

Water SOL and Other Curriculum Materials

CURRICULUM MATERIALS AVAILABLE FOR TEACHING ABOUT WATER

Many curriculum materials are available to help teachers as they teach about water, aquatic ecosystems, water pollution, and the Standards of Learning that focus on water topics. Here, we have listed several of the most important curriculum resources available for teachers along with some correlations to water. Information about these and other resources can also be found in the Resources appendix.

Also, be sure to call your nearest regional office of state agencies to learn if they have curriculum materials that are of interest to you. Some of the state agencies that offer curriculum materials are Soil and Water Conservation Districts, state parks, the Department of Conservation and Recreation, the Department of Forestry, and the Department of Game and Inland Fisheries. Providing education is an important function for many state employees. To find contact information for different agencies, see the "Yellow Pages" that were compiled by the Virginia Department of Conservation and Recreation (www.dcr.state.va.us/sw/wsheds.htm#contacts).

BRIDGE – OCEAN SCIENCES TEACHER RESOURCE CENTER

Web site: www.vims.edu/bridge

This comprehensive site offers marine education resources including lesson plans by grade level, data, literature, and national and regional projects. Site sponsors: The Virginia Institute of Marine Science, The National Sea Grant Office, the National Oceanographic Partnership Program, and the National Marine Educators Association.

CHESAPEAKE CLASSROOMS

Web site: www.cbf.org/site/PageServer?pagename=edu_educators_ChESApeakeClassrooms_homepage

The Chesapeake Bay Foundation (CBF) and the National Geographic Society sponsor this program, which provides professional development and materials for interested teachers to implement multi-week units over the course of the year, focused on the local watershed environment. Chesapeake Classrooms will help increase students' environmental literacy, stewardship, and engagement in the learning process.

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CHESIE AND CHESAPEAKE BAY PROGRAM

Web site: *www.bayeducation.net*

This site provides links to teaching resources, professional development, Bay-related information, and resources for teachers to incorporate into their curricula. Also includes Bay data.

EARTH FORCE GREEN - GLOBAL RIVERS ENVIRONMENTAL EDUCATION NETWORK

Web site: *www.green.org*

The GREEN website is designed to give water monitors and students a place to store water monitoring data and to allow students to view data and compare their work to the work of others. It has many resources that will be invaluable for teachers planning a school-based water-monitoring program.

ENVIROTHON

Web site: *www.envirothon.org* and
*www.ext.vt.edu/resources/4h/environment/
envirothon*

Envirothon is North America's largest natural resources competition for secondary students. Teams of five students compete in five areas: soils, forestry, aquatics, wildlife, and a current environmental issue. In Virginia, the Virginia Association of Soil and Water Conservation Districts coordinates Envirothon with the help of many sponsors.

GIVE WATER A HAND

Web site: *www.uwex.edu/erc/gwah*

A national watershed education program designed to involve young people in local environmental service projects. A program of the University of Wisconsin – Environmental Resources Center.

GLOBE

Web site: *www.globe.gov*

GLOBE (Global Learning and Observations to Benefit the Environment) is a hands-on international environmental science and education program. The principle behind GLOBE is that students can use established protocols to gather high quality data at local sites and then share the data using the Internet. The GLOBE program coordinates data collection for the atmosphere and climate, land cover and biology, and soils, as well as hydrology. Data from individual schools are collected in a central data processing facility as part of a larger pool of data. The large GLOBE data archive is available for students to use to analyze and compare data collected at different locations and at different times. (See our Comparing Water Quality Data lesson in this packet.) Students at schools that have qualified as GLOBE partners can report data to the archive and enter into various collaborations with other schools and scientists. This includes receiving feedback from mentoring scientists about the meaning and value of

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their data sets. Students at schools that are not GLOBE partners cannot participate fully, but they can still access and analyze data from the GLOBE web site.

To become a GLOBE partner, at least one teacher from the school must be trained in the GLOBE science measurement protocols and education activities by attending a GLOBE Teacher Workshop.

HEALTHY WATER, HEALTHY PEOPLE

Web site: <http://www.healthywater.org>

This water quality education program is sponsored by Project WET (www.projectwet.org) and the Hach Scientific Foundation. The program offers hands-on activity guides, testing kits, networking/training opportunities and extensive online resources. The activity guide features classroom lessons with test kit extensions that can be used to prepare students to conduct meaningful field investigations.

Healthy Water, Healthy People materials can be ordered online by anyone interested in teaching about water quality.

LOVE-A-TREE

Web site: <http://loveatree.com>

Love-A-Tree is an environmental education program developed by International Paper to raise awareness of natural systems and promote environmental stewardship by providing resources for teachers and a fun educational

site for students. International Paper has collaborated with the Virginia Department of Environmental Quality to make Love-A-Tree materials available to classrooms across the Commonwealth. Activities and lesson plans are available on the “Downloadable Activities” section of the web site.

NATIONAL OCEAN SCIENCES BOWL

Web site: www.vims.edu/bcb

This is an annual national secondary level student academic competition. Teams of high school students are questioned on the biology, physics, geology, and chemistry of the oceans, as well as related geography, technology, history, and current events. At the Blue Crab Bowl, Virginia’s oceanic knowledge championship, some of Virginia’s best science students match wits. The winning team travels to represent Virginia in a national competition with teams from other states.

