Backyard Landscape

Life Science | Lesson Guide

5th Grade

Photo Description

This backyard garden shows a diverse ecosystem with colorful flowers, green grass, and a small water feature surrounded by rocks. Orange cosmos and purple flowers bloom throughout the garden beds, while different types of plants create layers of vegetation. The garden demonstrates how living things can thrive together in a shared environment.

Scientific Phenomena

The Anchoring Phenomenon is a thriving backyard ecosystem where multiple plant species coexist and support each other through interdependent relationships. This happens because different plants have varying needs for sunlight, water, and nutrients, allowing them to occupy different niches in the same space. The water feature creates a microhabitat that supports additional biodiversity, while the arrangement of plants creates microclimates that benefit different species. This demonstrates how ecosystems naturally organize themselves through competition, cooperation, and resource sharing.

Core Science Concepts

1. Ecosystem Interactions: Plants compete for resources like sunlight, water, and nutrients while also creating beneficial conditions for each other through shade, wind protection, and soil improvement.

2. Biodiversity and Habitat: Different plant species create varied microhabitats that can support insects, birds, and other organisms, demonstrating how structural diversity leads to biological diversity.

3. Water Cycle in Action: The water feature and surrounding plants show evaporation, transpiration, and condensation occurring in a small-scale system.

4. Plant Adaptations: Various flower colors, leaf shapes, and growth patterns represent different evolutionary adaptations to attract pollinators and maximize survival.

Pedagogical Tip:

Use the "Notice and Wonder" strategy by having students spend 2-3 minutes silently observing the image, then sharing what they notice factually versus what they wonder about scientifically.

UDL Suggestions:

Provide magnifying glasses or zoom tools for students to examine details, and offer both verbal discussion and written/drawing response options for sharing observations.

Zoom In / Zoom Out

Zoom In: At the cellular level, plant roots are forming symbiotic relationships with mycorrhizal fungi, exchanging sugars for increased water and nutrient absorption. Chloroplasts in leaves are converting sunlight into chemical energy through photosynthesis, while stomata open and close to regulate gas exchange.

Zoom Out: This garden is part of a larger watershed system where rainwater flows through soil layers into groundwater, eventually reaching streams and rivers. The plants contribute to regional air quality by producing oxygen and absorbing carbon dioxide, while also providing food and shelter for local wildlife corridors.

Discussion Questions

1. How do you think the different plants in this garden help or compete with each other? (Bloom's: Analyze | DOK: 3)
2. What evidence can you find that this garden supports more than just plants? (Bloom's: Evaluate | DOK: 2)
3. If you removed the water feature, how might that change the ecosystem in this garden? (Bloom's: Synthesize | DOK: 3)
4. What patterns do you notice in how the plants are arranged, and why might that be beneficial? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. "Plants don't need other plants" - Students may think plants only compete. Clarification: Plants often help each other through nutrient sharing, protection from wind, and creating favorable microclimates.

2. "All plants need the same things" - Students might assume all plants have identical needs. Clarification: Different plants have evolved to thrive in different conditions, which is why diverse gardens work so well.

3. "Water features are just decoration" - Students may not recognize ecological functions. Clarification: Water features support the water cycle, provide habitat for beneficial insects, and create humidity that helps nearby plants.

Cross-Curricular Ideas

1. Math - Data Collection & Graphing: Have students count the number of each flower type in the garden photo, then create bar graphs or pie charts to represent the biodiversity data. Students can calculate percentages, compare populations, and make predictions about which plants might grow more if given different conditions.

2. ELA - Descriptive Writing & Poetry: Challenge students to write detailed descriptions of the garden using vivid sensory language, or create acrostic poems using words like "GARDEN," "ECOSYSTEM," or "FLOWERS." Students could also research and write informative paragraphs about one specific plant species shown in the photo.

3. Social Studies - Community Gardens & Local Food Systems: Connect the backyard garden to community gardens in your town. Students can explore how gardens help neighborhoods, reduce food transportation distances, and build community connections. Discuss how gardening practices reflect cultural traditions and local environmental knowledge.

4. Art - Color Theory & Garden Design: Have students study the color combinations in the photo (complementary colors like purple and yellow) and create their own garden designs using colored pencils or digital tools. They can experiment with different plant arrangements and explain their color choices using art vocabulary.

STEM Career Connection

1. Horticulturist - A horticulturist is a scientist who studies how to grow plants, improve plant varieties, and create beautiful gardens. They work for farms, botanical gardens, nurseries, and landscaping companies to help plants thrive. Some horticulturists focus on growing food crops, while others design ornamental gardens like the one in this photo. Average Salary: $40,000-$55,000/year

2. Ecologist - An ecologist is a scientist who studies how living things interact with each other and their environments, just like the relationships between plants in this garden. Ecologists might work in forests, wetlands, or gardens to understand ecosystems and help protect endangered species and habitats. Average Salary: $45,000-$65,000/year

3. Landscape Designer - A landscape designer creates beautiful outdoor spaces like gardens, parks, and yards by planning where to place plants, water features, and pathways. They use knowledge of plants, soil, water, and sun exposure to design ecosystems that are both beautiful and healthy for the environment. Average Salary: $48,000-$70,000/year

NGSS Connections

Performance Expectation: 5-LS2-1 - Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Disciplinary Core Ideas:
- 5-LS2.A - The food of almost any kind of animal can be traced back to plants
- 5-LS2.B - Matter cycles between the air and soil and among plants, animals, and microbes

Crosscutting Concepts:
- Systems and System Models
- Energy and Matter
- Structure and Function

Science Vocabulary

* Ecosystem: A community of living things interacting with each other and their environment.
* Biodiversity: The variety of different plants, animals, and other living things in an area.
* Microhabitat: A small, specific area within a larger habitat that has its own unique conditions.
* Transpiration: The process where plants release water vapor through their leaves.
* Pollinator: An animal that helps plants reproduce by moving pollen from flower to flower.
* Symbiosis: A close relationship between different species that live together.

External Resources

Children's Books:
- A Seed Is Sleepy by Dianna Hutts Aston
- The Great Kapok Tree by Lynne Cherry
- In the Garden with Van Gogh by Julie Merberg