

## Chapter Menu

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### Chapter Wrap-Up





How do living things and the nonliving parts of the environment interact?



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### Get Ready

## What do you think?

Before you begin, decide if you agree or disagree with each of these statements. As you view this presentation, see if you change your mind about any of the statements.



### Get Ready

## Do you agree or disagree?

1. The air you breathe is mostly oxygen.
2. Living things are made mostly of water.
3. Carbon, nitrogen, and other types of matter are used by living things over and over again.



### Get Ready

## Do you agree or disagree?

4. Clouds are made of water vapor.
5. The Sun is the source for all energy used by living things on Earth.
6. All living things get their energy from eating other living things.



## Lesson 1

# Abiotic Factors

## Key Concepts

- What are the nonliving parts of an environment?



## Lesson 1

# Abiotic Factors

## Vocabulary

- ecosystem
- biotic factor
- abiotic factor
- climate
- atmosphere



## What is an ecosystem?

- An ecosystem is all the living things and nonliving things in a given area.
- An ecosystem can be a pond, a desert, an ocean, a forest, or your neighborhood.





## What is an ecosystem? (cont.)

- **Biotic factors** are the living things in an ecosystem.
- **Abiotic factors** are the nonliving things in an ecosystem, such as sunlight and water.
- If either a biotic or abiotic factor is disturbed, other parts of the ecosystem are affected.



## What is an ecosystem? (cont.)

### WORD ORIGIN

**biotic**

from Greek *biotikos*, means “fit for life”



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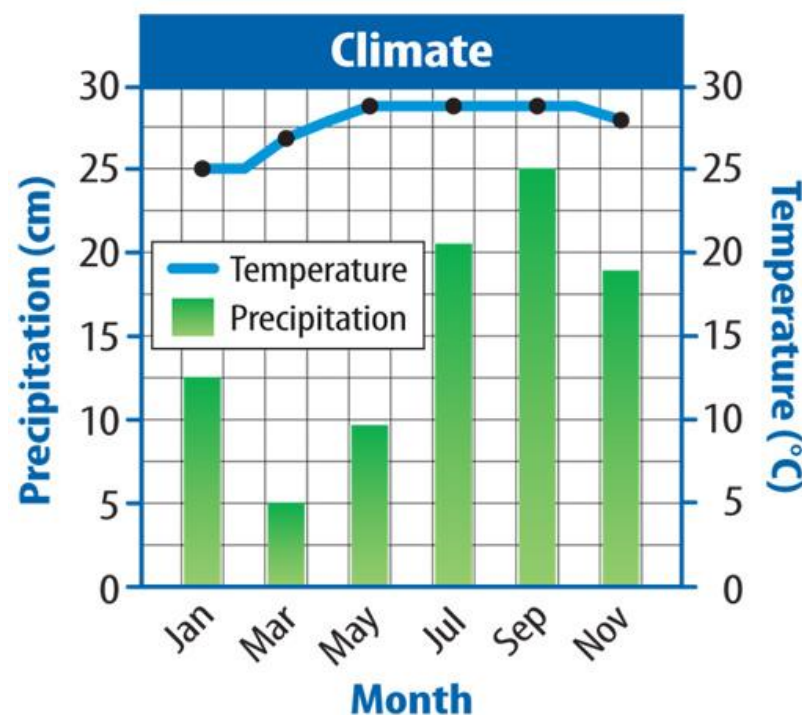


### What are the nonliving parts of an ecosystem?

- The Sun is the source of almost all energy on Earth.
- It provides warmth and light, and many plants use sunlight to make food.

# What are the nonliving parts of an ecosystem? (cont.)

- **Climate** describes average weather conditions in an area over time.
- A climate's weather conditions include temperature, moisture, and wind.



### What are the nonliving parts of an ecosystem? (cont.)

- Temperature is an abiotic factor that influences where organisms can survive.
- Temperatures on Earth vary greatly.

## What are the nonliving parts of an ecosystem? (cont.)

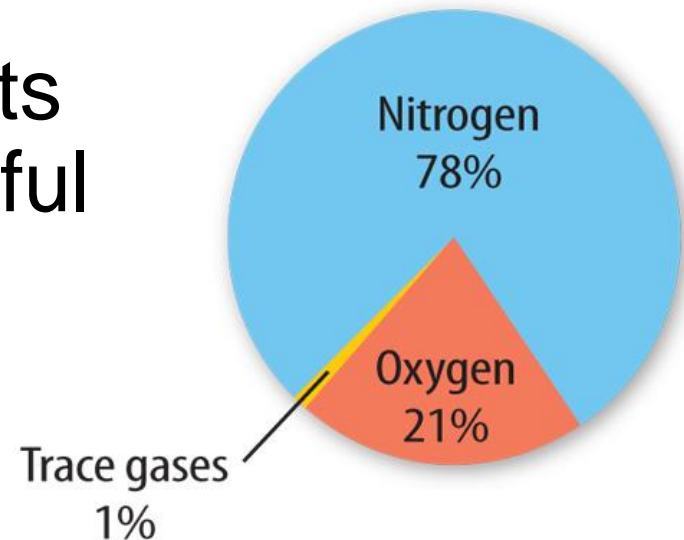
- All life on Earth requires water.
- Most organisms are made mostly of water.
- All organisms need water for important life processes, such as growing and reproducing.
- Every ecosystem must contain some water to support life.



## What are the nonliving parts of an ecosystem? (cont.)

- The atmosphere is the layer of gases that surrounds Earth.
- The atmosphere provides living things with oxygen and protects them from certain harmful rays from the Sun.

Gases in Atmosphere



## What are the nonliving parts of an ecosystem? (cont.)

- Soil is made up of bits of rocks, water, air, minerals, and the remains of once-living things.
- Soil provides water and nutrients for the plants we eat and is home for many organisms, such as insects, bacteria, and fungi.





## What are the nonliving parts of an ecosystem? (cont.)

- Factors such as water, soil texture, and the amount of available nutrients affect the types of organisms that can live in soil.
- Bacteria break down dead plants and animals, returning nutrients to the soil.



## What are the nonliving parts of an ecosystem? (cont.)



### KEY CONCEPT CHECK

List the nonliving things in an ecosystems.



### Summary

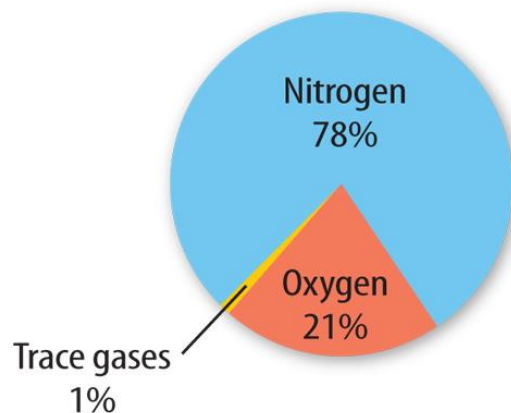
- Ecosystems include all the biotic and abiotic factors in an area.
- Biotic factors are the living things in ecosystems.



### Summary

- Abiotic factors are the nonliving things in ecosystems, including water, sunlight, temperature, climate, air, and soil.

Gases in Atmosphere



## Lesson Review

**Which term refers to the nonliving things in an ecosystem?**

- A. climate factors
- B. biotic factors
- C. abiotic factors**
- D. atmospheric factors



## Lesson Review

**Which of these is the layer of gases that surrounds Earth?**

- A. ecosystem
- B. atmosphere
- C. climate
- D. temperature



## Lesson Review

**A climate's possible weather conditions include which of these?**

- A.** soil, temperature, and moisture
- B.** atmosphere, moisture, and wind
- C.** gases, moisture, and atmosphere
- D.** temperature, moisture, and wind



## Lesson Review

**What do you think** **NOW?**

**Do you agree or disagree?**

1. The air you breathe is mostly oxygen.
2. Living things are made mostly of water.





## Lesson 2

# Cycles of Matter

## Key Concepts

- How does matter move in ecosystems?



## Lesson 2

# Cycles of Matter

## Vocabulary

- evaporation
- condensation
- precipitation
- nitrogen fixation



## How does matter move in ecosystems?

Elements that move through one matter cycle may also play a role in another, such as oxygen's role in the water cycle.



