



Wait, What's a Watershed?

Protecting Our Waters From Pollution

Have you ever wondered what goes on behind the scenes to keep Florida's waterways healthy and ensure we have enough water for people and nature to enjoy?

The **Wait, What's a Watershed?** lesson plan is here to help! With this lesson plan, you can help your students better understand what watersheds are, the effects of water contamination, and how the Suwannee River Water Management District is always working to maintain balance and ensure the well-being of our ecosystem.



1 Key Ideas / Purpose

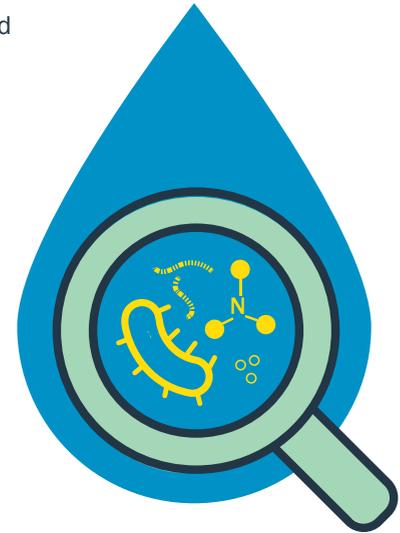
- Students will learn about the function of a watershed and how human actions affect the health of a watershed.
- Students will learn about the different kinds of water pollution and how experts are working to reduce the amount of pollutants going into our waterways.

2 Objectives

- 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.

- Students will learn how to reduce harmful impacts on surface waters.



3 Vocabulary

1. contamination
2. drainage divide
3. erosion
4. evaporation
5. evapotranspiration
6. fertilizer
7. hydrograph
8. hydrological unit codes
9. infiltration
10. nitrates
11. nutrients
12. pesticide
13. pH (acidity)
14. phosphates
15. pollution
16. precipitation
17. runoff
18. sediments
19. topography
20. transpiration
21. waste
22. water quality
23. watershed
24. wetland



4 Engage

Use these questions for either a bell-ringer or a Think-Pair-Share:

- How does water get to your home?
- How does a river or lake become polluted?
- What is pollution?
- What are some types of pollution?
- When you hear the words “water pollution,” describe what your mind sees: what colors, what objects, what motions?
- Is pollution something you can always see, smell, or touch?
- How does pollution affect our ecosystems?



5 Explore/ Explain

- Have students take the “**Pre-test of Florida Watersheds**” prior to watching the “Watersheds” video.
- Have students watch the “Watersheds” video (<https://youtu.be/LJ63xGJY4pM>) and complete the “Student Video (Florida Watersheds) Questions Worksheet” as they watch. Reference the Answer Key for guided notes and discussion points.
- Distribute the “**Water Pollution Student Vocabulary Worksheet**” and have students complete the “What you already know about this word” column for each vocabulary word.
- Have students watch the video “Water Pollution: The Dirty Details” (<https://youtu.be/7vTIRGfvT4o>) and instruct students to write down what they hear and learn about the vocabulary words in the “What new things/ideas you found out about this word” column. Students should write in their own words as this will help them learn how to use these words. Warn them that the video goes fast, so they need to pay close attention. Pause the video every few minutes to allow students time to write.

Heads-up!

The “**Water Pollution: The Dirty Details**” video goes fast, so pause the video every few minutes to allow students time to write and pay close attention.



6 Extend

- See the Activity Guide “Create Your Own Watershed” for directions. Students will test their model with a spray bottle filled with water.
- Perform a “Student Water Quality Lab Experiment” using a testing kit for pH, nitrates, and phosphates, like the example found [here](#).
- See attached teacher page / answer key for the “Water Pollution Student Vocabulary Worksheet.” After viewing the video, discuss what the students found out about each word. It is important to clarify and specify the meaning of the word in the context of the video.

7 Evaluate

- Students will take the post-test (same as pre-test) after watching the video and completing the activity.
- Instruct students to choose three or four of the vocabulary words and write down all the new things they learned about the word on a separate piece of paper.

8 Extensions

Learn more about water quality by watching videos created by the St. Johns Riverkeeper [here](#).