POLLUTION SOLUTIONS: LITTER PREVENTION ACTIVITIES FOR VIRGINIA TEACHERS

Web site: www.deq.state.va.us/education/polsul

This on-line curriculum supplement focuses on litter and pollution prevention. Lessons include “Litter-Less Lunch” and “How Long Will It Be There?” It is based on the Virginia Standards of Learning for grades K–12.

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PROJECT LEARNING TREE

Web site: www.plt.org

Project Learning Tree (PLT) is an internationally acclaimed environmental education program that uses trees and the environment as a window to the world. It is offered through the Virginia Department of Forestry. The PLT curriculum includes 96 hands-on activities for K–12 educators, plus special high school modules, multimedia, and funding for special projects. Educators who receive PLT training can then receive activity guides, a quarterly newsletter, awards, and recognition. They join a large family of educators from across the state and nation. PLT activities have been correlated with the Virginia SOL (www.plt.org/curriculum/virginia.cfm).

PROJECT UNDERGROUND

Web site: www.caves.org/committee/projectunderground and www.dcr.state.va.us/underground.htm

The Virginia Department of Conservation and Recreation sponsors Project Underground, an environmental education program designed to promote better understanding of caves and Karst lands. The purpose of Project Underground is to create and build awareness of and responsible attitudes toward Karst and cave resources and their management needs. It is a supplemental program for use by K-12 educators. During Project Underground

workshops, teachers participate in hands-on, interactive activities, learning more about the geology and hydrology of caves, Karst ecology, historical uses of caves, and the biodiversity of Virginia's Karst lands (including bat, salamander, insect, spider, millipede, and crustacean species).

PROJECT WET

Web site: www.projectwet.org

Project WET is a nationally developed, supplementary water education program for educators. The program includes activities addressing atmospheric water, surface water, groundwater, cultural, and historical uses of water, and contemporary water management issues such as nonpoint source pollution. Professionally developed teaching aids are hands-on, self-contained, and user-friendly. In Virginia, Project WET is sponsored by the Department of Environmental Quality, in conjunction with the Department of Conservation and Recreation and the Department of Game and Inland Fisheries.

Project WET activities have been correlated with the Virginia SOL (www.deq.state.va.us/education/wetinfo.html).

PROJECT WILD AND PROJECT WILD AQUATIC

Web site: www.projectwild.org and www.dgif.state.va.us/education/wildlife_

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education.html

Project WILD is a national K-12 wildlife education program. Two Activity Guides, an Introductory Guide and an Aquatic Guide, provide educators with materials needed to teach wildlife conservation and the importance of habitat. Six-hour in-service workshops can be scheduled in Virginia, usually by local school systems. The Department of Game & Inland Fisheries and the VA Division of the Izaak Walton League provide the workshops. Project WILD Aquatic activities and other Project WILD activities have been correlated with the Virginia SOL at the web site of the Virginia Department of Game and Inland Fisheries (www.dgif.state.va.us/education/proj_wild_sol_science.html).

THE GLOBAL WATER SAMPLING PROJECT: AN INVESTIGATION OF WATER QUALITY

Web site: www.ciese.org/curriculum/water-proj/index.shtml

This is a collaborative project opportunity for students. Students complete a relatively short-term water-monitoring project, and share data online. This project is designed as a one-time experience for students, unlike GLOBE, which is intended for schools planning ongoing participation. All students are welcome to participate, however, it is recommended for high school students due to the nature of the tests required for the project. This is a project of the Center for Improved

Engineering and Science Education (CIESE) located at Stevens Institute of Technology. CIESE also offers several other online collaborative projects for students of different ages (www.ciese.org).

THE WATER WIZARD VAN

Web site: www.ext.vt.edu/resources/4h/wizard

The Water Wizard Van is a stand-alone, interactive, educational exhibit that can be used at any public event or gathering. It teaches people how to protect and conserve their water resources. The van is sponsored by the Virginia office of the Natural Resource and Conservation Service (NRCS), and is housed and operated at Virginia's six 4-H Educational Centers.

VIRGINIA DEPARTMENT OF FORESTRY

Web site: www.dof.state.va.us/coned/index.shtml

The Virginia Department of Forestry (DOF) offers a wealth of resources for teachers, including Project Learning Tree (described elsewhere), forest stewardship programs, activity guides on preventing pollution and forest fires, and more. DOF offers the "Virtual Tour of the Forest" CD with accompanying Teachers Guide. In this exciting tour, students can take a walk through different types of forest and discover many fascinating aspects of nature.

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VIRGINIA DEPARTMENT OF GAME AND INLAND FISHERIES

Web site: www.dgif.state.va.us

In addition to Project WILD (described above), the Virginia Department of Game and Inland Fisheries also offers other educational materials and in-depth information about Virginia's animals.

