TN STATE STANDARD 4.ESS2.2

MAURY COUNTY PUBLIC SCHOOLS SUPPLEMENTAL INSTRUCTIONAL RESOURCE

EVERY DROP COUNTS: WATER CONSERVATION IN THE DUCK RIVER WATERSHED

GRADES 4-5

Developed by:
Mackenzie Rosen
spring 2026

In Partnership with:
TDEC and Keep Maury Beautiful.

Every drop counts!

Grade Level:
4th

Subject:
Earth Science

TN standard

4.ESS2.2
(water is a limited reasources)

Time Required:

15-20 minutes

Water is a precious resource, and we are all responsible for conserving it and keeping it clean.

Essential Question:

How does conserving water in the Duck river watershed protect our local environment and community resources?"

Description

This module provides students with a localized understanding of the water cycle and the critical importance of conservation within the Duck River Watershed. Through a visual "scarcity demonstration," students will conceptualize the small percentage of Earth's water that is available for human use.

The lesson connects global environmental issues to the Maury County community, empowering students to close the "intention-action gap" by implementing water-saving habits at home.

Specific Learning Outcomes

- Identify that while Earth is covered in water, only a tiny fraction (less than 1%) is fresh, usable water for humans and animals.
- Describe the importance of the Duck River as a primary source of drinking water and biodiversity for Maury County.
- Quantify water waste (e.g., a running tap wastes approximately 3 gallons per minute).
- Commit to at least three specific conservation actions: turning off the tap while brushing teeth, reporting leaks to adults, and taking shorter showers.

Materials List

- Instructional Media: Every Drop Counts! Slide Presentation
- The Scarcity Model: * 1 Clear Water Bottle (Labeled "Earth's Water") & Medicine cup or bottle cap
- Assessment Tool (optional): * Every Drop Counts Pre/Post-Lesson Survey Handouts.
- Take-Home Resources: * Maury County Water Conservation Info Sheets.
- (Optional) Incentive items (e.g., Jolly Ranchers/candy) to encourage participation.

Essential Question

How does conserving water in the Duck River watershed protect our local environment and community resources?

Narrative & Background Information

Prior Student Knowledge

- **The Water Cycle: Students should have a foundational understanding of evaporation, condensation, and precipitation.**
- **Basic Resource Needs: Students generally understand that all living things (humans and animals) require water to survive.**
- **Local Geography: Most students recognize the Duck River as a local landmark but may not be aware of its role as a utility source.**

Life Experience

- **Daily Usage: Students interact with water daily through hygiene (brushing teeth), hydration, and household chores.**
- **Regional Growth: Students living in Maury County are witnessing rapid local development, which directly impacts the demand on local natural resources like the Duck River.**

Teacher Background Information

- **Standard Alignment: This lesson fulfills TN 4.ESS2.2 by describing freshwater as a limited resource.**
- **The Duck River: It is one of the most biodiverse rivers in North America and serves as the primary drinking water source for over 250,000 people in the region.**
- **The Intention-Action Gap: Research indicates that while students value the environment, they often lack the specific quantitative knowledge (e.g., the 3-gallon-per-minute waste rule) to change their behavior.**

Possible Preconceptions & Misconceptions

- **The "Infinite Water" Myth: Because the Earth is covered in oceans, students often believe water is an infinite resource. The "Scarcity Model" (Bottle vs. Cap) is designed to correct this by showing that less than 1% is usable freshwater.**
- **Source Misconception: Many students assume water is "created" at a treatment plant rather than pulled from a local natural watershed like the Duck River.**
- **Impact Skepticism: Individual students may feel their personal habits (like turning off the tap) are too small to make a difference. This lesson quantifies that impact to show immediate results.**

Water Bottle Demo: Instructions

Purpose

To provide a visual, concrete representation of water as a limited resource (TN Standard 4.ESS2.2). This demonstration corrects the common misconception that Earth has an infinite supply of usable water.

Materials Needed

- 1 Clear Water Bottle: Standard 16.9 oz size (labeled "Earth's Total Water").
- 1 Medicine Cup or Bottle Cap: (labeled "Usable Freshwater").
- Water: Filled to the very top of the 16.9 oz bottle.

Water Bottle Demo

- You take a full water bottle - labeled the earths water
- Show and tell the kids imagine this is all the earths water
- Then you ask how much of this water do you think we can drink/use: half of the bottle, quarter, all the bottle, etc.
- Pour a small amount into a medicine cup and show them, this is the amount were able to use for everything we do/ use water for
- Tell them more than half the bottle is salt water (which we can't drink), the rest of the water is fresh water but it is in the ice caps, polluted, underground, or we just can not get to it. Which leaves us with this small cap of water.

