

K-2 Water Wonders Activity

Overview

Focus Question

Why is water important to living things? Where does water in habitats come from? Where does water in habitats go?

Activity Synopsis

Students will participate in an activity in which they use their senses to explore the properties of water, determine why living things need water to survive and determine how water can collect in habitats for living things to use.

Time Frame

3 days (30-60 minutes per day)

Objectives

The learner will be able to:

- Investigate water using the senses
- Provide verbal descriptions of water
- Communicate that water flows downhill
- Explain that water is important to living things
- Explain that habitats must contain water
- Explain that water in South Carolina flows from the mountains to the sea

Student Key Terms

- habitat
- water

Teacher Key Terms

- biodiversity
- cohesion
- groundwater
- hydrogen bonds
- polar molecules
- polarity
- stomata
- surface tension
- water cycle
- water vapor
- watersheds
- xylem

Standards

South Carolina College- and Career-Ready Science Standards 2021

Kindergarten: K-LS1-1, K-ESS3-1, K-ESS3-3

1st Grade: 1-LS1-1

2nd Grade: 2-PS1-1, 2-LS2-1, **2-ESS2-2**, **2-ESS2-3**, 2-ESS3-1

* **Standards are the main standards addressed in this activity**

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Kindergarten Performance Expectations

K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS3-1 Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-3 Obtain and communicate information to define problems related to human impact on the local environment.

First Grade Performance Expectations

1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Second Grade Performance Expectations

2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties

2-LS2-1 Plan and conduct an investigation to determine what plants need to grow.

2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area.

2-ESS2-3 Obtain information to identify where water is found on Earth and that it can be solid or liquid.

2-ESS3-1 Design solutions to address human impacts on natural resources in the local environment.

Cross Curricular Standards

South Carolina College and Career Standards for Social Studies

K.H.1, K.H.2, K.G.1, K.G.2, K.G.3, K.E.1, 1.G.1, 1.G.4

South Carolina College and Career Standards for Math

K.G.1

South Carolina College and Career Standards for ELA

Inquiry (I) – K-1.1, K-2.1, K-3.1, K-3.2, K-4.1, K-4.2, K-4.3, 1-1.1, 1-2.1, 1-3.1, 1-3.2, 1-4.1, 1-4.2, 1-4.3, 2-1.1, 2-2.1, 2-3.1, 2-3.2, 2-4.1, 2-4.2, 2-4.3

Reading Literacy (RL) – K-6.1, 1-6.1, 2-6.1

Communication (C) – K-1.1, K-1.2, K-1.4, K-1.5, K-5.1, K-5.2, 1-1.1, 1-1.2, 1-1.4, 1-1.5, 1-5.1, 1-5.2, 2-1.1, 2-1.2, 2-1.4, 2-1.5, 2-5.1, 2-5.2

Common Core ELA Standards

Writing – K.1, K.2, K.3, 1.1, 1.2, 1.3, 2.1

Speaking/Listening – K.1, K.2, K.3, 1.1, 1.2, 1.3, 2.1, 2.2, 2.3

Background

Key Points

Key Points will give you the main information you need to teach the activity.

- **Water** is necessary for life. Living things depend on water to help digest and break down food, to keep the body at a constant healthy temperature, to transport nutrients, to carry out wastes and as an ingredient in chemical reactions. Without water, an organism would soon die.
- Because organisms need water to survive, all **habitats** must contain water for organisms to live there.
- South Carolina receives a high amount of rainfall and has abundant water in most parts of the state. The availability of water leads to a great diversity of habitats and organisms in the state.
- All the water in South Carolina flows from the mountains to the sea to eventually empty into the ocean.

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Detailed Information

Detailed Information gives more in-depth background to increase your knowledge, in case you want to expand the activity or you are asked detailed questions.

Without **water**, there would be no life on earth. Single celled organisms and most cells in multicellular organisms need to be submerged in water to survive. The cells are comprised of approximately 70-90% water. Water covers 75% of the Earth's surface as oceans, rivers, streams, lakes, creeks and ponds. Water appears on the planet in solid form as ice sheets, icebergs, sleet, snow, and hail and in its gaseous form as **water vapor**, visible to us as steam. Liquid water is suspended in gas in the form of mist and fog and, in both solid and liquid forms, is suspended in gas in the clouds. Water is the only common substance to exist in the natural environment in all three physical states of matter: liquid, solid and gas.

