44.4A: Abiotic Factors Influencing Aquatic Biomes

Abiotic factors that influence aquatic biomes include light availability, depth, stratification, temperature, currents, and tides.

Learning Objectives

• Differentiate among the abiotic factors that affect aquatic biomes

Key Points

• In aquatic biomes, light is an important factor that influences the communities of organisms found in both freshwater and marine ecosystems.
• In freshwater biomes, stratification, a major abiotic factor, is related to the energy aspects of light.
• Marine systems are influenced by the physical water movements, such as currents and tides, along with the thermal properties of water.
• Oceans zones can be categorized into photic or aphotic zones, depending on the presence or absence of light and photosynthesis.

Key Terms

• **stratification**: the process leading to the formation or deposition of layers
• **photic**: of, related to, or irradiated by light; especially describing that part of the near-surface ocean is which photosynthesis is possible
• **aphotic**: describing that part of the deep oceans and lakes where photosynthesis is not possible
Abiotic Factors Influencing Aquatic Biomes

As with terrestrial biomes, aquatic biomes are influenced by a series of abiotic factors. However, these factors differ since water has different physical and chemical properties than does air. Even if the water in a pond or other body of water is perfectly clear (there are no suspended particles), water, on its own, absorbs light. As one descends into a deep body of water, there will eventually be a depth which the sunlight cannot reach. While there are some abiotic and biotic factors in a terrestrial ecosystem that might obscure light (such as fog, dust, or insect swarms), usually these are not permanent features of the environment. The importance of light in aquatic biomes is central to the communities of organisms found in both freshwater and marine ecosystems. In freshwater systems, stratification due to differences in density is perhaps the most critical abiotic factor and is related to the energy aspects of light. The thermal properties of water (rates of heating and cooling) are significant to the function of marine systems and have major impacts on global climate and weather patterns. Marine systems are also influenced by large-scale physical water movements, such as currents; these are less important in most freshwater lakes.

The ocean is categorized by several areas or zones. All of the ocean’s open water is referred to as the pelagic realm (or zone). The benthic realm (or zone) extends along the ocean bottom from the shoreline to the deepest parts of the ocean floor. Within the pelagic realm is the photic zone, which is the portion of the ocean that light can penetrate (approximately 200 m or 650 ft). At depths greater than 200 m, light cannot penetrate; thus, this is referred to as the aphotic zone. The majority of the ocean is aphotic, lacking sufficient light for photosynthesis. The deepest part of the ocean, the Challenger Deep (in the Mariana Trench, located in the western Pacific Ocean), is about 11,000 m (about 6.8 mi) deep. To give some perspective on the depth of this trench, the ocean is, on average, 4267 m or 14,000 ft deep. These realms and zones are relevant to freshwater lakes as well, as they determine the types of organisms that will inhabit each region.

![Oceanic zones diagram](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/44%3A_E…)

Figure \(\PageIndex{1}\): **Oceanic zones**: The ocean is divided into different zones based on water depth, light availability, and distance from the shoreline.