The "Recipe" for Success

- The Ocean Comparison: Hold up the full 16.9 oz bottle. Explain to students that if this bottle represents every drop of water on the planet, about 97% is salt water in our oceans.
- The Frozen Fraction: Explain that another 2% is locked away in glaciers and ice caps.
- The Pour: Carefully pour water into the medicine cup or bottle cap until it is about half full.
- The Reveal: Hold up the tiny cup. Tell the students: "This represents the less than 1% of freshwater that is actually available for the 250,000+ people in our region and all the animals in the Duck River."

Guiding Questions for Students

- Does the amount of water we can actually use look like a lot or a little compared to the whole Earth?
- If our "cup" of water has to be shared with more people moving to Maury County, what happens if we waste it?
- How does seeing this change how you feel about leaving the sink running?

Lesson Plan

Engage

Guiding Questions: * How did you use water today before coming to school?

- Where do you think that water goes once it disappears down the drain?

Teacher Script: * Introduce the "Intention-Action Gap", the difference between wanting to save the Earth and knowing the specific steps to take at home.

- Activity: Distribute the Pre-Lesson Survey to gauge initial awareness of local water sources.

Explore

The Water Bottle Demo "Recipe": (Refer to page 3 for instructions)

- Materials: 1 Clear 16.9oz water bottle, 1 medicine cup/bottle cap.
- Action: Hold the full bottle (Total Earth Water) and pour one cap-full into the small cup (Usable Freshwater).

Guiding Questions:
* Looking at this bottle, how much of it do you think is "fresh" water we can actually drink?

- Why is it a problem if most of our water is salt water or frozen?
- Do you think this is enough water for the needs of 8 billion people?

Vocabulary from Slides: * Freshwater: Water that contains minimal amounts of dissolved salts.

- Limited Resource: A resource that has a fixed amount and can be depleted.

Lesson Plan

Explain

Guiding Questions:

- Did you know your drinking water comes from a river right here in Maury County?
- What does "Biodiversity" mean for our local river?

Vocab Focus:

- Duck River Watershed: The area of land that drains into the Duck River; our local water source.
- Biodiversity: The variety of different living things in an environment.
- Conservation: The act of protecting and preserving our natural resources
- Limited: A small amount of a resource

Elaborate

Guiding Questions:

- If a running tap wastes 3 gallons every minute, how many gallons are lost during a 2-minute tooth brushing session?
- What are three things you can change at home tonight to protect the Duck River?

The 3-Gallon Rule:

- Emphasize that a running tap wastes approximately 3 gallons per minute.
- Action Steps:

1. Turn off the tap while brushing.
2. Report leaks.
3. Take shorter showers.

- The Call-and-Response: Lead the class motto: "Drinking Water is Limited so Every Drop Counts!" (repeat together throughout lesson)

Evaluate

Guiding Questions: * Can you explain why freshwater is a "limited resource"?

- How does your action at home help the Duck River?

Activity: * Complete the Post-Lesson Survey.

- Impact Note: In the Woodard Elementary pilot, this lesson led to a 98% mastery rate on the core concept that water is a limited resource.

Lesson Plan: Instructor Section

Teacher Background Information

The "Intention-Action Gap"

Research in environmental education suggests that many students experience an "Intention-Action Gap". While 4th graders generally express a desire to protect the environment (intention), they often lack the specific, quantifiable knowledge required to change their daily habits (action). This lesson bridges that gap by connecting the global reality of water scarcity to local, actionable conservation steps.

The Duck River: A Global Biodiversity Hotspot

The Duck River is not just a local landmark; it is the most biodiverse river in North America.

- Biodiversity Defined: The variety of different living species in a specific habitat.
- Species Count: The river is home to over 50 species of freshwater mussels and 150 species of fish.
- Rare Life: Many species in the Duck River are found nowhere else on Earth.
- Human Connection: The river serves as the primary drinking water source for over 250,000 people in the region. When we conserve water, we ensure enough remains in the river to support both the human population and these rare aquatic species.

Freshwater as a Limited Resource (Standard 4.ESS2.2)

While Earth is often called the "Water Planet," the vast majority of that water is unusable for land-based life.

- Salt Water: Approximately 97% of Earth's water is in the oceans and too salty to drink.
- Frozen Water: About 2% is locked in glaciers and polar ice caps.
- The "Cap-Full": Less than 1% of all water on Earth is freshwater available for humans, plants, and animals. The "Scarcity Model" (Water Bottle Demo) is a visual metaphor for this critical scientific fact.

The "3-Gallon Rule"

The most effective way for a student to visualize water waste is the 3-gallon rule.

- A standard bathroom faucet flows at a rate of approximately 3 gallons per minute.
- By simply turning the tap off while brushing their teeth (an average of 2 minutes), a student can save 6 gallons of water a day.
- Over a year, one student can save over 2,000 gallons of water, directly reducing the demand on the Duck River Watershed.

