

# WATERSHEDS

## Science and Social Studies Standards Covered:

SC (1)- 7. Identify components of Earth's surface including soil, rocks, and water.

9. Identify ways to conserve Earth's resources.

10. Describe uses of recycled materials.

SS (1)- 7. Identify ways to take personal action to protect the environment.

8. Identify how occupational and recreational opportunities in Alabama and local communities are affected by the physical environment.

SC (2)- 7. Identify geological features as mountains, valleys, plains, deserts, lakes, rivers, and ocean.

9. Describe evaporation, condensation, and precipitation in the water cycle.

SC (3)- 13. Describe ways to sustain natural resources, including recycling, reusing, conserving, and protecting the environment.

SS (3)- 2. Describe physical characteristics, including landforms, bodies of water, soil, and vegetation of various places on Earth.

8. Identify geographic links of land regions, river systems, and interstate highways between Alabama and other states.

SC (4)- 7. Describe geological features of Earth, including bodies of water, beaches, ocean ridges, etc.

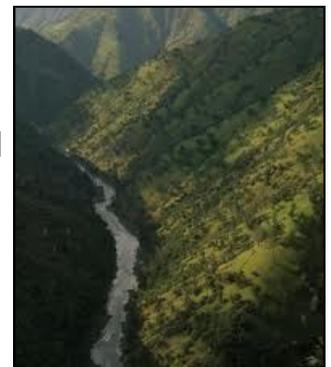
SC (5)- 10. Identify spheres of earth, including the geosphere, atmosphere, and hydrosphere.



The Alabama Museum of Natural History (AMNH) is part of the University of Alabama Museums and is located on the UA campus in Smith Hall. Opened in 1910, it is the oldest natural history museum in Alabama, and one of the oldest natural history museums in the nation. AMNH's

mission is to broaden the knowledge of natural sciences and human culture through collections and quality programs of research, instruction, and service.

Watersheds: Many people may not know that among the many things Alabama is known for is its extensive river systems. Alabama is ranked seventh in the states for its number of river miles and also has one of the largest watersheds in the nation, the Mobile River Basin. A watershed is defined as the total land area that drains surface water to a common point such as a river or an ocean. No matter where you live, you are in a watershed. Watersheds connect many people and environments who are all responsible for the well-being of our water supply. This watershed program teaches students about watersheds through interactive activities such as watershed mapping, environmental consciousness activities, water quality testing, watershed modeling, and other fun watershed related activities. This program can even be extended to a half day, in class "field trip"!



# WATERSHEDS

## *Did you know?*

The Alabama Museum of Natural History is right on the University of Alabama campus? It is housed in Smith Hall near the Gorgas Library.

## *Did you know?*

AMNH is a great destination for school field trips. Guided tours cost \$2 per student. If you would like a hands-on component added, a tour and Discovery Lab is only \$5 per student.

## **For information**

regarding field trips, you can call (205) 348-7550 or email [programs@ua.edu](mailto:programs@ua.edu).

## **For more info or to**

**schedule** this in-school program for your room, email [programs@ua.edu](mailto:programs@ua.edu)

[www.amnh.ua.edu](http://www.amnh.ua.edu)



## Suggested Pre-visit activities:

- The Water Cycle
- A Bird's Eye View
- A Poster is Worth A Thousand Words
- What is your Watershed Address?

## Suggested Post-Visit activities:

- Watershed Words
- Modeling the Water Cycle
- Guest Speakers



## Books about Watersheds:

- *A Drop of Water*-Gordon Morrison
- *Water Cycle*-Monica Hughes
- *All the Water in the World*- George Ella Lyon and Katherine Tillostone

## Videos and Websites about Watersheds:

- *Discovering Alabama: Cahaba River Watershed*
- *Citizen's Guide to Alabama Rivers-Black Warrior and Cahaba, Tennessee River, Chattahoochee and Coastal Plain Streams, Alabama, Coosa, and Tallapoosa*
- *U.S. Fish and Wildlife Service: Appendix A.:Alabama*
- Clean Water Partnership



# THE WATER CYCLE

The Water Cycle is an important process for a watershed. Earth today has the same amount of water that it always has, which means the water in your watershed has been around for a while! The water in your lake was once in a cloud, the rain on your window could have come from the trees in your backyard, and the dew on your grass could have come from your local river. It all cycles around, and has done so for billions of years.

