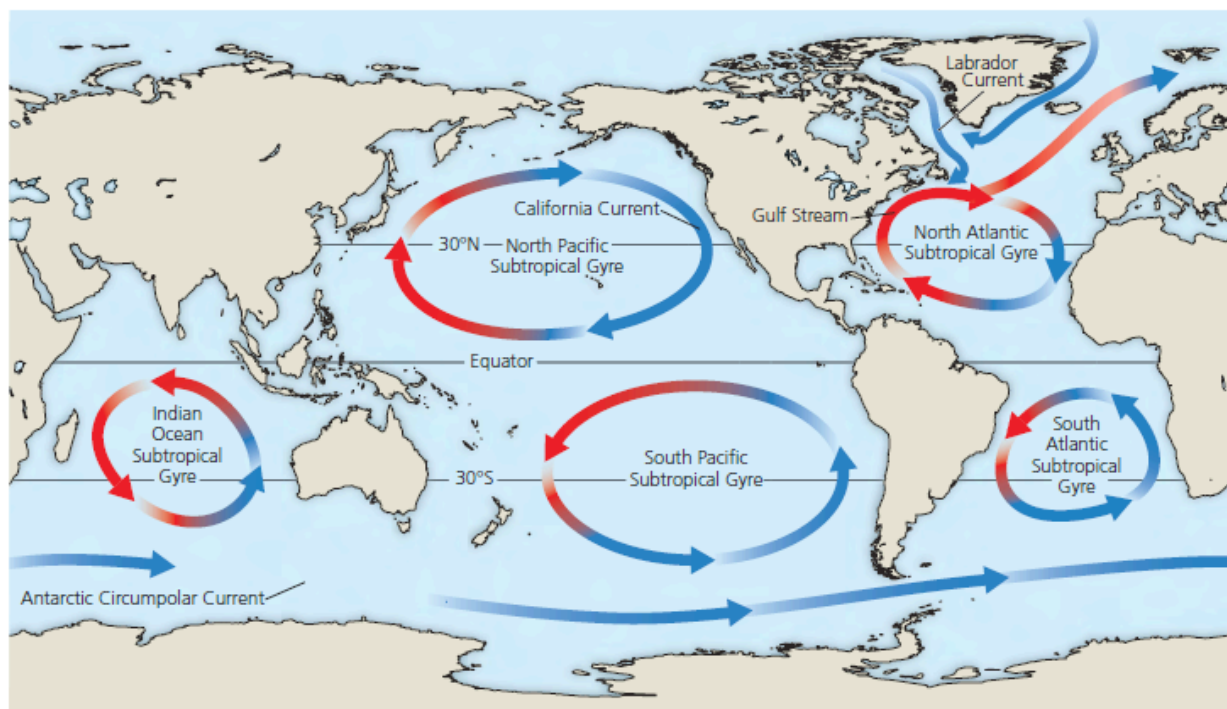
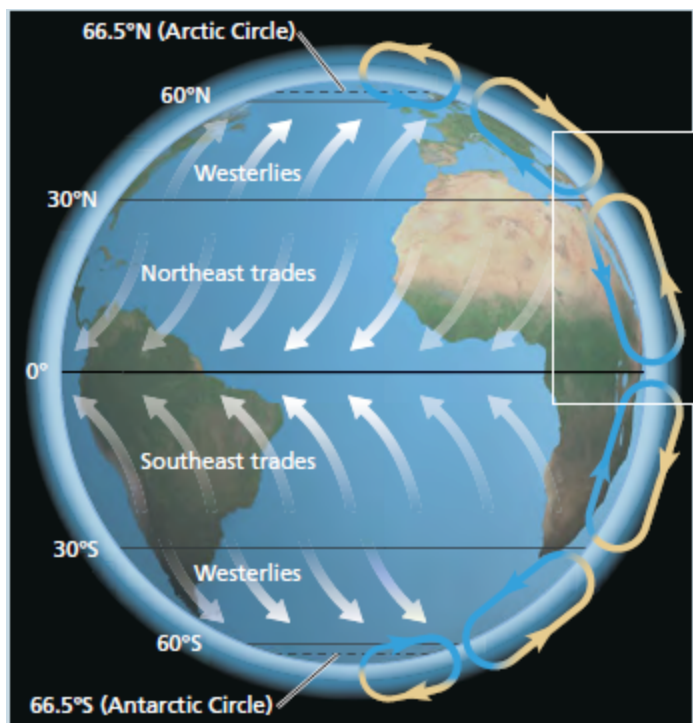
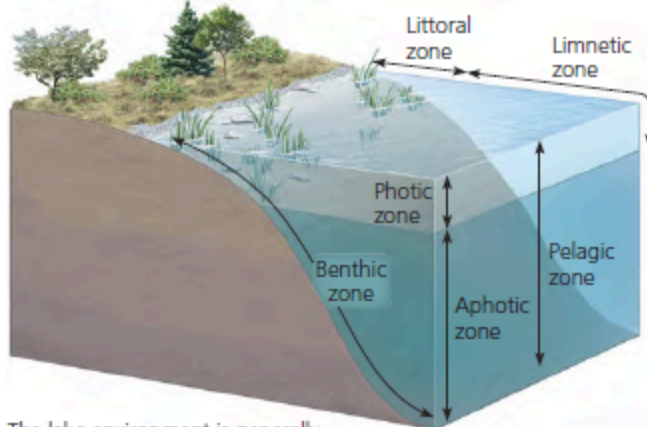


