Drought

Earth & Space Science | Lesson Guide

Kindergarten

Photo Description

The ground is very dry and cracked. The dirt has broken into many pieces like a puzzle. Small plants are trying to grow in some of the cracks.

Scientific Phenomena

This image shows drought conditions as an anchoring phenomenon. The cracked, dried mud demonstrates what happens when soil loses moisture over extended periods without rainfall. The polygonal crack patterns form due to clay particles in soil shrinking as water evaporates, creating tension that causes the surface to split along lines of weakness. This natural process reveals how water cycles and weather patterns directly impact Earth's surface materials.

Core Science Concepts

1. Water and Weather Changes: Water can disappear from soil when it gets hot and sunny for a long time
2. Earth Materials: Soil is made of tiny pieces that stick together when wet but pull apart when dry
3. Plant Survival: Plants need water to live and grow, and they can be found even in dry places
4. Patterns in Nature: Cracks form in predictable shapes when soil dries out

> **Pedagogical Tip:**
>
> Use sensory experiences with wet and dry playdough or clay to help kindergarteners understand how materials change when they lose moisture. This concrete manipulation helps bridge to the abstract concept of soil behavior.

> **UDL Suggestions:**
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> Provide multiple ways for students to explore this concept: visual observation of the photo, tactile exploration with clay materials, and kinesthetic movement by having students curl up small (wet) then stretch out with gaps (dry) to represent soil particles.

Zoom In / Zoom Out

1. Zoom In: Tiny clay particles in soil are like microscopic magnets that stick together when surrounded by water molecules, but when the water evaporates, the magnetic-like attraction weakens and particles pull away from each other.

2. Zoom Out: This dried soil is part of the larger water cycle where water moves from oceans to clouds to rain to ground and back again. When one part of this cycle is interrupted (no rain), it affects the entire local ecosystem and food web.

Discussion Questions

1. What do you think happened to make the ground look like this? (Bloom's: Analyze | DOK: 2)
2. How might this area look different after it rains? (Bloom's: Apply | DOK: 2)
3. What patterns do you notice in the cracks? (Bloom's: Remember | DOK: 1)
4. Why do you think some plants are still growing here? (Bloom's: Evaluate | DOK: 3)

Potential Student Misconceptions

1. Misconception: "The ground broke because something heavy stepped on it."
   Reality: The cracks formed naturally as water slowly left the soil over many days.

2. Misconception: "All dirt looks the same whether it's wet or dry."
   Reality: Soil changes its appearance, texture, and behavior depending on how much water it contains.

3. Misconception: "Plants can't grow in cracked, dry ground."
   Reality: Some hardy plants can survive in dry conditions and may even grow in the cracks where water collects.

Cross-Curricular Ideas

1. Math - Patterns and Shapes: Have students trace the crack patterns from the photo and count how many sides each polygon has. Create a sorting activity where students group crackers, puzzle pieces, or paper shapes by the number of sides, connecting to the natural polygonal patterns in dried soil.

2. ELA - Descriptive Writing and Storytelling: Students can dictate or draw stories about "Where did the water go?" or "A day in the life of a seed in dry soil." Create a class book where each student contributes one page with words and pictures describing what they observe in the photo using sensory language (rough, hard, cracked, dusty).

3. Social Studies - Community Resources and Water: Discuss where water comes from in your community (wells, rivers, rain) and why it's important for farms and gardens. Invite a local farmer or gardener to share how drought affects food we eat, connecting abstract concepts to students' everyday lives.

4. Art - Texture and Mixed Media: Students create their own "cracked earth" artwork by painting paper with watercolors, letting it dry completely, then gently crumpling and unfolding it to create crack patterns. They can add small seeds, sand, or clay to create a 3D texture representation of the dried soil.

STEM Career Connection

1. Meteorologist (Weather Scientist): A meteorologist watches the sky and studies weather patterns like rain, clouds, and storms. They help us understand when droughts happen and predict when rain will come. These scientists help farmers and communities prepare for dry times. Average annual salary: $98,000

2. Soil Scientist: A soil scientist digs in the dirt to learn about soil, what lives in it, and how to help plants grow. They study cracks like in this photo and figure out what soil needs to be healthy. They help farmers grow better crops and protect soil from drying out. Average annual salary: $65,000

3. Hydrologist (Water Scientist): A hydrologist studies water—where it goes, how much we have, and how it moves through soil and underground. They work to make sure communities have enough water during dry times and prevent droughts from hurting people and plants. Average annual salary: $84,500

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, Cause and Effect

Science Vocabulary

* Drought: A long time with no rain when the ground gets very dry
* Evaporate: When water disappears into the air as invisible gas
* Soil: The dirt that plants grow in, made of tiny rock pieces and old plant parts
* Pattern: Something that repeats or looks the same in different places
* Crack: A thin opening or split in something solid

External Resources

Children's Books:

- The Magic School Bus Wet All Over by Joanna Cole
- A Drop Around the World by Barbara Shaw McKinney
- Water Is Water by Miranda Paul