

Environmental Systems Guided Notes

Chapter 5: How Ecosystems Work

Section 1: Energy Flow in Ecosystems

Life Depends on the Sun

- Energy from the sun enters an ecosystem when plants use sunlight to make sugar molecules.
- This happens through a process called _____.
- Photosynthesis is the process by which plants, algae, and some bacteria use _____.
- End result of photosynthesis is a _____.
- Gives you energy to do daily activities



From Producers to Consumers

- Because plants make their own food, they are called _____.
- A **producer** is an organism that can make _____.
- Producers are also called _____.
- Organisms that get their energy by eating other organisms are called _____.
- A **consumer** is an organism that eats _____ instead of producing its own nutrients or obtaining nutrients from inorganic sources.
- Consumers are also called _____.

An Exception to the Rule

- Deep-ocean communities of worms, clams, crabs, mussels, and barnacles exist in total darkness on the ocean floor, where photosynthesis cannot occur.
- The producers in this environment are _____ present in the water.

What Eats What?

- Organisms can be classified by what they eat.
- Types of Consumers:
 - Herbivores –
 - Carnivores –
 - Omnivores –
 - Decomposers –
- Consumers that eat producers to get energy are what we call _____.

What Eats What In an Ecosystem		
	Energy source	Examples
Producer	makes its own food through photosynthesis or chemical sources	grasses, ferns, cactuses, flowering plants, trees, algae, and some bacteria
Consumer	gets energy by eating producers or other consumers	mice, starfish, elephants, turtles, humans, and ants
Types of Consumers In an Ecosystem		
	Energy source	Examples
Herbivore	producers	cows, sheep, deer, and grasshoppers
Carnivore	other consumers	lions, hawks, snakes, spiders, sharks, alligators, and whales
Omnivore	both producers and consumers	bears, pigs, gorillas, rats, raccoons, cockroaches, some insects, and humans
Decomposer	breaks down dead organisms in an ecosystem and returns nutrients to soil, water, and air	fungi and bacteria

- In other words they are _____.
- Most of the energy will be used up by the consumer (herbivore).
- A consumer that eats another consumer is called a _____.

Burning the Fuel

- The process of breaking down food to yield energy is called _____.
- Cellular respiration is the process by which cells produce _____; atmospheric oxygen combines with glucose to form water and carbon dioxide.
- Cellular respiration occurs inside the _____ of most organisms.
- During cellular respiration, cells _____.
- Through cellular respiration, cells use _____ and oxygen to produce carbon dioxide, water, and energy.



- Excess energy is stored as _____.

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Energy Transfer

- Each time an organism eats another organism, an _____ occurs.
- This transfer of energy can be traced by studying _____.

Food Chains

- A _____ is a sequence in which energy is transferred from one organism to the next as each organism eats another organism.

Food Webs

- Ecosystems, however, usually contain more than one food chain.
- A _____ shows many feeding relationships that are possible in an ecosystem.

Trophic Levels

- Each step in the transfer of energy through a food chain or food web is known as a _____.
- A trophic level is one of the _____; examples include producers and primary, secondary, and tertiary consumers.
- Each time energy is transferred, some of the energy is lost as _____.
- Therefore, _____ is available to organisms at higher trophic levels.
- One way to visualize this is with an _____.
- Each layer of the pyramid represents one _____ level.
- Producers form the _____ of the energy pyramid, and therefore contain the _____.

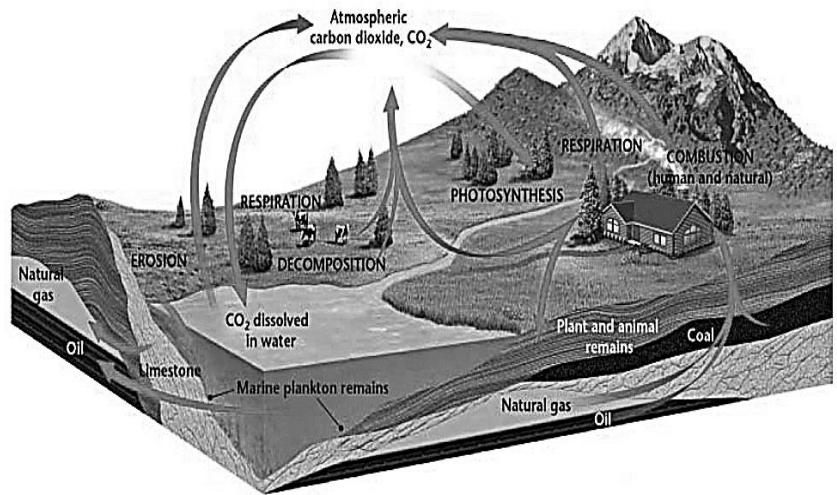
Energy Loss Affects Ecosystems

- Decreasing amounts of energy at each trophic level affects the organization of an ecosystem.
- Energy loss affects the _____ at each level.
- Energy loss limits the _____ in an ecosystem.