The Water Cycle starts with...



**1. Evaporation:** water turns to vapor after being heated from the Sun. The vapor rises into the atmosphere. This is also related to **transpiration**, which is when plants almost “sweat” from the heat of the Sun. It is evaporation of water from plants.



**2. Condensation:** Water vapor then collects in the atmosphere and changes from vapor to liquid. This is when, among other things such as fog, clouds are formed. Water continues to collect and form into these clouds until the water droplets become too heavy to stay in the cloud and fall to the ground.



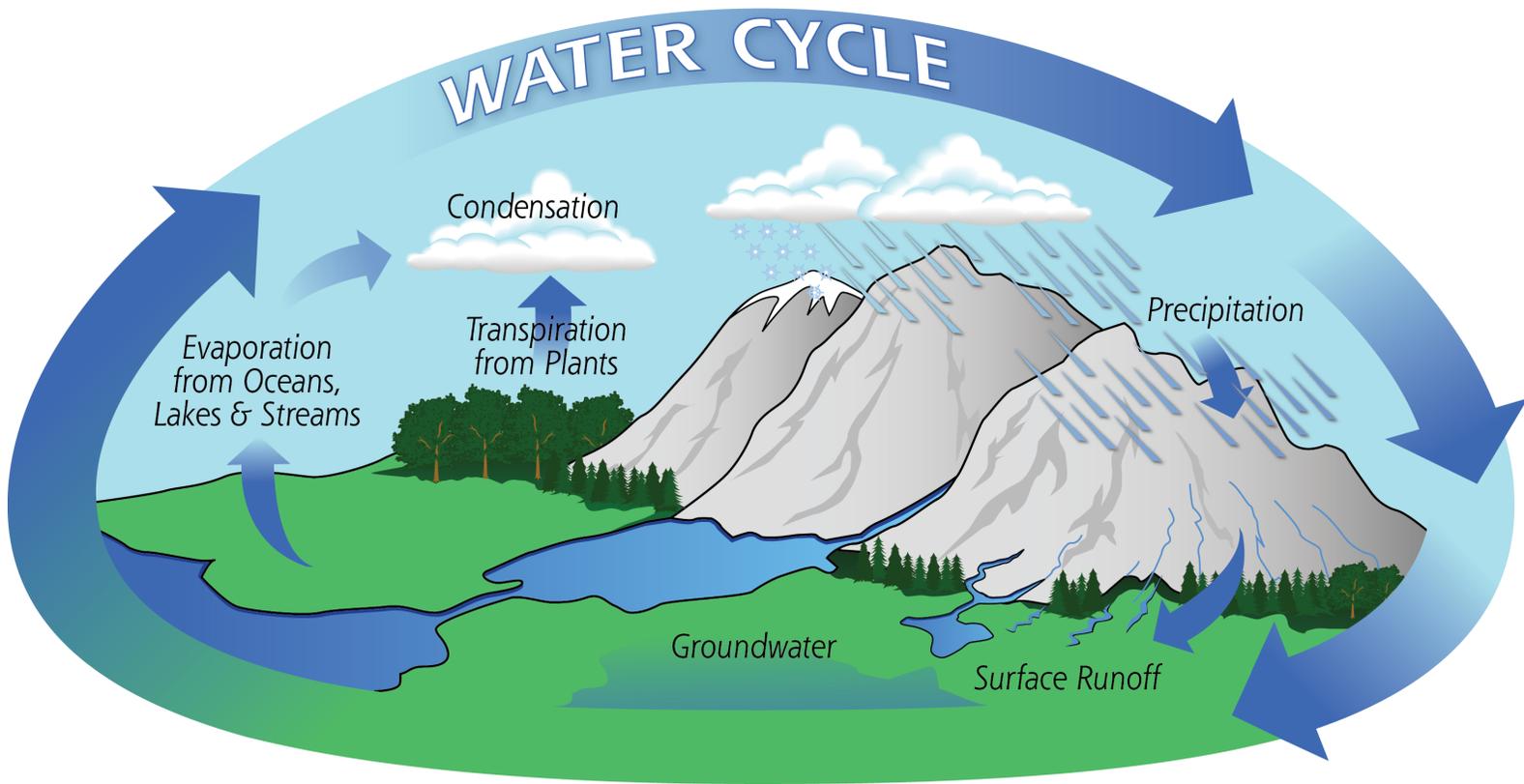
**3. Precipitation:** This is the main channel for water to return to Earth. Water droplets that are too heavy to stay in clouds fall to the ground in the form of rain, hail, sleet, or snow. These fall into lakes, rivers, on top of mountains and hills, and even directly onto the ground.



