

Aquatic Biomes

I. Aquatic Habitats

A. aquatic habitats: one in which the organisms live in or on water

- 1. not grouped geographically as are terrestrial biomes**
- 2. difficult to place on a map**
- 3. often determined by depth rather than by location**

B. Important factors determining aquatic biomes are:

- 1. amount of dissolved salts in the water**
- 2. depth of water**
- 3. rate of flow and amount of dissolved oxygen also play a role in determining the types of organisms**

C. Salinity

- 1. salinity: amount of dissolved salts in a sample of water**
- 2. Aquatic biomes can be divided into two main groups based on the amount of dissolved minerals in the water. These groups are:**
 - a. salt water**
 - b. fresh water**
- 3. Salinity is measured in parts per thousand**
 - a. salinity of ocean water is about 30 parts per thousand**
 - b. salinity of fresh water is 0.5 parts per thousand or less**
 - c. brackish water: water that is more saline than freshwater but less saline than ocean water**

- d. brackish water is common in areas such as river deltas and coastal marshes where fresh water meets the ocean
4. The water in most lakes, ponds, and rivers is fresh water, but there are some exceptions.
- a. Great Salt Lake in Utah
 - b. Mono Lake in California
 - c. such lakes are more saline than the ocean and are called hypersaline lakes

D. Depth

1. water depth is directly related to the amount of sunlight that reaches the bottom of the body of water
- a. the amount of sunlight is important in determining the types and amount of plants that can grow on the bottom
 - b. recall that as producers, these plants will form the bottom of the food web
2. bodies of water can be divided into depth zones
- a. photic zone:
top layer of water that receives enough sunlight for photosynthesis to occur
 - 1. the depth of the photic zone depends on how clear or cloudy the water is
 - 2. in the open ocean, the photic zone is about 100m deep
 - 3. amount of light available decreases steadily as the depth increases

b. aphotic zone:

located below the photic zone

- 1. Sunlight never reaches the aphotic zone**
- 2. only the ocean and extremely deep lakes have aphotic zones**

c. benthic zone:

floor of a body of water (the bottom, muddy stuff)

- 1. the benthic zones of shallow ponds, streams, and coastal areas have a variety of organisms**
- 2. common fresh water benthic animals are:
snails, mussels, catfish, turtles**
- 3. in shallow waters, sunlight reaches the benthic zone allowing it to support plant life**

II. Standing Water Ecosystems

A. freshwater biomes can be divided into two main types: standing water ecosystems and flowing water ecosystems

- 1. Lakes and ponds are common standing-water ecosystems**
 - a. also includes many types of wetlands such as:
bogs, prairie potholes, swamps, marshes**



2. there is no net flow of water in and out of most standing-water ecosystems, but there usually is a characteristic flow of water circulating through the system

a. this flow helps to distribute warmth, oxygen, and nutrients throughout the system

B. Types of Wetlands

TYPE	ABIOTIC FACTORS	BIOTIC FACTORS
Lake	Deepest type of standing water May have aphotic zone Usually fed by underground aquifers	Producers: floating algae in photic zone and benthic plants along shore; complex food webs
Pond	Light reaches benthic zone Fed by rainfall May be seasonal	Producers: plants and algae on the bottom Food web usually simpler than lakes
Marsh	Very shallow water with land occasionally exposed; soil is saturated; water is often free of oxygen; may be freshwater, saltwater, or brackish	Plants have roots under water but leaves are above water; mostly grasses, cattails, and rushes; ducks, waterfowl, and benthic organisms are common
Swamp	Land is soaked with water because of poor drainage; usually along low streambeds and flat land	Dominated by large trees and shrubs; plants are adapted to grow in muddy, oxygen-poor soil
Bog (fen, moor)	Inland wetland with little inflow or outflow; soil is acidic; decay is slow	Sphagnum moss is the dominant organism; partly decayed moss accumulated as peat

C. Standing-Water Organisms

1. many standing water ecosystems have several levels of habitat

2. top level of a standing water ecosystem supports the plankton community

3. plankton: general term for microorganisms that float on the surface of the water

a. two main types of plankton: phytoplankton and zooplankton

b. phytoplankton:

plankton that can perform photosynthesis

- 1. phytoplankton are the main producers in most aquatic biomes**

c. zooplankton:

plankton that does NOT perform photosynthesis

- 1. includes microscopic animals and protozoans**
- 2. because they can't perform photosynthesis, they are consumers in the ecosystem**

4. Benthic Community

- a. many benthic organisms are scavengers feeding on the remains of other organisms**
- b. depends on a steady rain of organic material that drifts down from the top (detritus)**
- c. includes the decomposers of the standing water ecosystem**

III. Wetlands

A. In general, wetlands are:

ecosystems in which the roots of plants are submerged under water at least part of the year

- 1. A single definition is not agreed upon by all scientists and groups**
 - a. includes marshes, swamps, and bogs**
 - b. soils are soaked with water and are very low in dissolved oxygen**
- 2. very important part of the biosphere**

- a. **act as filters, detoxifying chemicals in the water that passes through them**
 - **Wetlands are so efficient they can be used as part of treatment systems for waste water.**
 - b. **important feeding, breeding, and resting grounds for waterfowl**
 - c. **along rivers, act as flood protection regions**
 - d. **helps in the refilling of aquifers**
- 3. Wetlands are being destroyed by human activity at an alarming rate**
- 4. Several reasons for this destruction:**
- a. **many do not find wetlands as attractive as other natural habitats**
 - b. **breeding grounds for mosquitoes**
 - c. **give off an unpleasant odor due to methane or “swamp gas” given off by organisms in the soil**
 - d. **coastal lands that wetlands occupy are very valuable for other uses**
 - e. **have been used as landfill sites**

