Interactive Classroom

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Glencoe Science

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Section 1: Organisms and Their Relationships
Section 2: Flow of Energy in an Ecosystem
Section 3: Cycling of Matter

EXIT

Chapter 2

2.1 Organisms and Their Relationships

Ecology 🗨

- Scientific discipline in which the relationships among living organisms and the interaction the organisms have with their environments are studied
- Ecologists observe, experiment, and model using a variety of tools and methods.



Chapter 2 Prin

2.1 Organisms and Their Relationships

The Biosphere 🕥

- A thin layer around Earth
- Extends several kilometers above the Earth's surface
- Extends several kilometers below the ocean's surface



2.1 Organisms and Their Relationships

The Biosphere



Biotic Factors 🕥

Living factors in an organism's environment

Abiotic Factors 🕥

- Nonliving factors in an organism's environment
- Organisms adapt to survive in the abiotic factors present in their natural environment.



- 2.1 Organisms and Their Relationships
 - Levels of Organization
 - Levels increase in complexity as the numbers and interactions between organisms increase.

Resources

- organism
- population
- biological community

Home

- ecosystem
- biome
- biosphere

- 2.1 Organisms and Their Relationships
 - The lowest level of organization is the individual organism itself.
 - Organisms of a single species that share the same geographic location at the same time make up a population.
 - A biological community is a group of interacting populations that occupy the same geographic area at the same time.



- An ecosystem is a biological community and all of the abiotic factors that affect it.
- A biome is a large group of ecosystems that share the same climate and have similar types of communities.



- 2.1 Organisms and Their Relationships
 - **Ecosystem Interactions**
 - A habitat is an area where an organism lives.
 - A niche is the role or position that an organism has in its environment.



Community Interactions

- Competition
 - Occurs when more than one organism uses a resource at the same time
- Predation
 - Many species get their food by eating other organisms.



Symbiotic Relationships 🕥

- The close relationship that exists when two or more species live together
- Mutualism
- Commensalism
- Parasitism



Chapter 2

2.2 Flow of Energy in an Ecosystem

Energy in an Ecosystem

- Autotrophs
 - Organism that collects energy from sunlight or inorganic substances to produce food
- Heterotrophs
 - Organism that gets it energy requirements by consuming other organisms



A lynx is a heterotroph.



2.2 Flow of Energy in an Ecosystem

Detritivores eat fragments of dead matter in an ecosystem, and return nutrients to the soil, air, and water where the nutrients can be reused by organisms. 🕙

Fungus



2.2 Flow of Energy in an Ecosystem

Models of Energy Flow

- Food chains and food webs model the energy flow through an ecosystem.
- Each step in a food chain or food web is called a trophic level.



Chapter 2

2.2 Flow of Energy in an Ecosystem

Resources

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Food Chains

 A food chain is a simple model that shows how energy flows through an ecosystem.



2.2 Flow of Energy in an Ecosystem



Food Webs

A food web is a model representing the many interconnected food chains and pathways in which energy flows through a group of organisms.







Desert Community Food Web



Chapter 2

2.2 Flow of Energy in an Ecosystem

Ecological Pyramids

A diagram that can show the relative amounts of energy, biomass, or numbers of organisms at each trophic level in an organism



2.3 Cycling of Matter

Cycles in the Biosphere

- Energy is transformed into usable forms to support the functions of an ecosystem.
- The cycling of nutrients in the biosphere involves both matter in living organisms and physical processes found in the environment such as weathering.



2.3 Cycling of Matter

The Water Cycle







2.3 Cycling of Matter

- Approximately 90 percent of water vapor evaporates from oceans, lakes, and rivers; 10 percent evaporates from the surface of plants through a process called transpiration.
- Freshwater constitutes only about 3 percent of all water on Earth.
- About 69 percent of all freshwater is found in ice caps and glaciers.



2.3 Cycling of Matter

The Carbon and Oxygen Cycles



Home Resources 🗲



2.3 Cycling of Matter

- Carbon and oxygen often make up molecules essential for life.
- Carbon and oxygen recycle relatively quickly through living organisms.



2.3 Cycling of Matter

Long-term Cycle

- Organic matter converted to peat, coal, oil, or gas deposits (carbon)
- Calcium carbonate (carbon and oxygen)
 Short-term Cycle
- Burning fossil fuels (carbon)



2.3 Cycling of Matter

The Nitrogen Cycle



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Resources

The capture and conversion of nitrogen into a form that is useable by plants is called nitrogen fixation.



2.3 Cycling of Matter

- Nitrogen enters the food web when plants absorb nitrogen compounds from soil.
- Consumers get nitrogen by eating plants or animals that contain nitrogen.



2.3 Cycling of Matter

- Nitrogen is returned to the soil in several ways:
 - Animals urinate.
 - Organisms die.
 - Organisms convert ammonia into nitrogen compounds.
 - Denitrification



2.3 Cycling of Matter

The Phosphorus Cycle







Chapter 2 Principle

2.3 Cycling of Matter

Short-term Cycle

- Phosphorus is cycled from the soil to producers and then from the producers to consumers.
- Long-term Cycle
- Weathering or erosion of rocks that contain phosphorus slowly adds phosphorus to the cycle.



Principles of Ecology

Chapter Resource Menu



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Vocabulary

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<u>Animation</u>

Click on a hyperlink to view the corresponding lesson.



Chapter Diagnostic Questions



The act of one organism consuming another organism for food is _____.

