Hill

Earth & Space Science | Lesson Guide

2nd Grade

Photo Description

The picture shows a big house on a hill with lots of green trees all around it. In the far distance, you can see tall buildings from a city that look hazy and fuzzy. The sky looks cloudy and the air between the house and the city is not very clear.

Scientific Phenomena

This image demonstrates the Anchoring Phenomenon of air quality and atmospheric visibility. The hazy appearance of the distant city skyline occurs because tiny particles (pollutants, dust, water droplets) are suspended in the air between the observer and the city. These particles scatter and absorb light, making distant objects appear less clear and creating a "hazy" effect. This is a combination of natural atmospheric conditions and human-made air pollution that reduces visibility over long distances.

Core Science Concepts

1. Air is made of tiny particles - The air around us contains invisible particles like dust, pollen, and pollution that we cannot always see up close but become visible when looking far away.

2. Distance affects what we can see - Objects that are far away look different than objects that are close because light has to travel through more air to reach our eyes.

3. Weather and air quality change - Some days the air is clearer than others depending on wind, rain, and how much pollution is in the air.

4. Human activities affect air - Cars, factories, and other human activities can add particles to the air that make it harder to see far distances.

Pedagogical Tip:

Use the "hand telescope" technique - have students make a tube with their hands and look through it at distant objects, then without it, to help them focus on how distance affects visibility.

UDL Suggestions:

Provide multiple ways to observe air quality by having students draw what they see, describe it verbally, and use body movements to show "clear" versus "hazy" air.

Zoom In / Zoom Out

1. Zoom In: At the microscopic level, tiny particles smaller than the width of a human hair are floating in the air. These include dust, pollen, water droplets, and pollution particles that bump into light rays and scatter them in different directions.

2. Zoom Out: This connects to the larger Earth system where air moves around the planet carrying particles from one place to another. Weather patterns, ocean currents, and seasonal changes all affect air quality across entire regions and continents.

Discussion Questions

1. What do you think makes the city buildings look fuzzy and hard to see? (Bloom's: Analyze | DOK: 2)
2. How might the view change on a windy day compared to a still day? (Bloom's: Apply | DOK: 2)
3. What patterns do you notice when comparing things that are close to us versus far away? (Bloom's: Analyze | DOK: 2)
4. How could we find out if the air is cleaner or dirtier on different days? (Bloom's: Create | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Air is completely empty space with nothing in it."
   Clarification: Air contains many tiny particles we cannot see individually, including dust, pollen, water, and gases.

2. Misconception: "The hazy look means the buildings are dirty."
   Clarification: The buildings themselves are not dirty - the air between us and the buildings contains particles that make them look hazy.

3. Misconception: "We can always see the same distance every day."
   Clarification: How far we can see clearly changes based on weather conditions and air quality.

Cross-Curricular Ideas

1. Math Connection - Distance and Measurement: Have students measure how far they can see on different days using classroom landmarks. Create a simple bar graph showing "clear days" versus "hazy days" and compare the distances. This connects to measuring, comparing, and data collection skills.

2. ELA Connection - Descriptive Writing: Ask students to write or draw pictures describing what they see in the photo using sensory words like "hazy," "fuzzy," "cloudy," and "clear." Create a class book titled "What We Can See Today" where students describe the visibility from different locations around the school.

3. Social Studies Connection - Community Health: Discuss how air quality affects people in communities near cities versus rural areas. Talk about how communities work together to keep air clean (like planting trees, using clean transportation). Connect this to environmental responsibility and caring for our neighborhoods.

4. Art Connection - Perspective and Distance: Have students create paintings or drawings showing objects that are close (clear and detailed) versus far away (hazy and less detailed). Experiment with layering colors to show how things look more faded in the distance, teaching them about atmospheric perspective in art.

STEM Career Connection

1. Air Quality Scientist (Environmental Scientist): These scientists study the air we breathe and measure pollution to help keep people healthy. They use special tools to test the air and tell communities when the air quality is good or bad. They work to find ways to make the air cleaner for everyone. Average Salary: $68,000/year

2. Weather Forecaster (Meteorologist): Weather forecasters study clouds, wind, and air to predict what the weather will be like tomorrow. They use computers and special tools to understand how weather changes visibility and air quality. Their predictions help people plan their day and stay safe. Average Salary: $96,000/year

3. City Planner: City planners design communities and decide where buildings, trees, and parks should go. They think about air quality and plan cities to keep the air clean by adding green spaces and organizing traffic. They help make cities healthier places to live. Average Salary: $75,000/year

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 - Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.
- Crosscutting Concepts: Patterns - Patterns in the natural world can be observed and used as evidence.

Science Vocabulary

* Particles: Tiny pieces of matter that are so small we usually cannot see them by themselves.
* Atmosphere: The layer of air that surrounds Earth.
* Visibility: How far and how clearly we can see objects in the distance.
* Pollution: Harmful substances that make air, water, or land dirty.
* Hazy: When the air looks cloudy or unclear, making it hard to see far away.

External Resources

Children's Books:
- The Magic School Bus at the Waterworks by Joanna Cole
- The Air Around You by Franklyn M. Branley
- What Is Pollution? by Isaac Asimov