# How does matter move in ecosystems? (cont.)

## SCIENCE USE V. COMMON USE

### element

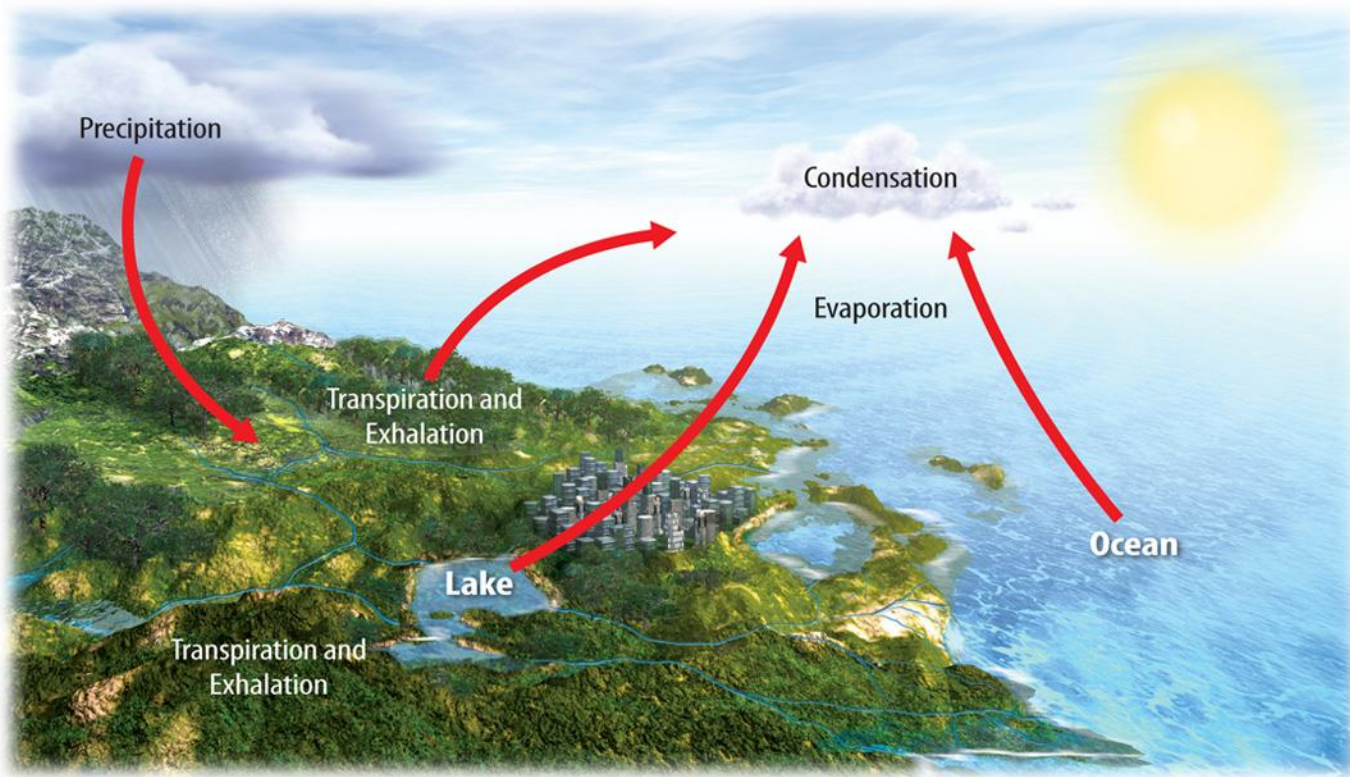
**Science Use** one of a class of substances that cannot be separated into simpler substances by chemical means

**Common Use** a part or piece



During the water cycle, the processes of evaporation, condensation, and precipitation move water from Earth's surface into the atmosphere and back again.

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# The Water Cycle

- **Evaporation** is the process during which liquid water changes into a gas called water vapor.
- Water vapor rises into the atmosphere.
- Temperature, humidity, and wind affect how quickly water evaporates.
- Transpiration is the release of water vapor from the leaves and stems of plants.



## The Water Cycle (cont.)

- **Condensation** is the process during which water vapor changes into liquid water.
- Clouds form because of condensation.
- Clouds are made of millions of tiny water droplets or crystals of ice.



## The Water Cycle (cont.)

- Water that falls from clouds to Earth's surface is called precipitation.
- Precipitation can be rain, snow, sleet, or hail that forms as water droplets or ice crystals join together in clouds.
- Over time, living things use this precipitation, and the water cycle continues.





## The Water Cycle (cont.)



### KEY CONCEPT CHECK

What forms does water take as it moves through ecosystems?



## The Nitrogen Cycle

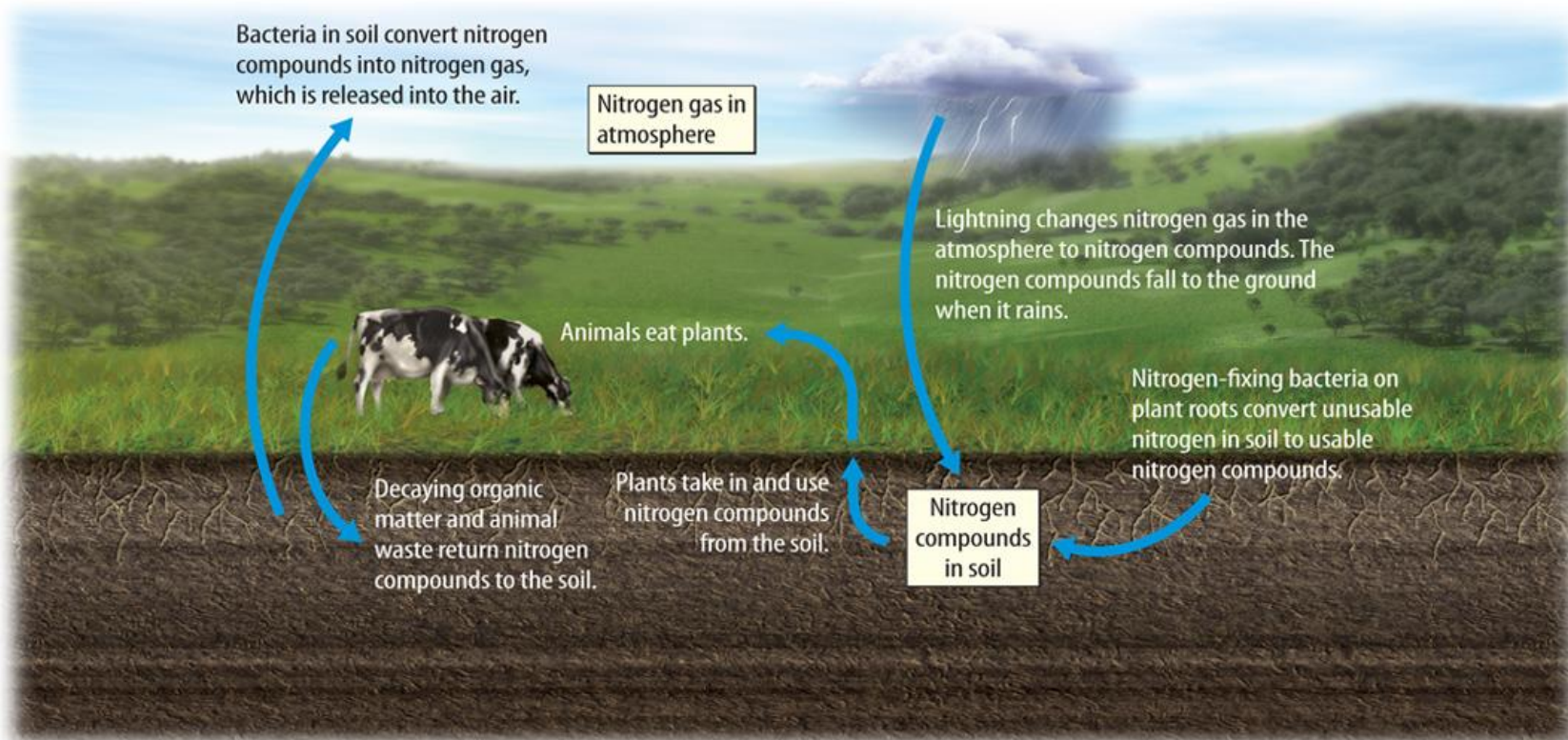
- Nitrogen is an essential part of proteins, which all organisms need to stay alive.
- Nitrogen is also an important part of DNA, the chemical that contains genetic information.
- Nitrogen cycles between Earth and its atmosphere and back again.

