

Water Smart Connections

TOPIC
Water Quality



Teacher's
Guide



Southwest Florida
Water Management District

A publication of the
Southwest Florida Water Management District
for grades 4-12



Dear Teacher,

Thank you for participating in **Water Smart Connections**. The goal of the **Water Smart Connections** program is to educate children about our area's water resources and what steps they can take to protect these precious resources for the future. The subject of this booklet is water quality.

Although we recognize our basic need for water, the connections between what we do every day at home, in school and in the community sometimes seem distant from the quality of our water.

The Southwest Florida Water Management District (SWFWMD) is protecting our water resources in many ways. Some of those ways include purchasing lands, conducting water quality studies, restoring habitats, controlling aquatic plants and, perhaps most important, educating children and adults about water resources. The SWFWMD is working hard to ensure that each of us has clean water to drink, now and in the future.

This teacher's guide was written in a format to encourage the teacher to be an information facilitator, not just an information provider. The activities are hands-on, letting students construct their own knowledge through experience. We have included evaluation suggestions to assist you in determining how much your students have learned. Correlations to Sunshine State Standards are at the end of this teacher's guide. The standards have been correlated according to grade levels 3–5, 6–8 and 9–12 for your convenience. The standards covered in each unit are based on the student reading the information presented in the booklet and completing the related activities included in this guide. We encourage you to complete all the activities and readings.

When you have completed the program, please fill out the short evaluation form located at the end of this teacher's guide and return it to the SWFWMD. In addition, we would appreciate receiving some examples of your students' work.

Thank you for your interest in the **Water Smart Connections** program. If you need additional information or resources for your class, please call us at 1-800-423-1476, ext. 4757. You can also order materials online at WaterMatters.org/publications/.



Southwest Florida
Water Management District

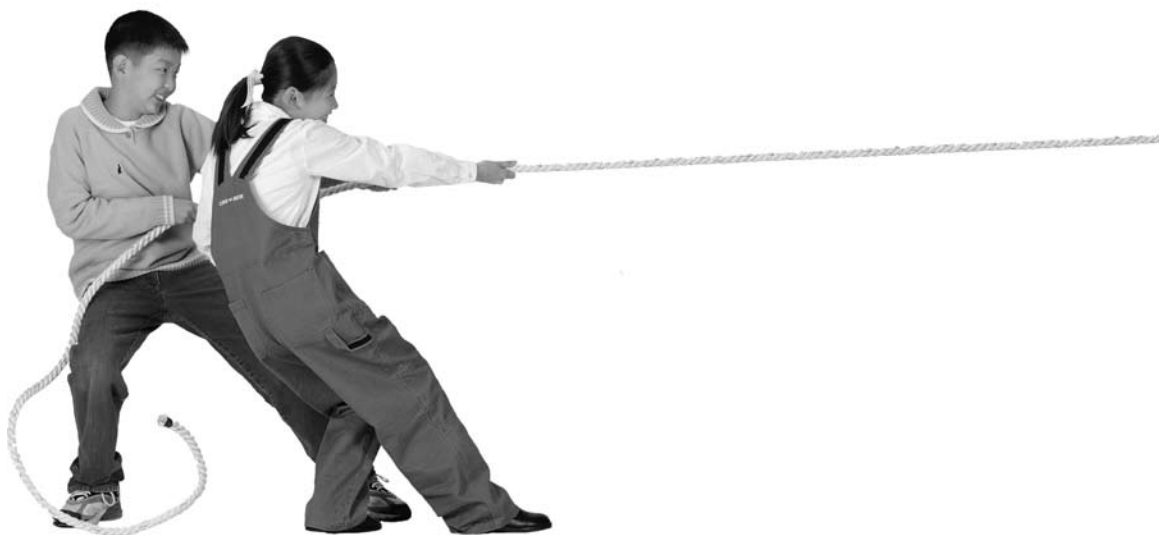
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Water Smart Connections

TOPIC Water Quality

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UNIT 1

Why Is Water So Important?



ACTIVITY 1.1: WATER BASICS

OBJECTIVES

The student will:

1. Define why water is important.
2. Explain how a drop of water goes through changes.
3. Describe who needs water.
4. Explain where water comes from.