**4. Storage:** Precipitation is stored as groundwater (water held under the surface), in rivers and lakes, and eventually in plants again. There it sits until it evaporates once again.

Name: \_\_\_\_\_

Date: \_\_\_\_\_



1. Rain, snow, and hail are all examples of what?

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2. Can we see evaporation happening? How?

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3. When water falls onto a mountain and flow down to a stream or lake, that is called?

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4. What makes evaporation happen?

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5. What are clouds made of?

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6. Where do trees and plants get water from?

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\*BONUS\* How do you think rain becomes groundwater?

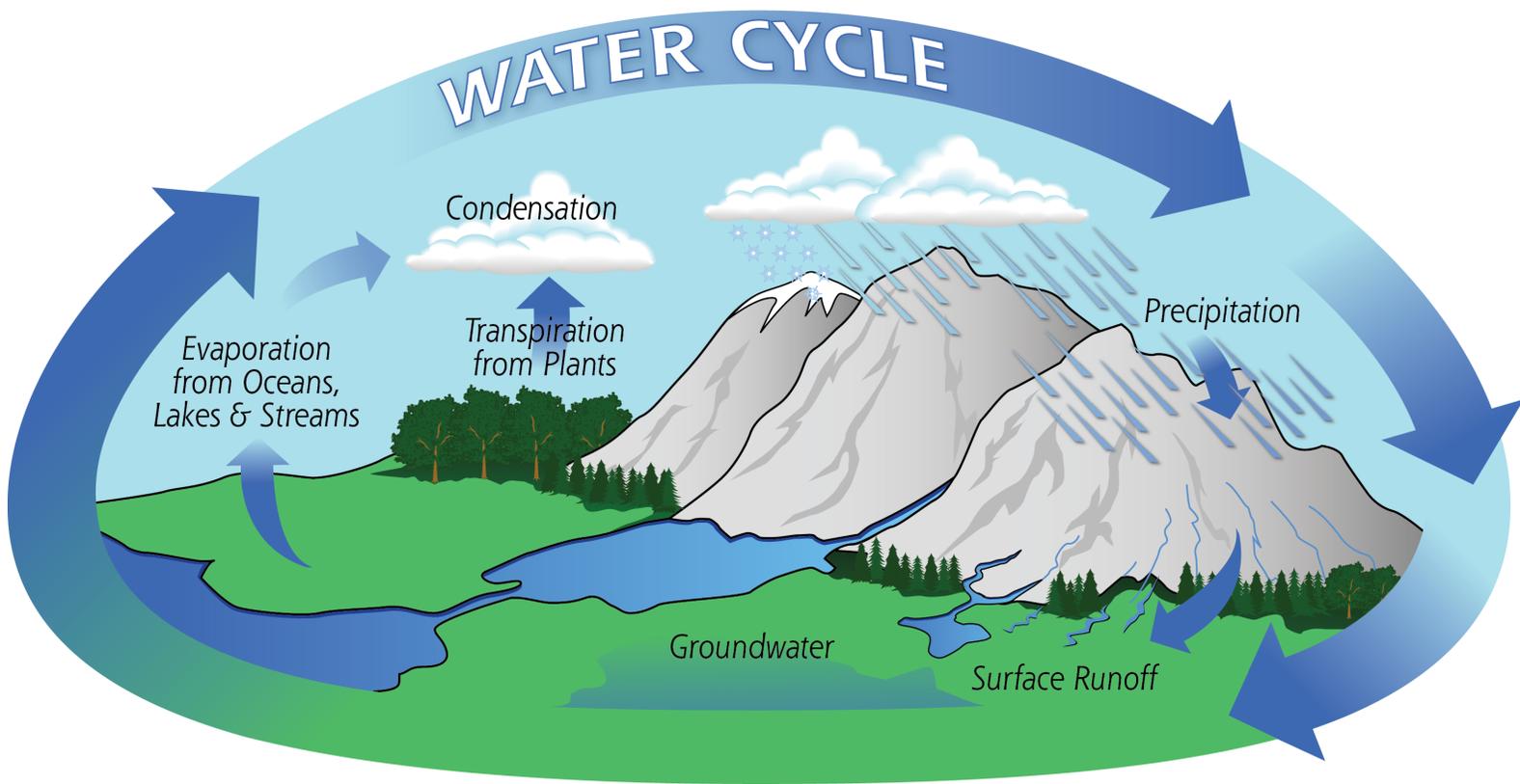
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Name: \_\_\_\_\_