At first glance, a water molecule is quite simple. It is comprised of one atom of oxygen and two atoms of hydrogen.

An interesting attribute of water is that one side of the molecule carries a positive charge (the side where the hydrogen atoms are located), and one side carries a negative charge (the side where the oxygen atom is located). A molecule that contains opposite charges on opposite sides of itself is called a **polar molecule**. The positively charged hydrogen atoms of one molecule of water are attracted to the negatively charged oxygen atom of a neighboring molecule. The oxygen and hydrogen atoms bond with one another, and these bonds are called **hydrogen bonds**. As a result of hydrogen bonding, water molecules stick together cohesively.

Cohesion of water molecules near the surface of water results in **surface tension**. Surface tension is the resistance the surface of water has to breaking apart and can sometimes give water properties of a solid. Surface tension can be seen when insects, such as water striders, walk across the surface of water or when you jump into a pool flat on your stomach and it initially feels like you landed on a solid. The pain you feel from the belly-flop is caused by surface tension.

Cohesion also enables plants to transport water from the roots to the leaves. Water enters a plant through the roots and is transported up connective tissue, called **xylem**, to the leaves. When leaves open their **stomata** (holes in the leaves) for respiration, water molecules in the xylem are lost in evaporation. These water molecules are attached to other water molecules by cohesion. The evaporating water pulls the attached water molecules, and water molecules in the roots pull new water molecules in the roots from the soil. This process creates a constant flow of water through plants.

Many substances, such as salt and sugar, dissolve in water because they have electrical charges that are attracted to the electrical charges of water molecules. The salt or sugar molecules bond with water molecules and seem to disappear. Water is important in the digestion and transportation of substances around an organism's body. Water, in the blood, carries nutrients to various cells and carries waste out of the body.

Extreme temperature changes can be fatal to most living things. High levels of energy are required to raise water one degree in temperature. High proportions of water in living things keep body temperatures in a limited range conducive for survival. The water retains heat when it is cold outside and resists heating when it is hot outside. If it is too hot, water can be released from the body in the form of sweat for increased cooling. It takes a great deal of heat to turn liquid water into water vapor (539 calories per gram of water). Heat used in the evaporation of sweat is taken from the body and results in a lower body temperature.

Water is also important as an ingredient in chemical reactions. For example, plants produce food during photosynthesis by combining molecules of water and carbon dioxide. Without the energy produced during photosynthesis, most living things could not survive.

Water constantly needs to be replenished because it is used in many different ways by living things. Organisms regularly intake water to replace water lost during life processes. For this reason, living things can only be found in habitats that contain water. Seventy-five percent of the Earth's surface is covered with water with 70% of the surface covered by oceans. Water is abundant to living things that can live in saltwater. Ninety-seven percent of water on earth is saltwater in the oceans. Of the remaining 3% that is freshwater, 2% is found in glaciers and polar caps, more than 0.5% is groundwater, so less than 0.5% of water on earth is freshwater in rivers, streams and lakes. This freshwater can be found in most land habitats on earth in greatly varying degrees of abundance.

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The abundance of water in the **habitat** often will determine the **biodiversity**, amount and variety, of life found in the habitat. For example, the tropical rainforests of the Amazon Basin have much higher biodiversity than the Saharan Desert. Similarly, the well-watered habitats of South Carolina have much higher biodiversity than the arid habitats of Nebraska. The presence of large amounts of water allows a larger variety of living things to flourish.

South Carolina receives a high amount of annual average rainfall ranging from 45 inches a year in the Sandhills to 80 inches a year in parts of the Mountains. Look on a map of South Carolina and you will see that each region contains large bodies of water ranging from mountain streams to rivers to blackwater swamps to salt marshes. The high amount of rainfall helps sustain a high biodiversity in the state.

