Teacher's Guide
Florida Watersheds Video

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT — Middle School

Download at: *http://www.WaterMatters.org/WatershedVideo*

Video Length: 11 minutes

Lesson Time: One block or class period (approximately 45 minutes)

Subject: Environmental Science and Life Science

Grades: 6–8

Objective: Students will explain the function of a watershed and be able to describe ways that a water body can be contaminated. Water quality factors can impact the health of an entire ecosystem. Using real-world applications and hands-on activities, students will learn how to prevent water contamination and discuss human impacts on our environment.

Purpose: To explain what a watershed is and how human actions affect the health of a watershed and the quality of water within the watershed.

Next Generation Sunshine State Standards:

SC.6.N.1.1 **SC.7.N.1.1** **SC.8.N.1.1**	Define a problem from the middle school 6–8 curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.L.17.3	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.8.L.18.1	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.

Common Core Curriculum Standards:

LACC.68.WHST.1.1	Text Types and Purposes
LACC.68.RST.1.1	Key Ideas and Details
LACC.68.RST.3	Integration of Knowledge and Ideas

Additional Links:

Find out more about the basics of a watershed and take your class on a virtual watershed excursion at *http://www.WaterMatters.org/WatershedLessons/.*

Request a free watershed poster and other free materials at *http://www.WaterMatters.org/publications/type/all/.*

Learn more about water quality testing at *http://www.WaterMatters.org/education/kids/WaterMonitoring/index.html/.*

Lesson Plan and Activities

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Vocabulary:
photosynthesis
watershed
aquifer
wetland
point source
nonpoint source
sedimentation
erosion
nitrates
phosphates
pH
runoff

Engage: (10 minutes) Review pre-discussion questions on page 7, then do the "Fact or Fib Review Challenge" on page 3.

Explore/Explain: (15 minutes) Pass out "Student Video Questions" on page 6 prior to watching the video.

Extend: (10 minutes) Conduct the "Create Your Own Watersheds" activity included on page 9.

Evaluate: (10 minutes) Give students the pretest prior to watching the video and the posttest (same as pretest) after watching the video and completing the activities.

Extensions: (30 minutes) "Station Learning"; see directions included on pages 10–17.

Take your class on a virtual watershed excursion at *http://WaterMatters.org/WatershedLessons/.*

Take a watershed pledge with your class at *http://WaterMatters.org/WatershedLessons/.*

Please take a few minutes to complete the Florida Watersheds Video and Teacher's Guide user survey. Your feedback will help us improve and expand our resources for educators and students. *http://www.surveymonkey.com/s/FloridaWatershedsVideo*

Fact or Fib Review Challenge Engage

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Prepare:

Step 1 Divide the class into groups of three or four students each.

Step 2 Groups will list two facts and two fibs (each on a separate piece of paper) about the topics and vocabulary discussed in the video. Students should not write if the statement is a fact or fib on the paper. Each team will then crumple all its papers into paper balls.

Step 3 Draw a target and assign points for each layer as shown below.

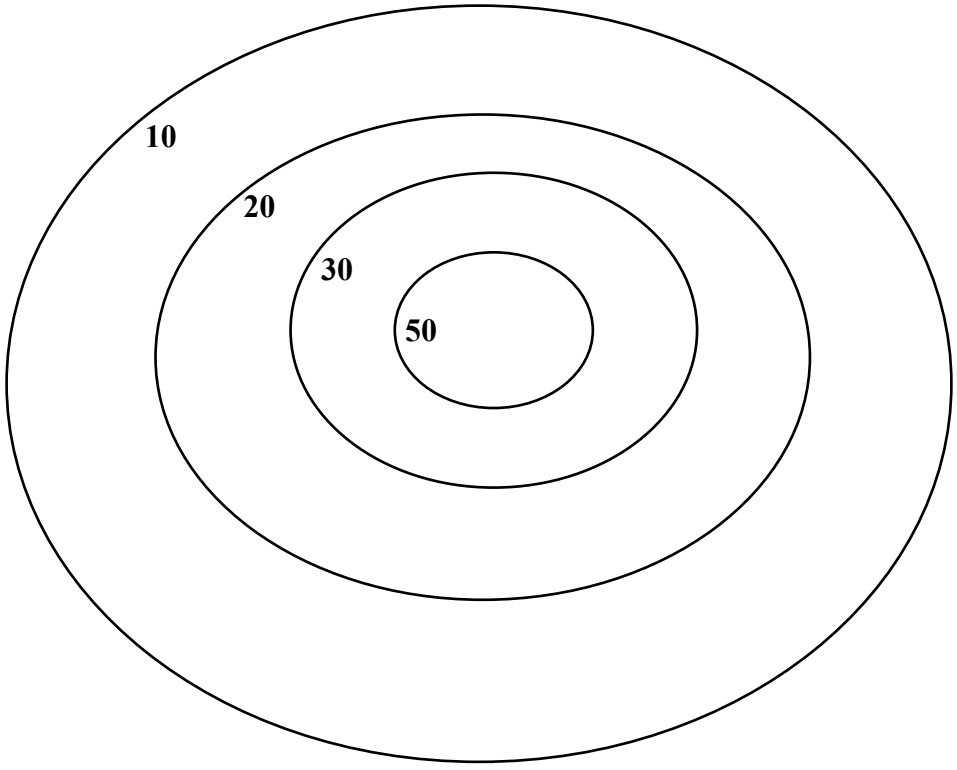
Play:

