

Aquatic Ecology

Water covers 75% of our planet's surface. It comprises the majority of most living things. It moderates our climate. It makes some ecosystems flourish and is the major limiting factor in others. It is the fluid of life. Without water, life could not exist. This simple molecule, with many unique properties, makes life possible.

“If there is magic on this planet, it is contained in water.” This quote from Loran Eisely sums up the importance and special attributes of water.

Water is considered to be a renewable resource because it can be recycled and it depends on mankind's care of the resource to take care of it. Man often takes this vital resource for granted, as Benjamin Franklin pointed out in his simple statement, “When the well is dry, we know the worth of water.

Water provides transportation, a large quantity of our food supply, minerals, recreational opportunities, and habitat for wildlife. It shapes the topography of the land through erosion and deposition, helping to create our soil and then carrying it away. Water is also used to produce much of our electrical power. It is a resource that we depend upon in ways we seldom think about.

The water we have today has been here since the time our atmosphere and oceans formed. It is also thought that water is entering our atmosphere every day from large blocks of ice entering our atmosphere and melting. Water is being continually recycled, by natural processes, into freshwater that organisms need and can use. The supply of water is not important just to man, it is essential to all organisms and provides the ecosystem in which many live.

Aquatics is the study of water and related ecosystems including streams, rivers, ponds, lakes, wetlands, and the oceans. There are habitats within, on, surrounding, and under bodies of water and their associated wetland areas. These areas also support and provide the food supply for many terrestrial wildlife species.

In this section you will examine the nature, importance, roles, cycling, and ecosystems of water, as well as, methods to conserve and protect our water resources.

Learning Objectives

- ☺ Know the importance and availability of water.
 - Know the distribution of water, how much is available for use, and where it is located.
 - Understand the processes and phases for each part of the water cycle.
 - Define surface water and groundwater, and know the terminology associated with each.
 - Know the structure of water and the unique properties that make it important for life.

- ☺ Be able to identify various components of aquatic ecosystems.
 - Know what an ecosystem, community, niche and habitats are.
 - Describe the various niches of organisms.
 - Define food chain and food web and understand the difference between the two terms.
 - Know how energy flows through an aquatic ecosystem and explain a pyramid of numbers.
 - Explain the biotic interactions, or relationships, that can occur between aquatic organisms.
 - Understand how organisms, in aquatic ecosystems, are affected by abiotic factors.
 - Know how oxygen and mineral nutrients are recycled in aquatic ecosystems.
 - Understand the range of tolerance of aquatic species, and know some conditions that impact aquatic life.
 - Identify the factors that determine the carrying capacity of aquatic ecosystems and how each limits aquatic productivity and life.
 - Know the process of eutrophication and be able to explain man's impact on this process.
 - Identify North Carolina species endangered or threatened and what contributes to their being at risk.
 - Analyze the interaction of competing uses of water for water supply, hydropower, navigation, wildlife, recreation, waste assimilation, irrigation, industry, and others.
- ☺ Know the main types of aquatic organisms.
 - Identify the various classification of organisms based upon their habitat and movement.
 - Understand the classification, structure, and reproduction of fish.
 - Be able to identify aquatic organisms: plant life, fish, amphibians, reptiles, birds, and mammals.
- ☺ Be able to describe and identify aquatic ecosystems.
 - Know the classifications of marine ecosystems based on salinity and the ecosystems of each group.
 - Understand the various zones within different aquatic environments (depth zones, light zones, vegetative zones).
 - Compare and contrast the availability of oxygen and carbon dioxide at different levels of aquatic environments.
 - Be able to explain thermal stratification and overturn.
 - Know the threats to aquatic ecosystems and practices to prevent their pollution.
 - Know and be able to describe the various freshwater ecosystems.
 - ~ Know the various types of wetlands, the definition of a wetland, indicators of wetland areas, wetland soils, wetland plants, and how wetlands are beneficial.
 - ~ Understand how a lake or pond ages and the succession of these water bodies.
 - ~ Know the structure of a river and factors that impact its velocity.
 - ~ Be able to identify the organisms common to each of the freshwater ecosystems and their adaptations to life in these habitats.
 - ~ Describe the threats to freshwater ecosystems.
 - ~ Know the function of riparian buffers, how they benefit water ecosystems and what benefit fallen leaves have in the input of energy to streams.
 - Identify and describe the various brackish and saltwater ecosystems, and know their importance.

- ☺ Identify the types of water pollution, know their sources and their impact, and know methods to prevent pollution, including BMP's.
 - Know various methods for testing water quality.
 - Identify equipment used for sampling and determining water quality.
 - Understand national legislation that relates to aquatic environments.
 - Know the main macroinvertebrates found in our streams and be able to identify them.
 - Be familiar with major methods and laws used to protect water quality (both surface and ground water) and utilize this information to make management decisions to improve the quality of water in a given situation.