

## Aquatic Environmental Science Scope & Sequence

Days	Unit	Standard(s)/Outcome(s)	Essential/Guiding Questions
3-4	<b>Introduction to Aquatic Ecosystems</b>	<p>Define fundamental ecology terminology.</p> <p>Develop and implement a scientifically based ecology project that benefits the local community.</p>	<p>What is the difference between aquatic and terrestrial ecosystems?</p> <p>How can humans positively impact aquatic ecosystems in Maryland?</p>
6	<b>Factors of an Ecosystem</b> <ul style="list-style-type: none"> <li>● Abiotic factors</li> <li>● Aquatic habitats</li> <li>● Adaptations</li> <li>● Energy transfer</li> <li>● Food chains and webs</li> <li>● Aquatic communities</li> </ul>	<p>Analyze how various abiotic factors delineate aquatic habitats.</p> <p>Analyze the effects of altering the abiotic factors of an aquatic habitat.</p> <p>Describe plant and animal adaptations for living in various environments.</p> <p>Explain how energy is transferred in the environment.</p> <p>Construct food chains and food webs.</p>	<p>How are aquatic ecosystems organized?</p> <p>How could changes to the abiotic factors in an aquarium affect that aquatic habitat?</p> <p>How is energy transferred in aquatic ecosystems?</p>

		Describe how abiotic factors play a role in the aquatic biotic community	
6	<b>Properties of Water</b> <ul style="list-style-type: none"> <li>● Temperature and basic properties</li> <li>● Chemicals dissolved in water</li> <li>● Variation of water temperature</li> <li>● Turbidity</li> <li>● Light transmission and photosynthesis</li> <li>● Water depth and related factors</li> <li>● Hydrologic cycle</li> <li>● Watershed</li> </ul>	<p>Explain water's ability to support organisms.</p> <p>Explain how dissolved chemicals in water affect living organisms.</p> <p>Compare water temperatures from one body of water to another, and within a single body of water.</p> <p>Explain the importance of light transmission to photosynthesis.</p>	<p>How do factors of water affect biotic and abiotic factors in aquatic ecosystems?</p> <p>How does turbidity affect the process of photosynthesis?</p>
7	<b>Groundwater</b> <ul style="list-style-type: none"> <li>● Water table</li> <li>● Water in soil and rock</li> <li>● Wetlands and hydrology</li> <li>● Filtering pollution</li> <li>● Percolation, porosity,</li> </ul>	<p>Model the components of a water table, including saturated and unsaturated zones, capillary fringe, recharge, and relation to</p>	<p>How is water held in soil and rock?</p> <p>How does groundwater impact aquatic ecosystems?</p>

	<p>permeability</p> <ul style="list-style-type: none"> <li>● Runoff</li> <li>● Types of pollution that affect groundwater</li> <li>● Saltwater intrusion and the water table</li> </ul>	<p>surface water.</p> <p>Describe how water is held in soil and rock.</p>	
3	<p><b>Lakes and Ponds</b></p> <ul style="list-style-type: none"> <li>● Stratification</li> <li>● Eutrophication</li> <li>● Human impact on eutrophication</li> </ul>	<p>Model the temperature stratification and turnover of lakes and ponds.</p>	<p>How do humans impact eutrophication?</p> <p>Why is pH important to organisms in an aquatic ecosystem?</p>
10	<p><b>Flowing Water</b></p> <ul style="list-style-type: none"> <li>● Major county stream and tributaries</li> <li>● Stream structure</li> <li>● Importance of water from streams</li> <li>● Physical factors of streams</li> <li>● Stream analysis</li> <li>● Stream communities</li> <li>● Calculating biotic index and stream health</li> <li>● Forest buffer</li> </ul>	<p>Identify and determine from topographic maps the following fundamentals of stream structure, and relate this structure to the problems of stream pollution.</p> <p>Distinguish between various physical factors on a freshwater stream</p> <p>Analyze a stream and determine the concentrations of various chemicals</p> <p>Calculate the biotic index of the stream and explain its connection to stream health.</p>	<p>How is a topographical map useful in predicting possible sources of pollution in a watershed?</p> <p>How does stream pollution affect wildlife habitats?</p> <p>Why are stream assessments useful?</p> <p>How do we test for water quality?</p> <p>What does the biotic index tell us about the health of a stream?</p>

		Describe how a forested buffer zone improves stream health.	How can forested buffer zones improve stream health?
9-10	<b>Chesapeake Bay and Wetlands</b> <ul style="list-style-type: none"> <li>● Characteristics of an estuary</li> <li>● Geologic history of the Chesapeake Bay</li> <li>● Abiotic factors and communities</li> <li>● Interdependent relationships in the Chesapeake Bay</li> <li>● Underwater grass communities</li> <li>● Impact of human population over 200 years</li> <li>● Wetland conservation and development decisions</li> <li>● Habitat destruction</li> <li>● Economic resources</li> <li>● Population dynamics</li> <li>● Native species management</li> <li>● Invasive species</li> </ul>	<p>Identify the characteristics of an estuary.</p> <p>Describe the geological history of the Chesapeake Bay.</p> <p>Compare and contrast drainage basins in the mountainous region, the Piedmont plateau and the Atlantic coastal plain.</p>	<p>What are the characteristics of estuaries?</p> <p>How do humans impact the Chesapeake Bay?</p> <p>Why are wetlands important?</p>