Learn more about what the Suwannee River Water Management District is doing to keep our rivers and springs clean.

- Visit the Suwannee River Water Management District website [here](#).
 - ◆ Read our Water Quality 101 page [here](#).
 - ◆ Learn more about what a spring is, how we’re protecting them, and how you can enjoy them [here](#).
- Watch our “Who We Are” video [here](#).
- Watch our “My Home, My Springs” video [here](#).
- Explore an interactive watershed map [here](#).



9**SUNSHINE
STATE
STANDARDS****SC.912.L.17.2**

Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity and temperature.

SC.912.L.17.11

Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife and forests.

SC.912.L.17.12

Discuss the political, social and environmental consequences of sustainable use of land.

SC.912.L.17.16

Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.

SC.912.L.17.17

Assess the effectiveness of innovative methods of protecting the environment.

SC.912.L.17.18

Describe how human population size and resource use relate to environmental quality.

SC.912.L.17.20

Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

SC.912.N.1.1

Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science.

LA.910.1.6.1

The students will use new vocabulary that is introduced and taught directly.

LA.910.5.2.1-2

The student will select and use appropriate listening strategies according to the intended purpose (e.g., solving problems, interpreting and evaluating the techniques and intent of a presentation).





Wait, What's a Watershed?

Activities & Resources

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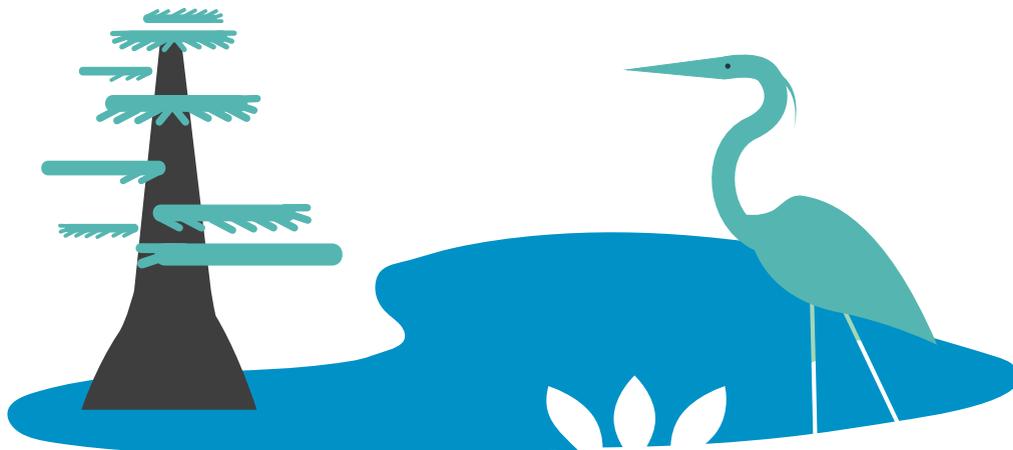
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Name _____ Period _____

True or False?
**Pre- and Post-test
 of Florida Watersheds**

Question	T	F
1 Excess fertilizer is not a type of pollution because it helps plants grow and stay green.		
2 A wetland causes flooding and can destroy habitats.		
3 Houses, businesses, farms, and cars are all things that can be found in a watershed.		
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 Water flows downhill.		
6 Berms and containment units are man-made structures that make watersheds worse.		
7 Picking up pet waste does not make a difference when it comes to preventing pollution in our waterways.		
8 Contaminated stormwater runoff does not affect the habitat for fish or oysters.		
9 One thing you can do to help keep our waterways clean is to plant Florida-friendly landscaping.		
10 Wetlands are natural environmental controls because they are habitats that can take in the pollutants and filter them out for us.		



True or False?

