

## Watersheds Lesson Plan

Students will read a selection from the Water Atlas and use it to answer FCAT-type questions.

Water Atlas Curriculum Lesson 27

**Lesson Summary:** Students will use the water atlas to explore the watershed in which they live, using map tools to consider what lies upstream and downstream from them. They will read an EPA paper on watersheds and answer practice FCAT questions.

**Grade Level:** Middle School (6<sup>th</sup>–8<sup>th</sup>)

**Time Allotted:** One period for FCAT practice and one for watershed exploration.

### Performance Objectives

*References are to the Next Generation Sunshine State Standards (2007).*

#### Social Studies

- SS.6.G.1.4 Utilize tools geographers use to study the world.
- SS.7.G.6.1 Use Global Information Systems (GIS) or other technology to view maps of current information about the United States.
- SS.8.G.5.1 Describe human dependence on the physical environment and natural resources to satisfy basic needs in local environments in the United States.

#### Science

- SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

#### Language Arts

- LA.6.1.7.3 The student will determine the main idea or essential message in grade-level text through inferring, paraphrasing, summarizing, and identifying relevant details.
- LA.6.6.4.2 The student will determine and apply digital tools (e.g., word processing, multimedia authoring, web tools, graphic organizers) to publications and presentations.

#### Math

- MA.6.S.6.1 Determine the measures of central tendency (mean, median, and mode) and variability (range) for a given set of data.
- MA.7.G.4.4 Compare, contrast, and convert units of measure between different measurement systems (US customary or metric (SI)), dimensions, and derived units to solve problems.

### Prior Knowledge

None.

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### Topic Overview

What is a Watershed? It is the area of land where all of the water that is under it or drains off of it goes into the same place. John Wesley Powell, scientist geographer, put it best when he said that a watershed is:

"that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community."

We all live in a watershed—the area that drains to a common waterway, such as a stream, lake, estuary, wetland, aquifer, or even the ocean—and our individual actions can directly affect it. Working together using a watershed approach will help protect our nation's water resources. Despite their importance to water quality, most people do not think of land in terms of “watersheds.” Students will be given the opportunity to investigate their own watersheds, what water bodies they drain into, the health of the water resources within the watershed, and the land uses and activities that may be impacting those water resources.

### Key Vocabulary

#### Drainage basin

Another term for watershed – the lands and waters that drain to a specific location.

#### Geographic Information System (GIS)

A mapping system that integrates computers, software, and databases to capture, manage, analyze and display information related to the position of objects on earth.

#### Gravity

The force that pulls water downstream through watersheds.

#### Pan

In a mapping context, panning means to move horizontally or vertically.

#### Spatial database

A collection of geographic information in a computer that is organized so that it can easily be sorted, searched, modified, retrieved and displayed.

#### Waterbody

Any significant accumulation of water, including oceans, lakes, rivers, ponds, canals and wetlands.

#### Watershed

All the lands and waters that drain to a specific location.

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### Materials

- Computer with internet access

### Resources

These resources are available on the Orange County Water Atlas:

Advanced Mapping Tool

<http://maps.wateratlas.usf.edu/orange/>

Watershed Excursion

<http://www.orange.wateratlas.usf.edu/wse/>

Watersheds “Learn More”

[http://www.orange.wateratlas.usf.edu/shared/learnmore.asp?toolsection=lm\\_watershed](http://www.orange.wateratlas.usf.edu/shared/learnmore.asp?toolsection=lm_watershed)

Stormwater Education Pages:

<http://www.orange.wateratlas.usf.edu/stormwatered/>

These resources are available in the Water Atlas Digital Library:

[Activities to Accompany Whatzzzzup-Stream?](#)

Source: U.S. Environmental Protection Agency, 2001.

[EnviroScape Model: Exploring Watersheds and Riparian Forests](#) (lesson plan). 2011. Audubon Naturalist Society.

[EnviroScape Rental Information](#). 2011. Orange County Environmental Protection Division.

[Whatzzzzup-stream? Student Activity Handout](#)

Source: U.S. Environmental Protection Agency, 2001.

