

AQUATIC ECOLOGY CURRICULUM

Aquatic Ecology Key Points

- 1A Identify the processes and phases for each part of the water cycle.
- 2A Describe the chemical and physical properties of water and explain their implications for freshwater and saltwater ecosystems.
- 3A Analyze the interaction of competing uses of water for water supply, hydropower, navigation, wildlife, recreation, waste assimilation, irrigation, industry, and others.
- 4 A Discuss methods of conserving water and reducing point and non-point source pollution.
- 5A Identify common aquatic organisms through the use of a key.
- 6A Delineate the watershed boundary for a small water body.
- 7A Explain the different types of aquifers and how each type relates to water quantity and quality.
- 8A Briefly describe the benefits of wetlands, including both function and value.
- 9A Describe the benefits of riparian areas, including both function and value.
- 10A Describe the changes to the aquatic ecosystem based on alteration to the aquatic habitat.
- 11A Know methods used to assess and manage aquatic environments and be able to utilize water quality information to assess the general water quality of a specific body of water. This includes sampling, technique, and water quality parameters used to monitor point and non-point source pollution.
- 12A Be familiar with major methods and laws used to protect water quality (i.e., both surface and ground water) and utilize this information to make management decisions to improve the quality of water in a given situation.

Suggested Core Activities

- Students should create a model of the hydrologic cycle, and demonstrate how the cycle works by making a terrarium, recording their observations, and analyzing their data. (1A)
- Students should diagram an educational display which describes the chemical and physical properties of water, and explains their implications for freshwater and saltwater ecosystems. (2A)
- Using maps of Canada and the United States, students should show comparisons between the two countries in their top seven competing uses of water. Students should then divide into teams and debate methods of conserving water and reducing pollution. (3A, 4 A)
- Students should use an aquatic dip net to collect aquatic organisms and then use a key to identify them. The students will use binocular microscopes to identify the smallest organisms and make identification tubes for future study. (5A)

- Students should delineate the watershed boundary for a small body of water in their local area. They will then describe and list the benefits of wetlands, and riparian areas. (6A, 8A, 9A)
- Students should create a presentation display showing a below ground view of the different types of aquifers, and how each type relates to water quantity and quality. (7A)
- Students should describe how biological, chemical, and physical changes to the aquatic habitat can affect the aquatic ecosystem by making a power point presentation. (10A)
- Using a commercial test kit, students should compare local water sources for pH, dissolved oxygen, temperature, and turbidity. They should then analyze their data to determine which sources are healthy for fish and wildlife. (11A)
- Large amounts of algae bloom have been discovered in a local lake. Students should site the laws used to protect the lake's water quality, and recommend management decisions to improve the problem. (12A)

Top Resources

- Environment Canada The Hydrologic Cycle. Excellent graphics and lessons.
http://www.ec.gc.ca/water/en/info/pubs/Intwfg/e_chap1b.htm (1A)
- Water Cycle Detailed graphics and information.
<http://ga.water.usgs.gov/edu/watercycle.html> (1A)
- USGS Physical and Chemical Properties of Water
<http://ga.water.usgs.gov/edu/waterproperties.html> (2A)
- Water Use Canada
http://www.ec.gc.ca/water/en/manage/use/e_use.htm (3A)
- Water Use USA
<http://ga.water.usgs.gov/edu/wateruse.html> (3A)
- Canada Water Efficiency and Conservation
http://www.ec.gc.ca/water/en/manage/effic/e_weff.htm (4A)
- USA Water Pollution
<http://www.epa.gov/ebtpages/watewaterpollution.html> (4A)
- Canada Water Pollution
http://www.ec.gc.ca/water/en/manage/poll/e_poll.htm (4A)
- Benthic Macro-invertebrates in Our Water

<http://www.epa.gov/bioindicators/html/benthosclean.html> (5A)

- Locate Your Watershed USA
<http://cfpub.epa.gov/surf/locate/index.cfm> (6A)
 - Locate Your Watershed Canada
<http://atlas.gc.ca/site/english/maps/freshwater/distribution/drainage> (6A)
 - Globe Hydrology
<http://www.globe.gov/sda/tg/globetg.html> (ALL)
 - Groundwater Aquifers
<http://ga.water.usgs.gov/edu/earthgwaquifer.html> (7A)
 - Wetlands
<http://www.on.ec.gc.ca/wildlife/wetlands/aboutwetlands-e.cfm> (8A)
 - Riparian Benefits
http://www.on.ec.gc.ca/wildlife/factsheets/fs_habitat-e.html#riparian (9A)
 - Aquatic Ecosystem Perspective
http://www.ec.gc.ca/water/en/info/pubs/primer/e_prim05.htm#a2 (10A)
 - Common Water Measurements
<http://ga.water.usgs.gov/edu/characteristics.html> (11A)
 - Water Policy and Legislation Canada
http://www.ec.gc.ca/water/en/policy/e_policy.htm (12A)
 - Clean Water Act
<http://www.epa.gov/r5water/cwa.htm> (12A)
- <http://epa.gov/indicators/roe/html/roeWaterW.htm> (12A)

Aquatic Ecology Extended Studies

Students should study the maps and information of Duffins Creek watershed and explain how 18 guidelines can be used for land use planning and conservation practices to lower the impacts of urbanization.

http://www.on.ec.gc.ca/wildlife/factsheets/fs_habitat-e.html#case1 (3A, 4A, 6A, 7A, 8A, 9A, 10A, 11A, 12A)

Students should create an educational display featuring the nine major threats to our oceans, and possible solutions for each threat.

http://www.pewoceans.org/oceans/oceans_pollution.asp (2A, 3A, 4A, 10A, 11A, 12A)

Students should measure the stream flow of two creeks in their local area, and determine the discharge volume of water in different seasons.

<http://ga.water.usgs.gov/edu/measureflow.html> (2A, 11A)

Students should create a chart that outlines how climate change might affect the regional water supply resources in their area.

http://www.ec.gc.ca/water/en/info/pubs/primer/e_prim01.htm#a4 (1A, 2A, 10A, 11A,)

Additional Resources

A complete glossary of aquatic terms can be accessed at:

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

Canadian Water Resources Association

http://www.cwra.org/Resource_Centre/resource_centre.html

Developing Successful Runoff Control Programs

<http://www.epa.gov/OWOW/NPS/facts/point7.htm>

Source Water Protection

<http://www.epa.gov/safewater/protect.html>

Ordinances and Supporting Materials

<http://www.epa.gov/nps/ordinance/osm7.htm>

The Hydrologic Cycle and Human Use

http://wps.prenhall.com/esm_wright_envisci_8/0,8543,1052341-,00.html

National Renewable Energy Laboratory

<http://www.nrel.gov/>

Water Quality Canada

http://www.ec.gc.ca/water_e.html

Water Policy and Legislation Canada

http://www.ec.gc.ca/water/en/policy/e_policy.htm

Clean Water Act

<http://www.epa.gov/r5water/cwa.htm>

U.S. Dept. of Energy

<http://www.eere.energy.gov/>

This document was created with Win2PDF available at <http://www.win2pdf.com>.
The unregistered version of Win2PDF is for evaluation or non-commercial use only.
This page will not be added after purchasing Win2PDF.