Pre- and Post-test of Florida Watersheds

ANSWER KEY



Question	T	F
1 Excess fertilizer is not a type of pollution because it helps plants grow and stay green.		F
2 A wetland causes flooding and can destroy habitats.		F
3 Houses, businesses, farms, and cars are all things that can be found in a watershed.	T	
4 A watershed is the area of land where water drains from the highest point to the lowest point to reach a water body.	T	
5 Water flows downhill.	T	
6 Berms and containment units are man-made structures that make watersheds worse.		F
7 Picking up pet waste does not make a difference when it comes to preventing pollution in our waterways.		F
8 Contaminated stormwater runoff does not affect the habitat for fish or oysters.		F
9 One thing you can do to help keep our waterways clean is to plant Florida-friendly landscaping.	T	
10 Wetlands are natural environmental controls because they are habitats that can take in the pollutants and filter them out for us.	T	



Name _____ Period _____

Coastal Watersheds

Model Worksheet

1. What does a coastal watershed model demonstrate?

2. What are some man-made structures you might find in a watershed?

3. List some of the sediments and/or contaminants that get washed off the land by rain and into our waterways.

4. Water flows _____ .
5. What are some natural, living things that can be affected by contaminated stormwater runoff?

6. What recreational activities might you think twice about after seeing how contaminated the water can get from the watershed demonstration?

7. What are two natural things that people can add to watersheds to make things better? How do these things help?

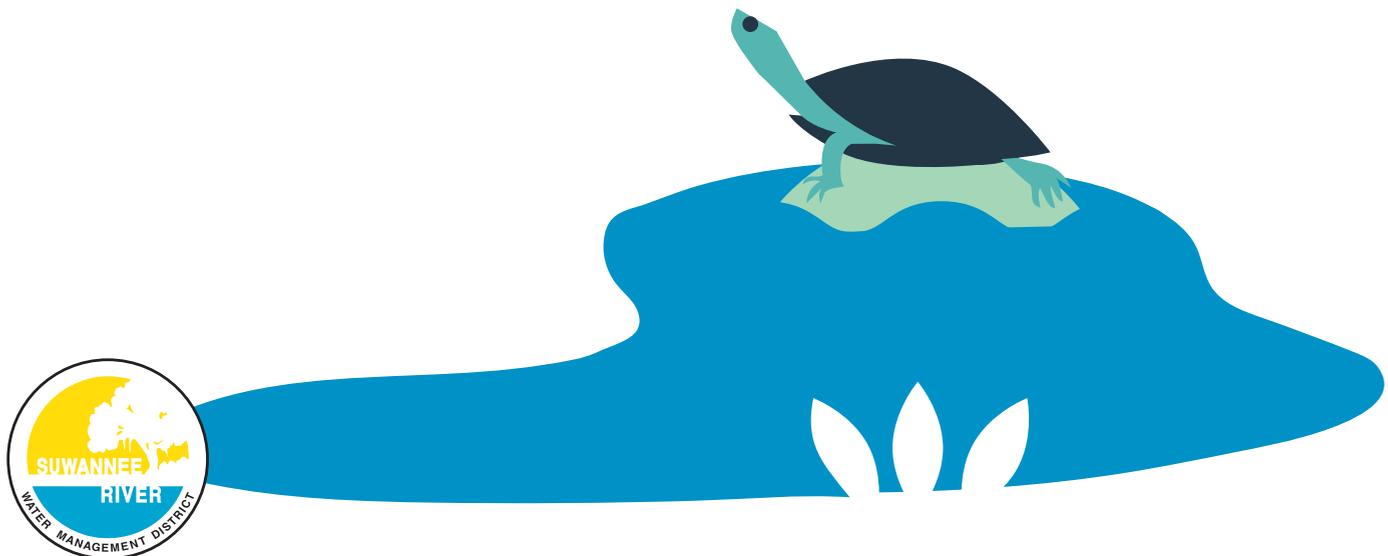


Worksheet *Continued*

Coastal Watersheds Model

8. What are two man-made things that people can add to watersheds to make things better? How do these things help?

9. What are some simple things you can do in your watershed to make sure our waterways stay clean?



Coastal Watersheds

ANSWER KEY



1. What does a coastal watershed model demonstrate?

It demonstrates how water falls on our land and, eventually, out into our oceans.

2. What are some man-made structures you might find in a watershed?

Houses, factories, farms, cars, machinery/equipment.

3. List some of the sediments and/or contaminants that get washed off the land by rain and into our waterways.

Fertilizer, pesticides, animal waste, oil, litter/debris/trash, bacteria, metals.