Cheat Sheet



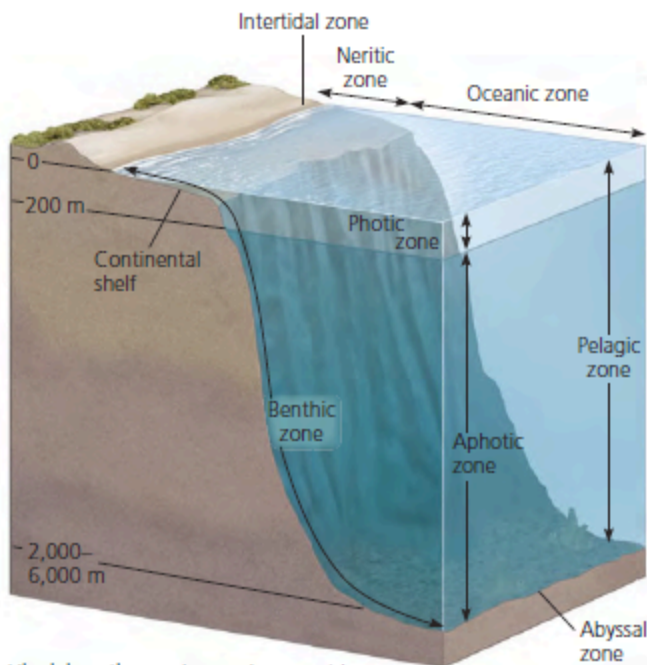
▲ **Figure 52.5 Global circulation of surface water in the oceans.** Water is warmed at the equator and flows north and south toward the poles, where it cools. Note the similarities between the direction of water circulation in the gyres and the direction of the trade winds in Figure 52.3.

(a) Zonation in a lake



The lake environment is generally classified on the basis of three physical criteria: light penetration (photic and aphotic zones), distance from shore and water depth (littoral and limnetic zones), and whether the environment is open water (pelagic zone) or bottom (benthic zone).

(b) Marine zonation



Like lakes, the marine environment is generally classified on the basis of light penetration (photic and aphotic zones), distance from shore and water depth (intertidal, neritic, and oceanic zones), and whether the environment is open water (pelagic zone) or bottom (benthic and abyssal zones).

Chapter 52 Questions

1. What is ecology?
2. What is organism ecology?
3. What is a population?
4. What is population ecology?
5. What is a community?
6. What is community ecology?
7. What is an ecosystem?
8. What is ecosystem ecology?
9. What is a landscape?
10. What is landscape ecology?
11. What is the biosphere?
12. What is global ecology?
13. What are the tropics?
14. What are the important latitudes?
15. Describe Earth's air circulation patterns.
16. What is climate?
17. What are the four extremes in Earth's orbit?
18. What causes wet and dry seasons at 20° N and S?
19. What is upwelling and what causes it?
20. Describe the global circulation of surface water.
21. What is the Mediterranean climate?
22. What is the difference between windward and leeward sides of a mountain?
23. What is a "rain shadow"?
24. What is the average temperature drop due to elevation?
25. What is a microclimate?
26. What is climate change?
27. Describe the effects of global warming.
28. What are biomes?
29. What is a climograph?
30. What is an ecotone?
31. What are the layers of forests?
32. What are euphorbs?
33. What is a disturbance?
34. Describe the biomes (distribution, precipitation, temperature, plants, animals, human impact).
35. What is the largest marine biome?
36. What are the salt concentrations of marine/freshwater environments?
37. What is the photic zone?
38. What is the aphotic zone?
39. What is the pelagic zone?

40. What is the abyssal zone?
41. What is the benthic zone?
42. What are the benthos?
43. Describe the other zones of lakes and oceans.
44. What is a thermocline?
45. What is a turnover?
46. Describe the features of aquatic biomes (physical, chemical, geologic features, photosynthetic organisms, heterotrophs, human impact). (8)
47. What is dispersal?
48. What is range expansion?
49. Describe the light absorbing properties of water.
50. Why are basic soils not good for plants?