Rainfall is one part of the **water cycle**, the cycle by which water circulates from the ocean, the land and the atmosphere. The two primary factors driving the water cycle are evaporation (the change from liquid to gas, such as water vapor) and precipitation (rain, sleet, hail and snow). Heat from the sun causes water on earth to warm and evaporate. As it rises, the water vapor cools and forms clouds. Precipitation in the form of rain occurs when water cools and condenses (the transition from water vapor to liquid) around small particles and the water falls to the ground. Precipitation in the form of sleet and snow occurs when water freezes around small particles and the water falls to the ground.

Most precipitation falls into the oceans, where it stays until it evaporates into the atmosphere. Precipitation that falls on land can do several things. Most water that falls on the ground will seep into the soil where it will be collected by plant roots or will become part of the **groundwater**. Groundwater is the water that collects in the spaces between rocks underneath the surface. Groundwater flows slowly towards the ocean and may resurface to feed a stream, swamp or other body of water. Some of the water that falls on land as rain will travel downhill across the land as runoff to join larger bodies of water, such as lakes, streams and ponds.

All water on land is part of a watershed. **Watersheds** are areas of land where all rainfall drains into a particular body of water. South Carolina has 4 major watershed areas: the Savannah River, the Santee River, the Pee Dee River and a collection of small watersheds within the Coastal Plain, which drain into rivers including the Edisto and the Ashley. South Carolina watersheds eventually flow into the ocean because elevation drops as you travel from the mountains to the sea.

Water in watersheds flows through many habitats and all organisms in the habitat depend on it for survival. The planet is unique because of its abundance of liquid water and its abundance of life. It is the presence of liquid water and amazing properties that have allowed life to flourish on Earth.

Procedure

Materials

Session one

- Water
- Clear plastic cups (one per student)
- Spray bottle
- Sugar cubes
- Tray
- Kool-aid powder (red is desirable)
- Waterproof aprons (optional)

Session two

- Water
- Clear plastic cups (one per student)
- Wax paper
- Eye droppers

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Session three

- 3-D topographic map of South Carolina or a physical map of South Carolina
- [Raindrop cut-outs](#)
- River Story by Meredith Hooper; ISBN number 0-7636-0792-4
- [The Raindrops' Journey Song](#)

Procedure

Session One Procedures

1. Give each student a cup of water. Have them observe the water with their senses. How does it look? How does it smell? How does it feel? How does it sound? How does it taste? What color is it? What shape is it? What size is it? Can the size and shape change? Write their observations on a chart in front of the class.

2. People are supposed to drink eight glasses of water every day. Ask students why humans need to drink so much water. Have them think about it and discuss their ideas. Discuss with students how water helps us eat our food (saliva), helps to keep us cool (sweat), helps to carry vitamins and minerals around our bodies (blood) and helps to remove wastes from our bodies (urine).

3. Using their cups of water, have the students conduct some experiments to see what water does for their bodies. Have the students roll up their sleeves, and spray some water on their arms. Have them wait about a minute, and then describe how the water makes their arm feel. Ask them, "Why is it good to sweat when you have been running? How does the water in the sweat help your bodies?"

4. Give each student a sugar cube and have them drop it in their cup of water. Have the students observe what happens to the sugar cube in the water and describe what they observe. Discuss with them how the water helps break the sugar cube up into little pieces and how the saliva in our mouths helps to do the same thing to the food we eat so it is easier for us to chew it.

5. Have the students gather around a table for this demonstration. Set up a tray on the table so it is at an incline. Place a teaspoon of dry red Kool-aid powder near the highest part of the tray. Spray the water on the tray so it flows over the Kool-aid powder and have students observe and describe what happens. Discuss with the students how the water picks up and carries the Kool-aid and how the water in our blood does the same thing with vitamins and minerals, the good stuff in our body, so it can be carried to all parts of our body, and how urine does the same thing with wastes, the bad stuff in our bodies, so it can be carried out of our bodies.

6. Discuss with students whether plants and other animals need water. Ask them if they give water to their pets and houseplants. Discuss with students what these living things might need water for and whether they think all living things need water.

Session Two Procedures

1. Discuss with students whether or not they think that a living thing could survive without water. If a habitat is a place where living things can get the things they need to survive, ask students if it is possible to have a habitat without water. Ask students to name some of the ways that water gets into habitats (rain, streams, rivers, ponds, lakes, marshes, swamps, the ocean, groundwater).