## The Nitrogen Cycle (cont.)

- The process that changes atmospheric nitrogen into nitrogen compounds that are usable by living things is called nitrogen fixation.
- When organisms die, bacteria help return nitrogen in the tissues of dead organisms to the environment.
- Nitrogen also returns to the environment in the waste products of organisms.



Nitrogen is found in different forms as it cycles between Earth and its atmosphere.



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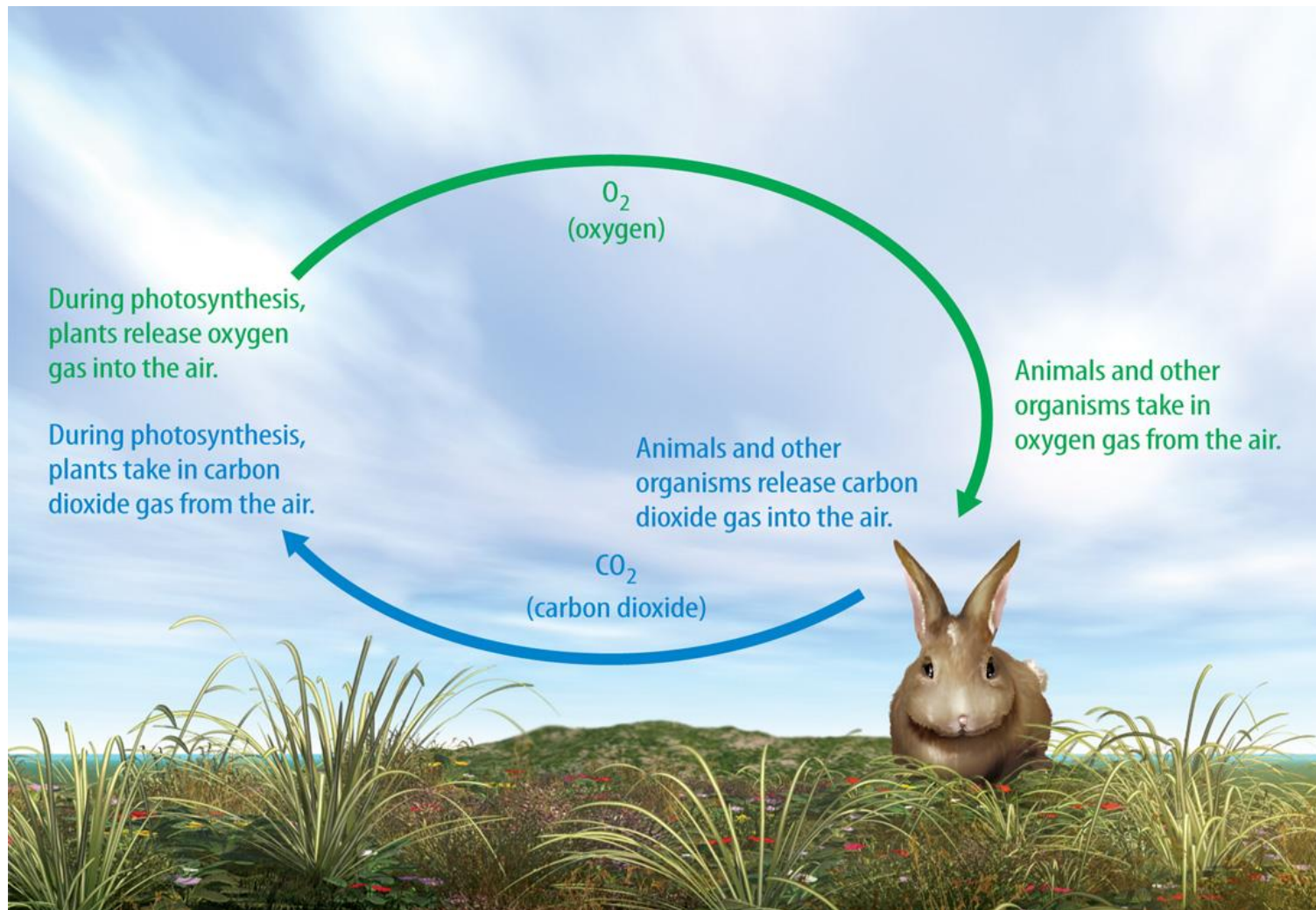


## The Oxygen Cycle

- Oxygen, which cycles through ecosystems, is needed by almost all living organism for cellular processes that release energy.
- Photosynthesis is the primary source of oxygen in Earth's atmosphere.
- Many living things, including humans, take in oxygen and release carbon dioxide.



## The Oxygen Cycle



## The Oxygen Cycle (cont.)

- The interaction of the carbon and oxygen cycles is one example of a relationship between different types of matter in ecosystems.
- As the matter cycles through an ecosystem, both the carbon and oxygen take different forms and play a role in the other element's cycle.



## The Carbon Cycle

- Like other types of matter, carbon cycles through the ecosystem.
- Like nitrogen, carbon can enter the environment when organisms die and decompose, returning carbon compounds to the soil and releasing carbon dioxide into the atmosphere for use by other organisms.

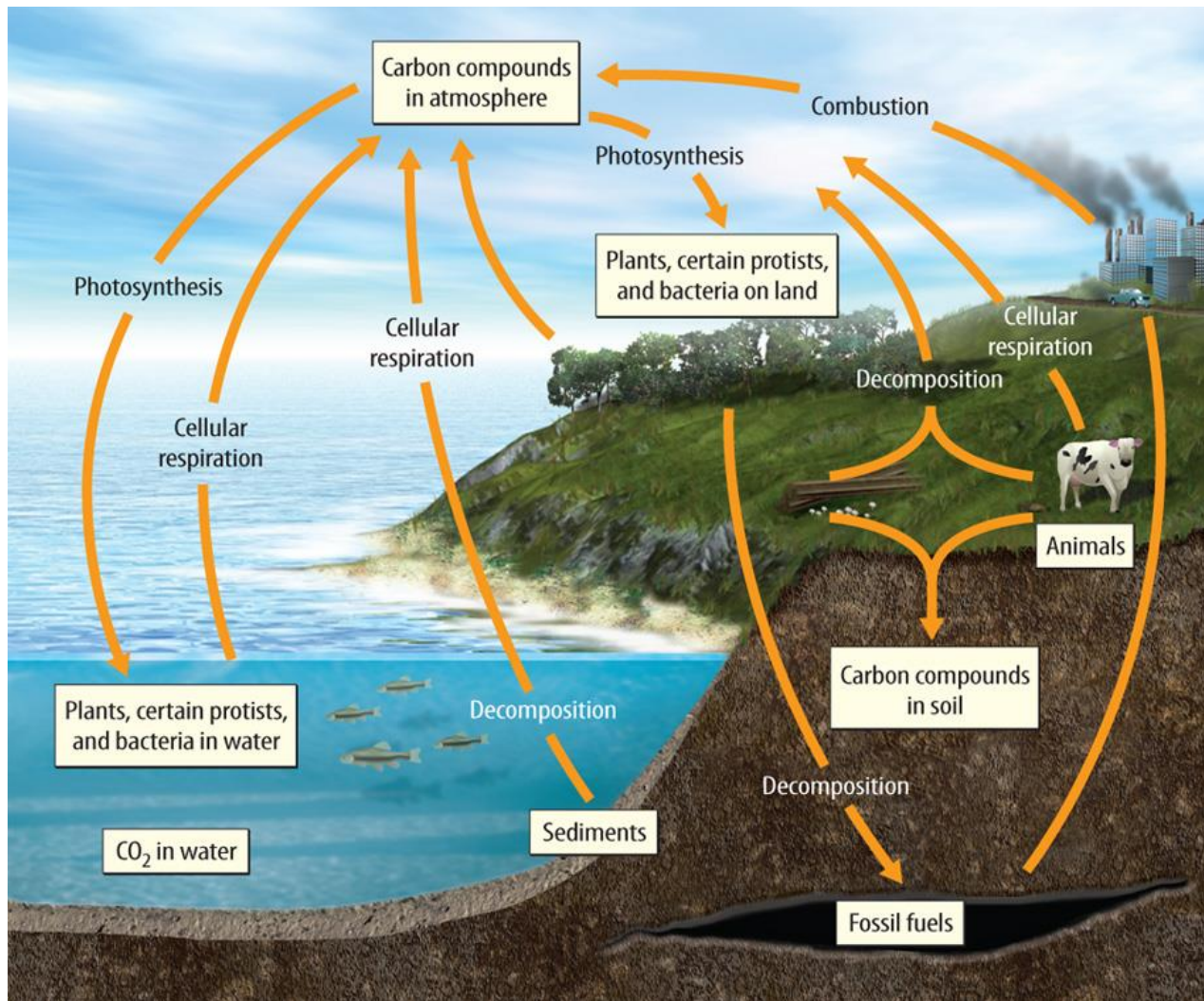




## The Carbon Cycle



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## The Carbon Cycle (cont.)