Step 4 After moving closer to the target, members of Team #1 throw their fact/fib paper balls at the target (one at a time) to score points. Keep track of points for each team. Leave paper balls on the floor.

Step 5 Team #2 selects team #1's paper balls (one at a time). As each is read, team members choose whether the statement is fact or fib. Team #2 receives 10 points for each correct answer. Then members of team #2 throws their paper balls (one at a time) and leaves them on the ground for Team #3.

Step 6 Repeat with the remaining teams. Team #1 reads the last team's paper balls for Team #1's chance at bonus points.

Step 7 The team with the most points wins!



Pre- and Posttest of *Florida Watersheds*

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

True or False

___ 1. Excess fertilizer and rainfall are types of point-source pollution.

___ 2. A wetland causes flooding and can destroy habitats.

___ 3. Excess pollutants, such as nitrates and phosphates, cause an overgrowth of algal blooms, green-color water and potential fish kills.

___ 4. A watershed is the area of land where water drains from the highest point to the lowest point to reach a water body.

___ 5. It's much cheaper to prevent pollution than to restore a natural system once it's been polluted.

___ 6. Dumping something down a storm drain does no harm to a watershed.

___ 7. Providing drinking water is not a main function of a watershed.

___ 8. Dissolved oxygen is a poor indicator of a water body's health.

___ 9. Turbidity is the cloudiness of water.

___ 10. Wetlands are like nature's kidney because they filter out impurities.

Answer Key for Pre- and Posttest

1. False F
2. False F
3. True T
4. True T
5. True T
6. False F
7. False F
8. False F
9. True T
10. True T

Student Video Questions

Name _____ Period _____

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Video Notes:

1. Explain what a watershed is: _____

   _____.
2. How can farmland contribute to water pollution? _____

   _____.
3. What types of stormwater runoff does an apartment complex produce? _____

   _____.
4. It is more cost effective to _____ than to treat water that has been contaminated.

Pause and Discuss #1 (4:10)

5. What watershed do you live in? _____.

Video Notes (cont.):

6. One of the most important functions of a watershed can be to _____

   _____.
7. One way to keep a watershed healthy is to reduce _____.
8. The 3 major types of water pollutants are sediments, _____ and _____.

Pause and Discuss #2 (7:24)

9. How does each of these major water pollutants affect water quality?

   Sediments _____

   _____.

   Bacteria _____

   _____.

   Nutrients _____

   _____.

Video Notes (cont.):

10. What is another name for Florida's wetlands? _____.

    Why? _____

    _____.

Answer Key for Video Questions Explain/Explore

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Pre-Discussion:

Activate prior knowledge on watersheds using guiding questions — Where does the majority of our drinking water come from? How does water get to your home? How does a river or lake become polluted: What are some types of pollution?

Video Notes

1. Explain what a watershed is:

   A watershed is an area of land that water flows across as it moves toward a common body of water, such as a stream, river, lake or coast.

2. How can farmland contribute to water pollution?

   It often produces stormwater runoff such as fertilizer, pesticides and livestock waste.

3. What types of stormwater runoff does an apartment complex produce?

   Litter, oils from parking lots and pet waste.

4. It is more cost effective to protect our watersheds and water resources than to treat water that has been contaminated.

Pause and Discuss #1 (4:10):

5. What watershed do you live in?

   Just before first Pause and Discuss portion of the video, a map is shown on the video to determine the watershed in which your students live.

Video Notes (cont.):

6. One of the most important functions of a watershed can be to provide drinking water.
7. One way to keep a watershed healthy is to reduce pollutants.
8. The 3 major types of water pollutants are sediments, bacteria and nutrients.