MATERIALS

chalkboard or chart paper

DIRECTIONS

Using a word web, the teacher will be able to preassess students' prior knowledge of water.

1. Write the word "water" on the board or chart paper for everyone to see.
2. Tell the students to think about the word for one minute.
3. Ask the students to tell you what they know about water, recording their answers on a word web (see example on page 2).

Possible words to include:

living things	solid
river	liquid
gas	evaporation
clouds	condensation
precipitation	runoff
pollution	conservation
lakes	wetlands
aquifer	

Ask the following questions:

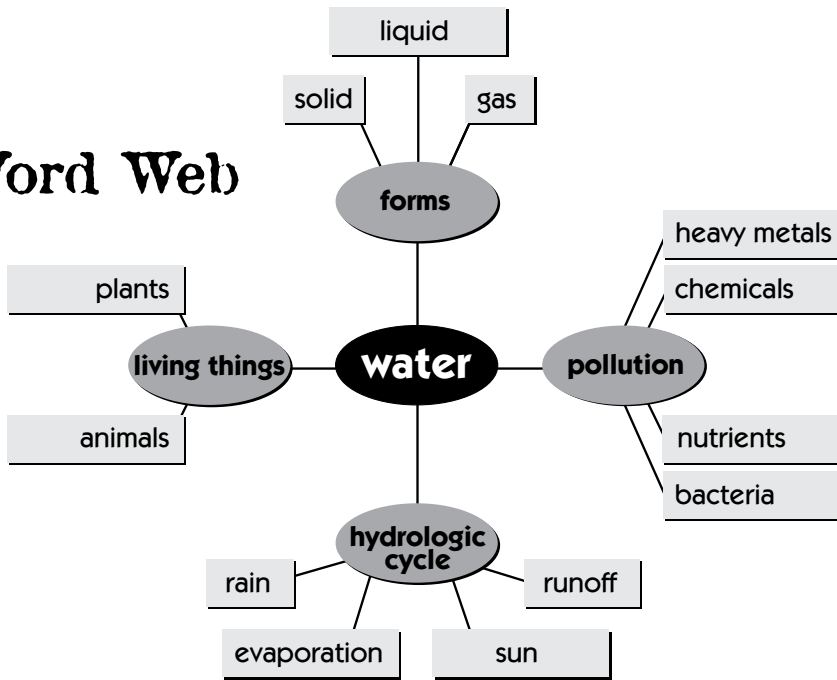
- Why is water important?
- Who needs water?
- Where does water come from?
- What is water quality?

Answers will vary, but this embedded assessment will give the teacher a starting point for teaching the **Water Smart Connections** booklet by providing information about students' prior water knowledge, and may help highlight any discrepancies or misconceptions students may have. Ask students to list words they associate with water. Place these words on chart paper in the form of a web. The graphic organizer can then be displayed (and even added to) in the room as future reference for the activities.

EVALUATION

A notebook will be helpful in the final evaluation. Ask the students to draw their own word web for water and have them put it in their notebook. Also include a three-minute free writing about what students would like to know about water.

Word Web



UNIT 2

Watersheds & Ecosystems



ACTIVITY 2.1: WATERSHEDS

OBJECTIVES

The student will:

1. Describe a watershed.
2. Effectively communicate how watersheds are altered by people.
3. Identify how a watershed connects living things.

MATERIALS

- “Watershed Boundaries” blackline master (p. 10)
- overhead projector

DIRECTIONS

1. Make an overhead using the blackline master of the watersheds in southwest Florida (see page 10 in this guide).
2. Place the map on the overhead projector.
3. Have each student locate their home, school or community.
4. Trace how water might enter the watershed in the student’s community.

Ask the following questions:

- In what watershed do you live?
- What would happen if a hurricane hit close by?
- What happens when rain washes fertilizer into a nearby water body?
- Why does a scientist need to know information about watersheds?
- What might a scientist do with this information?

EVALUATION

Draw a map of your schoolyard. Use arrows to show the direction water flows or drains when it rains. Show high and low areas, locations of buildings, ponds, parking lots, play areas, landscaping, etc.

ACTIVITY 2.2: ECOSYSTEMS

OBJECTIVES

The student will:

1. Define an ecosystem.
2. Explain the interrelationship between living things and the environment.
3. Describe the difference between living (biotic) and nonliving (abiotic) parts of an ecosystem.

