

## Photo Description



Water is flowing fast across rocks and gravel near train tracks. The muddy water is moving quickly because of heavy rain. You can see grass growing on the sides where the water flows.

## Scientific Phenomena

This image shows surface water runoff - the anchoring phenomenon where water flows over land when there is too much rain for the ground to soak up. This happens because the ground becomes saturated (full of water) or the surface is too hard for water to penetrate quickly. The water follows gravity and flows downhill, picking up sediment, rocks, and debris as it moves, which is why the water appears muddy and brown.

## Core Science Concepts

1. Water Movement: Water always flows downhill because of gravity, following the easiest path it can find.
2. Erosion and Sediment Transport: Moving water picks up soil, rocks, and other materials, carrying them to new places.
3. Surface vs. Groundwater: When rain falls faster than soil can absorb it, water flows on top of the ground instead of soaking in.
4. Human Impact on Water Flow: Hard surfaces like roads and railroad tracks prevent water from soaking into the ground, causing more runoff.

### Pedagogical Tip:

Have students use their hands to demonstrate water flow by tilting a tray with sand or soil. This concrete experience helps them understand abstract concepts about gravity and water movement.

### UDL Suggestions:

Provide multiple ways for students to observe water flow: videos, hands-on demonstrations with water tables, and outdoor observations after rain. This supports different learning preferences and abilities.

## Zoom In / Zoom Out

1. Zoom In: At the microscopic level, soil particles have tiny spaces between them. When these spaces fill up with water, no more water can soak in, forcing it to flow on the surface.
2. Zoom Out: This runoff eventually flows into streams, rivers, and oceans, becoming part of the larger water cycle that moves water around our entire planet.

### Discussion Questions

1. What do you think will happen to this flowing water next? (Bloom's: Predict | DOK: 2)
2. Why do you think the water looks brown and muddy? (Bloom's: Analyze | DOK: 2)
3. How might this flowing water change the land around it? (Bloom's: Evaluate | DOK: 3)
4. What would happen if we poured water on different surfaces like concrete, sand, and grass? (Bloom's: Apply | DOK: 2)

### Potential Student Misconceptions

1. Misconception: "Water only flows in rivers and streams."  
Reality: Water flows anywhere there is a slope, including streets, parking lots, and fields during heavy rain.
2. Misconception: "Dirty water is always bad."  
Reality: Moving water naturally picks up soil and rocks - this is a normal part of how Earth's surface changes over time.
3. Misconception: "Water disappears when it flows away."  
Reality: Water doesn't disappear - it moves to other places and continues through the water cycle.

### Cross-Curricular Ideas

1. Math - Measurement & Comparison: Have students measure the width and depth of the water flow using rulers or string. They can compare measurements from different areas and create simple bar graphs showing "deep water" vs. "shallow water" or "fast flow" vs. "slow flow."
2. ELA - Descriptive Writing: Ask students to write or dictate sentences describing what they see in the photo using sensory words. Example: "The water is muddy and brown. It moves fast. It sounds like rushing." This builds vocabulary and observation skills while practicing descriptive language.
3. Social Studies - Community & Environment: Discuss how this runoff affects people in the community. Where does the water go? Does it cause problems for roads, houses, or farms? How do engineers and town planners work to manage rainwater in safe ways?
4. Art - Nature Observation & Painting: Students can create paintings or collages showing water flowing downhill using blue, brown, and gray colors. They can use real materials like sand, small pebbles, and water to create textured artwork that mimics the erosion and sediment movement shown in the photo.

### STEM Career Connection

1. Hydrologist - A hydrologist is a scientist who studies water and how it moves around Earth. They watch rivers, rain, and groundwater to understand where water goes and how to keep it clean. Hydrologists help communities prepare for floods and droughts. Average Annual Salary: \$84,000 USD
2. Civil Engineer - Civil engineers design and build roads, bridges, buildings, and systems that manage water (like storm drains and channels). They solve problems like the flooding shown in this photo by creating smart ways to control water flow in cities and towns. Average Annual Salary: \$89,000 USD
3. Environmental Scientist - Environmental scientists study how water, soil, and air are affected by nature and human activities. They investigate erosion, water quality, and how to protect land and ecosystems from damage caused by heavy runoff and flooding. Average Annual Salary: \$76,000 USD

### NGSS Connections

- Performance Expectation: 2-ESS1-1 Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- Disciplinary Core Ideas: 2-ESS1.C - Earth events can occur quickly (like this flooding) or slowly (like mountain formation)
- Crosscutting Concepts: Patterns - Water always follows predictable patterns when it flows

### Science Vocabulary

- \* Runoff: Water that flows over the ground when it can't soak in
- \* Erosion: When moving water picks up and carries away soil and rocks
- \* Sediment: Tiny pieces of rock, soil, and sand that water carries along
- \* Gravity: The force that pulls everything down toward Earth
- \* Absorb: When something soaks up water like a sponge

### External Resources

Children's Books:

- A Drop Around the World by Barbara Shaw McKinney
- Down Comes the Rain by Franklyn Branley
- Water Is Water by Miranda Paul