

## Connecting Watersheds to Land Use

**GRADE LEVELS:** 4-5

**ESTIMATED TIME:** 45 minutes

### **OBJECTIVES:**

Students will be able to:

- Understand what a watershed is and how we all live in a watershed
- Understand how the land is connected to the sea
- Understand the types of land use
- Understand the characteristics of the types of land use (i.e., urban, suburban, and open space)
- Increase their environmental awareness

### **MATERIALS:**

- Stormwater Management in Your Schoolyard journal for each student
- Google Earth™ watershed tour on computer and associated projector and screen
- 8" x 11" "puzzle piece" of the aerial map of the schoolyard watershed for each pair/group
- Markers (red, orange, and green) for each pair/group
- Colored pencils (red, orange, and green) for each pair/group
- Laminated aerial map of the schoolyard watershed
- Tape

### **PROCEDURE:**

#### ***Part 1: Pre-Test***

***Estimated Time:*** 5 minutes

#### ***Preparation:***

1. Prepare the Stormwater Management in Your Schoolyard journal for each student to complete for this module (Before Lesson and After Lesson).

#### ***Directions:***

1. Distribute a pencil and a Stormwater Management in Your Schoolyard journal to each student.
2. Read the questions on the "Before Lesson" page and have the students complete.
3. Have the students hold onto their pencil and Stormwater Management in Your Schoolyard journal until the end of the module.

## **Part 2: Watersheds and Land Use**

**Estimated Time:** 15 minutes

### **Preparation:**

1. Prepare Google Earth™ watershed tour (used during Module 1: An Introduction to Watersheds) on the computer, projector, and screen to use as a reference when referring to the aerial map of the schoolyard watershed.

### **Directions:**

1. Ask the students to tell you what they think a watershed is (they should have learned this from Module 1: An Introduction to Watersheds). *A watershed is an area of land that water flows across, through, or under on its way to a stream, river, lake, ocean, or other body of water.* Reinforce that a watershed includes not only a waterway, but the area of land surrounding it.
2. Ask the students how people use land. *Answers will vary, but make sure to describe how land is used for agricultural (vegetables, fruits, farm animals), residential (houses, apartments, townhouses), and transportation (roadways) purposes, among other things.* Explain to the students that people use land for a variety of reasons.
3. Ask the students what they think are the characteristics of different types of land. Discuss urban, suburban, and open space land. Have the students describe what they think each type of land use looks like.
4. Use the Google Earth™ watershed tour to show the class each type of land use (i.e., urban, suburban, and open space) within the watershed.
5. Using the Google Earth™ watershed tour, stop at a particular point of interest in the schoolyard watershed. Using the "History" feature of Google Earth™, show how this particular point of interest's land use has changed over time. For example, Lindenwold High School is only about 10 years old, so showing a picture from before and after the High School was constructed will demonstrate how the land use has changed over time. When stopping at each point of interest in the watershed, ask the students the following questions:
  - a. If it is raining on this particular point of interest, which way do you think the stormwater runoff will flow?
  - b. If it is raining on this particular point of interest, approximately how much (i.e., little to a lot) stormwater runoff do you think will be washing off this point of interest? *For urban areas, there will be a lot of stormwater runoff while open space areas will have little stormwater runoff. This is because the vegetation in the open space areas will act like a sponge, soaking up the stormwater runoff.*
  - c. How do you think changing the land use will change the flow of stormwater runoff? Explain your answers.
  - d. From looking at the Google Earth™ historical map(s) of this point of interest, how has the amount of stormwater runoff changed over time or has it stayed the same?