MATERIALS

“Ecosystem Activity Sheet” blackline master (p. 11)

DIRECTIONS

1. Have students break up in groups of four or five.
2. Make copies of page 11 in this guide, labeled “Ecosystem Activity Sheet,” for each group.
3. Explain to students about biotic and abiotic parts of the environment. (Biotic would include plants and animals, including humans. Abiotic would include soil, air, water, temperature, light, etc.)
4. Have students list things in their environment as either biotic or abiotic.
5. Ask students how these biotic or abiotic things affect them.

Ask the following questions:

- What evidence do you have that biotic and abiotic things affect humans?
- How would you explain the relationship between biotic and abiotic things?

EVALUATION

Have students investigate their schoolyard and describe the types of ecosystems that are present.

ACTIVITY 2.3: SURFACE WATER AND GROUNDWATER CONNECTIONS

OBJECTIVES

The student will:

1. Define the difference between surface water and ground water.
2. Explain the Floridan aquifer system.
3. Predict an outcome of what happens during the percolation of water through the ground into aquifer systems.

MATERIALS

- sand
- potting soil
- small pebbles
- three small paper cups for each group
- blue coloring
- beaker for water

DIRECTIONS

1. Divide the students into groups of four. One student will be the recorder.
2. Put a small pencil hole in the bottom of the paper cups and give three cups to each group. Place approximately 300 milliliters of water in each group’s beaker. Add a few drops of blue coloring to the water.
3. Each group should label the paper cups one through three and fill the first cup with approximately one inch of sand. Place one inch of potting soil in the second cup and one inch of pebbles in the third cup.
4. Place the cups with the sand, soil and pebbles over a larger cup or bowl. Pour approximately 100 milliliters of water into each cup.
5. Assign each student a specific task:
 - Student 1 – place sand in cup one and add water.
 - Student 2 – place soil in cup two and add water.
 - Student 3 – place pebbles in cup three and add water.
 - Student 4 – record these results on the “Data Collection Chart” (page 9 of this guide).

Ask the following questions:

- How long did the water take to percolate through each material?
- Did the color of the water change?
- Why?
- Which material took the longest for the water to go through?

EVALUATION

Students should draw and label a picture of the hydrologic cycle, emphasizing groundwater and surface water systems.

UNIT 3

Pollution Sources & Their Effects



ACTIVITY 3.1: UNDERSTANDING POLLUTION

OBJECTIVES

The student will:

1. Effectively describe the different types of water pollutants and their damaging effects.
2. Demonstrate an understanding of the difference between point- and nonpoint-source pollution.

MATERIALS

- pencils
- paper

DIRECTIONS

1. Provide the following Writing Challenges for students.
2. Explain to students that these writing prompts are similar to items included on the Florida Comprehensive Assessment Test (FCAT).
3. Ask students to write an extended response to each of these prompts.

Writing Challenge #1

Many different types of pollution can affect the quality of our surface waters. Describe at least three types of pollution and their damaging effects.

Writing Challenge #2

Two main sources of pollution are point- and nonpoint-source pollution. Explain the difference between these two sources and include examples to support your answer.

EVALUATION

Answers to extended response items:

1. Answers should demonstrate an understanding of the different pollutants and their effects as described in the booklet.
2. The response should include a clear comparison and examples of point- and nonpoint-source pollution.

UNIT 4

Stormwater Runoff



ACTIVITY 4.1: STORM WATER AWARENESS

OBJECTIVES

The student will be able to:

1. Describe Florida's primary source of water pollution — stormwater runoff.
2. Explain the problems stormwater runoff creates.
3. Describe what happens to rainfall during urbanization.

DIRECTIONS

1. Divide the class into groups of three or four.
2. Have each group create an infomercial about how a community can decrease the amount of stormwater runoff.
3. These infomercials could include billboards, newspaper ads, radio, television or other types. Radio or television spots should be three minutes in length.

EVALUATION:

Have the students evaluate the other groups on their infomercial. Criteria could include:

- Vocabulary
- Creativity
- Clarity of the message
- Positive effect on the audience
- Accuracy of facts



UNIT 5

Water Quality Management

ACTIVITY 5.1: WHAT CAN WE DO?

