



## We're Water Aware

**Suggested Grade Level:** 3-5

**Time:** 60 minutes, four activities, can be divided into two class sessions

**Subject:** Science, Earth's Systems (Water Cycle), Ecosystems, English Language Arts, Informational Reading, Speaking and Learning, Agriculture, Stewardship, Soil and Water Conservation

**Overview:** This lesson examines the significance of water as a limited natural resource, focusing on its movement through the water cycle, its role in supporting agriculture, and its vital contribution to sustaining ecosystems. Students will learn that less than 1% of Earth's water is available for human and animal use, with much of Kansas relying on groundwater from aquifers, such as the Ogallala. The role of wetlands in filtering water, supporting wildlife, and offering recreational value will also be discussed. Through hands-on activities and demonstrations, students will gain an understanding of why water conservation is essential for our environment and future.

### Objectives:

1. Describe Earth's water (hydrologic) cycle.
2. Explain why water conservation is vital to farmers.
3. List at least five ways humans and animals depend on water.
4. Identify at least five ways bodies of water can become polluted.

### Background Information:

The Earth has a limited amount of water. Although water covers nearly 70% of the Earth's surface, less than 3% is freshwater, and a significant portion of that is frozen in glaciers and polar ice caps. Freshwater is critical to human survival, so protecting the quality of groundwater and surface water resources is essential. Water first reaches the Earth as precipitation (rain, snow, sleet, or hail), ends up in lakes, ponds, or streams, or seeps into the ground for storage. Groundwater storage areas are known as aquifers. There is no definable start or finish to this water cycle. Water evaporates from the oceans, forms clouds that precipitate back to Earth, and begins to evaporate again. It is a continuous process. Water that evaporates from the ocean and falls over land may evaporate, precipitate, become runoff, and condense multiple times before it returns to the ocean. Agriculture places great demands on freshwater around the world. Farmers use approximately 138.92 billion gallons of water daily globally for irrigation, livestock care, and aquaculture. As the world's population grows, conserving water becomes increasingly essential to ensure we have enough to produce food for everyone (Kansas Foundation Water).

Wetlands are transition areas between terrestrial (land) and aquatic ecosystems. A wetland has standing water or wet soils during at least part of the growing season of most years. These wet conditions hinder the growth of plants that are not adapted to wet conditions. Wetlands provide significant ecological, economic, and social benefits. They provide many environmental functions that would be costly and difficult to replicate with artificial systems. Many wetlands generate income through products harvested there, such as hay or timber, or by collecting fees from visitors. Wetlands provide habitats for hunting, fishing, bird-watching, photography, and other recreational activities. Wetlands provide habitat for one-half of the fish, one-third of the birds, one-fourth of the plants, and one-sixth of the mammals on the United States' Threatened and Endangered Species lists (Kansas Foundation Wetlands).

### **Kansas Connections:**

*Kansas' Water* - In Kansas, approximately 90% of the water we use comes from aquifers, which are underground layers of water-bearing rock or sediment. These aquifers act as natural storage tanks, supplying water for homes, farms, and industries. The remaining 10% comes from surface water sources, including reservoirs, ponds, lakes, and streams. The Ogallala-High Plains Aquifer in western Kansas is the largest groundwater source in the state and one of the largest in the world. It plays a critical role in supporting agriculture, especially in regions with limited rainfall. In Kansas, 85% of water usage is for irrigation. Irrigation helps farmers manage drought risk and maintain consistent yields, especially in semi-arid regions. The remaining 10% of water use is municipal, serving homes, schools, and businesses (Kansas Foundation Kids). By using water more efficiently, we can reduce waste, protect water quality, and ensure there's enough for future generations.

*Kansas Wetlands* - Wetlands are vital ecosystems that benefit both wildlife and humans. They provide homes for many animals and plants, including birds, fish, and mammals that are endangered. Wetlands also help people by improving water quality, reducing flooding, and providing places for outdoor activities such as birdwatching and fishing. Over 90 percent of the wetlands in Kansas are found on private property, while state and federal agencies own or manage 28,766 acres. There are four main types of wetlands located in Kansas:

- Forested wetlands – also known as riparian forests- are generally located in temporarily flooded areas or shallow depressions that provide water to support tree species.
- Shallow freshwater marshes –found in distinct depressions or around the perimeter of deep water; soils are saturated, and there is usually standing water for extended periods.
- Flooded basins – also called playa lakes; naturally occurring shallow depressions or sinkholes that hold water during wet years but may be dry at other times.
- Wet meadows – lowland prairies that do not drain well; soils stay saturated even though standing water is only present for short periods.