Pause and Discuss #2 (7:24):

9. How do each of these major water pollutants affect water quality?

   Sediments Sedimentation is caused by weathering and erosion from the land. As the sediments increase turbidity in a body of water, the aquatic life is covered, preventing sunlight from passing through for photosynthesis to occur. Sediments usually carry organic matter, wastes and nutrients. Sediments destroy spawning beds for fish and reduce survival of aquatic populations.

   Bacteria Coliform bacteria is fecal matter from runoff, leaking septic tanks and animals. Recreational areas for swimming and fishing are tested for coliform bacteria because increased levels may cause health risks to humans. *Escherichia coli* (*E. coli*) is a species in the fecal coliform group and causes intestinal distress or serious illness.

   Nutrients Excess nutrients such as nitrates and phosphates are harmful to the health of a water body. For instance, nutrients may cause an overgrowth of algae that decreases oxygen levels. The decay of algae depletes oxygen levels in water. An increase in nutrients also causes pH levels to become more acidic.

Video Notes (cont.):

10. What is another name for Florida's wetlands?

    Nature's kidneys.

    Why?

    A kidney filters out waste products from the human body much like a wetland filters out pollutants before they reach a larger water body.

Pause and Discuss #3 (9:35)

Wetlands Review: What are the benefits of wetlands?

Prevent flooding; store water for a drought; provide habitats; serve as a nursery to birds, fish, mammals and reptiles; stabilize shorelines; and provide recreations areas and activities.

Conclusion Discussion: (10:03)

What can we do to protect our water resources?

Answers may vary. Examples: Don't litter, pick up after your pets, don't dump anything down a storm drain, use fertilizers and pesticides as directed.

Create Your Own Watershed Extend

Southwest Florida Water Management District

Now that you know about watersheds, how about making one of your own? Depending on your flair for creativity, you can make your watershed a simple or complex system.

Learning Goals

- To teach the function of watersheds
- To stimulate thought about the role watersheds play in the world

Subjects

- Science
- Social Studies

Activity

1. To set up the activity, crumple several pieces of newspaper or other paper. Place paper in cake pan to represent different elevation levels of land. Cover the paper with aluminum foil or plastic wrap. Position small model pieces as desired.
2. Use a spray bottle to spray clear water at the highest elevation. Observe results.
3. Add small amounts of colored powders to various places to represent different types of pollutants. For instance, cocoa powder may represent soil erosion, green fruit drink mix powder may represent fertilizer, etc.
4. Again, use the spray bottle to spray water at the highest elevation. Observe results.

Discussion Questions

1. What happened the first time you sprayed clear water on your watershed model?
2. What happened to the pollutants when you sprayed water again?
3. What could be done to reduce the amount of pollutants affecting your watershed?
4. How does your watershed compare with watershed models made by other classmates?

Materials Needed

- large aluminum cake pan
- several pieces of crumpled paper
- large sheet of aluminum foil or plastic wrap
- variety of colored powders (cocoa, fruit drinks, etc.)
- clear water
- spray bottle
- small model pieces to represent homes, trees, cars, farm animals, etc.

Station Learning Extension

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Lab Time: 30 minutes

Before Conducting the Lab:

- Print and cut out the instructions for each station (pages 13–14) and pictures provided (pages 15–16). Reinforce the cutouts with cardstock or laminate. Make duplicate stations if you prefer smaller groups of students.

Lab Set-up:

- Set up stations according to the following directions. Student instructions are provided on pages 13–14 to place at each station.

  Station 1:

  - Two trays should be set up as instructed here. Tape the population pictures provided on page 15 to both trays on the front exterior of the trays.
    1. Fill Tray #1 about halfway with rocks. Then add water to come up about one inch from bottom of tray.
    2. Tray #2 will be arranged the same way but add enough water to cover the rocks. Optional items to represent the outdoors (green outdoor carpet for grass, animal figurines, etc.) could be added to enhance visual appeal.

  Station 2:

  - Place two bottles of water at the station and label Bottle #1 and Bottle #2.
    1. Bottle #1 should be clean water from the tap.
    2. Bottle #2 should be dirty water. Add dirt, cocoa, pudding, fruit drinks, etc.

  Station 3:

  - Label the three pictures (provided on page 16) #1, #2 and #3.

  Station 4:

  - Only student instructions are needed.

Directions:

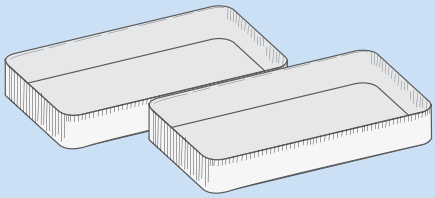
- Divide students into four groups. If you made duplicate stations, divide students into eight groups.
- Model each station briefly and explain student expectations at each.
- Rotate groups from station to station clockwise until each group has completed all stations. Stations are designed to be approximately five minutes in length. A timer is helpful for students.

