**CHAPTER 6**

**CLIMATE, TERRESTRIAL BIODIVERSITY, AND AQUATIC BIODIVERSITY**

**6-1 WEATHER AND CLIMATE: A BRIEF INTRODUCTION**

1. Weather occurs

a. in the troposphere. b. at a particular place. c. at a particular time.

d. all of these answers. e. none of these answers

2. Climate

a. describes long-term weather patterns. b. describes seasonal variations.

c. describes weather extremes. d. all of these answers.

e. none of these answers

3. Climate is the general pattern of weather over a period of at least

a. 10 years. b. 20 years. c. 30 years. d.50 years. e.75 years

4. The two most important factors in climate are

a. temperature and insulation. b. precipitation and pressure.

c. humidity, clouds, and wind. d. temperature and wind.

e. temperature and precipitation.

5. Climate is influenced by

a. the moon’s gravity. b. the size of the Earth.

c. the distribution of land, water and topography. d. the distribution of thunderstorms.

1. the earth’s gravity

6. Which of the following statements is false?

a. The amount of solar energy reaching Earth’s surface is dependent on latitude.

b. Hot air rises.

c. Air at the lower latitudes tends to cool and fall or sink downward.

1. Cool air is denser than warm air.
2. Cool air falls.

7. Which of the following statements of cause and effect is false?

a. The differential in solar energy striking the equator versus the poles sets up general global air circulation patterns.

b. Earth's rotating faster under air at the poles causes the prevailing winds.

c. Earth's rotational tilt and revolution around the sun cause seasonal variations in temperature.

1. Greenhouse gases let in the sun's ultraviolet radiation and trap infrared waves radiated from Earth.
2. Heat from the sun evaporates ocean water and transfers hear from the oceans to the atmosphere.

8. There are \_\_\_\_\_\_ separate belts of moving air or prevailing winds.

a. two b. four c. six d. eight e. ten

9. Which of the following wind patterns is found at the equator?

a. doldrums b. trade winds c. easterlies d. southerlies e. northerlies

10. The term upwelling refers to the movement of

a. warm surface water. b. cool nutrient-rich water from the bottom to the surface.

c. warm water replacing cool water. d .cool water from the Arctic toward the equator.

e.warm nutrient-rich water from the bottom to the surface.

11. Upwellings

a. cause the death of phytoplankton. b. result in small populations of seabirds.

c. produce conditions that kill a large number of fish.

d. create El Niño -Southern Oscillation. e. are highly productive areas.

12. Where do upwellings characteristically occur?

a. in the open ocean. b. on the east side of continents. c. near coral reefs.

d. on steep western sides of continents. e. they occur equally anywhere in the ocean.

13. During an El Niño–Southern Oscillation (ENSO),

a. prevailing easterly winds weaken.

b. surface water along the South and North American coasts becomes cooler.

c. upwellings of cold, nutrient-rich water are suppressed.

1. upwellings of warm, nutrient-poor water are suppressed.
2. upwellings of cold, nutrient-rich water are increased.

14. The term greenhouse effect

a. describes occupational diseases of florists.

b. describes the trapping of heat energy in the troposphere by certain gaseous molecules.

c. describes the trapping of heat energy in the stratosphere by nitrogen.

1. describes efforts by the White House to support environmental legislation.
2. describes the trapping of heat energy in the troposphere by nitrogen.

15. All of the following are greenhouse gases except

a. carbon dioxide. b. water vapor. c. methane.

d. nitrogen. e. chlorofluorocarbons (CFCs)

16. Ozone

a. in the stratosphere is a pollutant.

b. is formed in the stratosphere through the interaction of infrared radiation and molecular oxygen.

c. filters out all harmful ultraviolet radiation.

d. in the stratosphere forms a thermal cap important in determining the average temperature of the troposphere.

e. is O3.

17. The rain shadow effect refers to

a. more light on the windward side of mountain ranges.

b. more light on the leeward side of mountain ranges.

c. drier conditions on the windward side of mountain ranges.

d. drier conditions on the leeward side of mountain ranges.

e. wetter conditions on the windward side of mountain ranges.

18. Microclimates are least likely to be produced by

a. mountains. b. bodies of water c. cities . d. flat plains. e. sand dunes

19. A rain shadow is most likely to be produced by a

a. forest. b. ocean. c. lake. d. sand dune. e. mountain.

20. Which of the following microclimate effects is incorrectly described?

a. The leeward sides of high mountains tend to show relatively dry conditions.

b. Oceans and lakes modify temperature extremes.

c. Forests have fewer temperature extremes and lower wind speeds than nearby open land.

d. Cities tend to have lower temperatures and higher wind speeds than the surrounding countryside.

e. The windward sides of high mountains tend to show relatively wet conditions.