OBJECTIVES

The students will be able to:

1. Demonstrate ways to preserve the quality of water.
2. Create a conservation plan for their families and put it in their notebook.

MATERIALS

- pencils
- paper/notebook

DIRECTIONS

1. List on a sheet of paper how the school and/or class could conserve water and reduce pollution.
2. List ways students' families could conserve water and reduce pollution.

EVALUATION

Students should now have familiarity with water quality issues in our area and ideas about how they and their families can prevent water pollution.

ACTIVITY 5.2: SUMMARY SHEET

OBJECTIVES

The students should be able to:

1. Demonstrate knowledge of vocabulary found in **Water Smart Connections**.
2. Match water-related images with overarching concepts.

MATERIALS

- “Summary Sheet” blackline master (p. 12)
- pencils

DIRECTIONS

Make copies of the “Summary Sheet” for each student. Have them complete the activity.

EVALUATION

Students should be able to match each image with the concept it represents.

ACTIVITY 5.3: NATURE POEMS

OBJECTIVES

The students should:

1. Utilize vocabulary found in **Water Smart Connections**.
2. Understand various parts of speech.
3. Create a poem based on their newly acquired knowledge.

MATERIALS

- pencils
- paper

DIRECTIONS

Have the students develop a poem about water.

- (a) The first line should have one word that is a noun.
- (b) The second line should have two adjective words.
- (c) The third line should contain three adverbs.
- (d) The fourth line should contain an antonym.

Example

Drop

Clear, cold

Swimming, sliding, racing

Flood

or

Pollution

Organic, nutrients, sediment

Settling, infecting, nondrinking

Cleanliness

EVALUATION

Students should be able to create a water-related poem using the parts of speech as directed.

Sunshine State Standards

UNIT 1: Why Is Water So Important?

Grades 3–5

Science: The Nature of Matter, SC.A.1.2; Processes that Shape the Earth, SC.D.1.2, SC.D.2.2; Processes of Life, SC.F.1.2; How Living Things Interact with Their Environment, SC.G.1.2, SC.G.2.2; The Nature of Science, SC.H.1.2. *Social Studies:* Economics, SS.D.1.2. *Language Arts:* Reading, LA.A.1.2, LA.A.2.2; Writing, LA.B.2.2.

Grades 6–8

Science: The Nature of Matter, SC.A.1.3; Processes that Shape the Earth, SC.D.1.3, SC.D.2.3; Processes of Life, SC.F.1.3; How Living Things Interact with Their Environment, SC.G.1.3, SC.G.2.3; The Nature of Science, SC.H.1.3. *Social Studies:* Economics, SS.D.1.3. *Language Arts:* Reading, LA.A.1.3, LA.A.2.3; Writing, LA.B.2.3.

Grades 9–12

Science: The Nature of Matter, SC.A.1.4; Processes that Shape the Earth, SC.D.1.4, SC.D.2.4; Processes of Life, SC.F.1.4; How Living Things Interact with Their Environment, SC.G.1.4, SC.G.2.4; The Nature of Science, SC.H.1.4. *Social Studies:* Economics, SS.D.1.4. *Language Arts:* Reading, LA.A.1.4, LA.A.2.4; Writing, LA.B.2.4.

UNIT 2: Watersheds & Ecosystems

Grades 3–5

Science: Processes that Shape the Earth, SC.D.1.2, SC.D.2.2; Processes of Life, SC.F.1.2; How Living Things Interact with Their Environment, SC.G.1.2, SC.G.2.2; The Nature of Science, SC.H.1.2. *Social Studies:* People, Places, and Environments, SS.B.1.2; Government and the Citizen, SS.C.1.2. *Language Arts:* Reading, LA.A.1.2, LA.A.2.2; Writing, LA.B.2.2. *Mathematics:* Measurement, MA.B.1.2.

Grades 6–8

Science: Processes that Shape the Earth, SC.D.1.3, SC.D.2.3; Processes of Life, SC.F.1.3; How Living Things Interact with Their Environment, SC.G.1.3, SC.G.2.3; The Nature of Science, SC.H.1.3. *Social Studies:* People, Places, and Environments, SS.B.1.3; Government and the Citizen, SS.C.1.3. *Language Arts:* Reading, LA.A.1.3, LA.A.2.3; Writing, LA.B.2.3. *Mathematics:* Measurement, MA.B.1.3.

