Erosion

Earth & Space Science | Lesson Guide

1st Grade

Photo Description

Water flows fast across rocks and stones near train tracks. The muddy water moves quickly because of heavy rain. Green grass grows on the sides where the water does not go.

Scientific Phenomena

This image shows surface water runoff as the anchoring phenomenon. When rain falls faster than the ground can soak it up, the water flows across the surface following gravity toward lower areas. The water picks up dirt and small rocks as it moves, which is why it appears muddy brown. This runoff is following the natural slope of the land, creating temporary streams that carry sediment and debris.

Core Science Concepts

1. Water Movement: Water always flows downhill because of gravity, following the path of least resistance
2. Erosion and Sediment Transport: Moving water picks up and carries dirt, sand, and small rocks, changing the color and clarity of the water
3. Surface vs. Ground Water: When soil cannot absorb water fast enough, it flows over the surface instead of soaking into the ground
4. Human-Made vs. Natural Surfaces: The railroad ballast (rocks) and tracks create hard surfaces that don't absorb water like soil does

Pedagogical Tip:

Use a simple demonstration with a tilted tray, sand, and a watering can to show how water flows downhill and picks up sediment. This concrete experience helps first graders understand the abstract concept before observing it in nature.

UDL Suggestions:

Provide multiple ways for students to explore water flow: visual observations, hands-on water table activities, and kinesthetic movement where students act out being water droplets flowing downhill. This supports different learning preferences and abilities.

Zoom In / Zoom Out

1. Zoom In: Individual water molecules are attracted to each other and to soil particles through adhesion and cohesion forces, allowing water to pick up and transport tiny pieces of earth as it flows.

2. Zoom Out: This local runoff connects to larger watershed systems, eventually flowing into streams, rivers, and oceans. The sediment being transported here contributes to the formation of deltas and the shaping of landscapes over time.

Discussion Questions

1. What do you think made the water look brown and muddy? (Bloom's: Analyze | DOK: 2)
2. Where do you predict this flowing water will go next? (Bloom's: Apply | DOK: 2)
3. How is this flowing water different from water in a pond? (Bloom's: Compare | DOK: 2)
4. What might happen to the rocks and dirt if the water keeps flowing? (Bloom's: Predict | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Water only flows in rivers and streams"
   Clarification: Water flows anywhere there is a slope when the ground cannot absorb it fast enough, creating temporary streams during heavy rain.

2. Misconception: "Dirty water is always bad"
   Clarification: Muddy water during runoff is natural - it shows that water is doing its job of moving soil and rocks, which helps shape the land over time.

3. Misconception: "Water flows in all directions"
   Clarification: Water always flows downhill following gravity, taking the easiest path to lower ground.

NGSS Connections

- Performance Expectation: K-ESS2-1 - Use and share observations of local weather conditions to describe patterns over time
- Disciplinary Core Ideas: K-ESS2.D - Weather and Climate
- Crosscutting Concepts: Patterns - Patterns in the natural world can be observed and used as evidence

Science Vocabulary

* Runoff: Water that flows over the ground when it rains hard
* Erosion: When water or wind moves dirt and rocks from one place to another
* Sediment: Tiny pieces of dirt, sand, and rocks that water carries along
* Flow: How water moves from one place to another
* Absorb: When the ground soaks up water like a sponge

External Resources

Children's Books:
- Down Comes the Rain by Franklyn M. Branley
- Water Is Water by Miranda Paul
- The Magic School Bus at the Waterworks by Joanna Cole

YouTube Videos:
- "The Water Cycle Song" - Educational song explaining how water moves through the environment with simple animations perfect for K-1 students
  URL: https://www.youtube.com/watch?v=ncORPosDrjI
- "Erosion and Weathering for Kids" - Simple explanation of how water changes the land with real-world examples
  URL: https://www.youtube.com/watch?v=Qu7j0IFMhTU