

Michigan Water Quality Unit ~ Middle School Science & Social Studies

Essential Question	Key Concepts	Core Lesson	Enhancements & Extensions
<i>How much water is available for human use?</i>	Water cycle processes; distribution of water on Earth.	1. <i>Where Is All the Water in the World?</i> Students describe where water is located on Earth and how water moves through the water cycle; and how much fresh water is available for human use.	<ul style="list-style-type: none"> Investigate the chemical and physical characteristics of water in <i>Is There Water On Zork?</i> activity from Project WET.
<i>Why is clean, available freshwater important to Michigan?</i>	Direct and indirect water uses; value of water to Michigan's environment and economy.	2. <i>How Do We Use Water?</i> Students identify the many ways we use water daily in all we do and all we consume. Students calculate their weekly water use and its cost compared to gasoline.	<ul style="list-style-type: none"> Compare Michigan water use to other countries http://www.wateryear2003.org Build pyramids of gallon jugs to display water use for different activities.
<i>Why are watersheds important?</i>	Watershed, runoff, surface water, groundwater, stream discharge	3. <i>Do You Know Where Your Watershed Is?</i> 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"> <i>Watershed Concept</i> online learning module: http://www.techalive.mtu.edu/meec_index.htm Lesson Extension <i>Investigating Streamflow in Michigan's Rivers</i> to graph real-time streamflow data http://nwis.waterdata.usgs.gov/mi/nwis/discharge Outline their watershed on a topographic map.
<i>How do different land uses affect water quantity & quality?</i>	Land uses, sources of pollutants, point and non-point source pollution.	4. <i>How Do Land Uses Affect Water Quality?</i> 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"> Explore EPA's <i>Surf Your Watershed</i> website. <i>Water Quality—Pollutant Sources & Impacts</i>: http://www.techalive.mtu.edu/meec_index.htm Identify contaminated sites in their watershed: http://www.deq.state.mi.us/part201ss/
<i>How can groundwater become polluted?</i>	Connection of groundwater and surface water; groundwater movement; sources of groundwater contamination.	5. <i>Why Care About Groundwater?</i> 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"> Conduct <i>The Fruitvale Story: Investigating Groundwater (SEUPUP kit)</i>. <i>Groundwater Supply</i> online learning module: http://www.techalive.mtu.edu/meec_index.htm <i>Groundwater Contamination</i> online module: http://www.techalive.mtu.edu/meec_index.htm
<i>How do we know if water is clean?</i>	Water quality standards; drinking water protection; history of water quality protection.	6. <i>Would You Drink This Water?</i> Students consider whether the 'look' and 'smell' of water is enough to indicate its quality; conduct a serial dilution to observe the tiny quantities that can be harmful to humans and aquatic organisms; and become familiar with who protects Michigan's water quality.	<ul style="list-style-type: none"> Explore quality of public drinking water: http://www.epa.gov/safewater/dwinfo/mi.htm <i>Water Quality Problems Can Be Solved—At a Cost</i> http://www.techalive.mtu.edu/meec_index.htm <p>♦ Investigate need for drinking water protection with <i>Poison Pump</i> activity in Project WET.</p>
<i>How do you know if a stream is healthy?</i>	Stream health: water quality, bio-assessment, physical measurements, habitat quality.	7. <i>How Healthy Is This Stream?</i> Students identify characteristics of healthy streams; use real Michigan data to select the best stream for brook trout.	<ul style="list-style-type: none"> Conduct assessment of local stream. <i>Stream Monitoring</i> online learning module: http://www.techalive.mtu.edu/meec_index.htm Explore cumulative impacts of nonpoint source pollution in <i>Sum of the Parts</i> activity in Project WET.
<i>How does storm water runoff impact rivers, and the Great Lakes?</i>	Sources of storm water pollutants, strategies to reduce runoff and improve water quality.	8. <i>Can We Stop Storm Water?</i> Identify pollutants in storm water and BMPs to reduce impacts; compare land use changes with aerial photos.	<ul style="list-style-type: none"> Conduct storm drain stenciling in their community. Test water quality of storm water. Estimate storm water running off their school

<i>What can I do to help the Great Lakes?</i>	Bioaccumulation in the Great Lakes food web; stewardship of Michigan's water resources	9. Bioaccumulation and the Great Lakes Ecosystem Investigate bioaccumulation of contaminants in Great Lakes food chains and other concerns; answer 'How can I help?'"	site. <ul style="list-style-type: none"> Investigate Great Lakes issues: beach closures, export of Great Lakes water, invasive species, wet-land loss, emerging contaminants, land use, declining biodiversity, and more.
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