**6-2 BIOMES: CLIMATE AND LIFE ON LAND**

21. Large ecological regions with characteristic types of natural vegetation are called

a. ecosystems. b. communities. c. populations. d. biomes. e. niches

22. The distribution of the desert, grassland, and forest biomes is determined principally by

a. temperature. b. precipitation. c. latitude. d. sunlight. e. wind

23. The limiting factor that controls the vegetative character of a biome is

a. light. b. precipitation. c. nutrients. d. animal species. e. temperature

24. Climate and vegetation vary with

a. latitude only. b. altitude only. c. latitude and altitude.

1. latitude and longitude. e. altitude and longitude

25. Trees of wet tropical rain forests tend to be

a. succulent plants. b. broadleaf evergreen plants. c. broadleaf deciduous plants.

1. coniferous evergreen plants. e. coniferous deciduous plants.

26. Which of the following are examples of deciduous plants?

a. maples and oaks b. algae and seaweed c. bacteria d.pines and cedars e.fungi

27. Which of the following are examples of evergreen plants?

a. maples and oaks b. algae and seaweed c. bacteria d. fungi e. pines and cedars

28. Succulent plants are *most* likely to be found in

a. aquatic habitats. b. cold ecosystems. c. high altitudes. d. deserts. e. coastal ecosystems

**6-3 DESERT AND GRASSLAND BIOMES**

29. Which of the following is not characteristic of desert plants?

a. widespread, shallow root systems b. deep root systems

c. large leaves that droop in the bright sunlight d. succulent leaves or stems

1. becoming dormant during dry periods.

30. All of the following are common adaptations made by animals to the desert *except*

a. living underground during the heat of the day.

b. having thick outer coverings to minimize water loss

c. drink and store large amounts of water

1. become dormant during periods of extreme heat or drought
2. excreting dry feces

31. The fragility of the desert ecosystem is indicated by

a. the high growth rate of plants. b. moderate species diversity.

c. abundant groundwater. d. long regeneration time from vegetation destruction.

e. having shallow roots.

32. Off-road vehicles are a major threat to

a. grassland. b. desert. c. tundra. d. taiga. e. tropical rainforest

33. Human impacts on deserts include

a. encroachment by rapidly growing cities.

b. disruption by extraction of mineral resources and building materials.

c. lowering of the aquifers.

d. all of these answers.

e. none of these answers.

34. A tropical grassland with scattered shrubs and stunted trees would be called a

a. veld. b. steppes. c. savanna. d. pampas. e. taiga

35. If you were a National Geographic reporter assigned to cover large herds of grazing, hoofed animals, where would you most likely journey?

a. Arctic tundra b. tropical forest c. deciduous forest d. taiga e. savanna

36. All of the following would be considered types of temperate grasslands except

a. steppes. b. veldt. c. taiga. d. pampas. e. tall-grass prairies

37. You read the data records of a field ecologist who reports the following varieties of species: beetles, spiders, grasshoppers, many insects and invertebrates, earthworms, prairie dogs, rabbits, squirrels, meadowlarks, coyotes, foxes, hawks. You conclude that the field ecologist is located in a

a. desert. b. tropical grassland. c. temperate grassland. d. arctic tundra. e. tropical rainforest

38. Many species of hoofed animals can live together in the African tropical savannas because they have \_\_\_\_ eating habits that \_\_\_\_ competition for resources.

a. specialized . . . maximize b. specialized . . . minimize

c. generalized . . . maximize d. generalized . . . minimize

e. none of the above.

39. The \_\_\_\_\_\_ are located in Europe.

a. veldt b. steppes c. savanna d. pampas e. tall-grass prairies

40. Recurring fires in summer and fall are most typical of

a. desert. b. tropical grassland. c. temperate grassland. d. polar grassland. e. taiga

41. You are going on a scientific expedition from the equator to the North Pole. As you leave the boreal forest behind, you anticipate next exploring

a. gases captured in the ice. b. the fall leaves of New England.

c. patterns of cone design in coniferous trees. d. germination patterns of tall-prairie grasses.

e. the role of lichens and mosses in boggy ecosystems.

