Encyclopedia of Life
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Lesson Overview: Interdependence in Ecosystems

Grades 9-12 Biology

Big Idea/Learning Goal

Organisms in ecosystems depend on each other to obtain energy to survive through complex ecological relationships.

Essential Questions

- How do different organisms obtain energy to survive, grow, and reproduce?
- How is energy transferred in ecosystems through food webs?
- How do different organisms influence food webs?

Objectives

- Students will **model** the interrelationships of ecosystems.
- Students will **describe** how energy flows through food chains and food webs.
- Students will **build** and **examine** food chains and food webs.
- Students will **manipulate** ecological relationships through modeling and utilizing EOL Food Web Tool

Background

All organisms need **energy** in order to survive, grow, and reproduce. They obtain this energy in a variety of ways. Ultimately, the energy in an ecosystem comes from the sun, and flows through an ecosystem from one organism to another through complex ecological relationships. Some organisms can use the sun's energy to produce their own food; while others like humans need to eat food in order to gain energy.

Okaloosa County has many unique habitats in which producers, consumers, and decomposers live and interact. In order for organisms to survive, they must obtain energy from either the sun or by consuming or decomposing other organisms through a **food chain**. Each step of the food chain provides energy for the next step. The arrows show the direction of energy flow from one to another.

Sun → Grass → Grasshopper → Toad → Hawk → Fungi

The grass uses the sun's energy to produce its own food. The grasshopper eats the grass, the toad eats the grasshopper, and the hawk eats the frog. After the hawk dies, it provides energy to decomposers, such as fungi, which break down the organism and return its nutrients to the system.

Through this activity, students will use EOL Species Cards to build their own food chains and the EOL Food Web Tool to explore how food chains overlap into larger food webs.

Assessments

- Ongoing discussions and questioning
- Food chains and food webs
- Backyard Food Web assignment

Activities

1. Food Chains and Food Webs
2. Food Web Systems
3. Food Chains Rummy

Vocabulary

Carnivore: An animal that eats meat
Consumer: An organism that obtains energy by consuming another organism; includes carnivores, herbivores, and omnivores
Decomposer: An organism that obtains energy by breaking down dead organic material
Energy flow: The transfer of energy through a food chain from one organism to another
Food Chain: The flow of energy in an ecosystem beginning from the sun to a primary producers (plant) to a consumer to decomposers
Food Web: Overlapping food chains in an ecosystem that create a complex web of interconnectedness and energy flow
Herbivore: An animal that eats plant materials
Inference: A conclusion reached based on evidence and reasoning from observations
Observation: The process of carefully examining or looking at something in order to gather information
Omnivore: An animal that eats both plant materials and meat
Predator: An organism that hunts another organism
Prey: An organism that is hunted by a predator
Producer: An organism that obtains energy through photosynthesis: sunlight, carbon dioxide, and water

Next Generation Science Standards

Performance Expectations

HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Science and Engineering Practices

Asking Questions and Defining Problems

Developing and Using Models

Constructing Explanations and Designing Solutions

Engaging in Argument from Evidence

Obtaining, Evaluating and Communicating Information

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