4. Water flows Downhill.

5. What are some natural, living things that can be affected by contaminated stormwater runoff?

Coral reef, oyster beds, fisheries, invertebrates, any aquatic organism with gills, etc.

6. What recreational activities might you think twice about after seeing how contaminated the water can get from the watershed demonstration?

Playing or hunting for sharks' teeth in creeks, fishing, swimming in a lake or at the beach, drinking water from a stream.

7. What are two natural things that people can add to watersheds to make things better? How do these things help?

People can plant native vegetation and preserve and enhance natural wetlands. Wetlands act as natural filters to remove contaminants and trap sediment. They also help reduce the impacts of flooding by acting as a sponge to absorb excess water.

8. What are two man-made things that people can add to watersheds to make things better? How do these things help?

Berms and stormwater ponds. They trap sediment and contaminants so that they do not enter our natural waterways.

9. What are some simple things you can do in your watershed to make sure our waterways stay clean?

Make sure that you always pick up after your pets so their waste doesn't get into our system. Excess nutrients from waste can lead to algal blooms and harm aquatic environments. You can also make sure to use Florida-friendly plants in your garden because they are going to require less fertilizer and fewer pesticides, which means less pollution in our oceans! Florida-friendly plants also create habitat for pollinators that help keep Florida ecosystems healthy.

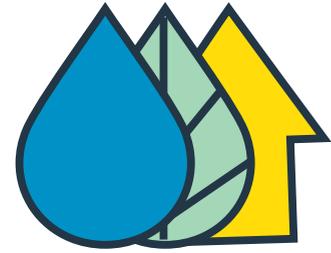


Subjects:

- ◆ Science
- ◆ Social Studies

Activity

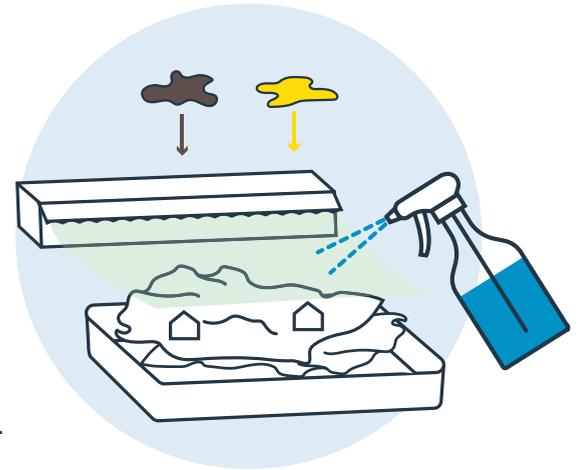
Create Your Own Watershed



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.

1 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.



2 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.

3 Discussion

1. What happened the first time you sprayed clear water in 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?

4 Learning Goals

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

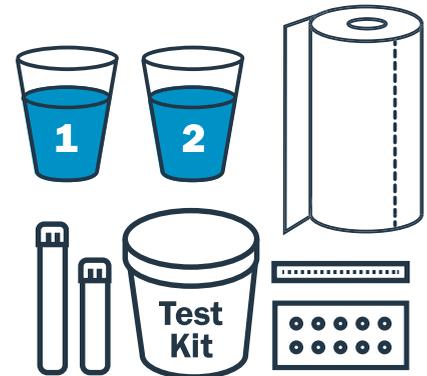
Materials & Lab Set Up

Student Water Quality Lab Experiment



1 Materials Needed

- one test kit per group
- two clear plastic cups per group labeled sample #1 and sample #2
- paper towels



2 Order the test kits

Order water quality test kits for pH, nitrates, and phosphates, like the example found [here](#).

3 Before conducting the lab

Collect two water samples.

Suggested water sources are a fish tank or small pond (one with lots of algae) and a cleaner source such as a faucet. If a source with algae isn't available, add fish food to one sample and set in sun for a few hours or leave on a counter overnight.

Using two different samples will ensure that students can understand the quality of water in different sources.

Comparing differences in the samples is part of the learning process.

4 Lab Set Up

- Divide students into groups of five. At each group, label two plastic cups, sample #1 (Fish Tank) and sample #2 (Faucet).
- At each group, place the instruction sheet (in a protective sleeve), the lab guides and paper towels for cleanup.
- *Follow kit instructions to complete the water quality testing.

