



<b>Project Title:</b> Be in the Know, Conserve H <sub>2</sub> O!	<b>Grade Level:</b> 3 - 5
<b>Driving Question:</b> How can we improve gardening spaces while using water conservation practices?	
<p><b>Georgia Standards of Excellence:</b></p> <p>S4E3. Obtain, evaluate, and communicate information to demonstrate the water cycle</p> <ul style="list-style-type: none"> <li>• Plan and carry our investigations to observe the flow of energy in water as it changes states from solid (ice) to liquid (water) to gas (water vapor) and changes from gas to liquid to solid.</li> <li>• Develop models to illustrate multiple pathways water may take during the water cycle (evaporation, condensation, and precipitation) (<i>Clarification Statement:</i> Students should understand the water cycle does not follow a single pathway.)</li> </ul> <p>S3E1. Obtain, evaluate, and communicate information about the physical attributes of rocks and soils</p> <ul style="list-style-type: none"> <li>• Make observations of the local environment to construct an explanation of how water and/or wind have made changes to soil and/or rocks over time. (<i>Clarification Statement:</i> Examples could include ripples in dirt on a playground and a hole formed under gutters)</li> </ul>	
<p><b>Georgia Elementary Ag Ed Standards:</b></p> <p><u>AFNR-NRS: Natural Resource Systems:</u> Develop and build an understanding of the area of forestry, environmental and natural resource systems</p> <ul style="list-style-type: none"> <li>• 3NRS1. Examine positive and negative impact of agriculture production on the environment in your region (water, air, soil, plants, insects.)</li> <li>• 3NRS3. Analyze Georgia’s renewable and nonrenewable natural resources</li> <li>• 5NRS2. Describe the benefits and the importance of conservation and recycling of natural resources</li> </ul> <p><u>AFNR-LCR: Leadership and Career Readiness:</u> Develop an understanding of leadership skills and characteristics for career readiness while exploring youth leadership opportunities and careers in agriculture as indicate by the National FFA Organization</p> <ul style="list-style-type: none"> <li>• 3LCR1. Develop and practice soft skills such as public speaking, eye contact, and good citizenship</li> <li>• 3LCR3. Explore careers related to the Forestry &amp; Natural Resources industry such as conservationist, environmentalist, game warden, wildlife management, hunting/fishing guides, forestry/natural resources professor, forestry/natural resources researchers, arborists</li> </ul>	

- 4LCR1. Develop and apply verbal and nonverbal communication skills such as public speaking/presentations

AFNR-FA: Foundations of Agriculture: Explore and communicate the importance of agriculture and its impact on daily life

- 3FA1. Describe how agriculture impacts your daily life

### Guiding Background Knowledge:

#### What is a renewable resource?

**Renewable Resource:** A **renewable resources** is a natural resource that cannot be used up or it is one that can be replaced within a human lifespan. Examples include air, water, soil, plants, and animals.

#### How is water a renewable resource?

Water is considered a renewable resource due to the **water cycle**. The **water cycle** is the path that all water follows as it moves around the Earth in different states. There are three states water can be found in. **Liquid** water is found in oceans, rivers, lakes, and even underground. **Solid ice** is found in glaciers, snow, and at the North and South Poles. **Water vapor** – a gas – is found in Earth’s atmosphere. This process has been happening continuously for millions of years and without it, there would be no life on Earth!

#### What is a water conservation?

**Water conservation** is the practice of using water efficiently to reduce unnecessary water usage. This is important because water is a **limited resource**, as well as costly. Water is a limited resource because the amount available depends on precipitation, the presence of rivers, lakes, and ground water. Water conservation is important because only 3% of the Earth’s water supply is made up of freshwater, with only half of that available for human consumption. With the world’s population increasing daily, farmers need to find a way to grow more food with fewer resources, like water.

One way farmers are conserving water is through updated agricultural methods like irrigation systems. Let’s dive in and learn a little more about those!

#### Video Suggestions:

[Where Does Water Come From?](#) By SciShow Kids

[What is Irrigation?](#) By Monkey See

[What is a Center Pivot?](#) By Valley Irrigation

[Water with 4 H2O Team](#) By UGA Extension

#### Book Suggestions:

[4-H Friends Magazine – Water](#) by UGA Extension

[The Great Big Water Cycle Adventure](#) By Kay Barnham

[Why Should I Save Water?](#) By Jen Green

[Farmer Will Allen and the Growing Table](#) By Jacqueline Briggs Martin

#### Community Partner Suggestions:

[Local Farm Bureau](#)  
[Local UGA Extension Agent](#)  
[USDA Natural Resources Conservation Service](#)  
[Georgia Association of Conservation Districts](#)