## **Part 3: Build Your Own Watershed**

**Estimated Time:** 15 minutes

**Preparation:**

1. Create “puzzle pieces” from the aerial map of schoolyard watershed (cut apart the aerial map of the schoolyard watershed that is not laminated) by cutting the map into 8 or 10 sections for each pair/group of students. Make sure you know how these puzzle pieces fit together in the end. It is best to write a number or letter on the back of each puzzle piece. Make sure that you have written down how to put the pieces together again.
  - a. Each puzzle piece may have a combination of land uses (i.e., urban, suburban, and/or open space)
2. Gather supplies for each pair/group of students. Each pair/group should receive the following materials: one “puzzle piece” section of the aerial map of the schoolyard watershed (approximately 8.5” x 11”), markers (red, orange, and green), and colored pencils (red, orange, and green).
3. Hang up laminated map of schoolyard watershed on the board.
4. Write on the board the following table:

Type of Land Use	Color
Urban	Red
Suburban	Orange
Open Space	Green

**Directions:**

1. Divide the students into pairs/groups and distribute the supplies to each pair/group.
2. Explain the following directions to the students: Today, you are going to be teams of scientists determining the types of land use in your section of the aerial map of the schoolyard watershed. Each of these sections of the map is a “puzzle piece” of the larger map that I have on the board (point to laminated map of schoolyard watershed). At the end of this activity, we are going to put these puzzle pieces together to see all the different types of land use in our schoolyard watershed. Your task is to identify the different types of land use (i.e., urban, suburban, and/or open space) on your section of the “puzzle piece.” You will use the markers to outline each type of land use and you will use the colored pencils to color in each type of land use following the table that I have written on the board (point to the table that you wrote on the board). Please note that some of you might not have all of these three types of land use on your puzzle piece. You have five minutes to work on this with your team of scientists. Once you are done, please write your names on the back of the puzzle piece and hand me your puzzle pieces.
3. Once you have received all of the students’ puzzle pieces, place all the pieces together on the larger laminated aerial map of the schoolyard watershed. You can do this by taping each puzzle piece to the laminated map or by placing the puzzle pieces over the laminated map. Once you have done this, ask the students the following questions:

- a. What type of land uses do you see in this watershed (i.e., urban, suburban, and/or open space)?
- b. Does it look like there is more of one type of land use than the other?
- c. Point to the nearby waterways in the schoolyard watershed. If we know that the stormwater runoff will go in this direction, how much stormwater runoff do you think that there will be? *For urban areas, there will be a lot of stormwater runoff while open space areas will have little stormwater runoff. This is because the vegetation in the open space areas will act like a sponge, soaking up the stormwater runoff.*
- d. How do you think the different types of land use in the watershed will change the amount of stormwater runoff? Explain your answers.

#### **Part 4: Putting it All Together and Post-Test**

**Estimated Time:** 10 minutes

**Preparation:**

1. Prepare the Stormwater Management in Your Schoolyard journal for each student to complete for this module (Before Lesson and After Lesson).

**Directions:**

1. Moderate a brief class discussion to help pull the module content together. Ask the students the following questions:
  - a. What is a watershed? *(An area of land that water flows across, through, or under on its way to a stream, river, lake, ocean, or other body of water.)*
  - b. How do people use land? *Answers will vary, but make sure to describe how land is used for agricultural (vegetables, fruits, farm animals), residential (houses, apartments, townhouses), and transportation (roadways) purposes, among other things.* Explain to the students that people use land for a variety of reasons.
  - c. What are the characteristics of urban land? How much stormwater runoff comes off of urban land? *A lot.* Why is this so? *There are a lot of hard surfaces for the stormwater runoff to come off of.*
  - d. What are the characteristics of suburban land? How much stormwater runoff comes off of suburban land? *In the middle.* Why is this so? *There are some vegetated areas to absorb the stormwater runoff and there are also hard surfaces where the stormwater runoff can come off of.*
  - e. What are the characteristics of open space land? How much stormwater runoff comes off of open space land? *Very little.* Why is this so? *It is absorbed by the vegetation.*
  - f. How is the land connected to the sea? *Through a watershed. A watershed is an area of land that water flows across, through, or under on its way to a stream, river, lake, ocean or other body of water.*
2. Ask the students to answer the prompt in their journal.