculum and Activity Guide. Project WET. Bozeman: The Watercourse, 1995. (See <<http://www.projectwet.org/watercourse/catalog.asp>>.)

Save the Bay. Chesapeake Bay Foundation. <<http://www.cbf.org>>.

Schmid, Eleonore. *The Water’s Journey*. New York: North-South Books, 1994. ISBN 1558583602.

“Using the Library Media Center for Project Research.” Project Action Guide. *Lessons from the Bay*. 55–56.

“Using the World Wide Web for Project Research.” Project Action Guide. *Lessons from the Bay*. 57–58.

Extensions for Students

- On a field trip to a local stream, creek, or river, assess the land use along the waterway, and offer recommendations for improvements.
- Research best practices in land management (see “Using the Library Media Center for Project Research” and “Using the World Wide Web for Project Research” on pages 55–58 of the **Project Action Guide**).
- Write a story about water as it flows down a river in your area. Study maps to determine land use practices along the river.
- Perform activities from the Chesapeake Bay Foundation’s and Maryland Dept. of Natural Resources’ “Schoolyard Report Card” lesson in Bay Grasses in Classes (see Resources).
- Write a letter to the principal recommending improvements in land use practices in the schoolyard.
- See “Build Your Own Rain Garden” on page 13 of the **Project Action Guide**.