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The biosphere: biogeochemical cycles

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CONCEPT REVIEW 34
Complete this concept review handout and keep it as a record of what you have learned.

Definitions

- The biosphere is *the layer around the Earth containing all living organisms.*
- A biogeochemical cycle is *a set of processes by which an element passes from one environment to the next and eventually returns to its original environment, in an infinite loop of recycling.*
- The carbon cycle is *a biogeochemical cycle involving all the exchanges of carbon on Earth.*
- The nitrogen cycle is *a biogeochemical cycle involving all the exchanges of nitrogen on Earth.*
- The phosphorous cycle is *a biogeochemical cycle involving all the exchanges of phosphorous on Earth.*

Layers of the Earth

Layer	Corresponds to
Lithosphere	The solid surface
Hydrosphere	*Water*
Atmosphere	*The air*
Biosphere	*Living organisms and their environments*

Processes involved in biogeochemical cycles

Process	Examples
Biological	• Respiration • Digestion
Geological	• *Erosion* • *Sedimentation*
Chemical	• *Combustion* • *Synthesis*

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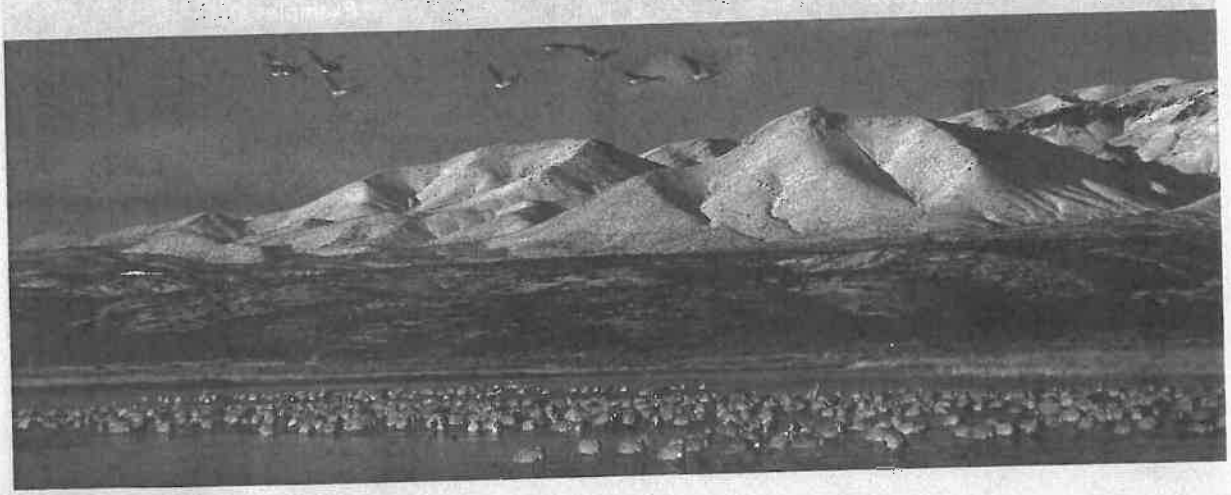
Carbon, nitrogen and phosphorous cycles

Element	Biological utility	Transformations
Carbon	• Makes up the tissues of living organisms	• Photosynthesis • Ingestion • Respiration • Decomposition of waste • Forest fires • Shells and skeletons • Carbonate rock • Volcanic eruptions • Fossil fuels
Nitrogen	Manufactures proteins and DNA	• Nitrogen fixation • Nitrification • Nitrogen absorption by plants and animals • Decomposition of waste • Denitrification
Phosphorous	• Basic component of DNA • Forms shells, bones and teeth	• Erosion • Absorption by living organisms • Decomposition of waste • Proliferation of plankton and sedimentation



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Biomes: distribution factors and terrestrial biomes

PAGES 262 TO 272

CONCEPT REVIEW 35
Complete this concept review handout and keep it as a record of what you have learned.

Definition

- Biomes are *large regions of the world with distinctive climates, wildlife and vegetation.*

Factors determining biome distribution

Terrestrial biomes	Aquatic biomes
• *Latitude*	• *Salinity*
• *Altitude*	• *Turbidity (water clarity)*
• *Temperature*	• *Temperature*
• *Precipitation*	• *Direction and strength of the current*
• *Soil type*	• *Presence of oxygen (O_2) and carbon dioxide (CO_2) for respiration and photosynthesis*
• *Solar energy (exposure to sunlight)*	• *Solar energy (exposure to sunlight)*
• *Winds*	• *Nutrients (type, amount, etc.)*
• *Proximity to bodies of water*	• *Water depth*

Main terrestrial biomes

Biome	Location	Climate	Flora
Tropical forests	• *Located between the Tropic of Cancer and the Tropic of Capricorn*	• *Mean annual temperatures of 20°C to 34°C* • *Seasonal or evergreen*	• *Seasonal forests* • *Evergreen forests*
Boreal forests	• *Located in the Northern Hemisphere* • *Form a green belt belów the Arctic Circle*	• *Long, cold winters* • *Long days in the summer*	• *Conifers (mainly black spruce)* • *Forest floor carpeted with moss and lichen*

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Main terrestrial biomes (cont.)