Grades 9–12

Science: Processes that Shape the Earth, SC.D.1.4, SC.D.2.4; Processes of Life, SC.F.1.4; How Living Things Interact with Their Environment, SC.G.1.4, SC.G.2.4; The Nature of Science, SC.H.1.4. *Social Studies:* People, Places, and Environments, SS.B.1.4; Government and the Citizen, SS.C.1.4. *Language Arts:* Reading, LA.A.1.4, LA.A.2.4; Writing, LA.B.2.4. *Mathematics:* Measurement, MA.B.1.4.

UNIT 3: Pollution Sources & Their Effects

Grades 3–5

Science: The Nature of Matter, SC.A.1.2; Processes that Shape the Earth, SC.D.1.2, SC.D.2.2; How Living Things Interact with Their Environment, SC.G.1.2, SC.G.2.2; The Nature of Science, SC.H.1.2. *Social Studies:* Government and the Citizen, SS.C.1.2. *Language Arts:* Reading, LA.A.1.2, LA.A.2.2; Writing, LA.B.1.2, LA.B.2.2.

Grades 6–8

Science: The Nature of Matter, SC.A.1.3; Processes that Shape the Earth, SC.D.1.3, SC.D.2.3; How Living Things Interact with Their Environment, SC.G.1.3, SC.G.2.3; The Nature of Science, SC.H.1.3. *Social Studies:* Government and the Citizen, SS.C.1.3. *Language Arts:* Reading, LA.A.1.3, LA.A.2.3; Writing, LA.B.1.3, LA.B.2.3.

Grades 9–12

Science: The Nature of Matter, SC.A.1.4; Processes that Shape the Earth, SC.D.1.4, SC.D.2.4; How Living Things Interact with Their Environment, SC.G.1.4, SC.G.2.4; The Nature of Science, SC.H.1.4. *Social Studies:* Government and the Citizen, SS.C.1.4. *Language Arts:* Reading, LA.A.1.4, LA.A.2.4; Writing, LA.B.1.4, LA.B.2.4.

UNIT 4: Stormwater Runoff

Grades 3–5

Science: The Nature of Matter, SC.A.1.2; Processes that Shape the Earth, SC.D.1.2, SC.D.2.2; How Living Things Interact with Their Environment, SC.G.1.2, SC.G.2.2; The Nature of Science, SC.H.1.2. *Social Studies:* Government and the Citizen, SS.C.1.2. *Language Arts:* Reading, LA.A.1.2, LA.A.2.2; Writing, LA.B.1.2, LA.B.2.2.

Grades 6–8

Science: The Nature of Matter, SC.A.1.3; Processes that Shape the Earth, SC.D.1.3, SC.D.2.3; How Living Things Interact with Their Environment, SC.G.1.3, SC.G.2.3; The Nature of Science, SC.H.1.3. *Social Studies:* Government and the Citizen, SS.C.1.3. *Language Arts:* Reading, LA.A.1.3, LA.A.2.3; Writing, LA.B.1.3, LA.B.2.3.

Grades 9–12

Science: Processes that Shape the Earth, SC.D.2.4; How Living Things Interact with Their Environment, SC.G.1.4, SC.G.2.4. *Social Studies:* Government and the Citizen, SS.C.1.4. *Language Arts:* Reading, LA.A.1.4, LA.A.2.4; Writing, LA.B.2.4; Listening, Viewing, and Speaking, LA.C.3.4. *The Arts:* Theatre, TH.A.1.4.

UNIT 5: Water Quality Management

Grades 3–5

Science: Processes that Shape the Earth, SC.D.2.2; How Living Things Interact with Their Environment, SC.G.1.2, SC.G.2.2. *Social Studies:* Government and the Citizen, SS.C.1.2, SS.C.2.2; Economics, SS.D.1.2. *Language Arts:* Reading, LA.A.1.2, LA.A.2.2; Writing, LA.B.2.2. *Mathematics:* Measurement, MA.B.1.2.

