

Conservation in the Classroom



Where Does the Water Go? Exploring Watersheds and Conservation

Grade Levels: 9-12

Duration: 50 minutes

OBJECTIVES

By the end of this lesson, students will:

1. Define a watershed and identify its major components.
2. Explain how agricultural practices affect watershed health.
3. Describe at least two conservation strategies used to protect watersheds.

MATERIALS

- Watersheds and Conservation Slideshow
- Computers or tablets with internet access (one per student or pair)
- Access to the Model My Watershed – Runoff Simulation
- Student worksheets: Graphic Organizer Part 1, Graphic Organizer Part 2, Scenario Activity, and Rubric

NEXT GENERATION SCIENCE STANDARDS (NGSS)

- Earth & Space Science: HS-ESS2-5, HS-ESS2-6, HS-ESS3-1, HS-ESS3-4
- Life Science: HS-LS2-6, HS-LS2-7
- Engineering Design: HS-ETS1-2, HS-ETS1-3

ILLINOIS STATE LEARNING STANDARDS

- Reading Informational Text (RI): RI.9-10.1, RI.9-10.4
- Writing (W): W.9-10.2, W.9-10.8
- Speaking and Listening (SL): SL.9-10.1, SL.9-10.4
- Language (L): L.9-10.1, L.9-10.6

AFNR CAREER CLUSTER CONTENT STANDARDS

- Environmental Sustainability Systems: ESS.01.01, ESS.03.02, ESS.04.01
- Foundational Pathway Skills: FPS.01.01., FPS.04.01., FPS.06.01.
- Natural Resource Systems: NRS.01.01., NRS.01.02., NRS.01.04., NRS.01.05., NRS.01.06., NRS.02.02., NRS.02.04., NRS.04.01., NRS.04.03.

Lesson Outline



INTRODUCTION (5 MINUTES)

Show slide #2 from the PowerPoint presentation.

Ask *“Imagine a big rainstorm just happened. Look at the photo. Where do you think the rainwater goes after it hits the ground?”*

- Give students 30 seconds to quietly think, then write a quick answer or sketch arrows to show where water goes (on a sticky note or in their notebooks).

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Ask students to share their ideas.

Purpose Setting *“What we just talked about is part of a bigger system called a watershed. That’s what we’re exploring today—how water moves, where it goes, and why it matters.”*

INSTRUCTION (5 MINUTES)

Show slides #3-5

Turn and share with their neighbor their responses to the question on slide #5, *“Are we located in a watershed?”*

- Give students 30 seconds to discuss and then invite the class to share their answers.

Share slide #6.

Find your watershed on slide #7 (link to the full map is below the image) as a group.

Say *“Now that we know what watershed we are in, let’s explore how watersheds work.”*

GUIDED ACTIVITY (20 MINUTES)

Show the class the Model My Watershed - Runoff Simulation website and how to select different scenarios (rainfall amount, land cover types, hydrologic soil types).

Group students into pairs or have them work individually on the **Watershed Simulation Exploration Graphic Organizer** (Parts 1 & 2)

After 20 minutes, bring the group back together to discuss their findings.

APPLICATION ACTIVITY (20 MINUTES)

Return students to the same partner or have them switch partners and complete the **Watershed Simulation Exploration Scenario Activity**.

Review the rubric with students to make sure they know how to earn full points. Students will need access to the internet to complete the activity.

Watershed Simulation Exploration

Graphic Organizer - Part 1

Goal: Explore how rainfall, land cover, and soil type affect water movement in a watershed.

Investigate and Observe

Use the simulator at <https://runoff.modelmywatershed.org/> to complete the table:

- Adjust the rainfall amount using the slider.
- Select different land cover types (e.g., crops, forest, developed-high).
- Choose various hydrologic soil types (e.g., high infiltration, very slow infiltration).
- Observe changes in evapotranspiration, runoff, and infiltration.

Simulation changes	Runoff	Infiltration	Evapotranspiration	Impact on water quality
Rainfall Increase	<i>Record changes</i>	<i>Record changes</i>	<i>Record changes</i>	<i>What might happen to rivers, lakes, or drinking water?</i>
Pasture/Hay vs. Developed - Open	<i>Which has more runoff?</i>	<i>Which absorbs more water?</i>	<i>Which loses more water to evaporation?</i>	<i>How does land type affect runoff?</i>
Crops vs. Developed - High	<i>Which has more runoff?</i>	<i>Which absorbs more water?</i>	<i>Which loses more water to evaporation?</i>	<i>How does land type affect runoff?</i>
High Infiltration vs. Very Slow Infiltration	<i>Record changes</i>	<i>Record changes</i>	<i>Record changes</i>	<i>How could soil group affect farming?</i>

Watershed Simulation Exploration Graphic Organizer - Part 2

Directions: Think like a scientist! After completing the table, answer the questions below:

1. What happens when land cannot absorb enough water?

2. How does the hydrologic soil group affect infiltration?

3. How might infiltration affect farming?

4. Which land cover & soil group combination was the most surprising to you? Why?

Watershed Simulation Exploration

Scenario Activity

STEP 1: Choose your scenario

Select one of the following challenges:

1. **Urban Planning Challenge:** A town is planning a new commercial district near a river. What types of land cover and soil management should they prioritize to prevent excessive runoff and water pollution?
2. **Farmer's Dilemma:** A local farmer notices that heavy rains cause severe runoff and soil erosion on their land. What conservation practices would you recommend to reduce runoff and retain soil nutrients?

STEP 2: Research with the Simulation

Use the Model My Watershed – Runoff Simulation to test different land cover and soil types.

- Adjust land cover and soil type sliders to test different solutions.
- Record key takeaways—Which choices minimize runoff the most.

STEP 3: Design your solution

Develop a real-world proposal using evidence from the simulation. Your solution should include:

1. A short solution (5 sentences or bullet points) explaining:
The best land cover or soil strategy for your scenario.
How it reduces runoff and improves water quality based on simulation data.
2. Results from using the Model my Watershed simulation (in a table or bulleted).
3. A quick sketch or diagram to illustrate your idea (don't forget to label it!).

Watershed Simulation Exploration Scenario Activity

RUBRIC

Criteria	Excellent (4 points)	Proficient (3 points)	Developing (2 points)	Beginning (1 point)	Points
Use of Simulation Data	Solution strongly incorporates simulation results with clear references to runoff, infiltration, and land cover choices.	Solution uses some simulation insights, but connections could be stronger.	Limited use of simulation data, with unclear references to watershed dynamics.	Minimal or no reference to simulation data.	/4
Effectiveness of Solution	Solution is realistic, practical, and strongly addresses runoff challenges based on simulation findings.	Solution addresses the problem well, but may need more refinement.	Solution partially addresses the issue, but lacks depth or feasibility.	Solution is unclear or unrealistic for real-world application.	/4
Clarity & Explanation	Solution is clearly written, well-structured, and logically explained with supporting details.	Solution is mostly clear, but lacks some detail or organization.	Some ideas are present, but unclear or lacking explanation.	Explanation is disorganized, confusing, or missing key points.	/4
Illustration	Visual aid effectively represents the solution, using clear labels, organization, and relevant details.	Illustration supports the solution but could be clearer. Includes some labels.	Some effort is shown, but the illustration lacks detail or organization. Illustration includes few or no labels.	Illustration is unclear, missing key elements, or does not enhance understanding.	/4

Total Score: _____ / 20