

## CHAPTER 34 The Biosphere

### Summary of Key Concepts

#### Concept 34.1 The biosphere is the global ecosystem. (pp. 744–749)

The scientific study of the interactions among organisms and between organisms and their environments is called *ecology*. Ecologists study the relationships among biotic and abiotic factors. All the living organisms in the environment are called *biotic factors*. The nonliving physical and chemical conditions are called *abiotic factors*. Ecologists conduct studies at five increasingly larger levels: individual organisms, populations, communities, ecosystems, and the biosphere. A *population* is a group of organisms of the same species living in a particular area. A *community* is made up of all of the organisms living in a particular area. An *ecosystem* is made up of the abiotic factors and the biotic factors in an area. The *biosphere* includes all of Earth’s ecosystems.

The biosphere is “patchy”—a particular area may contain an uneven distribution of different ecosystems. This patchiness creates different *habitats*, or specific environments in which organisms live. Each habitat has characteristic abiotic and biotic factors. Abiotic factors that define different habitats include amount of sunlight, availability of water, temperature, soil type, wind, and number and type of disturbances. Major natural disturbances that affect ecosystems include fires, hurricanes, tornadoes, and volcanic eruptions.

1. What are the five levels of ecological study? \_\_\_\_\_  
\_\_\_\_\_
2. What are habitats, and what creates habitats? \_\_\_\_\_  
\_\_\_\_\_
3. Distinguish biotic factors from abiotic factors. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### Concept 34.2 Climate determines global patterns in the biosphere. (pp. 750–752)

The climate of a region mostly determines the type of ecosystem found there. Earth’s climates are mainly produced by the uneven heating of Earth by the sun. Different locations on Earth’s surface receive different amounts of solar energy. As a result, Earth’s surface can be divided into different temperature zones based on lines of latitude. The region that lies between 23.5° N latitude and 23.5° S latitude, called the *tropics*, is the warmest temperature zone. The region north of the Arctic Circle and the region south of the Antarctic Circle, called the *polar zones*, are the coldest temperature zones. The latitudes between the tropics and the polar zones, called the *temperate zones*, experience less extreme heat and cold.

The uneven heating of Earth’s surface also affects global patterns of winds and precipitation. When air is warmed it can absorb more moisture, and it tends to rise. The rising and falling of air masses, combined with

Earth's rotation, produce predictable wind patterns. These wind patterns produce surface currents in the oceans. A *current* is a river-like flow pattern within a body of water. Surface currents can greatly affect the climates of land areas. Large bodies of water may create variations in local climates. Mountains also affect local climates. Specific locations in a climate region may be exposed to different conditions created by shade, snow cover, or wind-breaks. Such small-scale differences in climate result in a *microclimate*, a climate in a specific area that varies from the surrounding climate region.

4. What produces surface currents in the ocean? \_\_\_\_\_  
\_\_\_\_\_

5. What creates a microclimate? \_\_\_\_\_  
\_\_\_\_\_

**Concept 34.3 Biomes are the major types of terrestrial ecosystems.**  
(pp. 753–757)

The major types of terrestrial ecosystems that cover large regions of Earth are called *biomes*. Each biome has typical communities of organisms that are adapted to its climate and other abiotic factors. There are eight major biomes: tropical forest, savanna, desert, chaparral, temperate grassland, temperate deciduous forest, coniferous forest, and tundra. Tropical forests occur near the equator where temperatures are warm year-round. One type of tropical forest is the *tropical rain forest*, which can receive as much as 350 centimeters of rainfall yearly. Of all the biomes, tropical rain forests have the greatest diversity of life. A *savanna* is a grassland with scattered trees. *Deserts* are land areas that receive less than 30 centimeters of rain per year. The *chaparral* is a temperate coastal biome dominated by dense evergreen shrubs. The *temperate grassland* has deep, nutrient-rich soil that supports a variety of grass species and other plants. The *temperate deciduous forest* has dense stands of deciduous trees—trees that drop their leaves each year. The *coniferous forest* has towering cone-bearing evergreen trees such as pines and firs. The *tundra* has bitterly cold temperatures and high winds. The permanently frozen subsoil of the tundra is called *permafrost*.

6. In what ways does each biome differ from the other biomes? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. How do the biotic factors of a savanna differ from those of a chaparral?  
\_\_\_\_\_  
\_\_\_\_\_

**Concept 34.4 Aquatic ecosystems make up most of the biosphere.**  
(pp. 758–761)

Major abiotic factors that affect aquatic (water) ecosystems include the amount of dissolved salt in the water, the temperature of the water, and the availability of sunlight (how much sunlight reaches into the water). Freshwater ecosystems include bodies of water with very little dissolved salt, such as ponds, lakes, streams, and rivers. Lakes and large ponds are divided into zones. The *photic zone*, in which light is available for photosynthesis, includes

the shallow water close to shore and the upper zone of water away from shore. Organisms in the photic zone include water plants and *phytoplankton*, microscopic algae and bacteria that carry out photosynthesis. The deep areas of a lake, where light levels are low, are called the *aphotic zone*. The bottom of any aquatic ecosystem is called the *benthic zone*. A body of flowing fresh water is known as a river or a stream. An area where a stream or river mixes with ocean water is called an *estuary*.

