

Freshwater Ecosystems

- The types of organisms in an aquatic ecosystem are mainly determined by the water's **salinity**.
- As a result, aquatic ecosystems are divided into **freshwater and marine** ecosystems.
- Freshwater ecosystems include ponds, lakes, streams, rivers, and wetlands.
- **Wetlands** are areas of land that are periodically under water or whose soil contains a great deal of moisture.



Characteristics of Aquatic Ecosystems

- Factors such as **temperature, sunlight, oxygen, and nutrients** determine which organisms live in which area of the water.
- Aquatic ecosystems contains several types of organisms that are grouped by their **location** and by their **adaptation**.
- Three groups of aquatic organisms include **plankton, nekton, and benthos**.



Characteristics of Aquatic Ecosystems

- **Plankton** are the mass of mostly microscopic organisms that float or drift freely in the water, and can be microscopic animals called zooplankton or microscopic plants called phytoplankton.
- **Nekton** are all organisms that swim actively in open water, independent of currents.
- **Benthos** are bottom-dwelling organisms of the sea or ocean and are often attached to hard surfaces.
- **Decomposers** are also aquatic organisms.

Lakes and Ponds

- Lakes, ponds, and wetlands can form **naturally** where groundwater reaches the Earth's surface.
- Humans intentionally create **artificial lakes** by damming flowing rivers and streams to use them for power, irrigation, water storage, and recreation.
- Lakes and ponds can be structured into horizontal and vertical zones.
- The types of organisms present depend on the **amount of sunlight** available.



Life in a Lake

- The **littoral zone** is a shallow zone in a freshwater habitat where light reaches the bottom and nurtures plants and aquatic life is diverse and abundant.
- Some plants are **rooted in the mud** underwater with their upper leaves and stems above water.
- Other plants have **floating leaves**.
- In open water, plants, algae, and some bacteria capture solar energy to make their own food during photosynthesis.



Life in a Lake

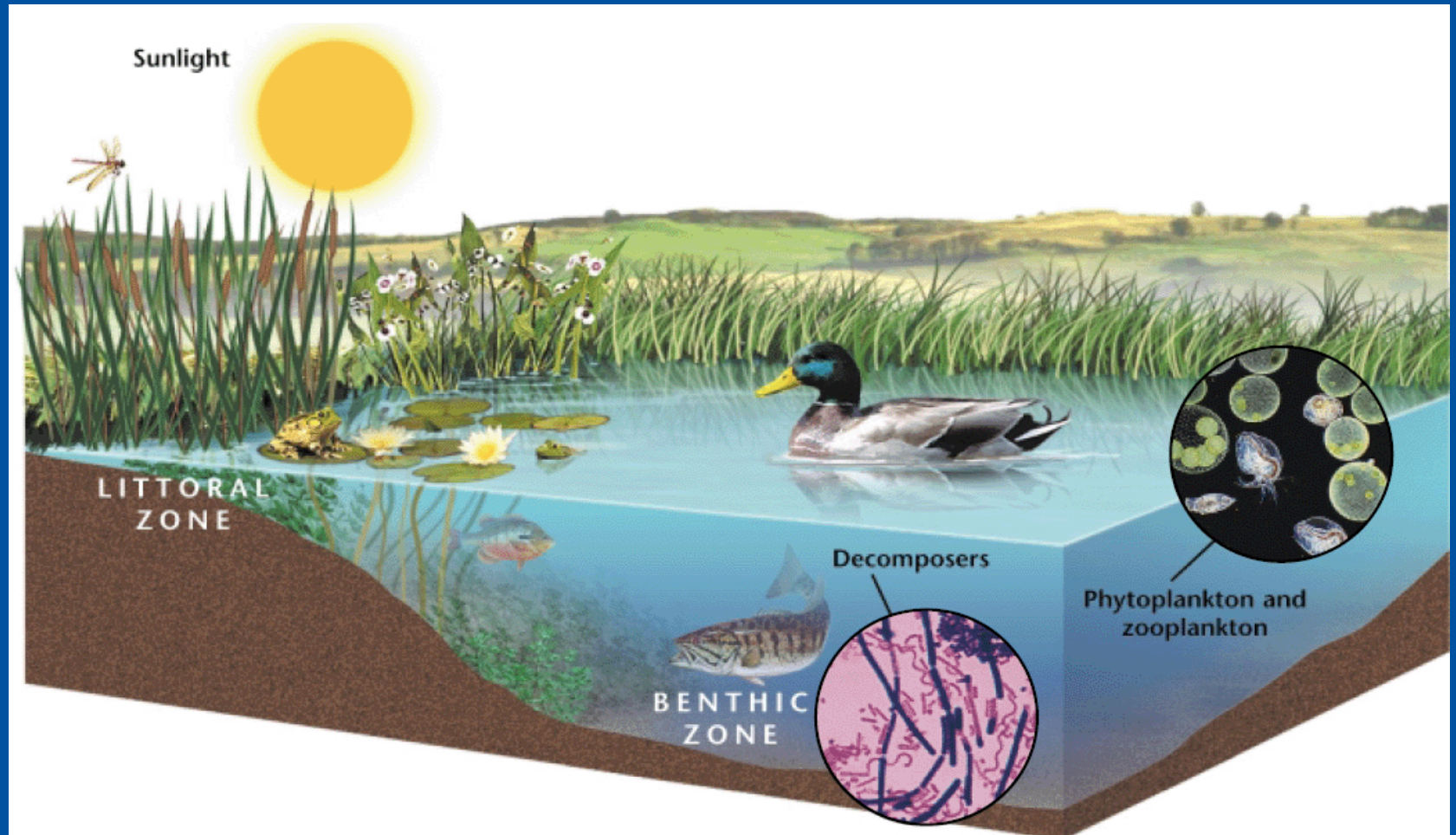
- Some bodies of fresh water have areas so deep that there is too little light for photosynthesis.
- Bacteria live in the deep areas of freshwater. Fish adapted to cooler, darker water also live there.
- Eventually, dead and decaying organisms reach the benthic zone.
- The **benthic zone** is the region near the bottom of a pond, lake or ocean which is inhabited by decomposers, insect larvae, and clams.