2. Ask students to think about and discuss how raindrops become a lake or river or other body of water that animals can drink from and/or live in. To get them thinking about rain, as a class, create the sounds of a rainstorm. Perform the following motions and rain sounds while the students imitate:

- Rub palms together back and forth (wind)
- Snap fingers slowly then quickly (raindrops)
- Clap hands, not all in the same rhythm (steady, light rain)
- Slap thighs (heavy rain)
- Stomp feet rapidly on the ground (downpour)
- Slap thighs, clap hands, snap fingers quickly and get slower, then rub palms.

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3. After creating the rainstorm, give students a piece of wax paper and a cup of water. Have them put two drops of water on the wax paper with an eyedropper. Ask students to place the two drops of water as close together as possible, without them touching. Ask students to lightly blow the drops together and observe how they are attracted to each other. Ask students to describe how the water drops cannot touch without becoming one large drop. Discuss with students how raindrops come together to form streams and rivers and lakes and other bodies of water that become important habitats for living things.
4. Have students observe and describe what happens to the water when they tilt the paper up at one end (water flows downhill). Ask the students what they think will happen to raindrops falling on top of a hill.
5. Have students lay their hand flat, palm down on the table on top of the wax paper. Tell students to pretend their hand is a hill. Drop raindrops on top of the "hill" by spraying water on the students' hands. Have them observe and describe what happens (water flows downhill and collects to form a large area of water). Discuss with students how the puddles on and around their hand are like the streams and lakes that would form around a hill after a rainstorm and become habitats for many living things.

Session Three Procedures

1. Have students examine a 3-D topographic map of South Carolina placed at the front of the classroom. Explain to the students that blue on the map represents water. Have students trace their fingers along the blue lines on the map to see that water can be found in habitats across South Carolina.
2. Have students determine which part of the state is the highest and which part is the lowest, (the mountains and the coast). Review with students how water flows downhill. Ask students, which way they think the rivers in South Carolina will flow and where do they think the water in the rivers eventually goes (they flow to the Ocean).
3. Give students the cutout of the raindrop, and ask them to place the cutout in the mountain region on the map. Tell them they are going to listen to a story to find out how the raindrop might travel across the state. Read *River Story* by Meredith Hooper. As you read the book, have the students move the raindrop cutout from the mountains to the sea across the South Carolina map to follow the story.
4. Discuss with students how water is constantly flowing across South Carolina and name some of the different habitats it will travel through and some of the living thing that would be found in each of the habitats.
5. Sing the Raindrops Journey song to reinforce what students have learned.

Follow-Up Questions

- Are there any habitats on earth that do not have water? Are there many living things that can be found there?
- If someone throws trash in a stream in the mountains can it eventually end up in the ocean?
- Do we just get water in our bodies by drinking plain water? Do other things we eat and drink have water in them?

At-home Learning and Virtual Modifications

At-home Learning: From home, students could get a cup of water to explore with their 5 senses. They should think about how it feels, tastes, sounds, looks and smells? They can write their answers in a science journal or on a piece of paper. Then they can think about 3 different places they see water and draw them (examples: their bathtub, a pond, rain). Have them imagine a world without water. Then they can draw a picture of how their house/neighborhood would look without water.

Virtual: *Special note* for this activity. This activity includes using water. Have students set up technology away from where they have the water or if you are more comfortable, have this be a watch only activity. It's much more interactive with the students participating, but know your students and what they can handle.

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Ask your students to go get a cup of water. Have them to use their 5 senses to explore the water (give them about 5 minutes). Ask them, how does it feel? Taste? Sound? Smell? Look? Next, have them think about where they see water. Have them draw a picture of one place they see water (5 minutes) and show it to the class. Ask them, why is water everywhere? Why is it so important to us and the earth? From there you can lead the following demonstrations for them to do/watch. Ask them questions along the way.