Other resources:

Watersheds page group, Environmental Protection Agency website:

<http://water.epa.gov/type/watersheds/>

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### Procedure

#### Engage/Elicit

Ask students if they live in a watershed or not. After noting that everyone does, ask them:

1. If they know what a watershed is.
2. What watershed the school is in.
3. What watershed they live in.

Help them to develop an answer to question 1. Give them the answer to question 2, if they do not know it. Tell them that they will discover the answer to question 3 themselves. Guide students to the [Orange County Water Atlas Watershed Excursion](#), telling them to explore the school's watershed and to note what other watersheds are adjacent to it.

#### Explore

1. Guide students to the [Orange County Water Atlas Advanced Mapping Tools](#). Depending on your students' computer abilities, you may let them explore on their own, or give them a brief introduction to the tools (Zoom, Select Watershed, Pan, etc.).  
In pairs or alone, depending on your student/computer ratio, ask students to use the Advanced Mapping Tools to discover the answers to the questions below.
  - a. What watershed do you live in?
  - b. What are some of the lakes and rivers that are located in your watershed?
  - c. What cities (municipalities) are in your watershed, if any?
  - d. Compared to other watersheds in Orange County, does your watershed have more, or fewer, people?
2. Guide students to the watershed pages on the [Orange County Water Atlas](#). (Use the Water Resources Search box to display a list of watersheds.)
  - a. Ask students to explore the information presented on the Water Atlas about their watershed. What else do they want to know about it?
  - b. Have students choose a question that interests them regarding some aspect of "their" watershed. For example, it may involve a particular pollutant, a source of pollution, the types of land use in the watershed, its population, the status of one particular water body, historic or seasonal changes in water levels, or the overall water quality status of the watershed. Have them collect and organize information relating to the question. (If several students live in the same watershed, you may wish to have them work in groups with each group addressing one question.)

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### Explain

1. Have students summarize the results of their watershed investigations, including the source of their information, and present the results to the class. Encourage them to use photos, maps, charts and graphs, etc., to illustrate their findings. Share these reports on the [Orange County Watershed Excursion](#) as stories.
2. Give students the Whatzzz-up-stream Handout reading (either as a printout or on computers) and ask them to respond to the FCAT practice questions.

#### **Answers to Whatzzz-up Stream Handout:**

Reading:

1. b. Simile
2. a. "Major River Basins" and "Catalog Units"
3. c. Third-order streams (A third-order stream would have at least two second-order streams, and each of those would have at least two first-order streams.)
4. a. That the reader understands the concept of "nesting dolls" prior to reading the article.

Writing: Use the rubric for Florida Writes! (8<sup>th</sup> grade)

1. The student will organize information to show understanding or relationships among facts, ideas, and events (e.g., representing key points within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting); (LA.8.2.2.3)
2. The student develops and demonstrates persuasive writing that is used for the purpose of influencing the reader. (LA.8.4.3)
3. The student develops and demonstrates creative writing. (LA.8.4.1)
4. The student develops and demonstrates persuasive writing that is used for the purpose of influencing the reader. (LA.8.4.3)

Math:

1. b. 2.77 cm
2. d. 4.30 feet above sea level

### Extend

1. Have students form groups of three or four based on where they live (the closer to each other, the better). Have each group prepare a presentation on what happens to water in their watershed as it moves above and below their neighborhood.
2. Use an EnviroScape® Model to increase awareness of water pollution an overall watershed concept. The model is designed to be an interactive demonstration to show how waterways flow into a larger water body, which is representative of a lake, river, bay, or ocean. The unit can be "rented" by teachers for classroom use (for free) from the Orange County Environmental Protection Divison and comes complete with a kit containing everything you need to demonstrate the movement of water through a watershed and the pollution that runoff may cause. (See references for rental information and a lesson plan.)

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### Exchange/Evaluate

- Have students grade their FCAT practice questions, being sure that they understand the correct answers.
- Evaluate their answers to the watershed questions.
- Evaluate their presentations (noting especially depth of research and creativity)

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