- Carbon is also found in fossil fuels, which formed when decomposing organisms were exposed to pressure, heat, and bacteria for hundreds of millions of years.
- Plants and other photosynthetic organisms take in carbon dioxide and water and produce energy-rich sugars.



## The Carbon Cycle (cont.)

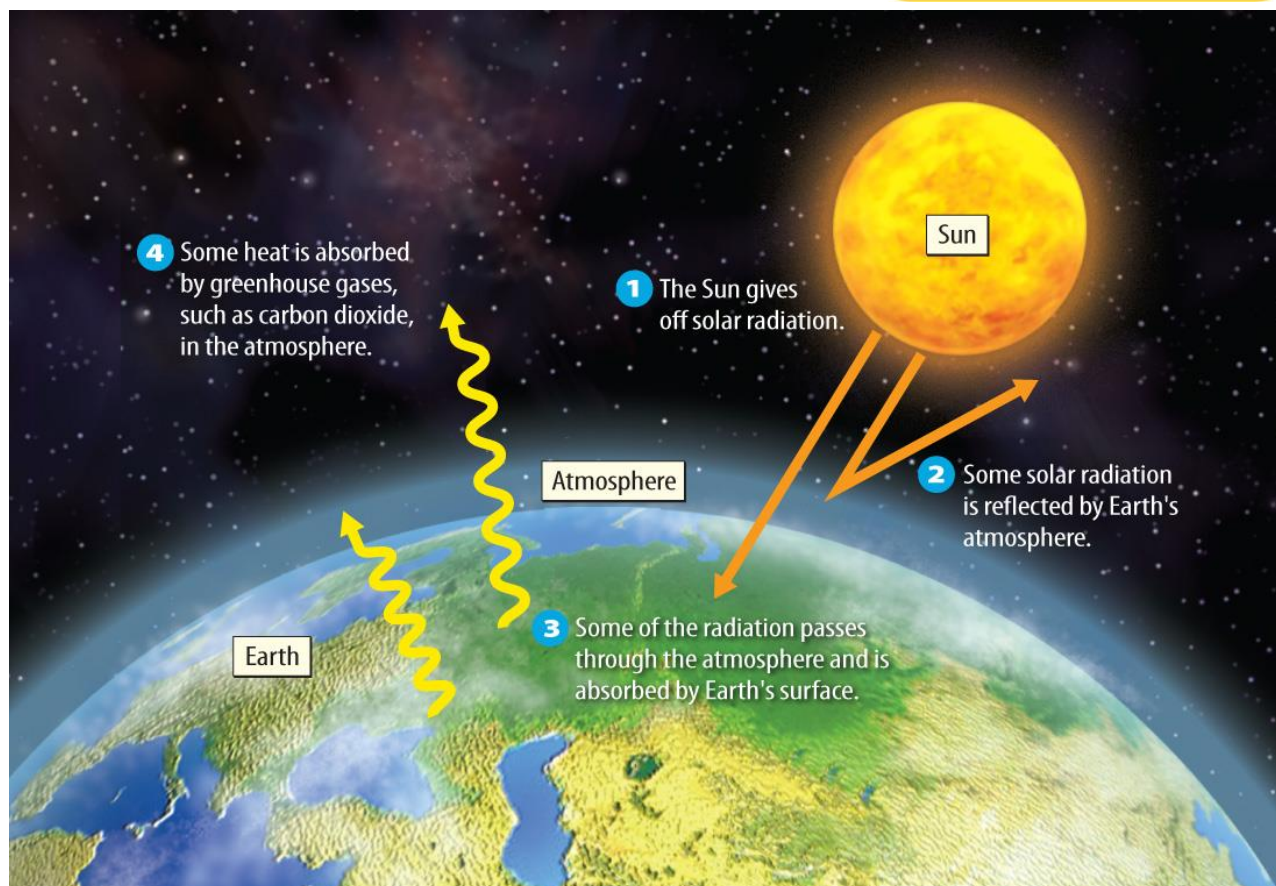
- When the sugar is broken down by cells and its energy is released, carbon dioxide is released as a by-product that enters the atmosphere and can be used again.
- Carbon dioxide is one of the gases in the atmosphere that absorbs thermal energy from the Sun and keeps Earth warm in a process called the greenhouse effect.



While the greenhouse effect is essential for life, a steady increase in greenhouse gases can harm ecosystems.



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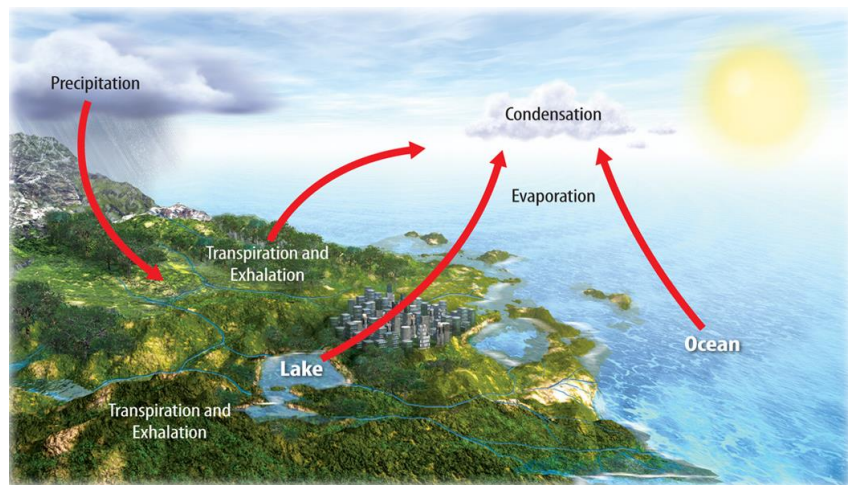


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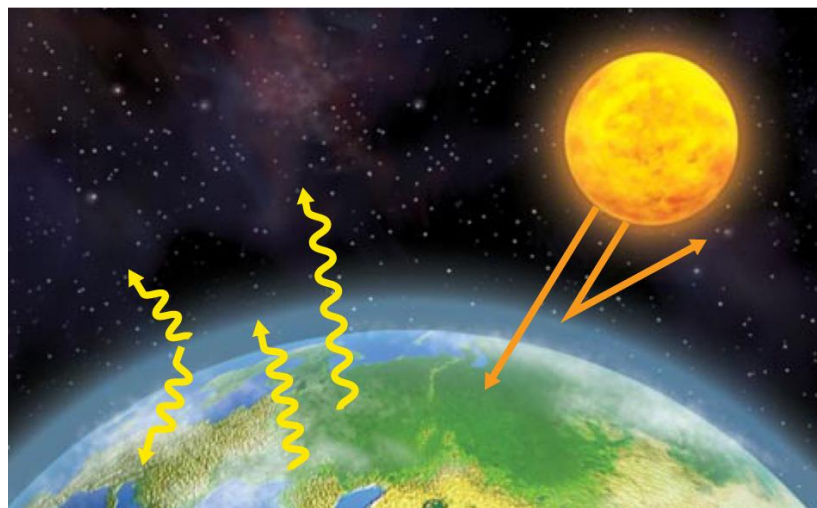
### Summary

- Matter such as water, oxygen, nitrogen, and carbon cycles through ecosystems.
- The three stages of the water cycle are evaporation, condensation, and precipitation.



### Summary

- The greenhouse effect helps keep the Earth from getting too hot or too cold.



## Lesson Review

**Which is a stage of the water cycle?**

- A. melting
- B. freezing
- C. precipitation**
- D. humidity



## Lesson Review

Which of the following is made up of bits of rocks, water, air, minerals, and the remains of once-living things?

- A. bacteria
- B. soil
- C. the atmosphere
- D. carbon





## Lesson Review

**What is the name for the process during which water vapor changes into liquid water?**

- A.** condensation
- B.** evaporation
- C.** precipitation
- D.** the greenhouse effect



## Lesson Review

**What do you think** **NOW?**  
**Do you agree or disagree?**

3. Carbon, nitrogen, and other types of matter are used by living things over and over again.
4. Clouds are made of water vapor.



