

## **Water Quality Unit - Web Module Descriptions**

Developed by Michigan Technological University and the Western Upper Peninsula Center for Science, Mathematics & Environmental Education ([http://tecalive.mtu.edu/meec\\_index.htm](http://tecalive.mtu.edu/meec_index.htm))

### **1. The Watershed Concept**

All of the water on Earth is stored in the oceans, ice caps and glaciers, groundwater, lakes, atmosphere, rivers, plants, animals, and soil. It is the movement of this water, via precipitation, runoff, evaporation, transpiration, and infiltration that has the potential to move pollutants from one place to another. Watersheds are all of the land area draining water (through runoff) into a particular stream, river or lake. Track the movement of water through the hydrologic cycle and explore ways in which scientists and engineers work to manage water resources. Supports water unit lesson 3.

### **2. Water Quality – Pollutant Sources and Impacts**

Pure water, H<sub>2</sub>O, is hard to find outside of the laboratory. As water moves over and through the earth, it may pick up natural chemicals which become dissolved in the water or pollutants placed on the land. These pollutants can have harmful effects on both aquatic and terrestrial ecosystems, if present in high enough concentrations. The types of pollutants, their sources, pathways, impacts, and strategies to control their impact will be described. Supports water unit lessons 4 and 9.

### **3. Groundwater Supply**

Where does groundwater come from and where does it go is the focus of this module. Explore how ground water moves through the water cycle, the concepts of porosity and permeability and how they are influenced by soil characteristics, how groundwater is pumped to provide for many human uses, proper precautions in siting a new well, and some current issues related to ground water management and use. Supports water unit lesson 5.

### **4. Groundwater Contamination**

The contamination of groundwater, which supplies drinking water for one-third of the U.S. population and half of Michigan's residents, is a serious health and environmental problem. During this investigation you will learn about the sources and impacts of groundwater contamination, how groundwater (an unseen resource) contamination is investigated, and some possible ways to clean up and prevent groundwater. Students engage in a groundwater contamination investigation to determine the size, direction of flow and rate of movement of a contamination plume. Supports water unit lesson 5.

### **5. Stream Monitoring**

What do foresters, environmental engineers, fisheries biologists, teachers, and maybe even your neighbor have in common? They are just some of the many people that use monitoring to assess the quality of streams and rivers. In this module, students will learn how to assess a stream's quality water quality by engaging in an interactive investigation of physical stream measurements, water chemistry, bioindicators, and streamside habitat assessment. Students will observe changes in a stream as a result of natural and human actions, and be able to identify the characteristics of healthy and unhealthy streams. Supports water unit lesson 7.

## **6. Water and Wastewater Treatment**

Most drinking water provided for human consumption requires treatment in order to make it safe. Wastewater from households and industrial processes must also be treated before being discharged to rivers and lakes to ensure the safety of the water for human recreation and to protect fish populations and aquatic ecosystems. While modern technology seeks to address these water quality cleanup requirements, the introduction of new and different pollutants and the need to design treatment technologies that are both economical and effective continues to provide a challenge to communities and industry. In this module, students examine why treatment is needed, the types and potential impacts of various water pollutants, and several treatment techniques. Water treatment challenges of homeowners on private wells, public water supply facilities, and providing wastewater treatment aboard the international space station are explored. Supports water unit lessons 6 and 9.

### **Credits**

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Water Quality – The Watershed Concept

Water Quality – Water Quality: Pollutant Sources and Impacts

Water Quality – Water and Wastewater Treatment

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Water Quality – Groundwater Contamination

Water Quality – Groundwater Supply

Water Quality – Stream Monitoring

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Water Quality – Water and Wastewater Treatment

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