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

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<th>Essential Question</th>
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<td>How much water is available for human use?</td>
<td>Water cycle processes; distribution of water on Earth.</td>
<td>1. <em>Where Is All the Water in the World?</em> 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.</td>
<td>• Investigate the chemical and physical characteristics of water in Is There Water On Zork? activity from Project WET.</td>
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| Why is clean, available freshwater important to Michigan? | Direct and indirect water uses; value of water to Michigan’s environment and economy. | 2. *How Do We Use Water?* 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. | • Compare Michigan water use to other countries [http://www.wateryear2003.org](http://www.wateryear2003.org)  
  • Build pyramids of gallon jugs to display water use for different activities. |
| Why are watersheds important?                           | Watershed, runoff, surface water, groundwater, stream discharge              | 3. *Do You Know Where Your Watershed Is?* 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 | • Watershed Concept online learning module: [http://www.techalive.mtu.edu/meec_index.htm](http://www.techalive.mtu.edu/meec_index.htm)  
  • Outline their watershed on a topographic map. |
| How do different land uses affect water quantity & quality? | Land uses, sources of pollutants, point and non-point source pollution.     | 4. *How Do Land Uses Affect Water Quality?* 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. | • Explore EPA’s Surf Your Watershed website.  
  • Water Quality—Pollutant Sources & Impacts: [http://www.techalive.mtu.edu/meec_index.htm](http://www.techalive.mtu.edu/meec_index.htm)  
  • Identify contaminated sites in their watershed: [http://www.deq.state.mi.us/part201ss/](http://www.deq.state.mi.us/part201ss/) |
| How can groundwater become polluted                      | Connection of groundwater and surface water; groundwater movement; sources of groundwater contamination. | 5. *Why Care About Groundwater?* 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. | • Conduct The Fruitvale Story: Investigating Groundwater (SEPUP kit).  
  • Groundwater Supply online learning module: [http://www.techalive.mtu.edu/meec_index.htm](http://www.techalive.mtu.edu/meec_index.htm)  
  • Groundwater Contamination online module: [http://www.techalive.mtu.edu/meec_index.htm](http://www.techalive.mtu.edu/meec_index.htm) |
| How do we know if water is clean?                        | Water quality standards; drinking water protection; history of water quality protection. | 6. *Would You Drink This Water?* 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. | • Explore quality of public drinking water: [http://www.epa.gov/safewater/dwinfo/mi.htm](http://www.epa.gov/safewater/dwinfo/mi.htm)  
  • Water Quality Problems Can Be Solved—At a Cost [http://www.techalive.mtu.edu/meec_index.htm](http://www.techalive.mtu.edu/meec_index.htm)  
  • Investigate need for drinking water protection with Poison Pump activity in Project WET. |
| How do you know if a stream is healthy?                 | Stream health: water quality, bio-assessment, physical measurements, habitat quality. | 7. *How Healthy Is This Stream?* Students identify characteristics of healthy streams; use real Michigan data to select the best stream for brook trout. | • Conduct assessment of local stream.  
  • Stream Monitoring online learning module: [http://www.techalive.mtu.edu/meec_index.htm](http://www.techalive.mtu.edu/meec_index.htm)  
  • Explore cumulative impacts of nonpoint source pollution in Sum of the Parts activity in Project WET. |
| How does storm water runoff impact rivers, and the Great Lakes? | Sources of storm water pollutants, strategies to reduce runoff and improve water quality. | 8. *Can We Stop Storm Water?* Identify pollutants in storm water and BMPs to reduce impacts; compare land use changes with aerial photos. | • Conduct storm drain stenciling in their community.  
  • Test water quality of storm water.  
  • Estimate storm water running off their school |

Unit Writer: Joan Schumaker Chadde, Western Upper Peninsula Center for Science, Mathematics and Environmental Education; jchadde@mtu.edu or 906-487-3341.
| What can I do to help the Great Lakes? | 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?" | • 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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