## Lesson 3

# Energy in Ecosystems

## Key Concepts

- How does energy move in ecosystems?
- How is the movement of energy in an ecosystem modeled?



## Lesson 3

# Energy in Ecosystems

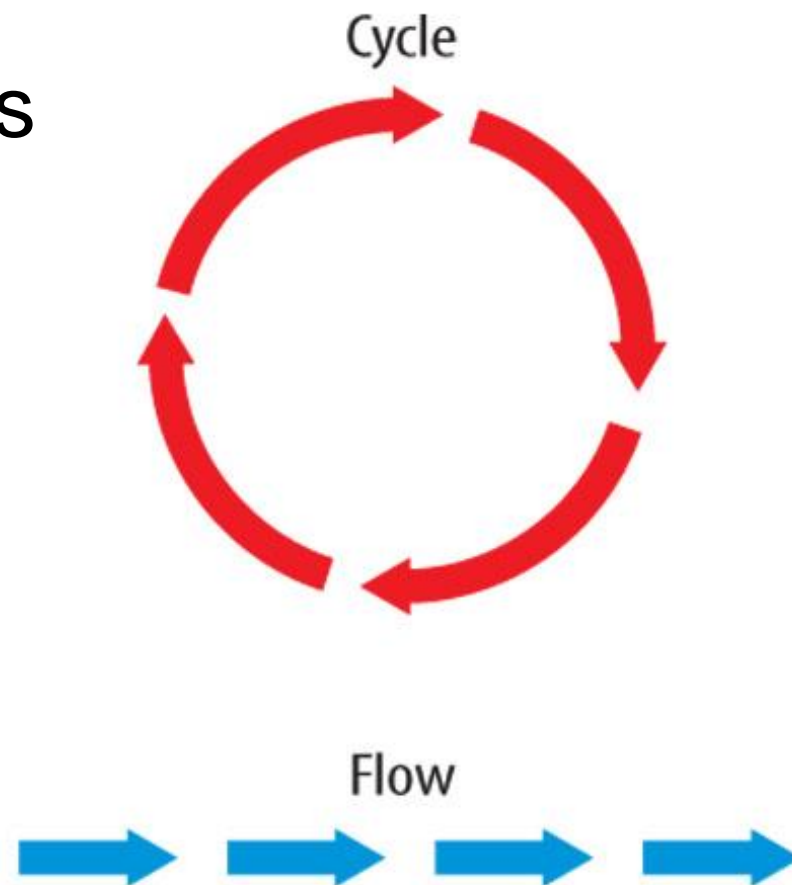
## Vocabulary

- photosynthesis
- chemosynthesis
- food chain
- food web
- energy pyramid



## How does energy move in ecosystems?

- Unlike other resources, energy does not cycle through ecosystems, but flows in one direction.
- In most cases, energy flow begins with the Sun and moves from one organism to another.



### How does energy move in ecosystems?

(cont.)

- Many organisms get energy by eating other organisms.
- Sometimes organisms change energy into different forms as it moves through the ecosystem.
- Some energy an organism gets is released to the environment as thermal energy.



# How does energy move in ecosystems?

(cont.)

The law of conservation of energy states that energy cannot be created or destroyed, but it can change form.



## KEY CONCEPT CHECK

How do the movements of matter and energy differ?



## How does energy move in ecosystems?

(cont.)

- Living things that make their own food from materials in their environment are called producers.
- **Photosynthesis** is the process during which producers use carbon dioxide, water, and light energy to make sugars.
- **Chemosynthesis** is the process during which producers use chemical energy in matter to make food.



## How does energy move in ecosystems?

(cont.)

### WORD ORIGIN

**photosynthesis**

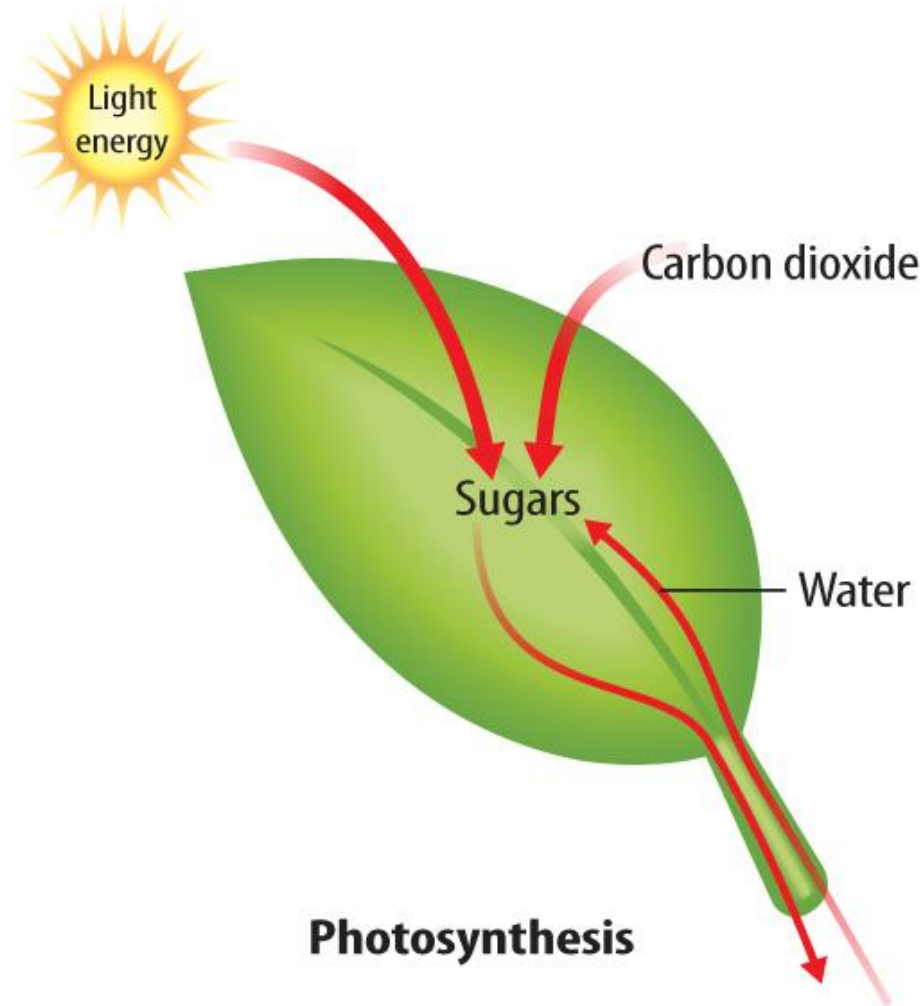
from Greek *photo*, meaning “light”;  
and *synthese*, meaning “synthesis”



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Most producers are photosynthetic.



### How does energy move in ecosystems?

(cont.)

- Consumers do not produce their own energy and can be classified as herbivores, carnivores, omnivores, and detritivores.
  - Herbivores feed on only producers.
  - Carnivores eat other animals and are usually predators.



### How does energy move in ecosystems?

(cont.)

