

Aquatic Biodiversity

Chapter Eight

Aquatic Biomes

- There are two types of aquatic biomes:
 - Marine biomes include estuaries, coastal wetlands, coral reefs, the oceanic zone, and polar ecosystems
 - _____ biomes include lakes/ponds, rivers/streams, and inland wetlands

Aquatic Organisms

- Both freshwater and marine ecosystems share major types of organisms:
 - _____ are free-floating organisms which have such weak swimming ability that they are at the mercy of the prevailing water movement
 - phytoplankton are capable of photosynthesis while zooplankton are animals
 - _____ are organisms capable of sustained locomotion against the prevailing water movement
 - benthos are bottom-dwelling organisms without the need for swimming

Limiting Factors

- The types and numbers of organisms in aquatic environments depend on temperature, access to _____, dissolved _____, and availability of nutrients such as carbon (CO_2), nitrogen (NO_3^-) and phosphorus (PO_4^{3-})
- _____ light is absorbed quickly in the upper meter of water while blue light penetrates as much as 200m. Aquatic photosynthesizers have adapted to address these conditions.

Marine Biomes

- Saltwater oceans cover about 71% of the earth's surface. The oceans are essential for regulating global temperature and _____. There are over 1 million known marine species with as many as 9 million undiscovered.
- There are two major marine zones:
 - the neritic zone extends to the edge of the continental shelf and contains 90% of all marine species
 - the oceanic zone includes all waters beyond the _____.

Estuaries

- An estuary is a partially enclosed area of coastal water where seawater mixes with freshwater.
 - Constant water movement from _____ and currents provide for a nutrient-rich environment with a wide range of temperature and _____

Coastal Wetlands

- Coastal wetlands are areas of coastal land that are covered with saltwater all or part of the year
- Wetlands are incredibly important because they filter water, protect shorelines from _____, and provide feeding and breeding grounds for many organisms

Types of Coastal Wetlands

- marshes are freshwater or estuarine wetlands dominated by _____
- bogs are inland freshwater wetlands dominated by mosses
- _____ are freshwater, estuarine, or marine wetlands dominated by trees
 - mangrove swamps are tropical communities dominated by _____ (adapted to grow in saline conditions) trees

Coral Reefs

- Coral reefs are massive colonies of coral polyps living in a secreted skeleton of calcium carbonate (limestone - CaCO_3).
 - most coral (phylum _____) is in a mutualistic symbiosis with zooxanthellae (single-cell algae).
- Coral reefs are among the oldest and most productive ecosystems in the world, but most grow at only one-half centimeter per year.
- The biggest threat to coral reefs is the warming and _____ of the oceans. This causes calcium carbonate to dissolve and coral bleaching, in which the coral becomes stressed and expels the zooxanthellae.
- Other stresses to coral include increased UV radiation, global warming, and runoff of pesticides, fertilizers, and industrial chemicals

The Oceanic Zone

- The Oceanic Zone is one of the least productive of all ecosystems, because _____ penetrates only the surface waters. _____ wavelengths are absorbed within 1 meter, while _____ wavelengths penetrate as deep as 200 meters.
- Divisions of the oceanic zone:
 - _____: 0-200 m, this the photic zone (lighted)
 - mesopelagic: 200 m to 1,000 m
 - bathypelagic: 1,000 m to 4,000 m, 10°C to 4°C
 - abyssalpelagic: 4,000 m to a depth of 6,000 m, overlying the plains of the major ocean basins
 - _____: 6,000 m to 10,000 m, includes the open water of deep trenches

Polar Ecosystems

- Polar Caps are considered marine ecosystems because the primary food source is _____
 - the Arctic Ocean is rich in nutrients from surrounding land masses
 - the Antarctic is not as rich in nutrients, lacking the surrounding land masses

Freshwater Biomes

- Freshwater life zones occur where water with a _____ of less than 1 ppt accumulates on or flows through the surfaces of terrestrial biomes.
 - _____ systems are standing, such as lakes, ponds, and inland wetlands
 - flowing systems are moving, such as streams and rivers.

Lakes and Ponds

- Lakes are large bodies of standing fresh water, formed when precipitation, runoff, or groundwater seepage fills depressions in the earth's surface.
- Lakes normally consist of four major zones:
 - the _____ zone is the shallow area near the shore to the depth at which rooted plants stop growing
 - the limnetic zone is the open, sunlit water surface layer away from the shore that extends to the depth penetrated by sunlight
 - the _____ zone is the deep, open water where it is too dark for photosynthesis
 - the benthic zone is the bottom of the lake
- Seasonal changes occur in temperate lakes, causing an overturn of the water column.
- During the summer and winter, the water becomes stratified into different temperature layers, separated by a thermocline. In the fall and spring, the waters at all layers mix in _____ that equalize the temperatures at all depths.

Streams and Rivers

- The entire land area, which delivers water, sediment, and dissolved substances to a stream or river is called a _____, or a drainage basin. Characteristics of a watershed include its area, length, slope, soil and vegetation.
- A river system is a series of different ecosystems because of different environmental conditions in each of three zones:
 - The source zone contains the headwaters of the river. This zone typically has cold, clear, highly oxygenated water.
 - In the _____ zone, the headwater streams merge to form wider, deeper streams. The warmer and slower moving water supports more biodiversity, particularly phytoplankton.
 - The flood plain zone joins streams into wider and deeper rivers that meander across broad, flat valleys. This area supports the greatest number of both plant and animal species.

Inland Wetlands

- Inland wetlands include marshes, swamps and bogs along with seasonal wetlands (ex.floodplain wetlands, prairie potholes). These are important for three main reasons:
 - provide food and _____ for fish, migratory waterfowl, and other wildlife
 - filter, dilute, and degrade toxic wastes, excess nutrients, sediments, and other pollutants from runoff
 - reduce _____ and erosion by absorbing overflows of streams and lakes.