B. Florida Everglades

- 1. originally spanned from Lake Okeechobee 160 km to the tip of Florida**
- 2. wet seasons from May to October and then a dry season**
- 3. home to a huge number of organisms such as alligators, fish, turtles, birds**

- a. **these animals had evolved and adapted to the Everglades: alligators sweep out huge depressions in the ground (called gator holes) that keep water during the dry season**



gator holes to survive the dry season; birds would feed on the organisms in the gator holes

4. **to create farmland, water from Lake Okeechobee was channeled and much of the wetland was drained**
5. **to save the wetlands, Everglades National Park was created in 1947**
- a. **but no water means no ecosystem, so a canal was dug in 1967 to bring water from the lake to the park**
- b. **now, flooding was a problem: water was coming too fast, flooding the gator holes**

c. as a result, between 1962 and 1981, bird populations dropped by 50%

6. In 1983, a new campaign to “Save Our Everglades” was launched

a. since then, more than 100,000 acres have been returned to the wetland

b. the flow of water was adjusted

c. yet it is still an endangered habitat



Flowing Water Ecosystems

To a scientist, all aboveground bodies of flowing fresh water are called streams.

I. Stream organisms

A. organisms that live in flowing water habitats are adapted to the rate of the water's movement

- 1. insect larvae have hooks that enable them to grab hold of plants**
- 2. others have suckers that enable them to anchor to rocks**
- 3. salmon and related fish breed and grow in freshwater but spend their adult lives in the ocean**
 - a. salmon find the stream and breeding spot by “smelling” tiny amounts of chemicals in the water**

II. Stream Flow

A. most streams begin at high altitudes, often from the runoff of melting snow on the tops of mountains

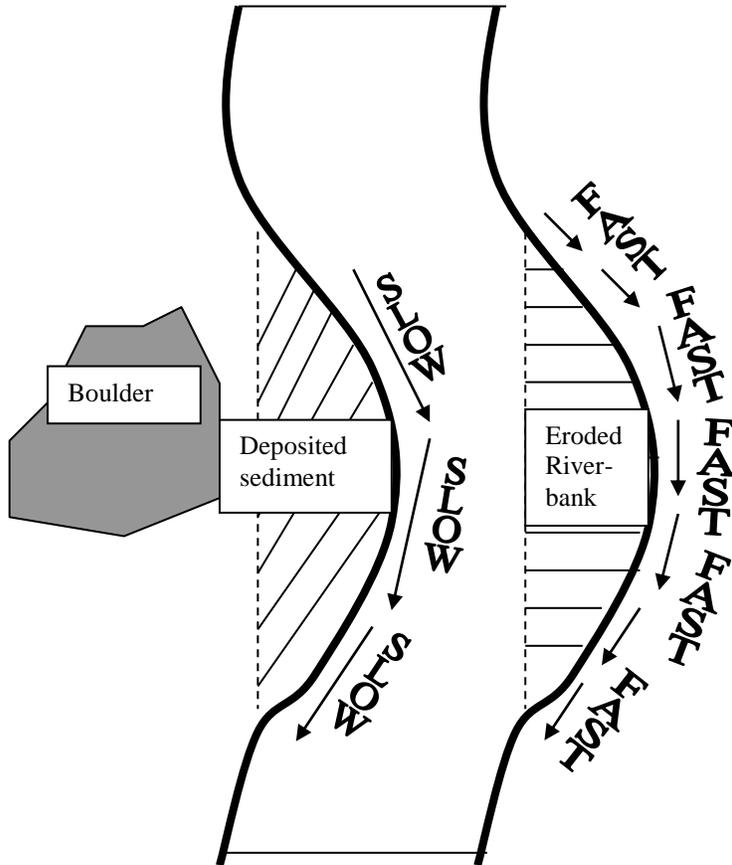
- 1. gravity causes the streams to flow downhill**
- 2. because inland areas usually have higher altitudes than coastal areas, streams usually flow toward the oceans**
- 3. source or head of a stream:**

place where the stream begins

 - a. headwaters are cold and contain large amounts of dissolved oxygen that can support a variety of organisms**
 - b. headwaters tend to flow too rapidly for most organisms to live in the water**

- 4. as the flow of water slows, small particles of minerals, sand, and organic material that were picked up by the flowing water begin to settle**
- 5. sediments:**
 - smaller particles that settle to the bottom of a body of water**
- 6. sediments accumulate at the bottom of the streambed and provide a place for plant roots to grow**
 - a. the plant growth further slows the flow of water, allowing the water to be warmed by the sun**
 - b. phytoplankton multiply in warmer water, and soon there is enough food to support populations of consumers**
- 7. the processes of sedimentation and erosion cause the course of a stream to change naturally over time**
 - a. as a stream curves, or meanders, the water flowing along the inside of the curve slows down**
 - b. at the same time, water on the outside of the curve speeds up**
 - c. sediments accumulate along the inner edge because of the slowed flow**
 - d. the increased flow on the outer edge increases the rate of erosion along the banks of the stream**
 - e. the curve in the stream gradually becomes more pronounced, and as the stream becomes older, it becomes more curved**
- 8. the flow of many streams has been changed dramatically by human activities**
 - a. some streams have been dammed to create reservoirs, which provide water and hydroelectric energy**

b. changing the course of a stream damages or destroys the delicate habitats of many organisms – ex. Salmon



..... = original path of water flow

_____ = new path of water flow