The ocean is also divided into different zones. Zones based on depth include the benthic zone—the ocean floor—and the *pelagic zone*—the open ocean above the ocean floor. Like a lake, the ocean has a photic zone and an aphotic zone. The area of shore between the high-tide and low-tide lines is called the *intertidal zone*. The area of the ocean from the low-tide line out to the edge of the continental shelf is the *neritic zone*. The vast ocean beyond the edge of the continental shelf is called the *oceanic zone*. Organisms that live in the photic oceanic zone include phytoplankton and *zooplankton*, or microscopic animals. Coral reefs—formed by colonies of coral animals—are mostly found in the ocean’s neritic zone. In the deep ocean, many unfamiliar species live around deep-sea hydrothermal vents. *Hydrothermal vents* are spots on the ocean floor where hot gases and minerals escape from Earth’s interior into the water. Vent communities use the chemical energy from Earth’s interior rather than sunlight as their energy source.

8. Explain why phytoplankton live in the photic zone rather than the aphotic zone. \_\_\_\_\_
9. What abiotic factors characterize a hydrothermal vent? \_\_\_\_\_

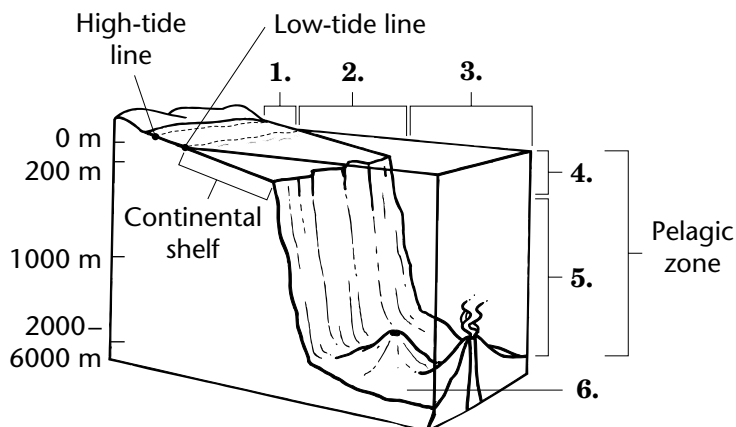
### Reading Skills Practice

**Outlining** Make an outline of Concept 34.3, pages 753–757. Use the blue headings in your textbook for the first level of your outline. Complete your outline by writing the main ideas about each biome under its heading. Include typical biotic factors and abiotic factors for each biome.

### Vocabulary Review and Reinforcement

In 1–6, study the diagram of the ocean. Then fill in the blanks with the appropriate terms from the chapter.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_



In 7–14, write the letter of the correct definition on the line next to each term.

- |                                      |  |
|--------------------------------------|--|
| _____ 7. tropical rain forest        | a. land area that receives less than 30 centimeters of rain per year |
| _____ 8. savanna                     | b. biome with nutrient-rich soil and a variety of grass species      |
| _____ 9. desert                      | c. biome with the greatest diversity of life                         |
| _____ 10. coniferous forest          | d. biome with cone-bearing evergreen trees                           |
| _____ 11. temperate deciduous forest | e. temperate coastal biome dominated by dense evergreen shrubs       |
| _____ 12. chaparral                  | f. grasslands with scattered trees                                   |
| _____ 13. temperate grassland        | g. biome with very cold temperatures, harsh winds, and permafrost    |
| _____ 14. tundra                     | h. biome with dense stands of deciduous trees                        |

In 15–18, write true if the statement is true. If the statement is false, replace the underlined term with a term that makes the statement true.

- \_\_\_\_\_ 15. The microscopic animals that live in the photic zone of an ocean are called phytoplankton.
- \_\_\_\_\_ 16. The major types of ecosystems that cover large regions of Earth are called temperate zones.
- \_\_\_\_\_ 17. The region that lies between 23.5° N latitude and 23.5° S latitude is called the tropics.
- \_\_\_\_\_ 18. A(n) community is a group of individual organisms of the same species living in a particular area.

### WordWise

Answer the questions by writing the correct Key Terms in the blanks. Use the circled letter or letters in each term to find the hidden Key Term. Then write a definition for the hidden Key Term.

- What is the scientific study of the interactions between organisms and their environments?  
  \_\_\_\_\_
- What is the permanently frozen subsoil of the tundra?  
 \_\_\_\_\_   \_\_\_\_\_
- What is an area where streams and rivers merge with ocean water?  
 \_\_\_\_\_
- What is the sum of all Earth's ecosystems?  
 \_\_\_\_\_  \_\_\_\_\_
- What is the term for a climate in a specific region that varies from the climate of the surrounding region?  
 \_\_\_\_\_
- What do all of the organisms inhabiting a particular area make up?  
 \_\_\_\_\_  \_\_\_\_\_

**Key Term:** \_\_\_\_\_

**Definition:** \_\_\_\_\_