42. Permafrost and lichens are characteristic of the \_\_\_\_\_ biome.

a. tropical savanna b. Arctic tundra c. taiga d. thorn woodland e. deciduous forest

43. Through your binoculars you observe a pack of wolves stalking a caribou separated from its herd. Geese take to the air, departing the boggy scene. You are most likely in

a. desert. b. tropical grassland. c. temperate grassland. d. polar grassland. e. savanna

44. Arctic tundra is perhaps Earth's most fragile biome because of

a. low rate of decomposition. b. shallow soil. c. slow growth rate of plants

d. all of these answers. e. bitter cold

45. Humans have affected grasslands by

a. the introduction of livestock. b. plowing and conversion to croplands.

c. oil exploration. d. all of these answers.

e. none of these answers

**6-4 FOREST AND MOUNTAIN BIOMES**

46. The primary limiting factor of the rain forest is

a. water. b. nutrients. c. temperature. d. light. e. wind

47. A mature \_\_\_\_ has the greatest species diversity of all terrestrial biomes.

a. tundra b. savanna c. taiga d. temperate deciduous forest e. tropical rain forest

48. Which of the following is not appropriate to use in describing a tropical rain forest?

a. humid b. rich soil c. stratified d. diversity e. rainfall

49. Which of the following biomes would be considered least fragile?

a. temperate deciduous forest b. desert c. tropical rain forest d. tundra e. coral reef

50. Which of the following is false? Deciduous forests

a. change significantly during four distinct seasons. b. are dominated by a few species of broadleaf trees.

c. have trees that survive winter by dropping their leaves. d. have nutrient-poor soil.

e. have a thick layer of slowly decaying leaf litter

51. Which of the following does not belong with the others?

a. taiga b. steppes c. boreal forest d. northern coniferous forest e. none of these answers

52. Cone-bearing trees are characteristic of the

a. taiga. b. tropical rain forest. c. temperate deciduous forest. d. savanna. e. desert

53. Trees with needlelike leaves that are kept year round are especially abundant in which biome?

a. tundra b. tropical rain forest c. coniferous forest

d. temperate deciduous forest e. desert

54. Which of the following is least descriptive of coniferous forest?

a. carpet of needles on forest floor b. long, cold, dry winter

c. short summer d. high species diversity

e. acidic soil

55. Clearing of forests often results in

a. increased diversity. b. decreased rates of soil erosion.

c. loss of biodiversity. d. an increase in specialist species.

e. none of these answers

56. The biome most likely to be found on the top of a very tall tropical mountain is the

a. desert. b. tundra. c. grassland.

d. temperate deciduous forest. e. taiga

57. Mountain biomes

a. have deep, rich soils. b. recover quickly from vegetation loss.

c. do not affect climate d. have little biodiversity.

e. may act as sanctuaries for animal species driven from lowland areas.

58. Humans affect mountain biomes by

a. expanding populations who may use the land in an unsustainable way.

b. ecotourism and recreation.

c. increase air pollution from urban areas.

d. all of these answers.

e. none of these answers

**6-5 AQUATIC ENVIRONMENTS: TYPES AND CHARACTERISTICS**

59. In your explorations as a marine biologist, you find a new species of algae floating on the surface of a coastal zone. You would most likely classify this species as

a. phytoplankton. b. zooplankton. c. benthos. d. nekton. e. decomposer.

60. In a sample from a mud flat, you observe cyanobacteria under the microscope. You are most likely to classify this organism as

a. phytoplankton. b. zooplankton. c. benthos. d. nekton. e. decomposer.

61. Out on a fishing boat, a swordfish is caught. You would most likely classify this species as a member of the

a. phytoplankton. b. zooplankton. c. benthos. d. nekton. e. decomposer.

62. All of the following organisms would be considered part of the benthos *except*

a. cod. b. lobster. c. oysters. d. sand worms. e. crabs.

63. An aquatic environment

a. concentrates toxic metabolic wastes. b. increases fluctuations in temperature.

c. increases chances of overheating. d. dissolves nutrients and makes them readily available.

e. all of these answers.

64. Populations of organisms living in aquatic life zones may be limited by

a. access to light. b. nutrient availability. c. dissolved oxygen.

d. all of these answers. e. none of these answers

65. Oxygen in the water varies widely because of

a. number of consumers and producers. b. number of decomposers.

c. temperature. d. number of consumers. e. all of these answers.

**6-6 SALTWATER LIFE ZONES**

66. Oceans

a. play a major role in controlling climate by distributing solar heat.

b. function to dilute and disperse human wastes.

c. participate in biogeochemical cycles.

d. all of these answers.

e. none of these answers.

67. The ocean zone that covers the continental shelf is the

a. estuary. b. coastal zone. c. littoral zone. d. benthic zone. e. abyssal zone.

68. The coastal zone has \_\_\_\_% of the ocean's plant and animal life and \_\_\_\_% of its surface area.

a. 95 . . . 5. b. 90 . . . 10. c. 90 . . . 25. d. 80 . . . 25. e. 80 . . . 10.

69. The deepest part of the ocean is the

a. abyssal zone. b. euphotic zone. c. estuary zone.