A.predation B. parasitism C. commensalism

D. mutualism



Chapter 2

Chapter Diagnostic Questions



Identify how energy flows through an ecosystem in a typical food chain.

A. from an autotroph to a heterotroph
B. from a heterotroph to an autotroph
C. from a carnivore to an herbivore
D. from an omnivore to an herbivore



Chapter 2

Chapter Diagnostic Questions



What is a chemical substance that an organism must obtain from its environment to survive?

A. biomass
B. energy
C. matter
D. nutrient



2.1 Formative Questions



Which are biotic factors in a forest environment?

- A. plants and microscopic organisms living in the soil
- B. pH and salt concentration of the soil
- C. sunlight, soil type and soil nutrients
- D. temperature, air currents and rainfall



2.1 Formative Questions



What is the name for a group of interacting populations that occupy the same area at the same time?

A. ecosystem
B. habitat
C. biological community
D. biotic collection



2.1 Formative Questions



Which defines habitat?

A. all of the biotic factors in an ecosystem
B. an area where an organism lives
C. an area in which various species interact
D. the role or position that an organism has



2.2 Formative Questions



What type of organism is the foundation of all ecosystems?

A. autotroph
B. herbivore
C. heterotroph
D. decomposer



Chapter 2 Princip

Principles of Ecology

2.2 Formative Questions



How do detritivores obtain their energy in an ecosystem?

- A. They feed on fragments of dead plants and animals.
 - B. They feed on organisms by releasing digestive enzymes.
 - C. They get energy from inorganic substances to make food.
 - D. They use chlorophyll to capture energy from the sun.



2.2 Formative Questions



Which type of organism exists at all trophic levels except the first trophic level?

A. carnivores
B. herbivores
C. autotrophs
D. heterotrophs





2.3 Formative Questions



What type of organism returns nutrients to an ecosystem?

A. decomposer
B. primary producer
C. secondary producer
D. top level consumer



2.3 Formative Questions



What type of scientist studies water found underground, in the atmosphere, and on the surface of the earth?

A. biochemist
B. ecologist
C. geologist
D. hydrologist



2.3 Formative Questions



Which biogeochemical cycle involves evaporation, transpiration, precipitation and runoff?

A. carbon cycle
B. nitrogen cycle
C. phosphorus cycle
D. water cycle



Principles of Ecology

2.3 Formative Questions



Which process in this cycle converts carbon dioxide and water into carbohydrates?





Principles of Ecology

2.3 Formative Questions



A. photosynthesis
B. respiration
C. combustion of fossil fuels
D. deposition of dead material





Chapter Assessment Questions



Use the diagram to compare and contrast biotic and abiotic factors. Give examples of each.





Chapter 2

Chapter Assessment Questions



Answer: Biotic factors include the living factors in an organism's environment, such as animals, reptiles, plants, and microscopic organisms. Abiotic factors are the nonliving factors, such as water temperature, rainfall, soil, and available nutrients.



Chapter Assessment Questions



Use the image below to explain how decomposers supply phosphorus to soil, groundwater, oceans, lakes, ponds, and rivers.



Resources

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Chapter 2 Pri

Chapter Assessment Questions



Answer: All organisms contain phosphorus. When organisms die or produce waste products, decomposers return the phosphorus to the soil where it can be used again.



Chapter 2

Chapter Assessment Questions



The diagram shows how carbon cycles through the environment. Describe how photosynthesis is involved in the carbon cycle.





Chapter 2

Chapter Assessment Questions



Answer: During photosynthesis, green plants and algae convert carbon dioxide and water to carbohydrates and release oxygen into the air. The plants use the carbohydrates for energy. Carbon dioxide is released back into the air through cellular respiration.



Standardized Test Practice



In what type of activity would you most expect an ecologist to be involved?

- A. identifying and classifying various species of insects in an ecosystem
- B. locating fossils of distinct species of turtles in a geographical area
- C. observing the relationships that woodpeckers have with other species in their environment
- D. studying the internal organs of a seal to learn how it survives in its environment



Standardized Test Practice



Certain types of tropical orchids use trees for support in order to grow higher and obtain more light. This neither harms nor benefits the tree. What type of symbiotic relationship is this?

A. commensalism B. competition C. mutualism





Standardized Test Practice



True or False

If an ecologist finds that the long-tailed weasels have disappeared from the desert community, she should conclude that there will be a decrease in the population of coyotes.





Standardized Test Practice

Why is this mouse classified as an omnivore?

A. It consumes grasshoppers. B. It is consumed by snakes. It consumes both grasshoppers and snakes. D. It is a third-level consumer.



Home Resources 🗲 🚔

Standardized Test Practice



Which process returns nitrogen to the food web?

A. decomposition
B. denitrification
C. nitrification
D. nitrogen fixation





Principles of Ecology

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Vocabulary

Section 1

- ecology
- biosphere
- Obiotic factor
- abiotic factor
- Opulation
- biological community
- ecosystem

🖻 biome





- predation
- symbiosis
- mutualism
- commensalism
- parasitism



Vocabulary

Section 2

- autotroph
- heterotroph
- herbivore
- carnivore
- omnivore
- detritivore
- Irophic level

food chain
food web
biomass

Home Resources

Vocabulary

Section 3

- matter
- Inutrient
- biogeochemical cycle
- Initrogen fixation
- denitrification



Animation



Visualizing Levels of Organization

Desert Community Food Web

The Water Cycle

The Carbon Cycle

The Nitrogen Cycle

The Phosphorus Cycle