VIRGINIA DEPARTMENT OF MINES, MINERALS, AND ENERGY

Web site: www.mme.state.va.us/dmr/FAQ/Materials/educmtls.htm

The Virginia Division of Mineral Resources offers education materials including a set of 4 CD-ROMS with Teacher Workbooks: Introduction to Virginia Geology; Geology of the Coastal Plain; Geology of the Piedmont and Blue Ridge; Valley and Ridge and Appalachian Plateaus.

VIRGINIA INSTITUTE OF MARINE SCIENCE

Web site: www.vims.edu

The VIMS web site includes web pages for the VIMS Virtual Marine Education Center (www.vims.edu/k-12), and the Bridge – Ocean Sciences Education Teacher Resource Center (www.vims.edu/bridge) discussed above.

VIRGINIA SAVE OUR STREAMS (SOS)

Web site: www.sosva.com

Virginia SOS leads the way in teaching about water quality monitoring by using aquatic invertebrates as indicators. The SOS method

has trained volunteers collect the insect larvae and other “critters” that live in a stream, then determine the quality of the water based on the animals that live there. SOS' goal is to ensure that future generations inherit improved and protected streams, rivers, and estuaries across Virginia. While training volunteers to conduct water quality monitoring is their priority activity, they also work with schools and teachers.

VIRGINIA'S NATURAL RESOURCES EDUCATION GUIDE

Web site: www.vanaturally.com/guide.html

Information, activities, and resources for elementary teachers. Subjects covered include Air, Agriculture, Chesapeake Bay, Forests, Minerals & Energy, Soil, Water, and Wildlife. You'll find great background information, illustrative graphics and engaging activities for K-6.

WAVE (WATERSHED ACTION FOR VIRGINIA'S ENVIRONMENT)

Web site: www.cbf.org/site/PageServer?pagename=edu_educators_curriculum_va_index

The Chesapeake Bay Foundation has created this curriculum unit supporting Virginia's middle school SOL. WAVE introduces students to the Chesapeake Bay watershed, its Virginia tributaries, and the biggest issues facing water quality and fisheries in the Commonwealth. To find out more about WAVE, visit the Chesapeake Bay Foundation website, or call 804-780-1392.

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SOL RESOURCES

Many of the curriculum resources for teaching about water that are listed in this section have already correlated their individual activities to the Virginia Standards of Learning. The Virginia Department of Education also has collected a wide variety of resource information to support the teaching of the SOL, and these resources can be accessed through the Department of Education web pages (www.pen.k12.va.us). Some specific links to this information are listed in this box.

Most of the Department of Education resource information is provided sorted by grade level. The different SOL relating to water resources were listed and discussed earlier in this curriculum packet in our initial Introduction section and also in the introductory chapter to each of the main packet sections. We have chosen to group the Science SOL for water into the following categories. DOE resource information can be located in their web pages by selecting for the desired grade levels.

Resources – K.10, 1.8, 3.10, 4.8, 6.9

Earth Science & Environmental Science – 3.9, 5.6, 6.5, ES.7, ES.9, ES.11

Life Science & Biology – 3.6, 6.7, LS.7, LS.11, LS.12, BIO.9

SCIENCE STANDARDS OF LEARNING TEACHER RESOURCE GUIDE

Web site: www.pen.k12.va.us/VDOE/Instruction/sci_resource.html

The teacher resource guides for the Science SOL delineate the essential knowledge, skills, and processes required by the different groups of SOL.

SCIENCE STANDARDS OF LEARNING SAMPLE SCOPE AND SEQUENCE GUIDE

Web site: www.pen.k12.va.us/VDOE/Instruction/solscope

Documents providing guidance on how essential knowledge, skills, and processes that are identified in the SOL and the SOL Teacher Resource Guide may be introduced to students in a logical, sequential, and meaningful manner. The scope and sequence documents for different groups of SOL include references to some of the available supporting resources.

EARTH SCIENCE RESOURCE WEB PAGE

Web site: <http://vtso.geol.vt.edu/vesr>

This resource page is a continuing project by the Department of Education in collaboration with the Virginia Tech Department of Geological Sciences.

COMMONWEALTH OF KNOWLEDGE

Web site: www.knowledge.state.va.us/welcome.htm

This site has information about the SOL, lesson plans by content area, and reference links. The site is maintained by the James Madison University (JMU) College of Education.

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SOL PRACTICE QUESTIONS

The Virginia Department of Education has provided information about SOL testing and sample questions for different SOL tests at their web site (www.pen.k12.va.us). Some specific links for SOL test information and practice questions are collected together in this box.

STANDARDS OF LEARNING TEST INFORMATION

www.pen.k12.va.us/VDOE/NewHome/soltestinfo

ORIGINAL SOL TEST BLUEPRINTS

www.pen.k12.va.us/VDOE/Assessment/soltests/home.html

1998 SAMPLE TEST ITEMS

www.pen.k12.va.us/VDOE/Assessment/samptests/solsamp.html

1998 RELEASED TEST ITEMS

www.pen.k12.va.us/VDOE/Assessment/releaseditems

2000 RELEASED TEST ITEMS

www.pen.k12.va.us/VDOE/Assessment/release2000

2002 RELEASED TEST ITEMS

www.pen.k12.va.us/VDOE/Assessment/Release2002