Biome	Location	Climate	Flora
Temperate forests	• Located in southern Canada, the United States, Europe and part of Asia	• Mean annual temperatures of 8°C to 10°C • High precipitation throughout the year	• In the northernmost regions like Québec, mixture of conifers and deciduous varieties • Farther south, primarily deciduous trees
Grasslands and shrublands	• Many are located in central North America	• In the temperate grasslands: Hot summers and long, cold winters • In the savannas: hot all year long	• Grasses and shrubs • Three types of grasslands and shrublands: temperate grasslands, savannas, derived grasslands
Arctic tundra	• Located to the north of the boreal forest • Forms a ring around the North Pole	• Long, cold winters • Very short summers • Permanently frozen ground	• Grasses • Stunted bushes • Moss • Lichen
Deserts	• At all latitudes	• Low precipitation (less than 25 cm per year) • Extreme temperatures	• Rare plant life
Alpine biomes	• Any high-altitude area in the world	• Varies according to altitude (the temperature drops by about 0.6°C per 100 m.)	• Vegetation zones: Submontane (deciduous forests and grain crops), montane (conifers), subalpine (highest zone), alpine (bushes and grasses), nival (lichen)

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CONCEPT REVIEW 36
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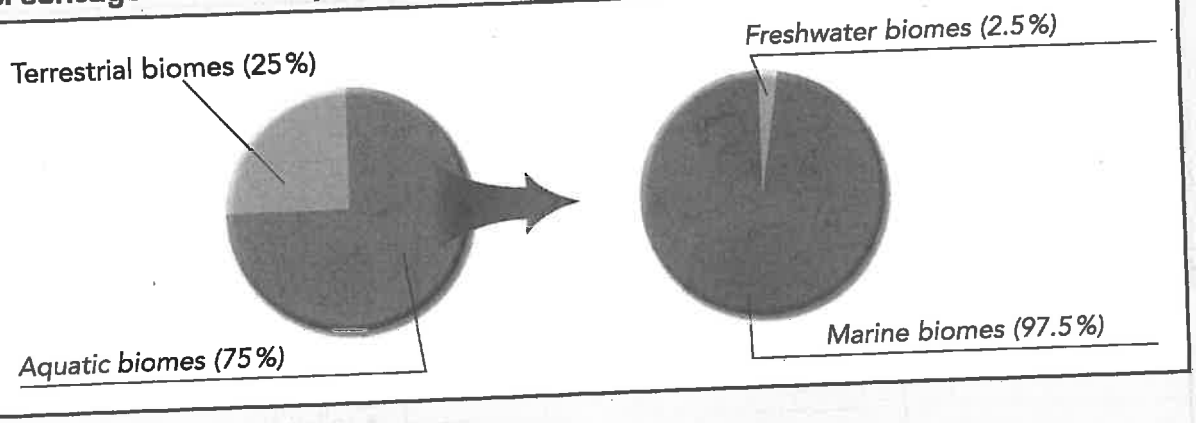
Aquatic biomes

Percentage covered by aquatic biomes



Salinity of water

Freshwater: *Less than 0.05%.* Salt water: *Greater than 3%.*

Freshwater biomes

Biome	Definition	Examples of organisms living there
Lakes	*Bodies of water surrounded by land and fed by springs, rivers or precipitation.*	• *Plants* • *Plankton* • *Fish* • *Poissons* • *Amphibians* • *Reptiles* • *Birds*
Rivers	*Streams and rivers that form fpermanent or seasonal drainage channels for surface water.*	• *Moss* • *Grass*
Wetlands: • Marshes • *Swamps* • *Peat bog*	Areas permanently or temporarily covered with water.	Plants that grow in water saturated soil.

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Marine biomes

Biome	Definition	Examples of organisms living there
Estuary	*Broadening at the mouths of rivers acting as a mixed zone between the maritime and river environments.*	• *Belugas* • *Oysters* • *Sponges*
Oceans and seas	Bodies of water that are subdivided according to the depth of the water.	• *Phytoplankton* • *Crustaceans* • *Fish* • *Jellyfish* • *Mollusks* • *Birds* • *Mammals*
Coral reefs	Environments characterized by the presence of calcium carbonate produced by coral.	Between 500 000 and two million plant and animal species live there.