Section 2: The Cycling of Materials

The Carbon Cycle

- The _____ is the movement of carbon from the nonliving environment into living things and back
- Carbon is the essential component of _____ which make up all organisms.
- Carbon exists in _____.
- Producers convert _____ in the atmosphere into carbohydrates during photosynthesis.
- Consumers obtain carbon from the carbohydrates in the producers they eat.
- During cellular respiration, some of the carbon is released back into the atmosphere as _____.
- Some carbon is stored in _____, forming one of the largest _____ on Earth.
- Carbon stored in the bodies of organisms as _____, may be released into the soil or air when the organisms dies.
- These molecules may form deposits of _____, which are known as _____.

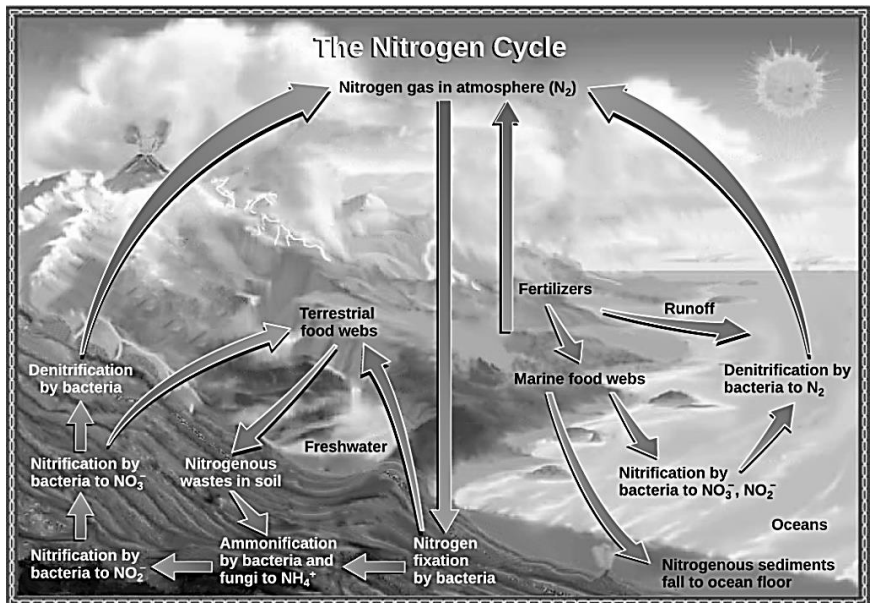


How Humans Affect the Carbon Cycle

- Humans burn fossil fuels, releasing carbon into the atmosphere.
- The carbon returns to the atmosphere as _____.
- Increased levels of carbon dioxide may contribute to _____.
- Global warming is an _____ of the Earth.

The Nitrogen Cycle

- The _____ is the process in which nitrogen circulates among the air, soil, water, plants, and animals in an ecosystem.
- All organisms need nitrogen to _____, which are used to build new cells.
- Nitrogen makes up _____ percent of the gases in the atmosphere.
- Nitrogen must be _____, before organisms can use it.
- These bacteria are known as _____ bacteria.
- _____ are bacteria that convert atmospheric nitrogen into ammonia.
- These bacteria live within the roots of plants called ...



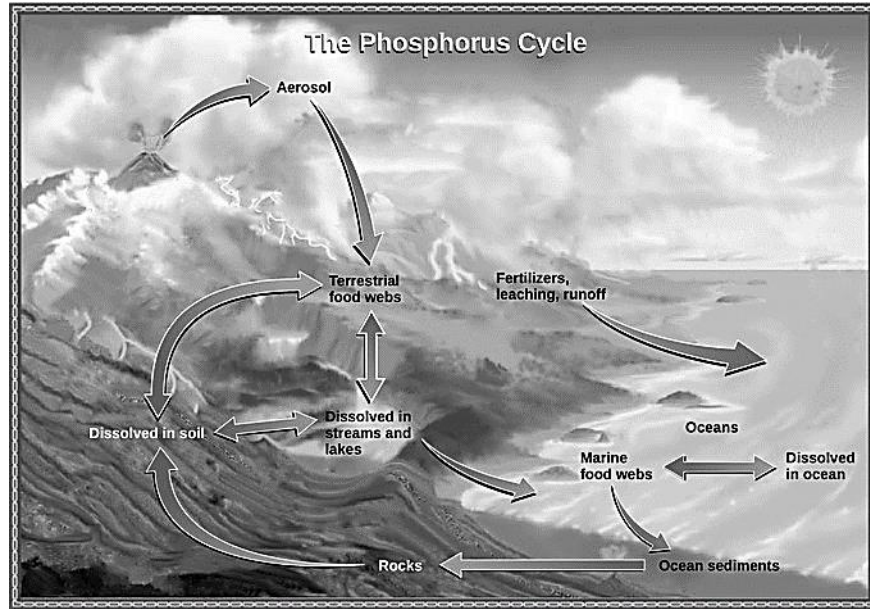
which include beans, peas, and clover.

