

## Overview of Michigan Water Quality Curriculum Unit ~ Middle School Science & Social Studies

Focus Question	Key Concepts	Core Lesson	Enhancements & Extensions
<i>How much water is available for human use?</i>	Water cycle terms and processes; % distribution of water on Earth.	<b>1. <i>Where Is All the Water in the World?</i></b> Students describe how water moves through the water cycle, where water is located on Earth, and how much fresh water is available for human use.	<ul style="list-style-type: none"> <li>Chemical and physical characteristics of water in <i>Is There Water On Zork?</i> <a href="#">WET Activity Guide</a></li> </ul>
<i>Why is clean, available freshwater important to Michigan?</i>	Direct and indirect water uses; value of water to Michigan's environment and economy	<b>2. <i>How Do We Use Water?</i></b> Students identify the many ways we use water daily in all we do and all we consume. Student's calculate their weekly water use; and imagine a Michigan without abundant freshwater.	<ul style="list-style-type: none"> <li>Compare Michigan water use to other countries <a href="http://www.wateryear2003.org">http://www.wateryear2003.org</a></li> <li>Build pyramids of gallon jugs to display water use for different activities.</li> </ul>
<i>Why are watersheds important?</i>	Watershed, runoff, surface water, groundwater, stream discharge	<b>3. <i>Do You Know Where Your Watershed Is?</i></b> Students define watershed and the parts of a river; compare watershed size and stream flow in Michigan; examine their watersheds' relationship to the Great Lakes	<ul style="list-style-type: none"> <li>Watershed Concept Web Module: <a href="http://www.techalive.mtu.edu/meec_index.htm">http://www.techalive.mtu.edu/meec_index.htm</a></li> <li>Graph their annual local stream discharge: <a href="http://nwis.waterdata.usgs.gov/mi/nwis/discharge">http://nwis.waterdata.usgs.gov/mi/nwis/discharge</a></li> <li>Outline their watershed on a topographic map.</li> </ul>
<i>How do our actions affect water quantity &amp; quality?</i>	Land uses, sources of pollutants, point and non-point source pollution	<b>4. <i>How Do Land Uses Affect Water Quality?</i></b> Students build a simple watershed model to observe point & non-point pollution from different land uses; identify the types of pollution resulting from different land uses; give examples of best management practices to reduce pollution.	<ul style="list-style-type: none"> <li>EPA's <i>Surf Your Watershed</i> for data: <a href="http://www.epa.gov/surf/">http://www.epa.gov/surf/</a></li> <li>Water Quality Pollutants &amp; Sources Web Module: <a href="http://www.techalive.mtu.edu/meec_index.htm">http://www.techalive.mtu.edu/meec_index.htm</a></li> <li>Use DEQ website to ID contaminated sites in their watershed: <a href="http://www.deq.state.mi.us/part201ss/">http://www.deq.state.mi.us/part201ss/</a></li> </ul>
<i>How can groundwater be polluted?</i>	Connection of groundwater and surface water; groundwater movement; sources of GW contamination	<b>5. <i>Groundwater: Michigan's Hidden Resource</i></b> Students examine groundwater characteristics, how groundwater is used in Michigan, and how groundwater interacts with surface water. Build a model to show how groundwater is recharged and how it can be polluted.	<ul style="list-style-type: none"> <li><i>The Fruitvale Story: Investigating groundwater (SEUPUP kit)</i></li> <li>Groundwater Supply Web Module: <a href="http://www.techalive.mtu.edu/meec_index.htm">http://www.techalive.mtu.edu/meec_index.htm</a></li> <li>Groundwater Contamination Web Module: <a href="http://www.techalive.mtu.edu/meec_index.htm">http://www.techalive.mtu.edu/meec_index.htm</a></li> </ul>
<i>How do we know if water is clean?</i>	Water quality standards; drinking water protection; history of water quality protection	<b>6. <i>Would You Drink This Water?</i></b> Students conduct a serial dilution to understand water quality standards; identify how Michigan water quality is measured; students assemble a water quality protection	<ul style="list-style-type: none"> <li>Search EPA website to ID quality of drinking water in MI: <a href="http://www.epa.gov/safewater/dwinfo/mi.htm">http://www.epa.gov/safewater/dwinfo/mi.htm</a>.</li> <li>Wastewater Treatment Plant Tour Web Module <a href="http://techalive.mtu.edu/meec/module02">http://techalive.mtu.edu/meec/module02</a></li> <li>Examine water quality confidence report for their public water supply</li> </ul>
<i>How do you know if a stream is healthy?</i>	Stream health: water quality, bio-assessment, physical measurements, habitat quality	<b>7. <i>What Is A Healthy Stream?</i></b> Students identify characteristics of healthy streams; use real Michigan data to select the best stream for brook trout.	<ul style="list-style-type: none"> <li>Conduct field assessment of local stream.</li> <li>Stream Monitoring Web Module: <a href="http://www.techalive.mtu.edu/meec_index.htm">http://www.techalive.mtu.edu/meec_index.htm</a></li> </ul>
<i>How does storm water runoff impact rivers, lakes and the Great Lakes?</i>	Management of storm water runoff; chemical analysis of storm water	<b>8. <i>Can We Stop Storm Water?</i></b> Identify pollutants in storm water; use aerial photos to compare changes in land use and runoff quantity; identify best management practices to reduce storm water impacts.	<ul style="list-style-type: none"> <li>Conduct storm drain stenciling in their community.</li> <li>Test water quality of stormwater.</li> <li>Estimate the amount of stormwater running off their school site.</li> </ul>
<i>What are the challenges to the Great Lakes and what can I do?</i>	Bioaccumulation in the Great Lakes food web; stewardship of Michigan's water resources	<b>9. <i>Challenges to the Great Lakes</i></b> Investigate food chains in the Great Lakes and how contaminants can bio-accumulate in fish; investigate Great Lakes concerns and answer "How can I help?"	<ul style="list-style-type: none"> <li>Investigate a Great Lakes water issue: beach closures, Great Lakes water diversion, invasive species, wetland loss</li> <li>Great Lakes Heritage Facts &amp; Timeline BINGO</li> </ul>