Kansas wetlands are internationally recognized as a vital component of our environment. Cheyenne Bottoms, including both the state-owned Cheyenne Bottoms Wildlife Area and The Nature Conservancy's Cheyenne Bottoms Preserve, was designated as a Wetland of International Importance in 1988. It was the first non-federal area in the United States to receive this recognition. Then, in 2002, Quivira National Wildlife Refuge was designated as a Wetland of International Importance.

Protecting Kansas' wetlands requires teamwork and long-term commitment. Restoring them is costly and complex, so landowners and agencies must continue to work together to ensure these valuable ecosystems remain part of Kansas's future (Kansas Foundation Wetlands).

### **Materials:**

#### *Activity 1: Apple Demonstration*

- Photos of water usage in agriculture (optional):  
[https://cdn.agclassroom.org/media/uploads/lp225/Water\\_in\\_Agriculture\\_Pictures.pdf](https://cdn.agclassroom.org/media/uploads/lp225/Water_in_Agriculture_Pictures.pdf)
- Apple
- Knife

#### *Activity 2: Awesome Aqua*

- Kansas Kids Connection magazine: "Awesome Aqua: What to Know About H2O" <https://ksagclassroom.org/resource-center/connection/>. Ideally, provide one per student or one per group as needed.

#### *Activity 3: Where Does Water Come From?*

- Copy of water cycle: (optional)  
<https://cdn.agclassroom.org/media/uploads/lp225/watercycleinacup.png>

#### *Activity 4: Water Pollution Demonstration*

- A clear plastic tub big enough to hold several gallons of water (a clear plastic storage container would work well)
- Enough clean water to fill the plastic wash tub 3/4 full; one gallon separate
- A bottle cap
- Slotted spoon
- Spoon
- Tongs
- Other tools useful for moving small items
- Laundry soap
- Salt
- Vegetable oil
- Small pieces of paper
- Small pieces of trash and food
- Food coloring
- Rocks and soil
- Towels



**Instructional Format:**

1. Review Background Information and Kansas Connections.
2. Conduct engagement exercise.
3. Complete Activity 1: Apple Demonstration.
4. Complete Activity 2: Awesome Aqua.
5. Complete Activity 3: Where Does Water Come From?
6. Complete Activity 4: Water Pollution.
7. Conduct assessment exercise(s).

**Engagement:**

To begin the lesson, review background information. Say, "Raise your hand if you can name three things we need to stay alive." Hopefully, they will include oxygen, food, and water. Explain that this lesson will focus on learning about (or reviewing) one of these essentials: water, including where the water we use comes from. Then, say: "Raise your hand and name some ways we use water." Write answers on a smartboard or a list that all students can see. After discussing the popular answers, such as drinking, cooking, or watering plants, prompt students to add to the list. Provide hints or display the pictures below to guide the class's answers. Your students' answers should include birds, animals that live in water, crops grown in water, food items produced in water, laundry, cleaning, and recreational activities such as fishing, boating, skiing, and canoeing. After showing your students the slideshow, ask: "Why is conserving and taking care of our water important?" Answer: because it is a limited natural resource. After getting students' answers, proceed to the apple demo below. Photos of water used in agriculture (examples):

[https://cdn.agclassroom.org/media/uploads/lp225/Water\\_in\\_Agriculture\\_Pictures.pdf](https://cdn.agclassroom.org/media/uploads/lp225/Water_in_Agriculture_Pictures.pdf)

**Procedures:***Activity 1: Apple Demonstration*

Watching this video of a teacher doing an apple demonstration to represent the Earth's usable water ahead of time may be helpful. There are numerous "Apple Earth" demonstrations online, but they often use an apple as a model to demonstrate the available farmland. This demonstration illustrates the percentage of the Earth's water that is drinkable (potable) and available for human and animal use.