Grades 6–8

Science: Processes that Shape the Earth, SC.D.2.3; How Living Things Interact with Their Environment, SC.G.1.3, SC.G.2.3. *Social Studies:* Government and the Citizen, SS.C.1.3, SS.C.2.3; Economics, SS.D.1.3. *Language Arts:* Reading, LA.A.1.3, LA.A.2.3; Writing, LA.B.2.3. *Mathematics:* Measurement, MA.B.1.3.

Grades 9–12

Science: Processes that Shape the Earth, SC.D.2.4; How Living Things Interact with Their Environment, SC.G.1.4, SC.G.2.4. *Social Studies:* Government and the Citizen, SS.C.1.4, SS.C.2.4; Economics, SS.D.1.4. *Language Arts:* Reading, LA.A.1.4, LA.A.2.4; Writing, LA.B.2.4. *Mathematics:* Measurement, MA.B.1.4.

Activity Sheets

DATA COLLECTION CHART

SURFACE WATER AND GROUNDWATER CONNECTIONS

Time To Percolate Through

soil _____

sand _____

pebbles _____

Change In Color + yes - no

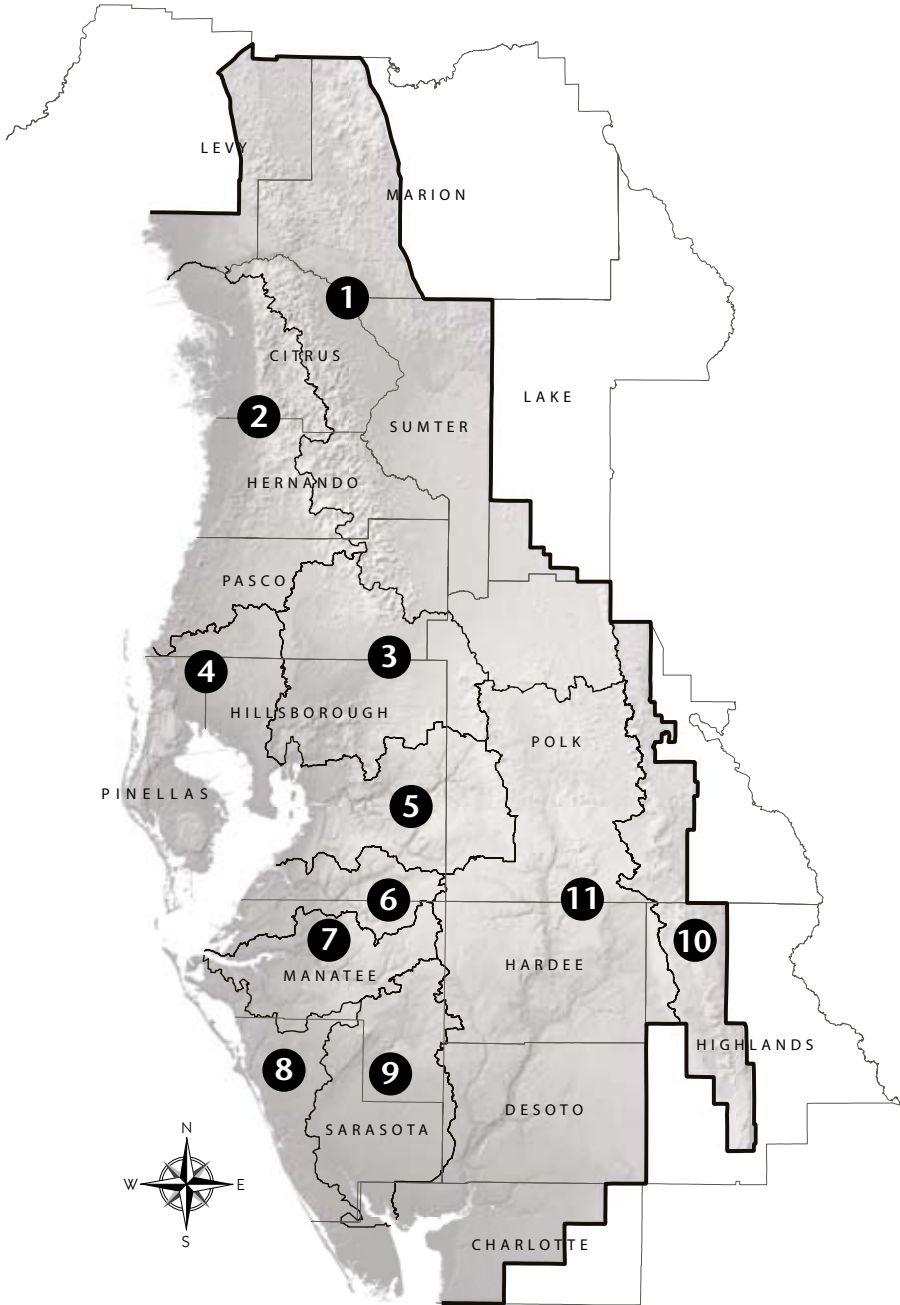
Which substance took the longest to percolate?