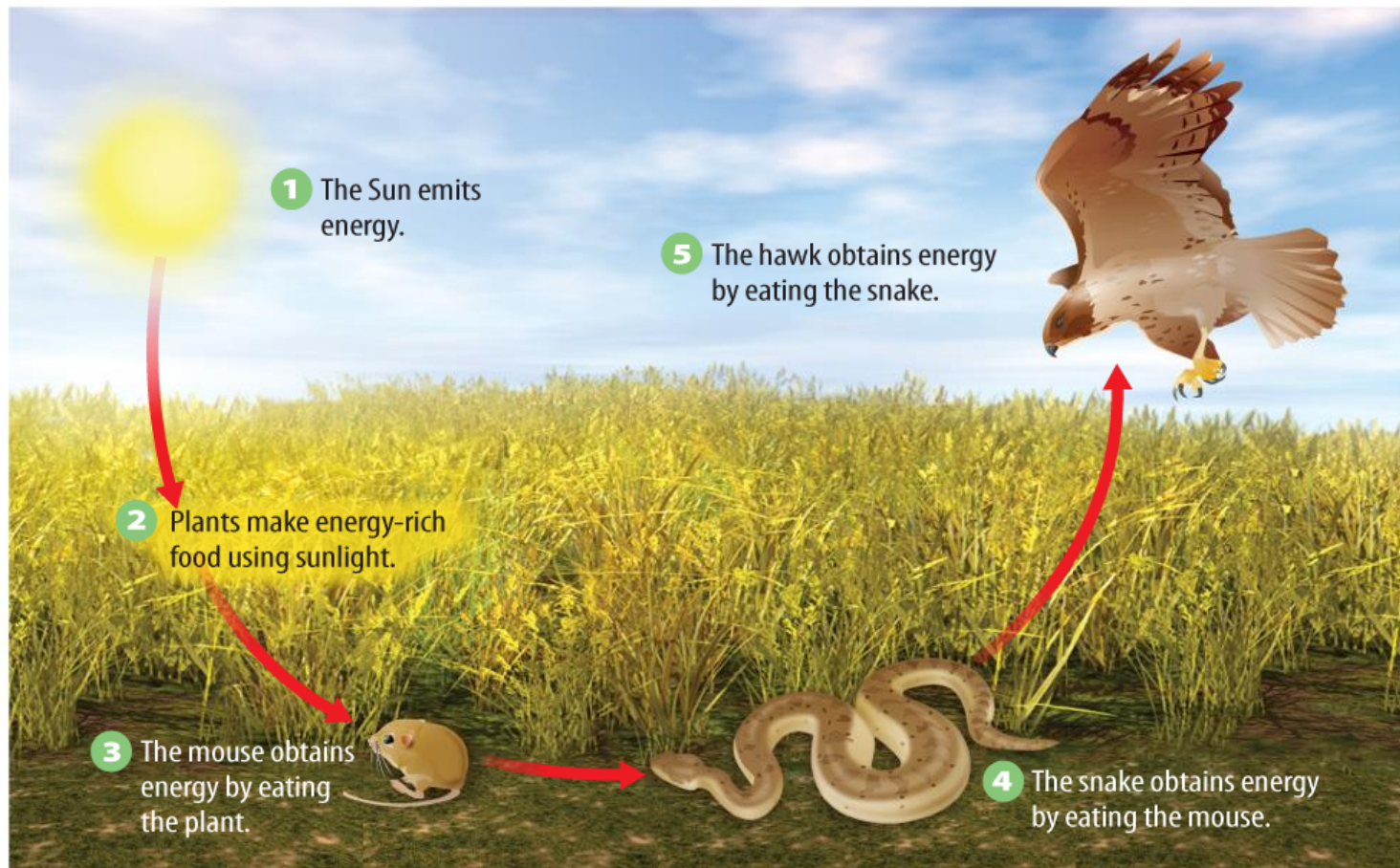
- Omnivores eat both producers and other consumers.
- Detritivores get their energy by eating the remains of other organisms.



## Modeling Energy in Ecosystems

- Scientists use models to study the flow of energy through an ecosystem.
- A **food chain** is a model that shows how energy flows in an ecosystem through feeding relationships.
- The amount of available energy decreases every time it is transferred from one organism to another.

In a food chain, arrows show the transfer of energy.



## Modeling Energy in Ecosystems (cont.)



### KEY CONCEPT CHECK

How does a food chain model energy flow?



## Food Webs

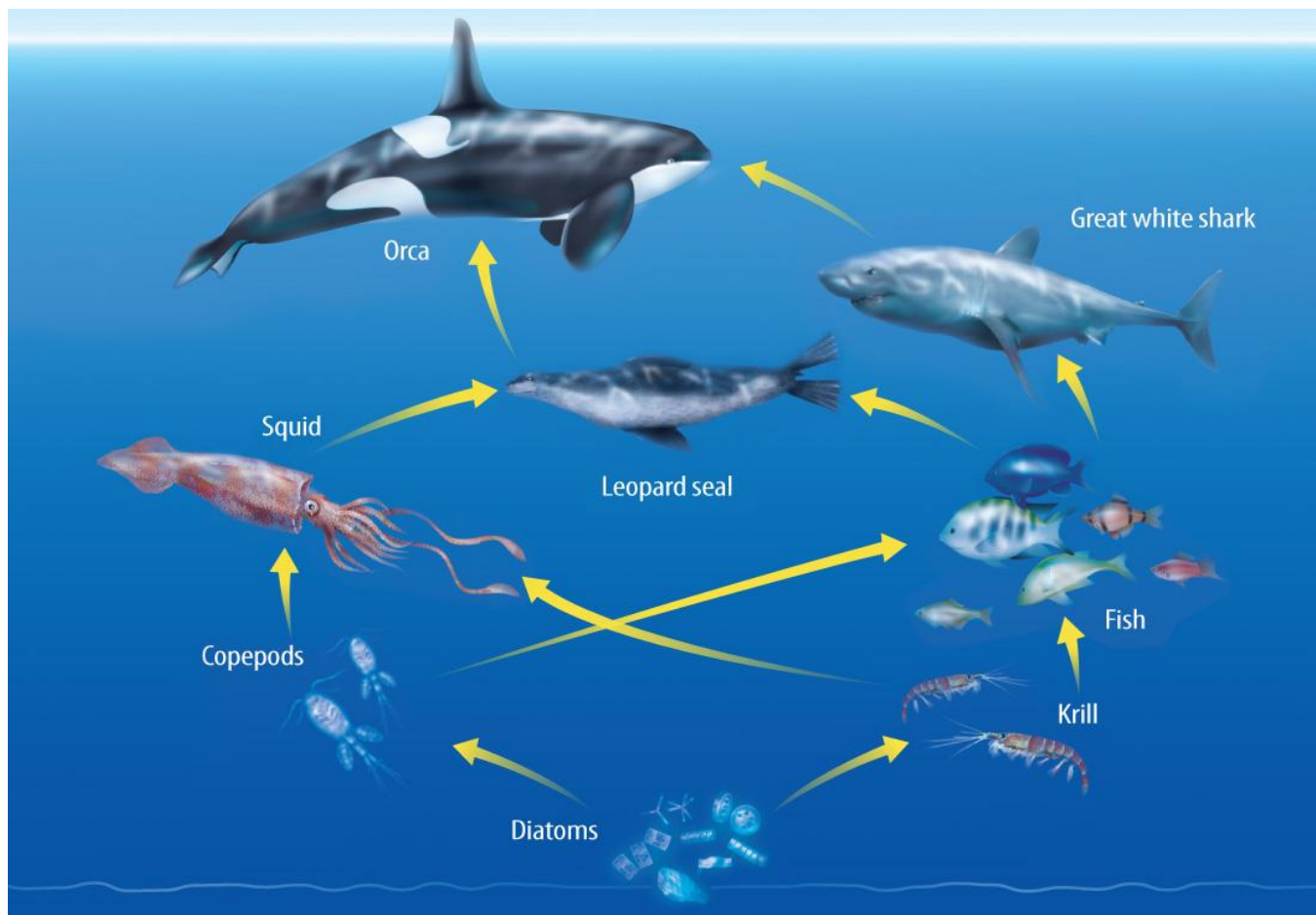
- Scientists use a model called a food web to illustrate all the complex feeding relationships in an ecosystem.
- Some organisms in a food web might be part of more than one food chain in that web.



Like in a food chain, arrows show how energy flows in a food web.



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## Energy Pyramids

- Scientists use a model called an energy pyramid to show the amount of energy available in each step of a food chain.
  - The steps of an energy pyramid are called trophic levels.
  - Producers, such as plants, make up the trophic level at the bottom of the pyramid.