Life in a Lake

- Animals that live in lakes and ponds have adaptations that help them obtain what they need to survive.
- For example, water beetles use the hairs under their bodies to trap surface air so that they can breathe during their dives for food.
- And, in regions where lakes partially freeze in the winter, amphibians burrow into the littoral mud to avoid freezing temperatures.



A Lake Ecosystem



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How Nutrients Affect Lakes

- **Eutrophication** is an increase in the amount of nutrients, such as nitrates, in an aquatic ecosystem.
- As the amount of plants and algae grow, the number of bacteria feeding on the decaying organisms also grows.
- These bacteria use the oxygen dissolved in the lake's waters.
- Eventually the reduced amount of oxygen kills oxygen loving organisms.



How Nutrients Affect Lakes

- A lake that has large amounts of plant growth due to nutrients is known as a **eutrophic lake**.
- Lakes naturally become eutrophic over a long period of time.
- However, eutrophication can be accelerated by **runoff**, such as rain, that can carry sewage, fertilizers, or animal wastes from land into bodies of water.

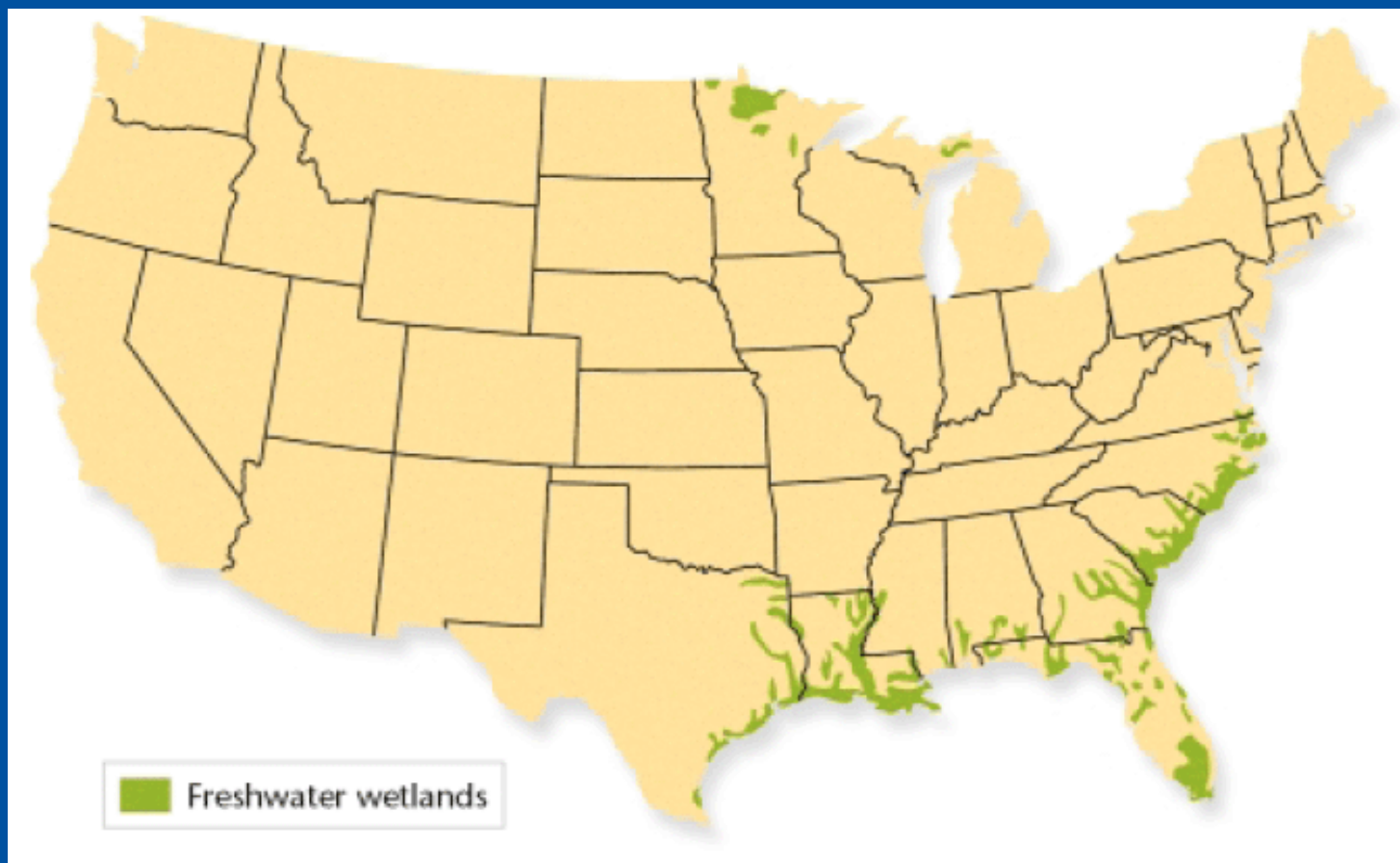


Freshwater Wetlands

- Freshwater wetlands are areas of land that are covered with **fresh water** for part of the year.
- The two main types of freshwater wetlands are **marshes and swamps**.
- Marshes contain **nonwoody plants**, while swamps are dominated by **woody plants**.
- Most freshwater wetlands are located in the southeastern United States, with the largest in the **Florida Everglades**.



Freshwater Wetlands



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Freshwater Wetlands

- Wetlands perform several important environmental functions.
- Wetlands **act like filters or sponges** that absorb and remove pollutants from the water.
- They also **control flooding** by absorbing extra water when rivers overflow.
- These areas **provide a home** for native and migratory wildlife in addition to feeding and spawning for many freshwater game fish.

Environmental Functions of Wetlands

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

Marshes

- Freshwater marshes tend to occur on low, flat lands and have little water movement.
- In shallow waters, plants root themselves in the rich bottom sediments while their leaves stick out about the surface of the water year-round.
- There are several kinds of marshes, each of which is characterized by its **salinity**.