SMARTERTEACHER: Earth - Apple Analogy

<https://www.youtube.com/watch?v=S8cD4M9Ayq4> (2:38)

1. Using an apple, cut pieces to demonstrate that about  $\frac{3}{4}$  of the Earth is water. Cut the apple into quarters and remove one quarter. This single quarter represents the land on Earth. The remaining 3 quarters represent the Earth's water. Explain that only a small portion of Earth's water is drinkable by humans. This includes the water used for feeding animals, watering crops, cooking, cleaning, etc., and drinking.
2. Remove two more of the apple quarters.
3. Cut the flesh from just one of the apple quarters out of the remaining quarter, leaving the skin and a little of the flesh as shown in the video clip. Explain that



from the entire apple (Earth), just this small thin slice represents the 3% of fresh water (not salt water).

4. Now divide this thin apple piece into thirds. Take away two-thirds of these. These represent 2% of the freshwater locked in glaciers at the North and South Poles. This leaves the final 1% of the Earth's fresh, potable water available for safe use by animals and humans.
5. Show students the whole cut-up apple and explain just how little water we can use on Earth. This is why it is so vital that we take care of the water that we have. Refer to the fourth lesson segment for information on how farmers care for the Earth's available water.

#### *Activity 2: Awesome Aqua*

1. Read the Kids Connection Awesome Aqua magazine (link listed in Materials) in small groups or as a class, according to the teacher's preference.
2. Use various instructional strategies, such as popcorn reading, pair/share, partners, etc., to cover the material.

#### *Activity 3: Where Does Water Come From?*

1. Show the class this 4-minute video to review the water cycle presented in the magazine. Scishow Kids: Where Does Water Come From  
<https://www.youtube.com/watch?v=R0K7VKkksyc>
2. After watching, discuss/review vocabulary words below and check for understanding. Refer to the diagram on page 1 of the Kids Connection magazine and the vocabulary words in this lesson, listed below.  
**Precipitation → Infiltration → Transpiration, Evaporation → Condensation → back to Precipitation.**
3. Have students create simple sketches, diagrams, or flowcharts that demonstrate their understanding of the water cycle. Example:  
<https://cdn.agclassroom.org/media/uploads/lp225/watercycleinacup.png>

#### *Activity 4: Water Pollution*

##### *Discussion*

1. Explain that although farmers use lots of water to provide food for the world, they also take very good care of the available water. Water conservation and stewardship of this natural resource are crucial to maintaining clean water for future generations. Water is essential for growing the world's food.
2. Discuss, as a class or in groups, ways that farmers conserve/care for water.  
Examples:
  - Using drip irrigation results in less evaporation compared to spray irrigation.
  - Building ponds to capture and store rainwater, relying less on groundwater.
  - Avoid under- or over-watering by monitoring weather forecasts.
  - Create less evaporation by watering at night.
  - Researching and planting drought-resistant species of crops.



- Rotational grazing, which is a process in which livestock are moved between fields to help promote pasture regrowth. Good grazing management increases the fields' water absorption and decreases water runoff, making pastures more drought-resistant. Increased soil organic matter and better forage cover are water-saving benefits of rotational grazing.
  - Compost, or decomposed organic matter used as fertilizer, has been found to improve soil structure, increasing its water-holding capacity. Mulch is a material spread on top of the soil to conserve moisture and prevent evaporation.
  - Cover crops protect the soil that would otherwise go bare; they reduce weeds, increase soil fertility and organic matter, and help prevent erosion and compaction. This allows water to penetrate the soil.
  - Conservation tillage, which utilizes specialized plows or implements that partially till the soil, leaving at least 30 percent of vegetative crop residue on the surface. Like the use of cover crops, such practices help increase water absorption and reduce evaporation, erosion, and compaction.
  - Minimizing pollution of bodies of water.
3. Ask: What can YOU do to care for our water? Answers may include taking shorter showers, etc., as referenced in the magazine; steer the discussion to keeping our water clean.