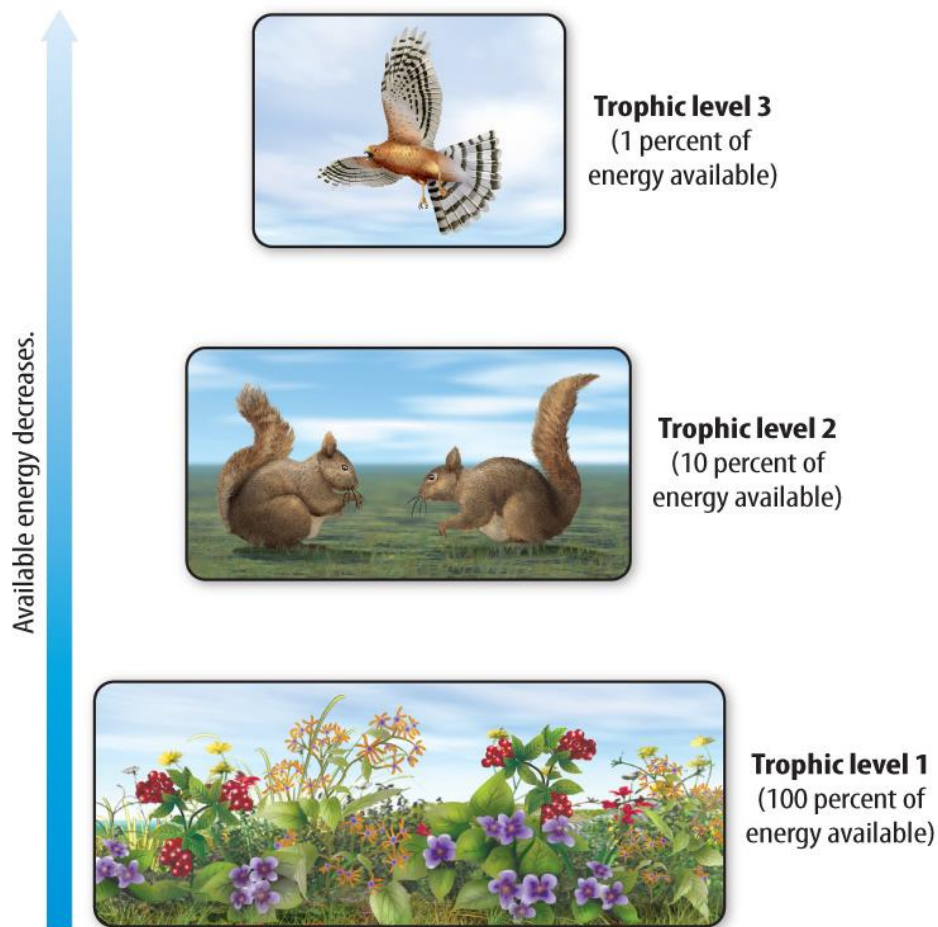


## Energy Pyramids (cont.)

- Consumers that eat producers make up the next trophic level.
- Consumers that eat other consumers make up the highest trophic level.
- Less energy is available for consumers at each higher trophic level.



## Energy Pyramid



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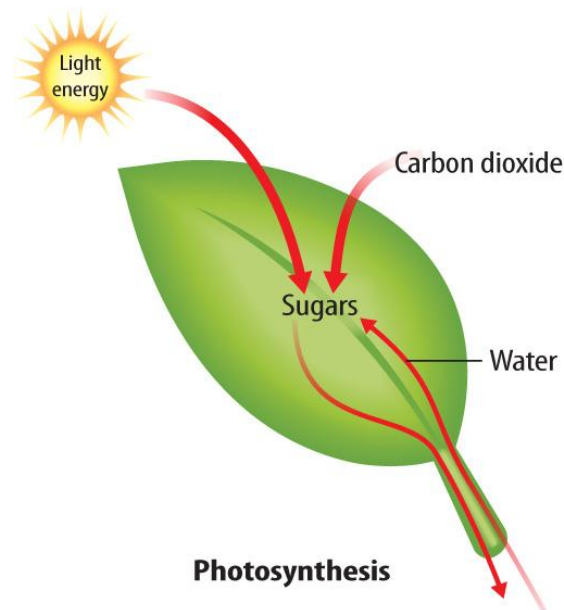
### Summary

- Energy flows in ecosystems from producers to consumers.



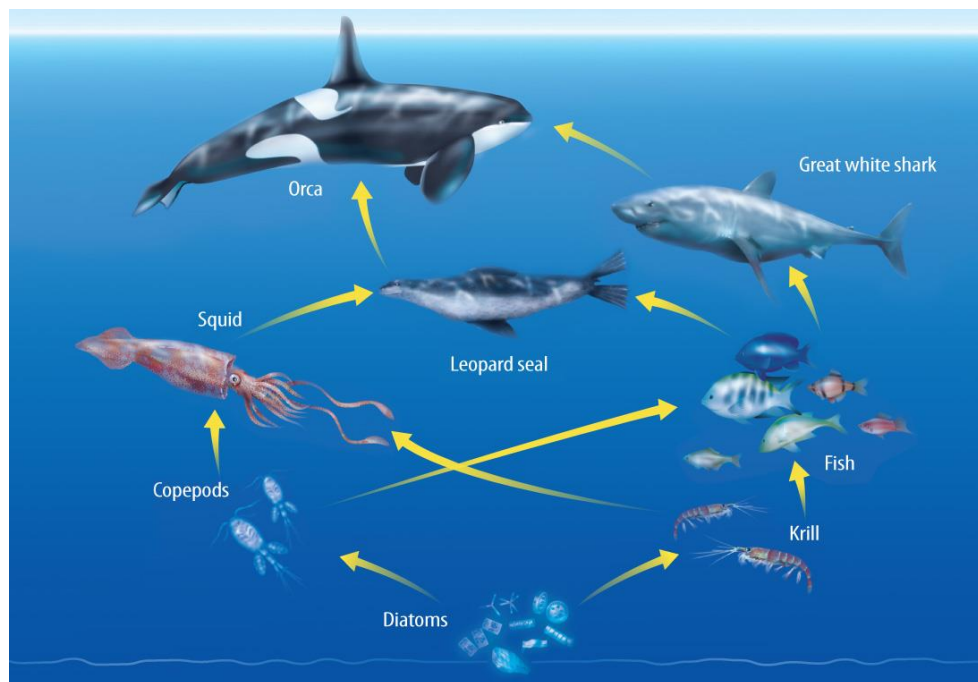
### Summary

- Producers make their own food through the processes of photosynthesis or chemosynthesis.



### Summary

- Food chains and food webs model how energy moves in ecosystems.



## Lesson Review

**What happens to the amount of available energy when it is transferred from one organism to another?**

- A.** it increases
- B.** it remains the same
- C.** it decreases
- D.** it disappears



## Lesson Review

**What model do scientists use to show the amount of energy available in each step of a food chain?**

- A.** a food chain
- B.** a food web
- C.** an energy pyramid
- D.** food pyramids



## Lesson Review

**Which process enables producers to use chemical energy to make food?**

- A.** chemosynthesis
- B.** photosynthesis
- C.** decomposition
- D.** eating



## Lesson Review

**What do you think** **NOW?**  
**Do you agree or disagree?**

5. The Sun is the source for all energy used by living things on Earth.
6. All living things get their energy from eating other living things.



## Menu

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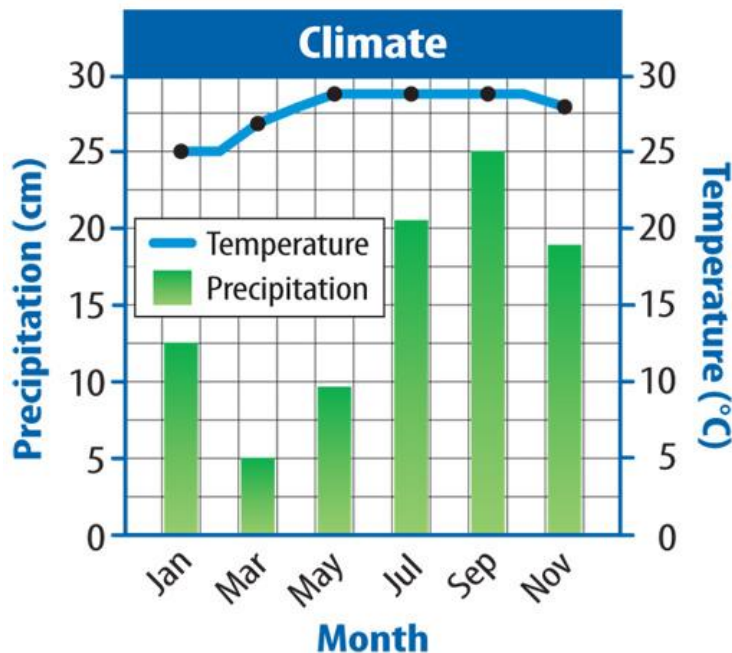


Living things interact with and depend on each other and on the nonliving things in an ecosystem. Matter and energy are recycled through cycles such as the carbon cycle.