Why? _____

Did the color change? _____

Why? _____

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT



Watershed Boundaries

- | | | | |
|---|-------------------------|----|------------------|
| 1 | Withlacoochee River | 7 | Manatee River |
| 2 | Springs Coast | 8 | Southern Coastal |
| 3 | Hillsborough River | 9 | Myakka River |
| 4 | Tampa Bay/Anclote River | 10 | Lake Wales Ridge |
| 5 | Alafia River | 11 | Peace River |
| 6 | Little Manatee River | | |

SUMMARY SHEET

WHAT I LEARNED

Directions:

Draw a line from the word to the matching picture below.



condensation

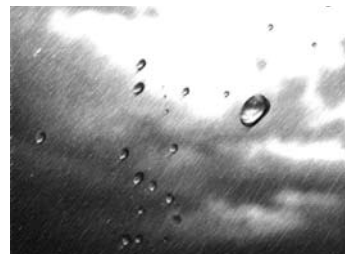
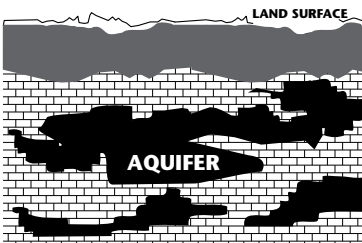
transpiration

ground water
(aquifer)

energy

pollution

conservation



Answer Keys

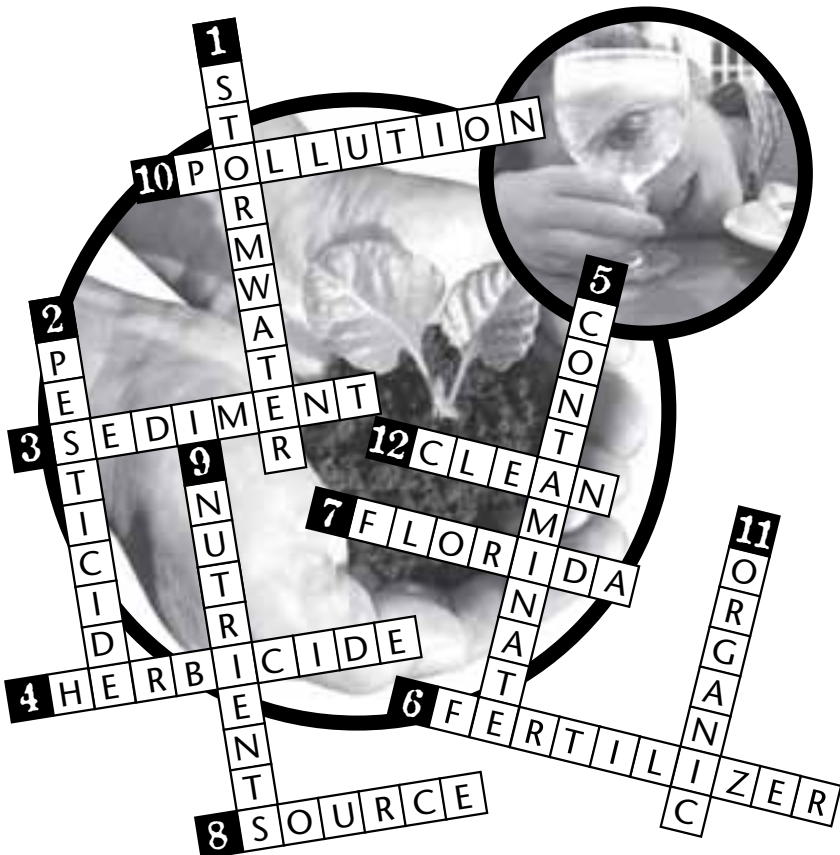
for activities on pages 16 and 17 of the
Water Smart Connections student book