Date: \_\_\_\_\_



1. What happens after water evaporates?

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2. What is transpiration?

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3. How does groundwater evaporate?

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4. What does surface runoff mean?

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5. What comes after condensation?

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6. What forms of precipitation are there?

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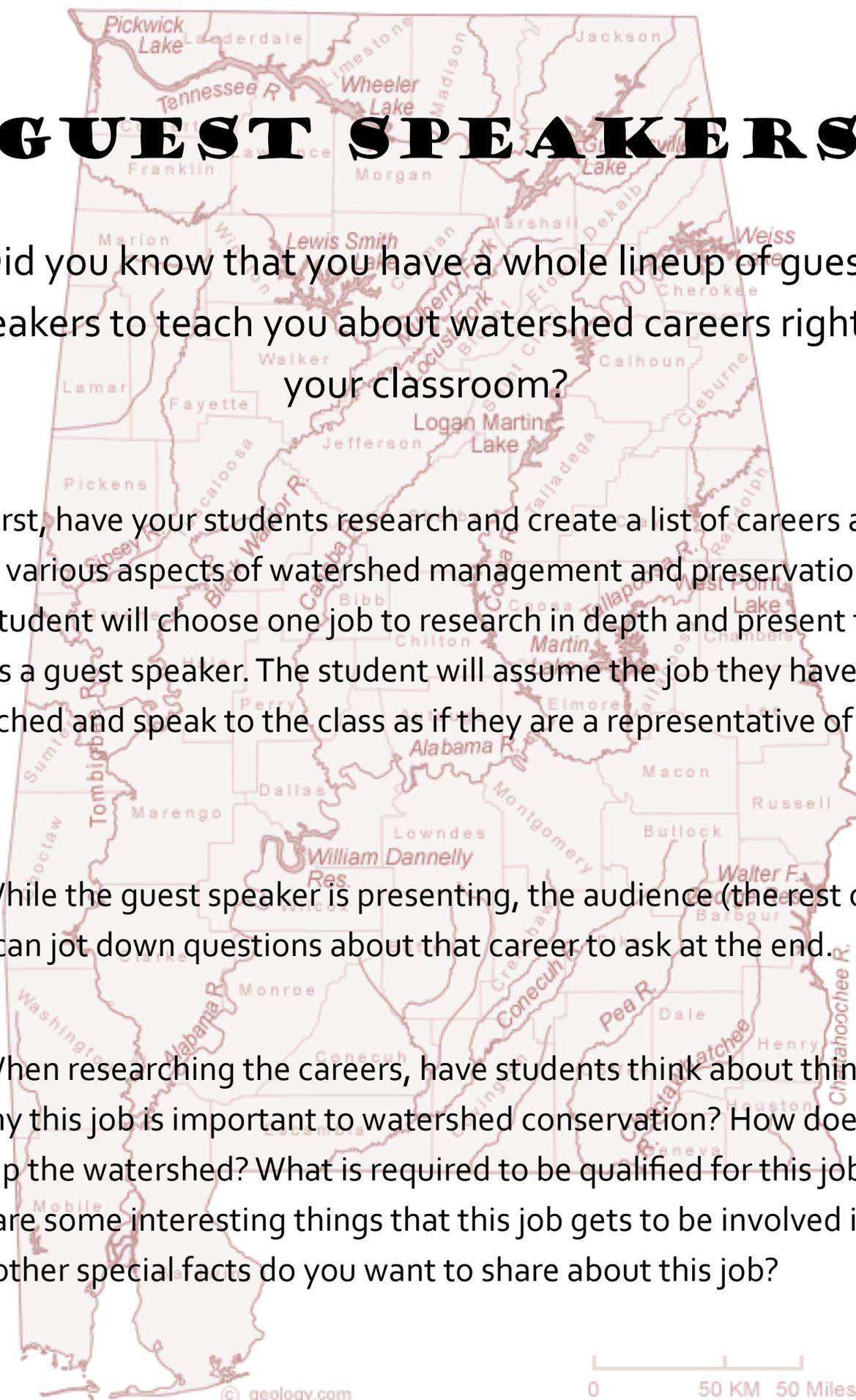
\*BONUS\* Are water molecules still in the atmosphere if there are no clouds in the sky? Why or why not? \_\_\_\_\_

