

# Aquatic Ecology Learning Objectives and Resources

1. Identify the processes and phases for each part of the water cycle.
  - ◆ *The Hydrologic Cycle*  
<http://ww2010.atmos.uiuc.edu/%28Gh%29/guides/mtr/hyd/smry.rxml.e.jpg>
  - ◆ *What is the Water Cycle?* – U.S. Geological Survey  
<http://ga.water.usgs.gov/edu/watercyclehi.html>  
Click on glossary terms in the “A quick summary of the water cycle” section to learn about each component of the hydrologic cycle.
2. Describe the chemical and physical properties of water and explain their importance for freshwater and saltwater ecosystems.
  - ◆ *Water Properties* – U.S. Geological Survey  
<http://ga.water.usgs.gov/edu/waterproperties.html>
3. Analyze the interaction of competing uses of water supply: hydropower, navigation, wildlife, recreation, waste assimilation, irrigation, industry, and others.
  - ◆ *Water Use in the United States* – U.S. Geological Survey  
<http://ga.water.usgs.gov/edu/wateruse.html>  
Click on each of the competing water uses to learn more about each of them.
4. Discuss methods of conserving water and reducing point and non-point source pollution. Water
  - ◆ *Cleaner Water Through Conservation* – U.S. EPA  
<http://www.epa.gov/region6/6wq/waterconserv/index.htm>
  - ◆ *The Art of Watershed Management Michigan DEQ*  
[http://www.michigan.gov/documents/deq/wb-nps-art-of-watershed-management\\_250576\\_7.pdf](http://www.michigan.gov/documents/deq/wb-nps-art-of-watershed-management_250576_7.pdf)
  - ◆ *Michigan Department of Environmental Quality NPS main page*  
[http://www.michigan.gov/deq/0,4561,7-135-3313\\_3682\\_3714-106374--,00.html](http://www.michigan.gov/deq/0,4561,7-135-3313_3682_3714-106374--,00.html)
  - ◆ *Understanding Water Quality Glossary of Terms*  
<http://water.usgs.gov/edu/dictionary.html>
  - ◆ *Stormwater Educational Handbook*  
<http://scholarworks.gvsu.edu/cgi/viewcontent.cgi?article=1005&context=egmo>
  - ◆ *Brown Water, Green Weeds* – MDEQ  
[http://www.michigan.gov/documents/deq/wb-nps-brown-water-green-weeds\\_250578\\_7.pdf](http://www.michigan.gov/documents/deq/wb-nps-brown-water-green-weeds_250578_7.pdf)
  - ◆ *Landscaping for Water Quality*  
[http://www.michigan.gov/documents/deq/wrd-nps-landscape4wq\\_401217\\_7.pdf](http://www.michigan.gov/documents/deq/wrd-nps-landscape4wq_401217_7.pdf)
  - ◆ *Getting to Know Your Local Watershed: A Guide for Watershed Partnerships* – Conservation Technology Information Center (CTIC)  
<http://www.ctic.purdue.edu/media/files/Getting%20To%20Know%20Your%20Local%20Watershed.pdf>
  - ◆ *Reflecting on Lakes: A Guide for Watershed Partnerships* - Conservation Technology Information Center (CTIC)  
<http://www.ctic.purdue.edu/media/files/Reflecting%20on%20Lakes.pdf>