Check Your Knowledge

**ABOUT WATER POLLUTION
WITH THE FOLLOWING
CROSSWORD PUZZLE**

- Extra rain that doesn't soak into the ground (2 words)
- A chemical that is put on plants to kill bugs
- Soil particles
- A chemical that is used to kill weeds
- To make something unusable or unhealthy
- A chemical that is put on plants to make them grow faster
- The Southwest _____ Water Management District
- Point- _____ pollution is easy to recognize
- These are found in fertilizers
- Stormwater runoff is a type of _____
- Food byproducts are a kind of _____ pollution
- We need _____ water



Find the Hidden Message About Florida's Waters

Answers

Student Booklet, page 17



- | | | |
|-------|--------|--------|
| 1 = A | 10 = J | 19 = S |
| 2 = B | 11 = K | 20 = T |
| 3 = C | 12 = L | 21 = U |
| 4 = D | 13 = M | 22 = V |
| 5 = E | 14 = N | 23 = W |
| 6 = F | 15 = O | 24 = X |
| 7 = G | 16 = P | 25 = Y |
| 8 = H | 17 = Q | 26 = Z |
| 9 = I | 18 = R | |

<u>S</u>	<u>T</u>	<u>O</u>	<u>R</u>	<u>M</u>	<u>W</u>	<u>A</u>	<u>T</u>	<u>E</u>	<u>R</u>			
19	20	15	18	13	23	1	20	5	18			
<u>R</u>	<u>U</u>	<u>N</u>	<u>O</u>	<u>F</u>	<u>F</u>		<u>I</u>	<u>S</u>		<u>T</u>	<u>H</u>	<u>E</u>
18	21	14	15	6	6		9	19		20	8	5
<u>M</u>	<u>A</u>	<u>J</u>	<u>O</u>	<u>R</u>		<u>S</u>	<u>O</u>	<u>U</u>	<u>R</u>	<u>C</u>	<u>E</u>	
13	1	10	15	18		19	15	21	18	3	5	
<u>O</u>	<u>F</u>		<u>P</u>	<u>O</u>	<u>L</u>	<u>L</u>	<u>U</u>	<u>T</u>	<u>I</u>	<u>O</u>	<u>N</u>	
15	6		16	15	12	12	21	20	9	15	14	
<u>O</u>	<u>F</u>		<u>F</u>	<u>L</u>	<u>O</u>	<u>R</u>	<u>I</u>	<u>D</u>	<u>A</u>			
15	6		6	12	15	18	9	4	1			
<u>W</u>	<u>A</u>	<u>T</u>	<u>E</u>	<u>R</u>	<u>S</u>							
23	1	20	5	18	19							

Teacher Evaluation

Southwest Florida
Water Management District

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Your comments are important to us. Please take a few minutes to complete the following evaluation. Remove this page and return to the Southwest Florida Water Management District. No postage necessary. You may also fax to (352) 754-6883. Visit the SWFWMD's web site at WaterMatters.org for more information on resources for teachers.

4 = Strongly agree 3 = Agree 2 = Disagree
1 = Strongly disagree 0 = No opinion

1. The activities fulfilled their descriptions and objectives.

4 3 2 1 0

2. The activities were relevant to my needs.

4 3 2 1 0

3. The materials were user-friendly.

4 3 2 1 0

4. How did you use the materials in your classroom? _____

5. Number of students that participated in this program: _____

Grade: _____

6. Is this a good resource for you to use? _____

7. Suggestions and comments: _____

If you would like to receive a class set of water conservation temporary tattoos for returning this survey, please provide the following information:

Teacher's name: _____

School name: _____

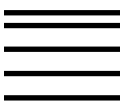
School address: _____

City, state, ZIP: _____

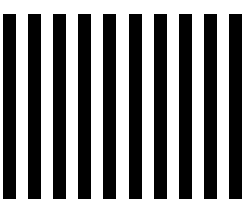
County: _____



2379 Broad St.
Brooksville, FL 34604-9911



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NECESSARY
IF MAILED IN THE
UNITED STATES



BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 6010 BROOKSVILLE, FL
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BROOKSVILLE, FL 34604-9911

