Chapter 7: Aquatic Ecosystems

Section 1: Freshwater Ecosystems
Objectives:
1. Describe the factors that determine where an organism lives in an aquatic ecosystem.
2. Describe the littoral zone and the benthic zone that make up a lake or pond.
3. _____
4. Describe one threat against river ecosystems.

A. Characteristics of Aquatic Ecosystems
- Salinity determines which organisms live in the H_2O
- _____, _____, _____, and _____ determine where the organisms live in the H_2O
- Locations of organisms
   (1) _____: float near the surface; 2 types: phyto- (plants) and zoo- (animals)
   (2) _____: free-swimming
   (3) _____: bottom-dwelling and often attached to hard surfaces

B. Lakes and Ponds
1. Life in a Lake (Fig. 3, p. 174)
- Types of organisms depend on the amount of _____ available
- Zones
   (1) _____: nutrient-rich, near-shore environment or area near the top that is inhabited by diverse and abundant plants and animals
   (2) _____: deep area near the bottom that is inhabited by decomposers, insect larvae, clams, etc.

2. How Nutrients Affect Lakes
- Eutrophication
   o Is due to an increase in nutrients in an aquatic ecosystem, which can lead to an overabundance of plant growth
   o Can occur naturally over time
   o Can be accelerated by run-off, which may contain sewage or fertilizers
   o Can lead to a reduction of oxygen (= death of oxygen-loving organisms)

C. Freshwater Wetlands
- _____
- Largest in US is Florida Everglades (marsh) – US freshwater wetlands: Fig. 6, p. 176
- Environmental functions (Table 1, p. 175)

Environmental Functions of Wetlands
• trapping and filtering sediments, nutrients, and pollutants, which keep these materials from entering lakes, reservoirs, and oceans
• reducing the likelihood of a flood, protecting agriculture, roads, buildings, and human health and safety
• buffering shorelines against erosion
• providing spawning grounds and habitat for commercially important fish and shellfish
• providing habitat for rare, threatened, and endangered plants and animals
• providing recreational areas for activities such as fishing, bird-watching, hiking, canoeing, photography, and painting

1. **Marshes**
   - Occur on low, flat lands with little H_2O movement and varying H_2O salinity
   - Have organisms adapted to different _____
   - Are dominated by _____ plants
   - Attract migratory birds

2. **Swamps**
   - Occur on flat, poorly-drained lands often near streams
   - Are dominated by _____,
     depending on climate

3. **Human Impact**
   - Once considered to be insect breeding grounds, many have been drained, filled, and cleared for human development
   - Many are now protected at state or federal levels

D. Rivers
   - Start at an area known as the _____: usually cold, shallow, fast-moving, and full of oxygen
   - _____
   - Have organisms that are determined by H_2O temperature and speed
   - Threats
     (1) Pollution from industrial and/or residential waste, sewage, and pesticide-carrying runoff
     (2) Dams = altered ecosystems

Section 2: Marine Ecosystems
Objectives:
   1. Explain why an estuary is a very productive ecosystem.

2. Compare salt marshes and mangrove swamps.
3. Describe two threats to coral reefs.
4. Describe two threats to ocean organisms.

A. Coastal Wetlands

- _____
- _____
- Absorb excess rain = flood protection
- _____
- Provide recreational areas

1. Estuaries
- Occur where fresh H_2O from a river mixes with salt H_2O from an ocean and forms brackish H_2O = "nutrient trap" (Fig. 11, p. 179)
- Provide protected harbors, access to the ocean, and connections to rivers
- Plants and Animals
  - o Are able to tolerate variations in salinity
  - o Use estuaries as a _____
- Threats
  - (1) Were used as waste dumps, then as building sites
  - (2) Pollution from industrial and/or residential waste, sewage, and pesticide-carrying runoff

2. Salt Marshes
- Develop in estuaries where rivers deposit mineral-rich mud
- Found primarily throughout the _____ and _____ regions
- Characterized by grasses, sedges, and other plants that have adapted to continual, periodic flooding

3. Mangrove Swamps
- Located along coastal areas of tropical and subtropical zones
- Dominated by mangroves
- Help protect coastline from erosion and storm damage
- Provide breeding and feeding grounds for _____ animal species
- Have been filled with waste and destroyed in many areas of the world

4. Rocky and Sandy Shores
- Rocky shores have more plants and animals than sandy shores
- _____ protect the mainland and the coastal wetlands

B. Coral Reefs (Fig. 15, p. 183)
- Are limestone ridges/islands built by coral polyps, which secrete calcium carbonate ($CaCO_3$)

- _____
  _____
- Are habitat for tropical fish, snails, clams, sponges, etc.
- Adaptations of coral polyps:
  - (1) _____
  - (2) Have stinging tentacles to capture small animals that float or swim too close
- Threats
  - (1) _____ of reefs are in danger of being destroyed due to human activities: oil spills, sewage, pesticide-carrying runoff, scuba diving
  - (2) Too hot or too cold H_2O or introduction of fresh H_2O = corals have difficulty producing $CaCO_3$
  - (3) Muddy, polluted, or too nutrient-rich H_2O = algae will die or grow out of control and smother the coral

C. Oceans
- Most oceanic life is concentrated in shallow, near-shore H_2O because
  - (1) _____
  - (2) _____

1. Plants and Animals (Fig. 17, p. 184)
- Non-flowering except near shore
- Phytoplankton = food for the herbivores in the open oceans
- _____ = smallest herbivores, which include jellyfish, larva of some marine animals, and krill (tiny shrimp)
- Adaptations: camouflage; lungs act as floats

2. Threats
- (1) Pollution from industrial and/or residential waste, sewage, and pesticide-carrying runoff
- (2) _____

3. Arctic and Antarctic Ecosystems
- Considered marine ecosystems because nearly all food comes from ocean
- Arctic Ocean: nutrient-rich, so supports large populations of plankton, which feed a diversity of life
- Antarctica and the Antarctic Ocean
  - o _____
  - o Only a few plants grow near the edges of the continent (and only in the summertime)
  - o Life supported by plankton
  - o _____
    _____