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# WATERSHED WORDS

Match the watershed vocabulary words on the left to their definition on the right.

- |                                  |   |
|----------------------------------|---|
| _____ Watershed                  | A. Rivers, streams, and lakes that are polluted.  |
| _____ Non-point source pollution | B. A stream that flows into another stream or body of water.  |
| _____ Impaired waters            | C. Pollutants that come from one, identifiable source like a pipe, ditch, channel, sewer, or tunnel.  |
| _____ Water quality              | D. A region that drains into a particular body of water.  |
| _____ Tributary                  | E. Pieces of rock and soil removed by erosion and moved by the flow of water, wind, ice, and gravity. |
| _____ Point source pollution     | F. Responsible for watching over and protecting something considered worth caring for and preserving. |
| _____ Biodiversity               | G. The amount of water devoted to a given purpose.  |
| _____ Sediment                   | H. Pollution that does not come from a specific source like a pipe, ditch, channel, sewer, or tunnel. |
| _____ Stewardship                | I. A measure of how much variety of life is found in a water source.                                  |
| _____ Water allocation           | J. Whether a water source is safe to be used by people and animals.                                   |



# GUEST SPEAKERS

Did you know that you have a whole lineup of guest speakers to teach you about watershed careers right in your classroom?

First, have your students research and create a list of careers and jobs in various aspects of watershed management and preservation. Each student will choose one job to research in depth and present to the class as a guest speaker. The student will assume the job they have just researched and speak to the class as if they are a representative of that career.

While the guest speaker is presenting, the audience (the rest of the class) can jot down questions about that career to ask at the end.

When researching the careers, have students think about things like why this job is important to watershed conservation? How does this job help the watershed? What is required to be qualified for this job? What are some interesting things that this job gets to be involved in? What other special facts do you want to share about this job?

# A Poster Is Worth a Thousand Words

Have your class create watershed posters to show what they know. Posters could be done individually or in small groups.

Be creative! Use markers, collage techniques, finger paint, construction paper, tissue paper, glitter, or whatever you want to make your posters interesting. But make sure to make it informative and relevant.



## Poster Subject Ideas:

- ◆ Create half of a poster before you learn about watersheds, and the other half after. The first half could be about what the student thought a watershed is and how it works, and the second half about what they learned. The two halves could be compared and discussed.
- ◆ After learning about watersheds, students could create a poster about what a watershed is and why it is important to be aware of them.
- ◆ Students could create a poster about problems that are unique to their own local watershed, such as pollution, run-off, non-point source pollution problems, etc.
- ◆ A poster could be created about ways to protect our watershed. What practices can be used to prevent run-off, non-point source pollution, point source pollution, and other processes which negatively affect our watershed?
- ◆ Students could create a poster about the businesses, farms, and towns which are included in their own local watershed. Where are they getting their water from? What are some potential problems they can cause?

## What is Your Watershed Address?

This activity encourages students to recognize and explore their watershed by using state or regional road maps that cover enough area to incorporate many rivers and streams. Have students first identify their immediate location and then find and trace all streams (including creeks and rivers) that flow or lead directly into a larger body of water. Have them trace these streams as far back (upstream) as they can. Next have them trace the outer boundary that includes all of these streams. This outer boundary represents their watershed.