* Specific lab instructions and materials needed will vary based on water quality lab kit acquired.

Please note: Each group has only enough tablets to test each water sample one time. Carefully read the directions before starting the lab. Each team member has a group role explained on the group data sheet.

Instructions

Student Water Quality Lab Experiment



1 Nitrates

1. **The supply coordinator** prepares all materials for the **water tech**.
2. Fill a test tube to the 5mL mark with a sample of water from cup labeled sample #1.
3. Add one nitrate tablet, put cap on tube and invert the tube until the tablet has mostly disintegrated. Let the inverted sample sit for five minutes.
4. While waiting for the nitrate sample to sit, start the phosphate test (see instructions in next row).
5. After the nitrate sample sits for five minutes, compare the color of the water to the color chart provided.
6. Record the levels.

2 Phosphates

1. While the nitrate test is in process, take another sample of water from cup labeled sample #1. Fill another test tube to the 10mL mark.
2. Slip the tube into the foil sleeve given to protect it from light.
3. Add one phosphate tablet, put cap on tube and invert it until the tablet has mostly disintegrated. Let the inverted sample sit for five minutes.
4. While waiting for the phosphate sample to sit, start the pH test (see instructions in next row).
5. After the phosphate sample sits for five minutes, compare the color of the water to the color chart provided.
6. Record the level. Use "0" to indicate clear.

3 pH

1. While the other tests are in process, take a third sample of water from cup labeled sample #1. Fill a test tube to the 10mL mark.
2. Add one pH tablet, put cap on the tube and invert it until the tablet has mostly disintegrated. Let the inverted sample sit for five minutes, compare the color of the water to the color chart provided.
3. Record the level. Use "0" to indicate clear.
4. After the pH test is completed, read and record test results in your data collection chart.

> **Once all data have been recorded for the first water sample, the supply coordinator should thoroughly wash the test tubes and prepare to repeat the lab for the second water sample.**

Name _____ Period _____

Group Data Sheet

Student Water Quality Lab Experiment

- > **Specific lab instructions and materials needed will vary based on water quality lab kit acquired.**

Supply Coordinator Checks all materials and coordinates the group to help clean up

Water Tech Takes the samples of water and initiates the tests

Data Tech Reads and records data for tests

Director Reads directions to group out loud



Test	Sample Cup 1	Sample Cup 2
Nitrate		
Phosphate		
pH		

1. Name three local places where people swim or fish. What clues indicate that the water quality at those sites may or may not be healthy?

Group Data Sheet *Continued*

Student Water Quality Lab Experiment



2. Looking at the data, compare the two samples. In which sample was the nitrate level higher? What things may cause nitrate levels to be higher?

3. Which sample had the highest phosphate level? What may cause phosphate levels to be higher?

4. In which sample was the pH level higher? What may cause pH levels to be higher?

5. After performing the water tests, what concerns do you have about water quality?

6. Why is water quality important?

Group Data Sheet *Continued*

Student Water Quality Lab Experiment



7. What is a potential impact of poor water quality?

8. Name two human actions that negatively affect water quality.

9. Name two human actions that help protect water quality.

**10. If nitrate levels are too high, how do you think the pH levels may be affected?
How will the aquatic life be affected?**

Group Data Sheet

Student Water Quality Lab Experiment

ANSWER KEY



1. Name three local places where people swim or fish. What clues indicate that the water quality at these sites may or may not be healthy?

Some answers may include freshwater or saltwater ecosystems. The clues that may indicate good/poor water quality are the number of living things, amount of algae or sediments, how clear the water appears or the color of the water, the presence or absence of diverse groupings of plants and animals, the nearby land activities such as factories or farmlands, etc.

2. Looking at the data, compare the two samples. In which sample was the nitrate level higher?

Answers will vary. High levels of nitrogen can occur where there is animal waste, leaky septic systems, and overfertilized agricultural runoff.

3. Which sample had the highest phosphate level? What may cause phosphate levels to be higher?

Answers will vary. Phosphorus levels may be higher due to non-point source pollution such as leaky septic tanks, excess fertilizer, and stormwater runoff. Point-source pollution such as industrial waste may also increase phosphorus levels. It is important to note that phosphorus levels can also be naturally elevated in some water bodies, due to underlying soils and geology.