Materials Needed

- cardstock or laminate
- two aluminum pans/trays
- rocks
- two water bottles
- colored powders (dirt, cocoa, pudding, fruit drinks, etc.)
- water

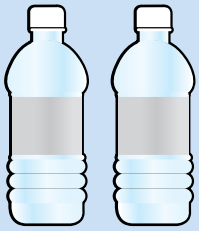
Cardstock or laminate

2 aluminum pans/trays

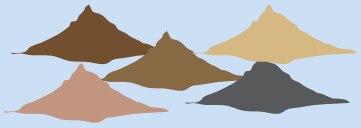


Rocks

2 water bottles



Colored powders



Water

Lab answer key:

Station 1 — Water Resources

Tray #1 has limited water resources as a result of a drought. Fertilized lawns have also been overwatered.

1. Compare the trays. Use complete sentences to compare what you see and how you think the amount of water resources available will affect the population dependent upon it. According to the pictures, both trays have the same population but different water resources available.

   Tray #1 has lower water levels indicating the population uses more water. Tray #2 has more water available indicating the population conserves water resources.

2. Contrast the trays. Describe the impact of the population on the available water resources. Use the following words in your answer: population, limited, runoff, pollution and watershed.

   The population of tray #1 has a limited supply of water in the watershed possibly caused by the population's overuse of water. Pollution from stormwater runoff could also contribute to the water supply and quality of water.

Station 2 — Photosynthesis and Sedimentation

Water bottle #1 represents good quality water while water bottle #2 represents water affected by stormwater runoff and sedimentation. Answer the following questions in complete sentences:

1. Plants need sunlight for photosynthesis to occur. Which water sample do you think would hinder the process of photosynthesis? Why?

   Bottle #2 would hinder photosynthesis from occurring because the sediments floating in the water and the poor water quality would prevent light from reaching aquatic plants under the surface. Plants need sunlight for photosynthesis to occur.

2. How important is water quality? Why?

   Water quality is important because there is a limited supply of water on Earth. If humans don't protect the quality of water we have, there will be even less available to us and the ecosystems that depend on it.

Station 3 — Environmental Cost

Reflect on the three pictures provided. Using complete sentences, explain what negative impacts the following situations cause on the surrounding water resources and population.

Photo #1: Litter in and around a body of water

Answers may include destroying aquatic habitat, killing fish and aquatic plants, and contaminating recreational or drinking water.

Photo #2: Clean water versus contaminated water

Answers may include animal and human health risks and disease.

Photo #3: Nicely manicured grass near a lake appearing in poor condition

Answers may include water contamination, fertilizer runoff causing an overgrowth of algae in the water and harm to fish, plants and cloudiness of the water may prevent photosynthesis from occurring.

Station 4 — What will you do?

Answer the following questions in complete sentences:

1. Name two human actions that are harmful to water quality.

   Possible answers include: littering, overfertilizing lawns, gas and oil spills from cars and boats, pet waste, wasting water

2. Name two actions YOU can do in and around your home to protect water quality.

   Pick up litter and pet waste, encourage family and friends to fix oil leaks, not overfertilize, etc.

Station 1 — Water resources

Tray #1 has limited water resources as a result of a drought. Fertilized lawns have also been overwatered.

1. Compare the trays. Use complete sentences to compare what you see and how you think the amount of water resources available will affect the population dependent upon it.

2. Contrast the trays. Describe the impact of the population on the resources available. Use the following words in your answer: population, limited, runoff, pollution and watershed.

Station 2 — Photosynthesis and sedimentation

Water bottle #1 represents good quality water while water bottle #2 represents water affected by stormwater runoff and sedimentation. Answer the following questions in complete sentences:

3. Plants need sunlight for photosynthesis to occur. Which water sample do you think would hinder the process of photosynthesis? Why?

4. How important is water quality? Why?

Station 3 — Environmental cost

Reflect on the three pictures provided. Using complete sentences, explain what negative impacts the following situations cause on the surrounding water resources and population.

Photo #1: Litter in and around a body of water.

Photo #2: Clean water versus contaminated water.

Photo #3: Nicely manicured grass near a lake appearing in poor condition.

Station 4 — What will you do?

Answer the following questions in complete sentences:

1. Name two human actions that are harmful to water quality.

2. Name two actions YOU can do in and around your home to protect water quality.

Station 1 Photo

Station 3 photos

Water with algae

Litter in water

Clean water in a neighborhood