For example, in our locale (Baltimore, Maryland) we used a regional road map that included the following states: New York, Pennsylvania, New Jersey, Maryland, Delaware, Virginia, and West Virginia. Students marked Baltimore as their location and then, using a blue highlighter, traced all streams and rivers that flowed into the Chesapeake Bay. Using a green marker they then traced the outer boundary of the streams and rivers. The intent was to show them how the Chesapeake Bay receives water from all of the streams and rivers. The intent was to show them how the Chesapeake Bay receives water from all of these sources and thus is the major watershed of the area.

### **Driving Questions**

1. What does it mean to be part of a watershed?
2. Based on where I live, how would my watershed be defined?

### **Materials**

- State or regional road map
- Highlighters or dry erase markers (black, blue, green, and red; use only low- or non-VOC markers)

### **Procedure**

Have students use the road maps and highlighters or markers as follows:

1. Ask them to use black to mark on the map where they are located.
2. Ask them to use blue to trace all waters (rivers, streams, etc.) that flows into the main body of water.
3. Ask them to use green to trace the outer boundary of all water flowing into the bay.
4. Have a class discussion in which students compare their boundaries (green lines) to the boundary of the actual watershed.
5. If the actual watershed boundary is different from their boundaries, ask the students to use red to trace the correct boundary.

### **Think About**

1. In what direction does water always flow?
2. What does the previous answer tell you about the elevation of river sources?
3. What are the main rivers flowing into your body of water?
4. What are the smaller rivers that flow into these larger ones?
5. What does the pattern of flowing rivers remind you of?
6. What is a watershed?
7. What is our watershed?
8. Where are we located in our watershed?

## Modeling the Water Cycle

This activity uses basic materials to demonstrate condensation and precipitation of the water cycle as well as phase changes of water. The setup is simple yet can lead to other inquiry activities.

### Driving Question

What stages of the water cycle are demonstrated by water of different temperatures?

### Materials

- Three containers, each half-full of water (good containers are clear plastic 2-liter bottles or clear plastic storage containers or jars with screw cap lid):
  1. One has room temperature water (approx. 20°C).
  2. One has hot water from the tap (approx. 40°C). (Use caution when working with hot water from the tap, as it can cause skin burns.)
  3. One has cold water (add a few ice cubes and let them melt, approx. 10°C).
- Indirectly vented chemical splash goggles.

### Procedure

1. Divide the class into groups of no more than three and ask the group to write down observations about changes in the three containers over time on their data sheet.
2. To help them make connections to what they see, ask groups to make illustrations.
3. Have each group share their observations with another group and develop some conclusions about how the containers are different (e.g., one jar has hot water, one jar has condensation on the outside).

### Think About

1. Share observations and illustrations with the whole class and develop some consensus about the containers, their contents, and how the observations relate to the phases of the water cycle.
2. Predict what you would observe if we left these water containers on the table over the weekend.
3. How would your predictions change if we left the water containers outside over the weekend?
4. Think about your car windows in the winter; or the mirror in the bathroom after you take a shower. Think about how you can draw pictures on the window or the mirror. Describe what parts of the water cycle this demonstrates.

Water Temperature	Cold (with some ice cubes melted)	Room Temperature	Hot (hot water from the tap)
Observation after 5 minutes			
Observation after 10 minutes			
Observation after 20 minutes			

# A Bird's Eye View

A watershed is a region that drains into a particular body of water. What is a major water source in your area? Use Google Earth to view your town and determine what water source defines your local watershed. Map out your watershed based on the rivers and lakes that affect your town.

## About your watershed:

- What rivers and lakes make up your watershed?
- Find the source and the mouth of defining rivers in your local watershed.
- Find streams and tributaries which feed into these rivers.
- What geographical features are in your watershed?
- How many towns and cities are in your watershed? How many of these cities and towns also use the same water source as you?
- Where are you located in your watershed?

## One Step Further:

Find the Mississippi River. Where is the source? Where is the mouth? How does the watershed surrounding the source of the Mississippi differ from the watershed at the mouth of the Mississippi?