- Brackish marshes have **slightly salty water**, while salt marshes contain **saltier water**.



Marshes

- The benthic zones of marshes are **nutrient rich** and contain plants, numerous types of decomposers, and scavengers.
- Water fowl, such as ducks, have flat beaks adapted for sifting through the water for fish and insects.
- While water birds, such as herons, have spear like beaks they use to grasp small fish and probe for frogs in the mud.
- Marshes also attract migratory birds from temperate and tropical habitats.



Swamps

- Swamps occur on **flat, poorly drained land**, often near streams and are dominated by woody shrubs or water loving trees.
- Freshwater swamps are the **ideal habitat** for amphibians because of the **continuous moisture**.
- Birds are also attracted to hollow trees near or over the water.
- Reptiles are the predators of the swamp, eating almost any organism that crosses their path.



Human Impact on Wetlands

- Wetlands were previously considered to be **wastelands** that provide breeding grounds for insects.
- As a result, many have been drained, filled, and cleared for farms or residential and commercial development.
- The importance of wetlands is now recognized, as the law and the federal government protect many wetlands while most states now prohibit the destruction of certain wetlands.



Rivers

- At its headwaters, a river is usually cold and full of oxygen and runs swiftly through a shallow riverbed.
- As a river flows down a mountain, it may broaden, become warmer, wider, slower, and decrease in oxygen.
- A river changes with the **land and the climate** through which it flows.



Life in a River

- In and near the headwater, mosses anchor themselves to rocks by using rootlike structures called *rhizoids*.
- Trout and minnows are adapted to the cold, oxygen rich water.
- Farther downstream, plankton can float in the warmer, calmer waters.
- Plants here can set roots in the river's rich sediment, and the plant's leaves vary in shape according to the strength of the river's current.
- Fish such as catfish and carp also live in these calmer waters.



Rivers in Danger

- Industries use river water in **manufacturing processes and as receptacles** for wastes.
- In addition, people have used rivers to dispose of their sewage and garbage.
- These practices have polluted rivers with toxins, which have killed river organisms and made river fish inedible.
- Today, runoff from the land puts pesticides and other poisons into rivers and coats riverbeds with toxic sediments.