- ◆ *Working Trees for Water Quality* – USDA  
<http://nac.unl.edu/documents/workingtrees/brochures/wtwq.pdf>.
  - ◆ *Water Quality Best Management Practices on Forest Lands* – MSU Extension  
<http://web2.msue.msu.edu/bulletins/Bulletin/PDF/E2770.pdf>
5. Identify common aquatic organisms through the use of the key.
- ◆ Macroinvertebrates as Bioindicators of Stream Health  
<http://wupcenter.mtu.edu/education/stream/Macroinvertebrate.pdf>
  - ◆ *Stream Insects & Crustaceans*  
[http://www.virginia.edu/blandy/blandy\\_web/education/Bay/MacroinvertebrateIDCard.pdf](http://www.virginia.edu/blandy/blandy_web/education/Bay/MacroinvertebrateIDCard.pdf)
  - ◆ *Key to Macroinvertebrate Life in the River & Key to Macroinvertebrate Life in the Pond* – University of Wisconsin Extension  
<http://watermonitoring.uwex.edu/pdf/level1/pondkey.pdf>
  - ◆ *Guide to Freshwater Macroinvertebrates - Stroud*  
[http://www.stroudcenter.org/education/MacroKey\\_Complete.pdf](http://www.stroudcenter.org/education/MacroKey_Complete.pdf)
6. Delineate the watershed boundary for a small water body.
- ◆ *An introduction to Michigan Watersheds – MI Seagrant*  
<http://www.miseagrant.umich.edu/downloads/education/11-405-Watershed-Teaching-Guide-rev-2012.pdf>
7. Be able to explain the different types of aquifers and how each type relates to water quality and quantity.
- ◆ *Groundwater & Surface Water: Understanding the Interaction*  
<http://www.ctic.purdue.edu/media/files/Ground%20Water%20and%20Surface%20Water.pdf>
  - ◆ *Groundwater basics – the Groundwater Foundation*  
<http://www.groundwater.org/get-informed/basics/groundwater.html> *Groundwater*
  - ◆ Groundwater Myths and Facts  
<http://cseo.mtu.edu/community/groundwater/GWmyths.htm>
  - ◆ *Groundwater utilization and Sustainability*  
<http://groundwater.sdsu.edu/>
  - ◆ *Groundwater Contamination* – MSU Extension  
<http://web2.msue.msu.edu/bulletins/Bulletin/PDF/WQ34.pdf>
8. Briefly describe the benefits of wetlands, both their function and value.
- ◆ *Wetlands Overview* – U.S. EPA  
<http://water.epa.gov/type/wetlands/outreach/upload/overview.pdf>
  - ◆ *Types of Wetlands* – U.S. EPA  
<http://water.epa.gov/type/wetlands/outreach/upload/types.pdf>
  - ◆ *Threats to Wetlands* – U.S. EPA  
<http://water.epa.gov/type/wetlands/outreach/upload/threats.pdf>
  - ◆ *Functions & Values of Wetlands* – U.S. EPA  
<http://water.epa.gov/type/wetlands/outreach/upload/functions-values.pdf>
  - ◆ *Economic Benefits of Wetlands* – U.S. EPA  
<http://water.epa.gov/type/wetlands/outreach/upload/EconomicBenefits.pdf>
9. Know methods used to assess and manage aquatic environments and utilize water quality

information to assess the general water quality of a given body of water (includes sampling techniques, water quality parameters used to monitor point and non-point source pollution).

- ◆ *Key Water Quality Indicators* – Rice University  
<http://www.rice.edu/armadillo/Galveston/Chap6/water.quality.indicator.html>
- ◆ *Field guide to Waterway Observations & Waterways Watch Guide*  
Volunteer Stream Monitoring: A Methods Manual  
<http://www.epa.gov/owow/monitoring/volunteer/stream/stream.pdf>

10. Be familiar with major methods and laws used to protect water quality (surface and ground water) and utilize this information to make management decisions to improve the quality of water in a given situation.

- ◆ *Clean Water Act* – U.S. EPA  
<http://www2.epa.gov/laws-regulations/summary-clean-water-act>

### **Additional Internet Resources for Aquatic Ecology**

*USGS – The Water Science School*

<http://water.usgs.gov/edu/mwater.html>

*Surf Your Watershed* – U.S. Environmental Protection Agency

<http://cfpub.epa.gov/surf/locate/index.cfm>

*Groundwater Aquifers* – U.S. Geological Survey

<http://ga.water.usgs.gov/edu/earthgwaquifer.html>