### *Activity*

1. Fill a clear washtub with water and place it in the center of the classroom. Have students circle the washtub, and tell them a story, starting with the tub representing a crystal clear, clean lake. The fish in the lake are happy, humans can swim in it, and mammals can drink from it. However, people keep coming to the lake and polluting it! We are very dependent on the water from this lake. What might we need it for? Farmers who farm close to the lake rely on it as well. Why might they need it?
2. Set out the salt, food coloring, paper, trash pieces, vegetable oil, soil, rocks, and laundry soap. Have students choose an item, add it to the washtub, and tell the story that matches it:
  - **Vegetable oil:** (Student who chose the item) works as a mechanic in the car repair shop. He spends a lot of time changing the oil in cars, which results in a lot of used engine oil. Properly disposing of the oil is costly, so he dumps it in the lake instead. Is this good for the lake?
  - **Salt:** Let's pretend this salt represents fertilizers used on golf courses, lawns, and farm fields. They are useful for helping grasses grow, but sometimes they can travel through the soil and end up in water, like our lake.
  - **Food coloring:** Chemicals are widely used in America. We use them for various purposes, but primarily to control insects and weeds on our lawns, golf courses, and farm fields. Like fertilizers, these chemicals can travel through the soil and into our water, such as lakes.

- **Laundry soap:** (Student who chose the item) owns a laundromat beside the lake. Sometimes, soaps and suds leftover from her washing machines drain into the lake.
  - **Trash:** A family comes to the lakeshore for a nice picnic, but it's a blustery day. The wind blows the garbage from their picnic into the water.
  - **Paper:** while driving by the lake (student who chose the item) had their windows down. A gust of wind blew several store receipts and a letter into the lake.
  - **Soil and rocks:** Soil is the most significant source of pollution in our water. (Student who picked the item) lives close to the lake. They recently removed the trees and shrubs bordering the lake, so the exposed soil runs into the lake when it rains! This can clog fish gills, stop underwater plants from photosynthesizing, and smother smaller water-dwelling creatures.
1. Have students examine the washtub in its polluted state. Ask students if they think the water can still be used for drinking, swimming, and living. Why might the water not be healthy anymore? How would this impact the community and the farmers around the lake?
  2. Have students take turns using a utensil, such as a slotted spoon or tongs, to try to remove pollution from the lake. Students will notice that larger items are easily cleared away, but some can't be removed from the water. That's why taking care of the water before it becomes polluted is essential!
  3. Optional companion activity: List food products from the grocery store that come from aquatic sources. Have students visit an actual grocery store on a field trip or bring in pictures of food items that are grown in water.

### Vocabulary:

- **Aquifer:** an underground layer of water-bearing rock, gravel, sand, or silt.
- **Condensation** occurs when water vapor cools and forms clouds, which carry the water to a different location and release it in the form of precipitation.
- **Conservation:** the preservation, protection, restoration, control, and management of a natural resource.
- **Evaporation:** occurs when water is heated and turns into water vapor or when plants use water and lose water vapor through tiny surface pores (transpiration, below).
- **Transpiration:** when plants use water and lose water vapor through extremely small surface pores.
- **Hydro:** from the ancient Greek prefix meaning "water."
- **Hydrologic cycle:** the continuous circulation of water around, over, and through the earth; also known as the water cycle.
- **Hydrosphere:** portion of the Earth's surface that is water; includes atmosphere and underground aquifers.
- **Infiltration:** the process by which water is absorbed into the soil to become groundwater or flows off the surface of the land, in which case it is called runoff.

- **Natural resource:** something that exists without any actions of mankind, such as sunlight, atmosphere, water, land, minerals, vegetation, animal life; can be renewable or nonrenewable.
- **Precipitation:** the falling of water in any form (i.e., rain, hail, or snow) to the Earth's surface.
- **Wetlands:** transition areas that lie between terrestrial (land) and aquatic ecosystems. A wetland has standing water or wet soils during at least part of the growing season of most years. (source: Educator's Guide, KFAC; unit 6, Water Overview)

## **Kansas Standards:**

### ***Next Generation Science Standards***

#### 3rd Grade

##### *Interdependent Relationships in Ecosystems*

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

##### *Weather and Climate*

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

#### 4th Grade

##### *Earth's Systems: Processes that Shape the Earth*

4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

#### 5th Grade

##### *Matter and Energy in Organisms and Ecosystems*

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

##### *Earth's Systems*

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

## ***Language Arts***

#### 3rd Grade

##### *Reading: Foundational*

RF.3.4 Read with sufficient accuracy and fluency to support comprehension.

