

Freshwater Ecosystems

Only 3% of the world's water is fresh. And 99% of this is either frozen in glaciers and pack ice or is buried in aquifers. The remainder is found in lakes, ponds, rivers, and streams.

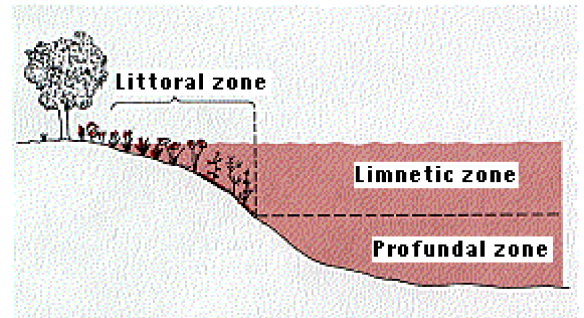
Lakes and Ponds

Deep lakes contain three distinct zones, each with its characteristic community of organisms.

Littoral zone

The zone close to shore. Here light reaches all the way to the bottom. The [producers](#) are plants rooted to the bottom and algae attached to the plants and to any other solid substrate. The [consumers](#) include

- tiny [crustaceans](#)
- [flatworms](#)
- insect larvae
- [snails](#)
- frogs, fish, and turtles.



Limnetic zone

This is the layer of open water where [photosynthesis](#) can occur.

As one descends deeper in the limnetic zone, the amount of light decreases until a depth is reached where the rate of photosynthesis becomes equal to the rate of [respiration](#). At this level, [net primary production](#) no longer occurs.

The limnetic zone is shallower in turbid water than in clear and is a more prominent feature of lakes than of ponds.

Life in the limnetic zone is dominated by

- floating microorganisms - called **plankton**
- actively swimming animals - called **nekton**.
- The [producers](#) in this ecosystem are planktonic [algae](#).
- The [primary consumers](#) include such animals as microscopic crustaceans and [rotifers](#) - the so-called **zooplankton**.
- The secondary (and higher) consumers are swimming insects and fish. These nekton usually move freely between the littoral and limnetic zones.

Profundal zone

Many lakes (but few ponds) are so deep that not enough light reaches here to support net primary productivity. Therefore, this zone depends for its calories on the drifting down of organic matter from the littoral and limnetic zones.

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The profundal zone is chiefly inhabited by primary sediments at the bottom of the lake.

that are either attached to or crawl along the

Such bottom-dwelling animals are called the **benthos**.

The sediments underlying the profundal zone also support a large population of bacteria and fungi. These [decomposers](#) break down the organic matter reaching them, releasing inorganic nutrients for recycling.

Fall overturn

Where there is a pronounced change of seasons, the warming of the surface of the lake in the summer prevents this water from mixing with deeper water. This is because warm water is less dense than cold.

The surface water becomes enriched in oxygen

- some from the air above it
- the rest — because it is in the limnetic zone — from photosynthesis.

But the water in the profundal zone — being removed from both these sources — becomes stagnant.

In the fall, however, as the surface water cools, it becomes denser and sinks to the bottom — carrying oxygen with it.

Spring overturn

A similar phenomenon occurs when the ice melts in the spring.

Rivers and Streams

The habitats available in rivers and streams differ in several ways from those in lakes and ponds.

- Because of the current, the water is usually more oxygenated.
- Photosynthesizers play a minor role in the food chains here; a large fraction of the energy available for consumers is brought from the land; e.g., in falling leaves.

Oceans, like lakes, can be described in terms of zones. There are many parallels between the two but unfortunately a separate vocabulary is used for each.

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