Water and Us

- *Students do:* Have them use their fingers to splash a little water on their arm. How does it feel? This demonstrates why we sweat, to keep us cool.
- *Students watch:* Put a sugar cube in a small glass of water using a clear cup. Hold the cup up to the webcam so they can watch. What happens over time? This demonstrates our saliva and how it helps us breakdown our food.
- *Students watch:* Put red Kool-Aid on a tray. Spray water on the Kool-Aid in front of the webcam so the students can see the red flow (be sure to have something to catch the dips so you don't get Kool-Aid everywhere). This demonstrated how the blood moves through our body.
- *Students watch:* Can do the same demonstration with yellow Kool-Aid to demonstrate how our bodies get rid of waste (urine).

All of these things can only happen in our bodies have water. Be sure to drink water every day!

Water and the Earth

- *Students do:* Ask them to get a plate as well as a small cup of water. Have them dip their finger in the water and then touch the plate. This will make a bubble of water. Have them do that again close to the other drop, but not touching. Next have them gently blow the first drop into the other drop. What happens? They combine together to make a bigger drop! Explain that this is what happens when it rains. Rain joins with other water to make puddles, ponds, lakes and more.
- *Students do:* Now, have them gently tip the plate at an angle. What happens? The water moves down from high to low. This is how water flows on the earth, higher elevation to lower elevation (Example: a river). Show them a [river map of South Carolina](#) and point out a river near your school/town. Ask them which way the water flows (toward the ocean).
- *Students listen:* If you have it, read them the River Story by Meredith Hooper. Discuss with students how water is constantly flowing across South Carolina and name some of the different habitats it will travel through and some of the living thing that would be found in each of the habitats.

Assessment

Have students tell or write a story about what they think might happen if it stopped raining in South Carolina.

Scoring rubric out of 100 points

Tell that bodies of water, such as rivers and lakes, might disappear:	40 points
Tell that habitats might not have any water in them:	20 point
Tell that all living things will die from lack of water:	40 points

Cross Curricular Extensions

STEM Extension

Challenge students to design an instrument that can measure the amount of rainfall at home or school (rain gauge). They will need some sort of container and a measuring device. Have them mark the measurement lines on the container and record the amount of rainfall over a period of time on a simple graph.

Music Extension

Have the students develop movements to act out The Raindrops Journey Song while they are singing it. Words & Music by Karey Santos.

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Science Extension

Have students examine a drop of pond water under a microscope and then pose the question “What is living and nonliving in the drop of water?” Water is nonliving, but each drop contains living things.

Art Extension

Create rainmakers using toilet paper or paper towel rolls, tape or fabric and rubber bands (to cap the ends of rolls), and materials to place inside the rolls (rice, dried beans, paper clips, etc.). Let students experiment with different materials to produce the most realistic sounding rainmaker. Introduce the art activity by reading Listen to the Rain by Bill Martin, Jr. and John Archambault; ISBN number 0-8050-0682-

English Extension

Read the book Water Dance by Thomas Locker. Before turning to the last page, ask the students “What am I?” (Answer: water). Read the book Rain by Manya Stojic. Discuss which body parts enabled each animal to sense the arrival of a rainstorm. Which sense did each animal use? Which sense can the students use when it is raining?

[Kindergarten Math Extension](#) by SCA Master teacher, Beth Blaskowitz, Blaney Elementary School

Resources

Teacher Reference Books

Audesirk, Gerald and Teresa Audesirk. Biology: Life on Earth, Macmillan Publishing Company, New York, 1993.
This college textbook explains the importance of water to life and the reasons why it has this importance.

Kovacik, Charles F. and John J. Winberry. South Carolina: the Making of a Landscape, University of South Carolina Press, Columbia, 1989.
This wonderful reference book provides information on the abiotic factors that determine the habitats of South Carolina.

Teacher Reference Websites

Project WET: Water Education for Teachers

<http://www.projectwet.org/>

This is the home page for Project WET. Visit this site for on-line information and activities.

South Carolina Department of Health and Environmental Control: Bureau of Water

www.scdhec.net/water

This site offers information on drinking water, water pollution control, watersheds plus much more.

Student Reference Books

Cone, Molly. Come Back, Salmon, Sierra Club Books for Children, San Francisco, 1992.

Learn how the students of Jackson Elementary School in Everett, Washington, cleaned a nearby stream, stocked it with salmon and protected it from pollution.