The Impact Report

PILOT STUDY IMPACT REPORT

Location

J.E. Woodard Elementary School

Facilitator:

Mackenzie Rosen

Date(s)

- 2/9/2026
- 2/10/2026
- 2/11/2026

Details

Day One: 22 students
Day Two: 41 students
Day Three: 48 students

Students will understand that fresh water is limited and identify simple ways they can help conserve water at home and at school

Material(s) Used

- Instructional Media: Every Drop Counts! Slide Presentation
- The Scarcity Model: * 1 Clear Water Bottle (Labeled "Earth's Water") & Medicine cup
- Assessment Tool : * Every Drop Counts Pre/Post-Lesson Survey Handouts.
- Take-Home Resources: * Maury County Water Conservation Info Sheets.
- Incentive items (e.g., Jolly Ranchers/candy) to encourage participation.

Pilot Results (February 2026)

- Total Students: 111 students across 3 days

Pre-Lesson Data

- Initial survey showed 98% of kids did not know the meaning of conservation.
- 84% of the students knew the earth doesn't have unlimited clean water before lesson, but 15% didn't know
- Overall classes displayed little to no environmental awareness.

Post-Lesson Data

- Post survey showed that 99% of students knew the meaning of water conservation after the lesson, 1% were N/A due to the lack of being table to read there answer or no response.
- 98% of students could say why it is important to save water because water is limited! , 1% were N/A due to the lack of being table to read there answer or no response.
- Overall class responded positively when asked if they would help do their part to save water ,and showed growth in environmental awareness after lesson.

Resources

Supporting Materials for Educators and Students

For the Teacher: Professional Context & Deep Dives

- The Nature Conservancy: The Duck River Learn about why this river is considered one of the most significant conservation priorities in the world.
    - Link: nature.org/duckriver
- TDEC: Division of Water Resources Official data on Tennessee's water quality and watershed management.
    - Link: tn.gov/environment/water
- Keep Maury Beautiful Local resources for community involvement and environmental education in Maury County.
    - Link: keepmaurybeautiful.com

Recommended Videos for the Classroom

1. The Duck River: A Hidden Treasure (3-5 Minutes)
    - Best for: Explain or Elaborate stages.
    - Content: Visuals of the rare mussels and fish species that make the Duck River "biodiverse."
    - Search Recommendation: Look for "Duck River Biodiversity" on YouTube or Tennessee Wildlife Resources Agency (TWRA) channels.

2. Why is Freshwater Limited? (2-3 Minutes)
    - Best for: Explore stage (pairs well with the Water Bottle Demo).
    - Content: Animated explanation of the global water cycle and the tiny percentage of usable water on Earth.
    - Search Recommendation: "NASA: The Water Cycle" or "National Geographic: Freshwater Scarcity."

Student-Friendly Discovery Tools

- The "Water Footprint" Calculator
- A fun, interactive tool where students can calculate how many gallons their family uses daily.
    - Link: watercalculator.org
- Duck River Interactive Map Explore the watershed boundaries of Maury County.
    - Link: duckriverwatershed.org

Survey Template

Pre-Lesson Questions

What's conservation (its OK to put "I don't know" for this question)?

True or False: We have unlimited clean water on Earth. ☐ True ☐ False

Name two ways people use water every day.

Post-Lesson Questions

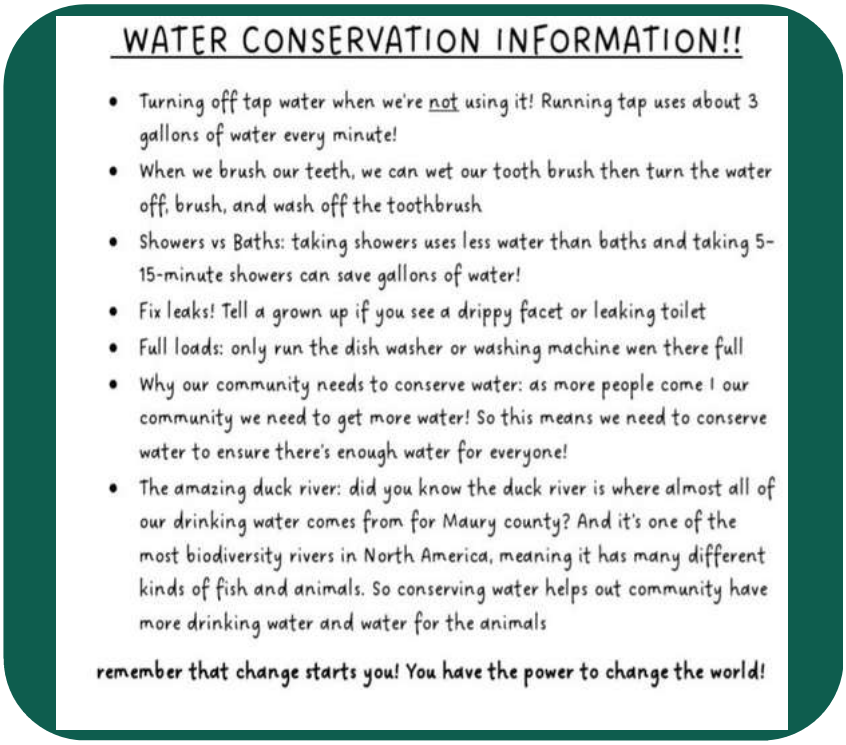
What's water conservation?