**Ask and Expert:** University of Georgia Cooperative Extension

<p><b>Agricultural Career Connections:</b></p> <p>Conservationist          Extension Agent          Teacher          Environmental Scientist          Horticulturist          Garden Coordinator          Farmer</p>	<p><b>Optional Materials and Resources:</b></p> <p><a href="#">Drip Irrigation For Kids!</a></p> <p><a href="#">Build an Irrigation System Activity</a></p>
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<p><b>Lesson Procedures:</b></p> <p><b>Engage:</b>          Students will begin the lesson by forming connections between the growing population on Earth and the need for food production to increase. Ask students what they think is the current population of the world? Approximately 7 billion.</p> <p>Ask students if the population is increasing or decreasing?</p> <p>With the increasing population, farmers need to be able to produce more with less without degrading our natural resources.</p> <p>Ask students what type of resources farmers need to produce our food. As you discuss them, point out that they are limited. (Open space to grow crops and raise livestock, water, arable land). Point out that farmers have become more efficient in previous years using technology. One of the largest advancements in agriculture technology is the use and conservation of water.</p> <p>Introduce the term <b>precision agriculture</b>. Precision agriculture uses different technological instruments to make agriculture more precise and efficient.</p> <p><b>How does the water cycle affect agriculture?</b>          Soil types can affect crop production by providing different amounts of nutrients and water to the plant. A farmer needs to know what kind of soil they have in their field to maximize crop production. The <b>soil type</b> on a farm determines the path the water takes from when it hits the ground until it evaporates. There are different types of soils, including clay, sand, silt (which is excellent for growing plants), and loam (a mixture of different kinds of soils). Clay and sand are not ideal for growing plants, but silt and loam have characteristics that allow plants to thrive.</p> <p><b>How can farmers make sure their crops are getting the right amount of water depending on their soil type?</b>          Farmers use irrigation systems to help make sure all of their crops get the amount of water needed to grow! The University of Georgia can help farmers determine the type of soils they have around their farm as well as what kind of nutrients it needs to produce the most crops possible. Irrigation systems are used by farmers to add water to their fields to help increase farm production. There are many irrigation systems that can be used depending on the types of plants and crops they're growing as well as the size of their field. <b>Center pivot</b> irrigation systems are large sprinklers on wheels that can rotate and water a large field in a short amount of time. Each sprinkler along the pivot can put out a different amount of water. Through technology, farmers can tell the pivot to spray more or less water</p>
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in the fields where necessary. This is an important water conservation practice to help reduce cost and use less resources to produce our food!

Another form of irrigation system is a **drip line**. This can be used by farmers who produce food grown on trees. Pipes or hoses with holes in them drip water onto plants. This is a great way to conserve water because it is usually placed very close to the plant to be used right away. Drip lines are versatile and can even be used in our home gardens!

**Explore:**

Students will explore areas outside that would be ideal for crop production. Keep in mind the things plants need to survive (sunlight, water, nutrient soil). Students should keep in mind which of these resources can be altered and which cannot. For example, the amount of sunlight an area gets is relatively permanent as trees and buildings provide shade during the daytime. The amount of water an area gets can be altered by the soil type and irrigation systems.

Once students have chosen at least two areas they think would grow crops best based on sunlight, have them test the soil type. Check out this [easy experiment](#) to test your soil samples! If the students have soil that is not ideal for planting crops, they can adjust the soil type by adding more sand or clay to the area.

It's also a good idea to test how much water the area is getting using a rain gauge. This will help determine if your plants will get enough water naturally or if an irrigation system needs to be put in place! Check out these easy and [simple irrigation systems](#) that can be used in small gardens.

**Test and Improve:**

Students will use the data they have gathered to decide if their area is ideal for a garden or if adjustments need to be made. Does this area receive enough sunlight? Is the soil getting enough water? Will an irrigation system need to be put in place? Is the soil ideal for holding water and nutrients for the crops? Do we need to add more clay or sand?

Once they have decided on changes that need to be made to improve their garden area, plant some fall crops to grow! A few crops that can be planted from September to October include carrots, cabbage, onions and broccoli.

**Share Results:**

Students will create a video showcasing their garden areas. Have students explain the characteristics that existed prior to the project (sunlight, soil composition, water requirements) and have students explain the changes they made to produce crops more efficiently. Lastly, show us your harvest!

**Reflection:**

- Why is water conservation important to our community?
- What happens if we no longer participate in water conservation practices?
- What are two ways farmers practice water conservation?
- How can we improve water conservation in our homes?

<b>Submission Guidelines:</b>	
<b>Student Presentation:</b> <ul style="list-style-type: none"><li>• A video presentation must include the process of data collection, and overview of the pre-existing garden space, and how it has been modified to fit the needs of crops planted.</li><li>• The video must demonstrate knowledge of what crops need to grow and the relationship between humans and water conservation, particularly in agriculture.</li><li>• The video must incorporate the role of farmers and water conservation methods.</li><li>• Include at least <b>5 photos</b> showing their process throughout the challenge</li></ul>	<b>Rules:</b> <ul style="list-style-type: none"><li>• The video should be no longer than <b>five minutes</b></li><li>• There will be <b>one video submission per class</b></li><li>• Upload the final class presentation to the STEM Challenge portal for judging by <b>November 18, 2022 (link <a href="#">here</a>)</b></li><li>• <b>Final Winner Announcement - Dec 2<sup>nd</sup> @ 1pm</b> (You will receive link via email after you submit <a href="#">here</a>)</li></ul>

If you are having trouble connecting to a community partner, please email [info@georgiaagexperience.org](mailto:info@georgiaagexperience.org)