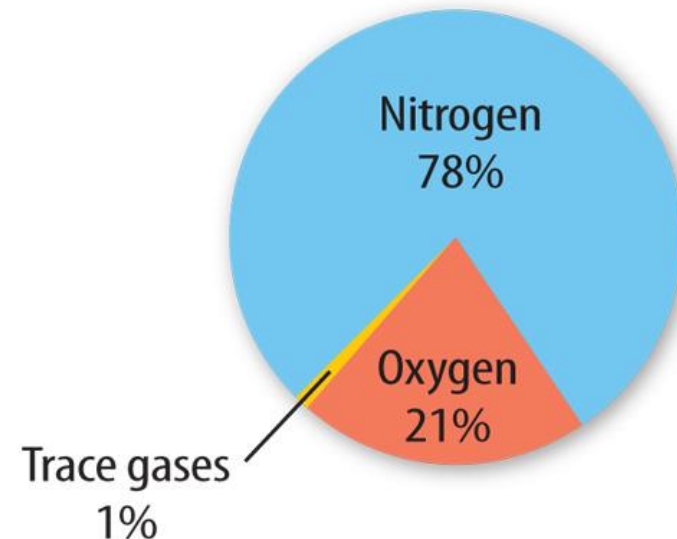


## Lesson 1: Abiotic Factors

- The abiotic factors in an environment include sunlight, temperature, climate, air, water, and soil.

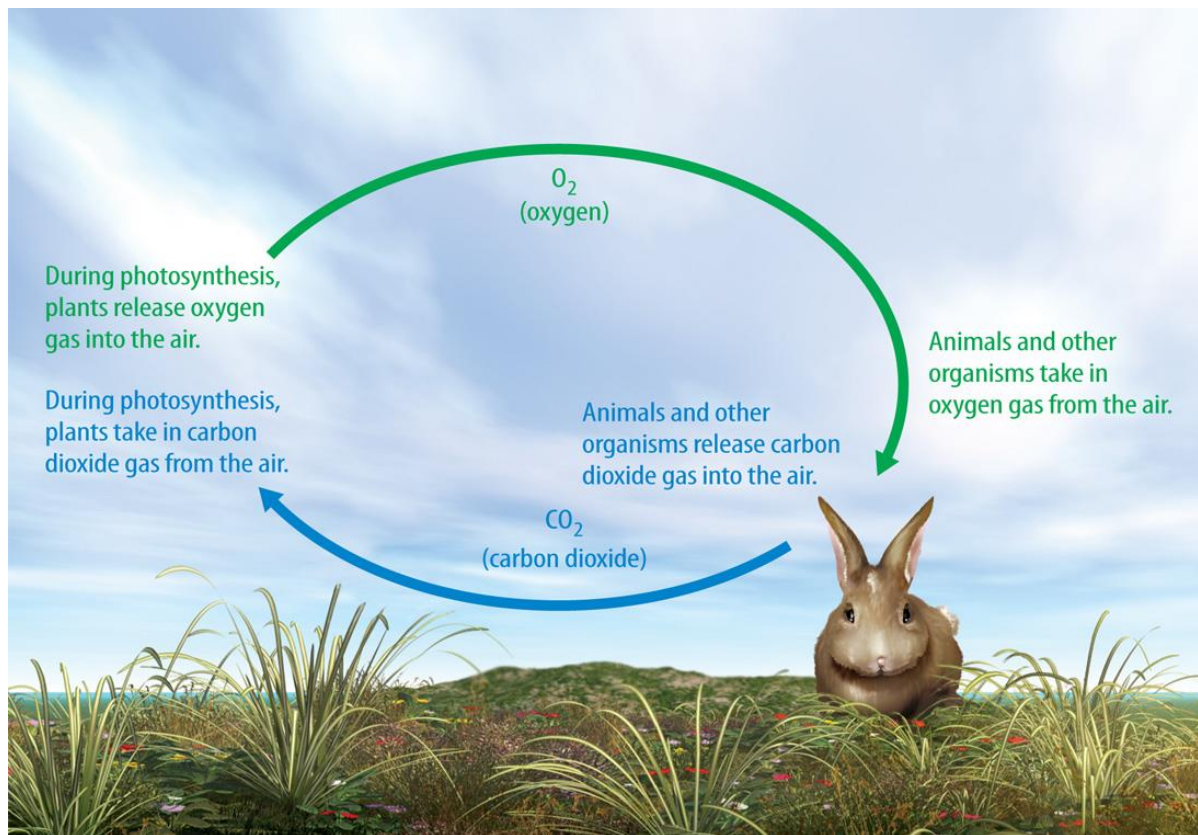


### Gases in Atmosphere



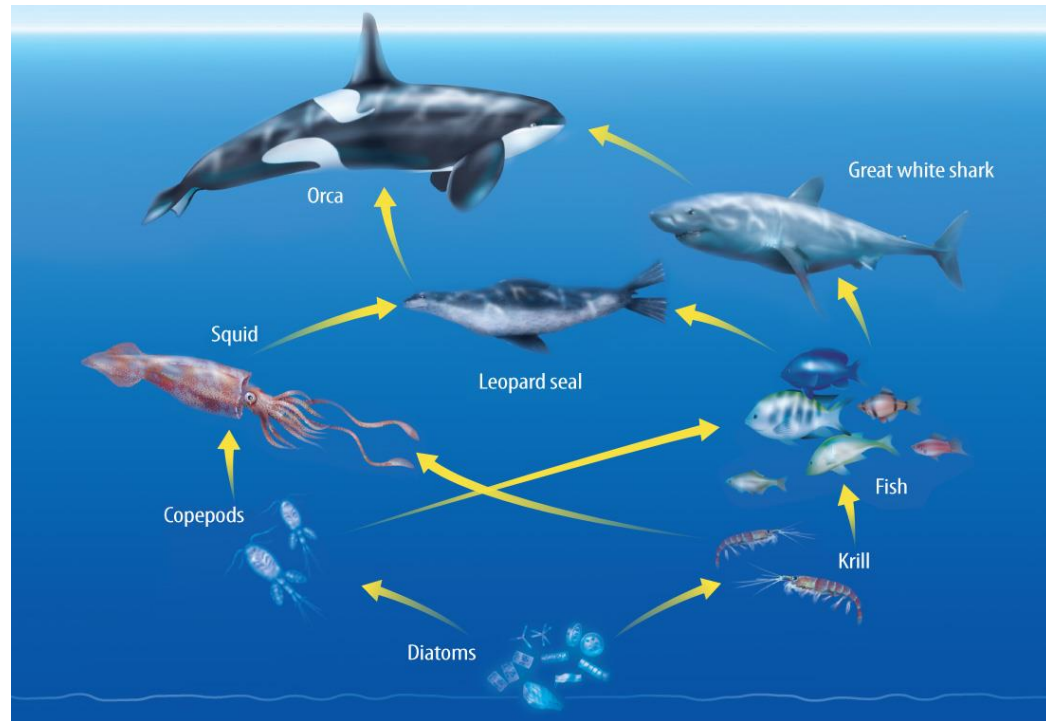
## Lesson 2: Cycles of Matter

- Matter such as oxygen nitrogen, water, carbon, and minerals moves in cycles in the ecosystem.



## Lesson 3: Energy in Ecosystems

- Energy flows through ecosystems from producers to consumers.
- Food chains, food webs, and energy pyramids model the flow of energy in ecosystems.





## Chapter Review

Which term refers to all of the living things in an ecosystem?

- A. abiotic factors
- B. producers
- C. biotic factors
- D. animals



**Chapter Review**

**What is the source of almost all energy on Earth?**

- A.** water
- B.** soil
- C.** climate
- D.** the Sun



## Chapter Review

Which of these refers to water that falls from clouds to Earth's surface?

- A. condensation
- B. evaporation
- C. weather
- D. precipitation**



## Chapter Review

Which process changes atmospheric nitrogen into nitrogen compounds that are usable by living things?

- A. the greenhouse effect
- B. condensation
- C. nitrogen fixation**
- D. the nitrogen cycle



## Chapter Review

Which model do scientists use to show how energy flows in an ecosystem through feeding relationships?

- A.** food chain
- B.** abiotic pyramid
- C.** energy pyramid
- D.** flow of energy



## Standardized Test Practice

Which term refers to all the living things and nonliving things in a given area?

- A. abiotic factor
- B. ecosystem
- C. biotic factor
- D. atmosphere



## Standardized Test Practice

Which of these provides water and nutrients for the plants we eat?

- A. the ocean
- B. the atmosphere
- C. soil
- D. the Sun



## Standardized Test Practice

During which process does liquid water change into a gas called water vapor?

- A.** evaporation
- B.** condensation
- C.** precipitation
- D.** nitrogen fixation





## Standardized Test Practice

Clouds form because of which of these?

- A. precipitation
- B. evaporation
- C.** condensation
- D. nitrogen fixation



## Standardized Test Practice

Which model do scientists use to illustrate all the complex feeding relationships in an ecosystem?

- A. a food chain
- B. a food web
- C. an energy pyramid
- D. an energy web