Why is it important to save water?

Name two way you can save water!

Will you help conserve water?

Regular Layout- Take Home Info sheet



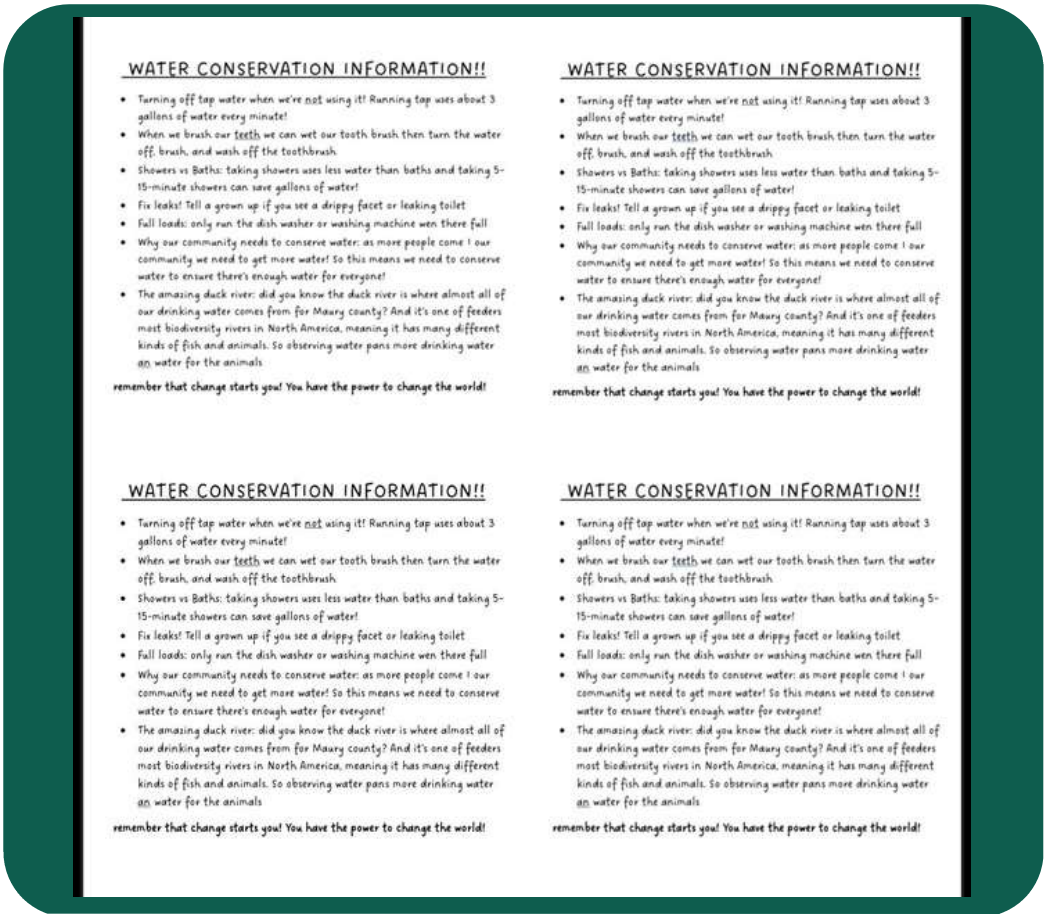
WATER CONSERVATION INFORMATION!!

- Turning off tap water when we're not using it! Running tap uses about 3 gallons of water every minute!
- When we brush our teeth, we can wet our tooth brush then turn the water off, brush, and wash off the toothbrush
- Showers vs Baths: taking showers uses less water than baths and taking 5-15-minute showers can save gallons of water!
- Fix leaks! Tell a grown up if you see a drippy facet or leaking toilet
- Full loads: only run the dish washer or washing machine wen there full
- Why our community needs to conserve water: as more people come ! our community we need to get more water! So this means we need to conserve water to ensure there's enough water for everyone!
- The amazing duck river: did you know the duck river is where almost all of our drinking water comes from for Maury county? And it's one of the most biodiversity rivers in North America, meaning it has many different kinds of fish and animals. So conserving water helps out community have more drinking water and water for the animals

remember that change starts you! You have the power to change the world!

Print Layout- Take Home Info sheet

(colorful cardstock is recommended)



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