Chapter 52 Answers

1. Scientific study of the interactions between organisms and the environment
2. Physiological/evolutionary/behavioral ecology, how organisms face challenges of environment
3. Group of individuals of same species living in area
4. Analysis of factors that affect population and how it changes
5. Group of populations of different species in area
6. Interactions between species
7. Community of organisms and physical factors that they interact with
8. Energy and chemical flow through abiotic/biotic factors
9. Mosaic of connected ecosystem
10. Factors controlling exchanges of energy/material/organisms across ecosystems
11. Global ecosystem
12. How regional exchange influences function and distribution of organisms across biosphere
13. Regions between 23.5° N and 23.5° S latitude
14. 90° N = north pole, 23.5° N = tropic of cancer, 0° = equator, 23.5° S = tropic of capricorn, 90° S = south pole, 66.5° N arctic circle, 66.5° S antarctic circle
15. High temperatures in tropics evaporate water, cause warm wet air masses to rise at equator (release water as they rise, high precipitation in tropical regions). High altitude air masses (dry) flow towards poles, descend at 30°, absorb moisture to create arid climate. Descending air flows towards poles/rises at 60°, release precipitation (less than at equator). Some air flows toward poles, descends, and flows back to equator, see picture
16. Longer-term prevailing weather conditions in given area, key components = temperature, precipitation, sunlight, and wind
17. March equinox, equator faces sun directly, neither pole tilts toward sun, all regions experience 12 hours day, 12 hours night
December solstice, northern hemisphere away from sun, shortest day/longest night, southern hemisphere toward sun, longest day/shortest night
September equinox, equator faces sun directly neither pole tilts toward sun, all regions on Earth experience 12 hours of daylight, 12 hours of darkness
June solstice - Northern towards, southern away
18. Belts of wet/dry air move northward/southward as sun angle changes
19. Seasonal changes in wind pattern alter ocean currents, cold water moves up from deep ocean, nutrient rich water stimulates growth of surface phytoplankton and the organisms that eat them
20. see picture
21. Cool, dry ocean breezes in summer are warmed when they contact land, absorbing moisture and creating hot arid climate inland (occurs in southern Cal, sw australia, and mediterranean sea)

22. Windward = wetter side, side the wind moves towards, lee ward is where wind moves away
23. Warm, moist air approaches mountain, air rises and cools creating precipitation on windward side. Descends on leeward side cool and dry, absorbs moisture
24. 1000 m increase in elevation = 6° average temp drop, equivalent to 880 km latitude
25. Very fine, localized patterns in climatic conditions
26. Directional change to global climate that lasts three decades or more
27. 0.9°C (1.6°F) average warming since 1900, projected to warm 1-6° (2-11° F) more by 2100, wind/precipitation changing and extreme weather events more frequent
28. Major life zones characterized by vegetation type in terrestrial biomes
29. Plot of annual mean temperature/precipitation in a particular region
30. Area of intergradation between terrestrial biomes
31. From top to bottom: canopy, low-tree layer, shrub understory, ground layer of herbaceous plants, forest floor (litter layer) and root layer
32. Plants in Africa similar to cacti of North/South America morphologically
33. Event such as storm, fire, or human activity that changes community
34. Tropical forest: equatorial/subequatorial regions, tropical rain forest (200-400 cm constantly/annually) tropical dry forests (seasonal, 150-200 annually, 6-7 months dry), high temp year-round, 25-29°C. Vertical layering, more layers in rainforest. Broadleaf evergreen = dominant. 5-30 million undescribed species of arthropods. Highest animal diversity. Being cut down/converted. Epiphytes in both but less common in dry, thorny shrubs/succulents common in dry

Desert: bands near 30° N and S/in interior of continents. Low precipitation, variable, less than 30 cm per year. Variable seasonally/daily. Maximum air temp = 50°, min -30°C. Scattered, low vegetation. Nocturnal animals. Irrigation reduces natural biodiversity

Savanna: equatorial/subequatorial, seasonal 30-50 cm per year, dry season 8-9 months. Warm year-round (24-29°C) more variation than tropical. Scattered trees, common fires, forbs = ground cover (grasses/small nonwoody plants). Cattle ranching/overhunting hurts large mammals. Dominant herbivores = insects

Chaparral: midlatitude coastal regions, seasonal precip, rainy winters/dry summers, 30-50 cm per year. Fall/winter/spring = avg. temp 10-12° C. Summer temp avg = 30°C, maximum daytime over 40°C. Shrubs+small trees, grasses/herbs, high plant diversity. Adaptations = fire-resistance/reduced water loss. High diversity of small mammals. Hurt by urbanization.

