

Photo Description



This image shows a large house with a red tile roof sitting on a hillside covered with green trees and vegetation. In the distance, you can see a city skyline through hazy air, and the land rolls up and down in hills between the house and the city. The sky looks cloudy and the air appears somewhat foggy or misty.

Scientific Phenomena

The anchoring phenomenon in this image is air pollution and its effects on visibility. The hazy, reduced visibility between the hillside and distant city demonstrates how tiny particles and gases in the atmosphere scatter and absorb light. This happens when pollutants from vehicles, factories, and other human activities mix with natural particles in the air, creating what we call smog or haze. The particles are so small we can't see individual ones, but together they make the air look cloudy and reduce how far we can see clearly.

Core Science Concepts

1. Air Quality and Pollution: Human activities release tiny particles and gases into the atmosphere that can reduce air quality and visibility.
2. Light Scattering: When light travels through air containing particles, it gets scattered in different directions, making distant objects appear hazy or unclear.
3. Topography and Weather Patterns: Hills and valleys can trap air pollution, especially during certain weather conditions, creating areas of poor air quality.
4. Human Impact on Environment: Cities and developed areas produce more air pollution than natural areas, which can affect the health of both people and ecosystems.

Pedagogical Tip:

Use the "See-Think-Wonder" thinking routine with this image. Have students first observe what they see, then think about what might be causing the hazy appearance, and finally wonder about questions they have. This helps develop scientific observation skills.

UDL Suggestions:

Provide multiple ways for students to express their observations - through drawing, verbal descriptions, or written responses. Consider having students with visual impairments feel different textures that represent clear vs. hazy air, or use sound analogies like how fog muffles sound similar to how particles affect light.

Zoom In / Zoom Out

1. Zoom In: At the microscopic level, tiny particles called particulate matter (PM_{2.5} and PM₁₀) float in the air. These particles are so small that thousands could fit on the period at the end of this sentence. They come from car exhaust, factory smoke, dust, and even natural sources like pollen.
2. Zoom Out: This local air quality issue connects to global climate patterns and the water cycle. Air pollution can travel hundreds of miles, affecting regions far from where it was created. It also impacts weather patterns, plant growth across entire watersheds, and even global climate change.

Discussion Questions

1. What do you think is causing the hazy appearance in the distance, and what evidence supports your thinking? (Bloom's: Analyze | DOK: 3)
2. How might the air quality on this hillside compare to the air quality in the city you can see in the distance? (Bloom's: Evaluate | DOK: 2)
3. What solutions could communities implement to reduce the hazy air pollution visible in this image? (Bloom's: Create | DOK: 3)
4. How do you think this air quality might affect the plants and animals living in this area? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: "The hazy air is just fog or natural clouds."
Clarification: While natural water vapor can create haze, the persistent hazy appearance near cities is often caused by air pollution mixed with natural moisture.
2. Misconception: "Air pollution only affects the air we breathe."
Clarification: Air pollution also affects visibility, plant growth, building materials, and weather patterns in addition to human and animal health.
3. Misconception: "You can always see air pollution as dark, dirty air."
Clarification: Many air pollutants are invisible to the naked eye, and pollution can make air look hazy or reduce visibility without appearing obviously "dirty."

NGSS Connections

- Performance Expectation: 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
- Disciplinary Core Ideas: 5-ESS3.C - Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space.
- Crosscutting Concepts: Cause and Effect - Events have causes that generate observable patterns.
- Crosscutting Concepts: Systems and System Models - A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.
- Science and Engineering Practices: Obtaining, Evaluating, and Communicating Information

Science Vocabulary

- * Air pollution: Harmful substances in the air that can hurt people, animals, and plants.
- * Visibility: How far and how clearly you can see through the air.
- * Particulate matter: Tiny pieces of solid or liquid materials floating in the air.
- * Atmosphere: The layer of gases that surrounds Earth.
- * Smog: A mixture of air pollution and fog that makes the air look hazy.
- * Topography: The shape and features of the land, including hills and valleys.

External Resources

Children's Books:

- The Air We Breathe by Cynthia Pratt Nicolson
- Air Pollution by Isaac Asimov
- Our Polluted Planet: Air Pollution by Carol Ballard

YouTube Videos:

- "Air Pollution for Kids | Learn about the causes and effects of air pollution" - Educational video explaining air pollution sources and impacts in kid-friendly terms: <https://www.youtube.com/watch?v=e6rgIsLy1Ys>
- "What is Air Pollution? | Environment for Kids" - Animated explanation of different types of air pollution and solutions: <https://www.youtube.com/watch?v=GVBey1jSG9Y>