##### *Reading: Informational*

##### *Key Ideas and Details*

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts or steps in technical procedures in a text, using language that pertains to time, sequence and cause/effect.

##### *Craft and Structure*



RI.3.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a third grade topic or subject area.

Integration of Knowledge and Ideas

RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why and how key events occur).

Speaking and Learning

Comprehension and Collaboration

SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on third grade topics and texts, building on others' ideas and expressing their own clearly.

SL.3.2 Determine the main ideas and supporting details of a text read aloud or

information presented in diverse media and formats, including visually, quantitatively and orally.

SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

#### 4th Grade

Reading: Foundational

Fluency

RF.4.4 Read with sufficient accuracy and fluency to support comprehension.

Reading: Informational

Key Ideas and Details

RI.4.3 Explain events, procedures, ideas or concepts in a historical, scientific or technical text, including what happened and why, based on specific information in the text.

Craft and Structure

RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a fourth grade topic or subject area.

Speaking and Learning

Comprehension and Collaboration

SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on fourth grade topics and texts, building on others' ideas and expressing their own clearly.

SL.4.2 Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively and orally.

#### 5th Grade

Reading: Foundational

RF.5.4 Read with sufficient accuracy and fluency to support comprehension.

Reading: Informational

Key Ideas and Details

RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas or concepts in a historical, scientific or technical text based on specific information in the text.

Craft and Structure

RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a fifth grade topic or subject area.

Speaking and Learning

Comprehension and Collaboration

SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on fifth grade topics and texts, building on others' ideas and expressing their own clearly.

SL.5.2 Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively and orally.

#### **National Ag Literacy Standards:**



### ***Agriculture and the Environment***

- Identify land and water conservation methods used in farming systems (wind barriers, conservation tillage, laser leveling, GPS planting, etc.) (T1.3-5c.)
- Recognize the natural resources used in agricultural practices to produce food, feed, clothing, landscaping plants, and fuel (e.g., soil, water, air, plants, animals, and minerals) (T1.3-5.e)

### ***Plants and Animals for Food, Fiber, and Energy***

- Distinguish between renewable and non-renewable resources used in the production of food, feed, fuel, fiber (fabric or clothing) and shelter (T2.3-5.b)
- Understand the concept of stewardship and identify ways farmers/ranchers care for soil, water, plants, and animals (T2.3-5.e)

### **Supporting Resources:**

National Agriculture in the Classroom: “Water Supply” written by Debra Spielmaker.  
<https://www.agclassroom.org/matrix/lesson/225/>

“Water: Sources, Use, Conservation” by Nancy Carlson.

<https://www.agfoundation.org/recommended-pubs/water.-sources.-use.-conservation>

### **Career Information: Natural Resource Officer**

In 1987, KDWP's certified law enforcement officers, formerly known as game wardens or game protectors, were renamed natural resource officers. What does a natural resource officer do? They enforce laws and educate the public about natural resources, including wildlife and *waterways*. The natural resource officer role is both physically and mentally challenging—officers who work at the state level may have a jurisdiction that matches the boundaries of their nearest protected wildlife area and wetlands. In contrast, federal employees may manage an even larger state or national reserve region. A natural resource officer's job duties are incredibly diverse. They could include providing court testimony for criminal offenses, performing search and rescue missions for persons missing in the area, tracking population data for fish, birds, and wildlife, and educating the public about wildlife conservation efforts. Game wardens are passionate about the outdoors and should be dedicated to protecting our natural resources.

### **Assessment:**

- "Walk the Room": Vocabulary words and definitions at different stations around the room. Have students find the match.
- Exit ticket ideas: Explain one step in the water cycle, list three things that can pollute water sources, or explain two ways people or animals use water.
- In Lesson Segment 2, ask students to create simple sketches, diagrams, or flowcharts that demonstrate their understanding of the water cycle.

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