Temperate grassland: Steppes, veldts, prairies, plains, etc. Seasonal precip, dry winters, wet summers, 30-100 cm, common periodic drought. Winters cold, avg temp under -10°C. Summer avg temp = 30 °C. Dominated by forbs, common fires. Deep, fertile soils

Northern coniferous forest: Band across northern NA and Eurasia to edge of tundra,

largest biome, aka taiga. 30-70 cm annually. Periodic droughts common. Cold winters, -50°C to 20 in summer. Cone bearing pines, less plant diversity, diverse mammals, logging

Temperate broadleaf: midlatitudes in northern hemisphere, chile, south africa, australia, new zealand. 70-200 cm annually. Significant precip through all seasons. Winter average 0° C, summer = 35°C, hot/humid. Distinct vertical layers, dominated by deciduous trees. evergreen eucalyptus in Australia. Logging/ clearing

Tundra (arctic, 20% of Earth land surface). High winds/low temps (similar to high mountaintops with plant community called alpine tundra). Precip 20-60 cm in arctic, 100 cm in alpine. -30°C winter, less than 10°C summer. Herbaceous (mosses, forbs), lichens, dwarf shrubs, trees. Permafrost (permanently frozen soil layer restricts plant growth). Sparsely settled, mineral/oil extraction

35. Ocean, 75% of Earth surface.
36. 3% in salt water, 0.1% in fresh
37. Upper zone where photosynthesis can take place in water
38. Water region where little light penetrates
39. Photic and aphotic together
40. 2000-6000 m below, bottom of aphotic
41. Ocean floor
42. Communities of organisms in benthic zone, major food source = detritus (dead organic matter, rains down from surface water)
43. see picture
44. Narrow layer of abrupt temperature change separating uniformly warm upper layer from uniformly cold deeper waters.
45. Semiannual mixing of waters as result of changing temperatures (usually layered by temp), sends oxygenated water from surface to bottom, brings nutrient rich water from bottom in spring/autumn. IN winter, coldest water (0°C) at surface, warmest (4°) at bottom. IN summer, warm at top, cold at bottom
46. Lakes: Standing bodies of water, stratified (temperate seasonal thermocline, tropical year-round thermocline). Oligotrophic = nutrient-poor/oxygen-rich. Eutrophic = nutrient-rich oxygen-poor, more decomposable organic matter, more surface area relative to depth. Aquatic plants in littoral zone (shallow waters at shore). Limnetic zone (farther from shore) with phytoplankton (e.g. cyanobacteria).

Wetland: habitat inundated with water at least some of time, supports plants adapted to water-saturated soil. High organic production, low in dissolved oxygen, filter dissolved nutrients/pollutants. Basin wetlands from shallow basins, riverine along shallow/periodically flooded banks of rivers, fringe at coasts of large lakes/seas. Among most productive biomes. Plants can grow anaerobically periodically. Woody plants dominate swamps, sphagnum mosses bogs.

Streams/rivers: Headwater streams cold, clear, swift, turbulent. Downstream water is

warmer/more turbid because of sediment. Salt/nutrient content increases from headwaters to mouth. Oxygen decreases. Headwater often narrow, rocky. Downstream = wide/meandering. Bottoms often silty. May be rich in phytoplankton/rooted plants.

Estuary: transition area between river/sea. High-density seawater often occupies bottom and mixes little with lower-density river water. Among most productive biomes.

Saltmarsh grasses and algae.

Intertidal zones: periodically submerged/exposed by tides, often twice daily. Upper zones exposed more to air, greater temp/salinity variation. High oxygen/nutrient levels.

Oceanic pelagic zone: open blue water, mixed by wind, larger photic zone than coastal marine waters. High oxygen levels, lower nutrients, tropical thermally stratified year-round. Tropical areas lower nutrients than temperate. Turnover renews nutrients in photic zones of temperate areas. 70% of earth surface, 4000 m average depth. deepest is 10000 m.

Coral Reefs: Formed by calcium carbonate skeletons of corals. Shallow corals live in photic zone of stable tropical marine environments with high water clarity. Sensitive to temps under 18-20°C and above 30°, deep-sea reefs 200-1500 m deep. Require high oxygen levels, excluded by freshwater and nutrient input. Starts as fringing reef on young island, forms offshore barrier reef later, becomes coral atoll as island submerges. Dominated by corals. Animal diversity rivals tropical forests

Marine benthic zone: Seafloor beneath surface waters of neritic zone/offshore pelagic zone. Receives no sunlight, temp declines with depth, pressure increases. (3°C at abyssal zone). Oxygen present to support life. Mostly soft-sediment. Chemoautotrophic prokaryotes use SO_4^{2-} (sulfate) to make energy at hydrothermal vents on mid-ocean ridges.

47. Movement of individuals or gametes away from their area of origin or from centers of high population density.
48. Organisms reach area where they did not exist previously
49. Every meter of water absorbs 45% of red light, 2% of blue light.
50. Phosphorus is insoluble in basic soil and precipitates, becomes unavailable for plants