

# Land Use

## Cognitive Demand:

Interpreting  
Concepts (C)

Recalling Science (R)

## Overview:

In this activity adapted from *Lessons from the Bay*, students will assess the impact of a variety of land use scenarios on the health of an imaginary river. They will investigate land use around their schoolyard.

## 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
- post-it notes
- large piece of paper cut into the shape of a raindrop
- land use scenario cards (see Appendix)

## Teacher Background

- Rivers, creeks, and streams throughout the Muskingum 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 watershed.
- 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. During warm months, when decomposers like bacteria feed on the excess algae that has died and sunk to the bottom, they can use up all the dissolved oxygen in the surrounding area.
- 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.

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## Setting the Stage

Divide the class into 10 groups, or pairs, of students. Give each group a piece of drawing paper and a Land Use Scenario Card. Instruct each group to draw a picture of their piece of land, using information described in their Land Use Scenario Card. Impress upon them to include in their drawing all the details from the scenario. Give self-stick notes to each group. Direct each group to list on their post-it 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. When the groups are finished, have students place their drawings along the edge of the blue bulletin-board-paper river.

## Acquisition of Learning

1. Beginning at the start of the river, move the paper raindrop downstream. As you pass by each land use picture, ask the group that drew the picture to read their Land Use Scenario to the class. Have them describe what they have drawn, and read the list from their post-it note. Have the group then place their post-it note(s) on the raindrop.
2. Proceed to the next land use picture and repeat.

## Closure

When you reach the end of the river, read the post-it notes that are on the paper raindrop. 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.

## Extensions

- Have the groups modify their drawings to reflect better stewardship of their land.
- Take the “river” and “raindrop” used outside. Again, give students post-it notes. Tell students to imagine that the river passes through the schoolyard.
- Direct students 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 post-it notes.
- When students have completed their investigation of the schoolyard, have them attach their post-it notes to the raindrop.
- Discuss the items listed on the raindrop.
- Discuss possible improvements to the land that would decrease the negative impacts.

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## Land Use Scenario Cards

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### **Scenario 1**

You are a farmer who grows wheat, barley, and oats. Your farm is along the riverbank. To save money in equipment costs, you have chosen to use a no-till method of farming, which means that you do not plow the land that you farm. To keep your land free of unwanted plant growth between crops, you apply herbicides regularly.

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### **Scenario 2**

You are the owner of the Riverview Shopping Mall. This mall has many paved parking lots and concrete sidewalks. There is even a sidewalk along the riverbank, where shoppers can relax and eat with a lovely view of the river. There is extensive landscaping around your mall, with lush trees, shrubs, and flowers. You instruct your maintenance staff to apply fertilizers regularly to keep the landscaping lush.

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### **Scenario 3**

You are the owner of the Down by the Riverside golf course. Your course has 18 holes of manicured fairways and greens, all of which are kept green by the frequent application of fertilizers and herbicides. Many of the fairways slope to the river's edge, offering golfers an extra challenge, as well as a beautiful view.

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### **Scenario 4**

You are the developer of the Homes on the River subdivision. This subdivision contains 25 homes owned by high-income families. Many of these families have dogs and cats that enjoy the well-manicured lawns that surround each home. Most of the homeowners apply fertilizers and herbicides regularly to their lawns to keep them beautiful. The roads and driveways in the subdivision are paved. The trees and vegetation that once lined the riverbank have been removed to give residents a view of the river.

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### **Scenario 5**

You are the owner of the Big River Marina. You have numerous concrete boat ramps that descend directly into the river, where boaters can easily gain access to the water. You also sell oil and gasoline from a dock in the river, where boaters can fill their boats with fuel without leaving the water.

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**Scenario 6**

You are a contractor assigned to build a new subdivision of riverfront homes. You are currently in the beginning stages of construction. Your bulldozers have dug up the soil where the basements of these homes will eventually be built. There is a tremendous area of bare, exposed soil alongside the river.

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**Scenario 7**

You are a farmer who grows corn. Corn extracts a tremendous amount of nutrients from the soil. Since you plant corn in the same fields every year, the soil does not always have enough nutrients to support the growth of the corn. Therefore, you apply a great deal of fertilizers (which contain nutrients) to the soil, as well as to the leaves of the corn plants when they begin to grow. One of your fields slopes down to the edge of the river. You plow this field in rows that are perpendicular to the river. Rainwater often runs very fast down the gullies created by these rows.

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**Scenario 8**

You are the owner of a forestry company that makes its money by cutting down trees along the river and selling them to lumber companies. You bring in several bulldozers and chainsaws that plow down and cut the trees. This equipment runs on gasoline and produces a large amount of exhaust. To ensure that you will have more trees to cut in the future, you replant the land in pines after you have finished clearing it.

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**Scenario 9**

You are the owner of a chicken farm. Chicken manure contains a very high amount of nitrogen. You have about 20 chicken coops. When it is time for you to clean them, you shovel the manure and pile it on the edges of fields that drain into the river.

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**Scenario 10**

You are the owner of a fishing pier. Many tourists and locals use this pier for sport fishing. Your dock contains a store that sells bait, tackle, and refreshments. Many of the people who fish from your pier catch an average of 20 fish a day. Those that are too small to keep are always thrown back. There is also a spot beside your pier where guests can clean their fish. The remains of the fish are dumped back into the river. There is also a paved parking lot beside your pier that extends very close to the river's edge.

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# Additional Resources

## **The Watershed Game:**

<http://northlandnemo.org/wsg-student.html>