- The bacteria use sugar provided by the legumes to produce nitrogen-containing compounds such as _____.

Decomposers and the Nitrogen Cycle

- Nitrogen stored within the bodies of living things is returned to the nitrogen cycle once those organisms die.
- _____ break down decaying plants and animals, as well as plant and animal wastes.
- After decomposers return nitrogen to the soil, bacteria transform a small amount of the nitrogen into _____, which then returns to the atmosphere to complete the nitrogen cycle.

The Phosphorus Cycle



- _____ is an element that is part of many molecules that make up the cells of living organisms.
- Plants get the phosphorus they need from _____, while animals get their phosphorus by _____ that have eaten plants.
- The _____ is the cyclic movement of phosphorus in different chemical forms from the environment to organisms and then back to the environment.
- Small amounts of phosphorus dissolve as _____ which moves into the soil.
- Because many phosphate salts are not soluble in water, they sink to the bottom and _____.

Fertilizers and the Nitrogen and Phosphorus Cycles

- _____, which people use to stimulate and maximize plant growth, contain both nitrogen and phosphorus.
- Excessive amounts of fertilizer can enter terrestrial and aquatic ecosystems through _____.
- Excess nitrogen and phosphorus can cause _____.
- Excess algae can deplete an aquatic ecosystem of important nutrients such as _____, on which fish and other aquatic organisms depend.

Acid Precipitation

- When fuel is burned, large amounts of _____ is release into the atmosphere.

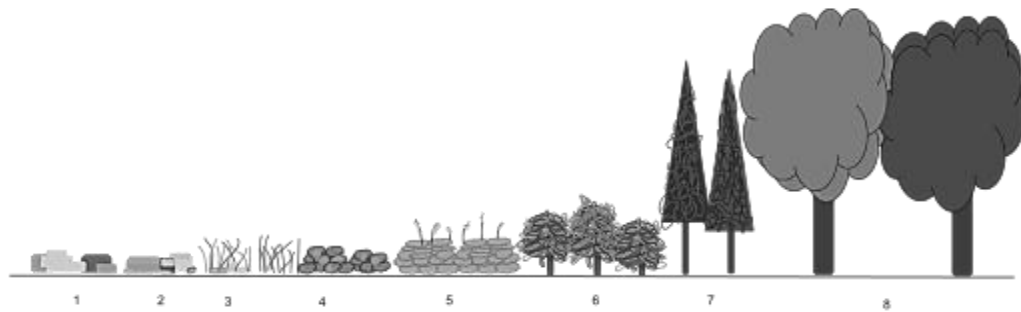
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- In the air, nitric oxide can combine with oxygen and water vapor to form _____.
- Dissolved in rain or snow, the nitric acid falls as _____.

Section 3, How Ecosystems Change

Ecological Succession

- Ecosystems are constantly changing.



- _____ is a gradual process of change and replacement of the types of species in a community.
- _____ is a type of succession that occurs on a surface where _____.
- It begins in an area that previously did not support life.
- Primary succession can occur on _____.
- _____ occurs on a surface where an ecosystem has _____.
- It is the process by which one community replaces another community that has been _____.
- Secondary succession can occur in ecosystems that have been _____ by humans, animals, or by natural process such as storms, floods, earthquakes, or volcanic eruptions.
- A _____ is a species that colonizes an _____ and that starts an ecological cycle in which many other species become established.
- A _____ is the final, stable community in equilibrium with the environment.
- Even though a climax community may change in small ways, this type of community may remain the same through time if it is not disturbed.
- _____ caused by lightning are a necessary part of secondary succession in some communities.

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- Minor forest fires remove _____ that would otherwise contribute to major fires that burn out of control.
- _____ is a type of _____ succession that occurs when farmland is abandoned.
- _____ can occur on new islands created by _____.

Ecological Succession

- The first pioneer species to colonize bare rock will probably be _____, which can live without soil.
- The growth of lichens _____, which with the action of water, begins to form soil.