1. bathyal zone. e. riparian zone

70. Most photosynthesis in the open sea occurs in the

a. euphotic zone. b. abyssal zone. c. bathyal zone.

1. coastal zone. e. benthic zone.

71. The twilight zone of the sea is the

a. euphotic zone. b. abyssal zone. c. bathyal zone.

1. coastal zone. e. benthic zone.

72. The zone of the ocean with the highest net primary productivity is the

a. euphotic zone. b. abyssal zone. c. bathyal zone.

d. coastal zone. e. benthic zone.

73. Which of the following trees is characteristic of tropical coastal wetlands?

a. cypress b. coconut c. mangrove d. palm e. live oak.

74. The relationship demonstrated by coral polyps and algae is

a. predation. b. commensalism. c. parasitism. d. competition. e. mutualism.

75. The least appropriate use of coastal wetlands is for

a. spawning and nursery grounds. b. condominiums and disposal of landfill waste.

c. food production. d. recreational diving. e. education.

76. Estuaries and coastal wetlands are important for all of the following reasons except

a. spawning and nursery grounds for marine fish and shellfish.

b. filtering out waterborne pollutants from swimming and wildlife areas.

c. breeding grounds for waterfowl.

d. providing coral for limestone production and the tourist trade.

e. habitat for alligators.

77. Cities established on barrier islands are subject to

a. beach erosion. b. hurricanes. c. flooding.

d. all of these answers. e. none of these answers

78. The relationship demonstrated by coral polyps and dinoflagellates is

a. predation. b. commensalism. c. parasitism. d. mutualism. e. partnerism

79. Coral reefs

a. support a large variety of marine species. b. provide food, jobs, and building materials.

c. protect coastlines from erosion. d. all of these answers.

e. none of these answers.

80. During the past 200 years, about \_\_\_\_\_ of the area of estuaries and coastal wetlands in the United States has been destroyed or damaged.

a. one-quarter b. one-third c. one-half d. two-thirds. e. three-fourths

81. All of the following threaten the survival of coral reefs except

a. runoff of toxic pesticides and industrial chemicals.

b. eroded soil from deforestation and poor land management.

c. depletion of stratospheric ozone.

d. predation by sharks.

e. collection by tourists.

**6-7 FRESHWATER LIFE ZONES**

82. Lakes that have few minerals and low productivity are referred to as

a. autotrophic. b. eutrophic. c. oligotrophic. d. mesotrophic. e. neotrophic

83. Lakes with large nutrient supplies are called

a. autotrophic. b. eutrophic. c. oligotrophic. d. mesotrophic. e. neotrophic

84. In lakes, the nutrient-rich water near the shore is part of the

a. limnetic zone. b. benthic zone. c. littoral zone.

1. profundal zone. e. abyssal zone.

85. In lakes, the open-water surface layer is called the

a. limnetic zone. b. benthic zone. c. littoral zone.

d. profundal zone. e. abyssal zone.

86. Fish adapted to cool, dark water are most likely found in the zone of lakes called the

a. limnetic zone. b. benthic zone. c. littoral zone.

d. profundal zone. e. abyssal zone.

87. The highest level of dissolved oxygen is most likely to be found in the \_\_\_\_\_ zone of a river system.

a. first b. second c. third d. fourth e. fifth.

88. A river is most likely to be wide and deep at its \_\_\_\_\_ zone.

a. first b. second c. third d .fourth e. fifth.

89. A mix of warm-water and cold-water fish are most likely to be found in the \_\_\_\_\_ zone of a river.

a. first b. second c. third d. fourth e. fifth.

90. Waterfalls are most likely to be found in the \_\_\_\_\_ zone of a river.

a. first b. second c. third d. fourth e. fifth.

91. Inland wetlands include all of the following except

a. bogs. b. wet Arctic tundra. c. marshes.

d. swamps. e. estuaries.

92. Inland wetlands are valuable for providing

a. wildlife habitat. b. improved water quality.

c. regulated stream flow. d. all of these answers.

e. none of these answers.

93. Inland wetlands are often lost to

a. croplands. b. mining. c. urban development.

d. all of these answers. e. none of these answers.

**6-8 SUSTAINABILITY OF AQUATIC LIFE ZONES**

94. Life in both saltwater and freshwater ecosystems can be limited by

a. dissolved oxygen for respiration. b. temperature.

c. access to sunlight for photosynthesis. d. all of these answers.

e. none of these answers.

95. Which of the following illustrations does not match the accompanying ecological concept.

a. Coral reefs have high biodiversity.

b. Estuaries have high productivity.

c. Dissolved oxygen is a primary limiting factor in the upper layer of a stratified lake.

1. The open ocean is the least productive of aquatic life zones.

e. Littoral zones have high biodiversity.