4. In which sample was the pH level higher? What may cause pH levels to be higher?

Answers will vary. pH levels are affected by the time of day the water sample was taken. pH levels increase throughout the day as the sun causes an increase in photosynthesis. Photosynthesis produces oxygen and increases the pH as CO₂ (carbon dioxide) is consumed by plants. A second factor affecting pH levels is CO (carbon monoxide) released from vehicles, manufacturing plants and other sources eventually becomes CO₂ and enters surface waters as rain. The presence of excess fertilizers can also increase the pH of surface waters.

5. After performing the water tests, what concerns do you have about water quality?

Answers may include concerns about the amount of nutrients in the water they swim in or drink from because of risks to their health. They may include concerns about things that live in the water from which the sample came.

6. Why is water quality important?

The quality of water is important because we have a limited amount on Earth that we can use, and if it is not protected, our health could be at risk. Water quality is important for a balanced aquatic ecosystem and the connecting ecosystems.

Group Data Sheet

Student Water Quality Lab Experiment

ANSWER KEY



7. What is a potential impact of poor water quality?

Some impacts may include spread of disease, lack of sanitation or clean drinking water, reduced sustainability of fish and other aquatic life, limited use of water for fresh food from farmlands, and fewer recreational opportunities for swimming and fishing at Florida beaches, rivers, and springs.

8. Name two human actions that negatively affect water quality.

Some answers may include overusing pesticides, herbicides, and fertilizers; littering; dumping oil or chemicals on the ground/water; wasting water or water depletion; leaking septic tanks; or recreational activities such as boating; destruction of wetlands and natural habitat; air pollution from industrial operations.

9. Name two human actions that help protect water quality.

Community involvement, education, water conservation awareness and practice, water quality monitoring, landscape management, controlling and treating stormwater runoff with landscaped stormwater ponds, etc.

10. If nitrate levels are too high, how do you think the pH levels may be affected? How will the aquatic life be affected?

pH levels can both increase in the daytime and decrease at night if the nutrient levels are too high, thereby promoting algal blooms. In this scenario, aquatic life may not be supported and would not likely thrive. Most aquatic organisms function at the optimal range of 6.5 to 8.5 pH. For example, fish eggs, and clam and mussel shell formation are impaired if the water is too acidic. Additionally, plant and algae composition will change with pH, affecting all the organisms that would feed or live on them.

Name _____ Period _____

Watersheds!

Student Vocabulary Worksheet

Vocabulary word	What you already know about this word	What new things/ideas you found out about this word
Watershed		
Evaporation		
Transpiration		
Topography		
Drainage Divide		
Hydrological Unit Codes (HUCs)		
Precipitation		
Runoff		
Hydrographs		

Watersheds!

Student Vocabulary Worksheet

ANSWER KEY



Vocabulary word	What new things/ideas you found out about this word
Watershed	an area of land where surface water drains down to a single point, be it a stream, lake or ocean; a drainage basin that collects all of the water that doesn't first get evaporated or transpired; a big funnel that drains down to one spot
Evaporation	a type of vaporization that occurs on the surface of a liquid as it changes into a vapor
Transpiration	the process of water movement through a plant and its evaporation from aerial parts, such as leaves, stems, and flowers
Topography	the shape of the land surface, based on the elevation changes created by natural and man-made features
Drainage Divide	the highest ridge that divides the water from falling into one basin rather than another
Hydrological Unit Codes (HUCs)	a watershed identifier
Precipitation	rain, snow, sleet, or hail that falls to the ground
Runoff	the draining away of water (or substances carried in it) from the surface of an area of land, a building or structure
Hydrographs	<p>A hydrograph is a graph showing stage, discharge, velocity, or other properties of water flow with respect to time.</p> <p>Sources of data include:</p> <ul style="list-style-type: none">• soil absorption (the type of soil, how absorbent it is, and how much water is already in the soil)• plant life (how much is around and the rate at which the plants use water)• the rate of evaporation (how warm or dry the atmosphere is)• human uses (how much water is stored or used by people for cities and agriculture)